

| Item       | Impact   | Objectives  | Mitigation Task  | Responsibility   | Project Phase |   |   |
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| 3.09       | <b>Reduction in local biodiversity</b>   | Management of biodiversity during decommissioning   | <ul style="list-style-type: none"> <li>• A biodiversity assessment will be undertaken prior to decommissioning, to update the knowledge of site attributes and evaluate specific impact types (given the life span of the project is in the order of 30 years);</li> <li>• Relevant mitigation measures implemented during the construction phase to contain impacts will also be applied to decommissioning works;</li> <li>• New measures to avoid and mitigate impacts will be developed depending on the results of the assessment.</li> </ul>                   | Proponent in consultation with technical specialists   |               | ✓ | ✓ |
| <b>4.0</b> | <b>Indigenous Heritage</b>   |   |  |  |               |   |   |
| 4.01       | <b>Damage or disturbance to sites or items of Indigenous heritage significance</b> | Minimisation of potential impacts on sites or items of potential indigenous heritage significance             | <p>While no sites have been found to occur to date within the project area, the assessment of likely occurrence is moderate and as such, a strategy of avoidance of impacts will be adopted.</p> <p>In regard to the previously recorded Aboriginal objects identified in previous studies which are located within the study area, but outside areas of proposed impact, these areas will be avoided during construction, operation and decommissioning of the wind farm. Steps will be taken to ensure that inadvertent impacts to these locales do not occur.</p> | Proponent and contractor in consultation with technical specialists and the local Aboriginal Community | ✓             |   |   |
| 4.02       | <b>Damage or disturbance to sites or items of Indigenous heritage significance</b> | Minimisation of potential impacts on sites or items of potential indigenous heritage significance             | Ground disturbance impacts associated with the Proposal will be kept to a minimum and that areas of work will be defined so as to ensure as little impact as possible to objects of Aboriginal cultural and heritage value which may occur on site.  | Proponent and Contractor   | ✓             |   |   |
| 4.03       | <b>Damage or disturbance to sites or items of Indigenous heritage significance</b> | Assess the potential Indigenous heritage impacts in development areas which have not been previously assessed | Additional archaeological assessment will be conducted in any areas proposed to be disturbed which have not been surveyed during the assessment completed to date prior to work commencing.  | Proponent in consultation with Technical Specialists   | ✓             |   |   |

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| 4.04 | <b>Damage or disturbance to sites or items of Indigenous heritage significance</b> | Minimisation of potential impacts on sites or items of potential indigenous heritage significance | In consultation with an archaeologist, the relevant Aboriginal communities, an Indigenous Heritage Management Plan (IHMP) will be prepared as a component of the CHMP to document the procedures to be followed for impact avoidance or mitigation to ensure that all recorded Aboriginal objects identified in previous studies, which are located in the development envelope, but outside areas of proposed impact, are avoided during construction and operation of the wind farm.   | Proponent in consultation with Technical Specialists    | ✓             | ✓ |   |
| 4.05 | <b>Damage or disturb areas/items of Indigenous Heritage</b>                        | Management of undiscovered items of Aboriginal and/or archaeological significance                 | If during the course of the construction works any items of aboriginal cultural heritage or significance (i.e. archaeological items) are uncovered, works shall cease (within vicinity to the item) and DERM notified of the findings. An appropriate assessment and salvage strategy will be determined and implemented prior to the recommencement of construction works within the area.<br><br>Should human remains be found during the proposed earthworks works will cease and the police notified immediately.  | Contractor in consultation with the Proponent and DECCW | ✓             |   | ✓ |
| 4.06 | <b>Damage or disturb areas/items of Indigenous Heritage</b>                        | Management of Aboriginal Cultural Heritage  | Personnel involved in the construction management phases of the project will be trained in procedures to implement recommendations relating to cultural heritage where necessary.  | Proponent and Contractor                                | ✓             |   |   |
| 5.0  | <b>European Heritage</b>   |   |  |   |               |   |   |
| 4.07 | <b>Damage or disturb areas/items potentially involving unexploded Ordnance</b>     | Management of European History (specifically World War II)  | <ul style="list-style-type: none"> <li>• Prior to construction, undertake an investigation of presence of unexploded ordnance within the project site in accordance with Department of Defence and DERM requirements;</li> <li>• Undertake remediation measures in accordance with findings of the investigation report;</li> <li>• Personnel involved in the construction phase of the project will be trained in appropriate procedures to report findings of UXO which include: <ul style="list-style-type: none"> <li>• Ensuring the object is left in situ;</li> <li>• Marking the general area to ensure no further disturbance can occur;</li> <li>• Note appearance, dimensions and location of object;</li> <li>• Notify the police immediately.</li> </ul> </li> </ul> | Proponent and Contractor                                | ✓             |   |   |

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|             | <b>Damage or disturbance to sites and areas of European Cultural Heritage</b>                          | Minimisation of potential impacts on sites or items of potential european heritage significance               | Ground disturbance impacts associated with the proposal will be kept to a minimum and that areas of work will be defined so as to ensure as little impact as possible to objects of European cultural and heritage value which may occur on site.   | Proponent and Contractor   | ✓             |   |   |
|             | <b>Damage or disturbance to sites or items of European heritage significance</b>                       | Assess the potential Indigenous heritage impacts in development areas which have not been previously assessed | Additional archaeological assessment will be conducted in any areas proposed to be disturbed which have not been surveyed during the assessment completed to date prior to work commencing.   | Proponent in consultation with Technical Specialists                         | ✓             |   |   |
|             | <b>Damage or disturbance to sites or items of European heritage significance</b>                       | Minimisation of potential impacts on sites or items of potential indigenous heritage significance             | Prepare CHMP to document the procedures to be followed for impact avoidance or mitigation to ensure that European objects found during investigations are avoided during construction and operation of the wind farm.   | Proponent in consultation with Technical Specialists                         | ✓             | ✓ |   |
|             | <b>Damage or disturb areas/items of European Heritage</b>  | Management of undiscovered European Cultural Heritage   | If during the course of the construction works any items of European cultural heritage or significance (i.e. archaeological items) are uncovered, works shall cease (within vicinity to the item) and DERM notified of the findings. An appropriate assessment and salvage strategy will be determined and implemented prior to the recommencement of construction works within the area.                     |  | ✓             |   |   |
| <b>5.0</b>  | <b>Traffic and Transport</b>   |   |   |  |               |   |   |
| <b>5.01</b> | <b>Adverse impact on local and regional traffic during the construction and decommissioning phases</b> | Minimisation of impact to local and regional traffic  | <ul style="list-style-type: none"> <li>Large oversize materials will be transported overnight to reduce impacts on road network (subject to DTMR approval);</li> <li>No oversize or large trucks associated with the construction will operate on the Kennedy Highway or Channel/Springmount Roads during the school bus hours of 7:30am and 8:50am, and between 3:20pm and 4:30pm on school days;</li> </ul> | Contractor in consultation with Traffic Management Specialists, RTA and ULSC | ✓             |   | ✓ |

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|      |  |  | <ul style="list-style-type: none"> <li>Once more detail is known about the exact type of transport vehicles and routing for the delivery of turbine components to site, more detailed swept path analysis will be undertaken along the truck route to identify any road widening and road furniture relocation works that may be required.</li> </ul>   |                        |               |   |   |
| 5.02 | <b>Traffic safety risks from construction vehicles</b> | Minimise traffic safety risks from movement of construction vehicles | <ul style="list-style-type: none"> <li>Upgrade Kippin Drive and Springmount Road intersection, to accommodate oversize vehicles during the construction phase;</li> <li>Upgrade of Kippin Drive to a standard required to accommodate expected vehicle types;</li> <li>Traffic controllers on Kippin Drive and Springmount/Channel Road intersection will be provided to help assist large trucks exiting the site and manage any safety risks. Advance warning signs will be placed on each approach, 200 metres from the access road with "Prepare to stop" warnings when traffic controllers are present;</li> <li>A relatively significant increase of traffic volume on Kippin Drive, Channel and Springmount Roads could increase the risk of accidents with vehicles. Therefore, lower speed limits will be enforced on Springmount and Channel Roads and internal access roads at all times during construction.</li> </ul> | Contractor             | ✓             |   |   |
| 5.03 | <b>Damage to existing road infrastructure</b>          | Protect existing road infrastructure                                 | <ul style="list-style-type: none"> <li>Road and intersection conditions will be established by the use of field surveys and regular site inspections. When required, rehabilitation of the pavement and/or edges of seal, shoulders and verges will be carried out. At the completion of the works the access roads will be in the same or superior condition than at the commencement of the works;</li> <li>Regular road dilapidation surveys will be carried out during construction and decommissioning;</li> <li>Internal roads and turns in the project site are required to be widened up to 10m in order to transport the construction materials and the large turbines to the desired location, and will require surfacing upgrade through grading; and</li> <li>A procedure will be established to ensure the ongoing maintenance of access roads during the operation phase.</li> </ul>                                  | Proponent / Contractor | ✓             | ✓ | ✓ |

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| 5.04 | <b>Amenity impacts from construction and operation traffic</b>      | Minimise potential amenity impacts from traffic from the Proposal                                      | <ul style="list-style-type: none"> <li>Procedures will be established to monitor traffic impacts on public and internal access tracks during construction, including noise, dust and travel times, and to implement modified work methods to reduce such impacts where possible.</li> </ul>  | Proponent, Contractor and Technical Specialists      | ✓             | ✓ | ✓ |
| 5.05 | <b>Loss of internal access roads</b>                                | Retain and handover internal access roads  | Internal access roads will be retained and handed over to the landowners after decommissioning.  |  |               |   | ✓ |
| 6.0  | <b>Aeronautical</b>   |  |  |  |               |   |   |
| 6.01 | <b>Disruption of flight paths and local aeronautical activities</b> | Minimise risk  | <p>Prior to the commencement of construction and operation the following information shall be provided to the CASA and DoD:</p> <ul style="list-style-type: none"> <li>as constructed coordinates in latitude and longitude of each WTG (WGS84 or MGA94);</li> <li>final height of each WTG in m AHD; and</li> <li>elevation at the base of each WTG in m AHD.</li> </ul>  | Proponent in consultation with technical specialists | ✓             |   |   |
| 7.0  | <b>Telecommunications</b>   |  |  |  |               |   |   |
| 7.01 | <b>Potential interference</b>                                       | Minimise potential of Proposal infrastructure to interfere with existing telecommunications facilities | Once the final models and locations of wind turbines are known, the locations of communications towers and requirements of licence holders will be confirmed and input into the micro-siting of individual turbines to minimise potential for telecommunications interference.   | Proponent and Contractor                             | ✓             |   |   |
| 7.02 | <b>Prolonged interference or disturbance of communication links</b> | Manage and minimise impacts  | At the commencement of operation, the Proponent shall offer to undertake a monitoring program of houses within 5km of the wind farm to determine any loss in television signal strength. If loss of signal occurs and the source of interference can be reasonably attributed to the Proposal, the Proponent shall put in place mitigation measures at each of the affected receivers in consultation and agreement with the landowners. | Proponent  |               | ✓ |   |
| 8.0  | <b>Fire and Bushfire</b>  |  |  |  |               |   |   |
| 8.01 | <b>Bushfire risk during construction</b>                            | Manage bushfire risk   | <p>A Bushfire Risk Management Plan will be prepared in consultation with the Rural Fire Service and QLD Fire and Rescue Service. The mitigation measures will include:</p> <ul style="list-style-type: none"> <li>Construction personnel will be inducted on bushfire risk management and other fire risks that could be present at the project site.</li> </ul>   | Contractor   | ✓             | ✓ | ✓ |

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|      |  |                                | <ul style="list-style-type: none"> <li>On total fire ban days, restrictions will be placed on certain activities with the potential to cause fires.</li> <li>Basic fire fighting equipment at each active site will be provided, including fire extinguishers, knapsacks and other equipment suitable for initial response actions with a minimum of one trained person on-site</li> </ul>   |                          |               |   |   |
| 8.02 | <b>Bushfire risk during construction</b>                           | Maintain coordination with RFS | The QFRS will be provided with the final wind turbine locations, ancillary infrastructure, construction work schedule and locations of additional water supplies for construction, potential landing pads for fire fighting aircrafts and helicopters and access gates for fire fighting services.   | Proponent and Contractor | ✓             |   |   |
| 8.03 | <b>Ignition of fire due to mechanical malfunction</b>              | Minimise risk                  | <ul style="list-style-type: none"> <li>Dedicated monitoring systems (e.g. SCADA) enable wind turbines to be automatically shut down if ambient temperatures exceed the safe operating range, or if components overheat;</li> <li>Other remote alarming and maintenance procedures are required for electrical faults, which can still occur within the tower or nacelle and create a fire;</li> <li>Wind turbines will be shut down if directed by the QFRS in the event of nearby wildfire.</li> </ul>                            | Turbine Manufacturer     |               | ✓ |   |
| 8.04 | <b>Spreading of fire away from wind farm infrastructure</b>        | Minimise risk                  | <ul style="list-style-type: none"> <li>The substation will be surrounded by a gravel and concrete area free of vegetation to prevent the spread of fire from the substation and to reduce the impact of any bushfire on the structure;</li> <li>An Asset Protection Zone (APZ) will be maintained around the control room and substation buildings, compliant with the RFS guidelines;</li> <li>Areas around each WTG will be managed for fire risk (e.g. regular vegetation clearing and reduction of any fuel loads).</li> </ul> | Proponent and Contractor |               | ✓ |   |
| 8.05 | <b>Ignition of fire due to lightning strike on turbines</b>        | Minimise risk                  | Lightening arresters will be built into each of the turbines to minimise the potential impacts of fire caused by lightening.   | Turbine Manufacture      |               | ✓ |   |
| 8.06 | <b>Restricted movement of fire response vehicles and personnel</b> | Manage fire vehicle movement   | Access roads will be constructed and maintained with suitable width and specifications for the movement of fire management vehicles.   | Proponent and Contractor | ✓             | ✓ | ✓ |

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| <b>9.0</b>   | <b>Health and Safety</b>                      |   |  |                          |               |   |   |
| <b>9.01</b>  | <b>Wind farm noise</b>                        | Manage community concerns with respect to wind farm noise                           | The Proponent will establish a complaints management system to be implemented prior to the construction phase and maintained throughout the operation phase of the development to register noise and other health complaints and concerns about the Proposal from the community.   | Proponent                |               | ✓ |   |
| <b>10.0</b>  | <b>Electromagnetic Fields</b>                 |   |  |                          |               |   |   |
| <b>10.01</b> | <b>Exposure to EMF</b>                        | Minimise unnecessary exposure to EMF  | To ensure there will be no unnecessary exposure to EMF from the Proposal, the following mitigation and management measures will be implemented: <ul style="list-style-type: none"> <li>• electrical cables will be placed below ground where possible to shield electrical fields;</li> <li>• wires will be bundled where possible to reduce the magnetic field emissions;</li> <li>• appropriate security will be placed around emitting structures (e.g. substation) to restrict public access and limit potential exposure; and</li> <li>• non-staff that need to go near the emitting structures will be accompanied by a trained and qualified staff member.</li> </ul>   | Proponent and Contractor |               | ✓ |   |
| <b>11.0</b>  | <b>Water Quality</b>                          |   |  |                          |               |   |   |
| <b>11.01</b> | <b>Pollution or contamination of aquifers</b> | Minimisation of pollution or contamination risk to surface and ground water quality | An Erosion and Sediment Control Plan and Stormwater Management Plan will be prepared in line with the FNQROC Development Manual, Institute of Engineers Australia Queensland ESC Guidelines and Queensland Urban Drainage Manual, as part of the CEMP. Both the ESCP and SWMP will address the requirements for: <ul style="list-style-type: none"> <li>• water retardation and diversion devices around construction areas, including devices to manage surface runoff from hardstand areas and surfaced access tracks;</li> <li>• design of appropriately sized sedimentation basins to capture and treat runoff from construction areas; and</li> <li>• monitoring and maintenance procedures for erosion and sediment control structures.</li> </ul> | Proponent and Contractor | ✓             |   |   |

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| 11.02 | <b>Pollution or contamination of local water ways and aquifers</b> | Minimising risk to groundwater quality and wind farm infrastructure | <ul style="list-style-type: none"> <li>Where rock anchor foundations are the first choice solution but the resulting risks posed to groundwater could be too high as may be shown in detailed geotechnical studies, alternative footings such as gravity foundations will be designed and implemented;</li> <li>Suitable perimeter protection and bunding will be provided to the substation transformers to minimise the risk of transformer oil leaks or spills during operation and maintenance.</li> </ul>  | Proponent in consultation with technical specialists, Contractors and Turbine Manufacturer | ✓             | ✓ |   |
| 11.03 | <b>Pollution of local water ways and aquifers</b>                  | Minimising risk to groundwater quality                              | <ul style="list-style-type: none"> <li>In the instance that belowground infrastructure intercepts the groundwater table, a suitable protective casing (for example a plastic pipe sleeve) will be used to pass through the ground water zone. This sleeve will allow the foundation/pile material to pass through and form a solid foundation without affecting the groundwater zone;</li> <li>Spill kits will be provided at or near the location of oil and fuel storage to contain potential spills and leaks;</li> <li>Concrete and cement carrying vehicles will only be washed out in appropriate wash down facilities;</li> <li>Hazardous material, waste and sewage will be managed in accordance with regulatory requirements;</li> <li>Wastewater produced from temporary on site toilets during construction will be disposed off site.</li> </ul> | Contractor and Proponent   | ✓             | ✓ | ✓ |
| 11.04 | <b>Alteration to local hydrology</b>                               | Minimising adverse impacts on local hydrology                       | <p>The construction of hardstands and sealed roads may cause minor alterations to drainage patterns due to localised reduction in infiltration resulting in increased runoff. The appropriate drainage structures and erosion controls will be incorporated in hardstands, access roads and tracks to manage run-off and reduce the risk erosion and scour from concentrated flows.</p> <p>Outlet structures will be designed in accordance with the DERM guidelines to minimise construction and operation impacts on watercourse and riparian corridors. Considerations include, but are not limited to:</p> <ul style="list-style-type: none"> <li>Any stormwater outlets should aim to be 'natural', yet provide a stable transition from a constructed drainage system to a natural flow regime;</li> </ul>  | Proponent, designers and Contractor  | ✓             | ✓ | ✓ |



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|       |   |   | <ul style="list-style-type: none"> <li>All ancillary drainage infrastructure, e.g. sediment and litter traps, should be located outside the riparian corridor. Runoff should be of an appropriate water quality and quantity before discharge into a riparian corridor or watercourse is allowed;</li> <li>Discharge from an outlet should not cause bed or bank instability.</li> </ul>  |                |               |   |   |
| 11.05 | <b>Pollution or contamination of local water ways</b> | Minimising pollution or contamination risk to surface water quality | <ul style="list-style-type: none"> <li>Except for drainage line crossings of access tracks and cable trenches, ground disturbance activities, including road construction and track upgrades and the excavation of footings for turbines, crane pads, control buildings and substation, will be located away from natural drainage features where possible;</li> <li>The storage of oils, fuels and other hazardous chemicals will be appropriately bunded and located away from watercourses;</li> <li>All trenching works will be rehabilitated immediately following completion and works within drainage lines will be confined to a minimal timeframe to reduce the risk of release of discharge of and accidental spills of oil or fuel from construction plant;</li> <li>Any spoil stockpiles from foundation excavation and access road construction will be located away from drainage lines, natural watercourses, road surfaces and trees, Stockpiles will be protected against erosion and sedimentation until the material is carted away for reuse or offsite disposal. Stockpiles to be retained longer than four weeks on site will be stabilised;</li> <li>The extra width of construction roads not required for operational phase access will be stabilised and rehabilitated to reduce the extent of bare ground;</li> <li>Sediment and erosion controls during various phases of construction will be developed in accordance with the requirements of the Institute of Engineers Australia Queensland ESC Guidelines;</li> <li>Water quality and erosion and sedimentation control devices will be regularly inspected and maintained to ensure functionality. If erosion is detected as a result of inadequate maintenance of drainage control devices, remedial action will be carried out immediately to avoid reoccurrence of the event.</li> </ul> | Contractor     | ✓             | ✓ | ✓ |

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| 11.06       | <b>Pollution of local water ways</b>   | Manage the disturbance of riparian vegetation throughout the site   | Any access tracks (with the exception of creek crossings) and all other works and disturbances will avoid any core riparian zone to avoid impacting on the integrity of the riparian corridors.   | Proponent and Contractor | ✓             |   | ✓ |
| <b>12.0</b> | <b>Soils and Landform</b>  |   |   |                          |               |   |   |
| 12.01       | <b>Ground disturbance</b>  | Minimise alteration to soils and landform especially where beneficial land use post-decommissioning may be restricted | <ul style="list-style-type: none"> <li>Detailed geotechnical investigations will be undertaken to assess ground conditions and determine the most suitable foundation design for the turbine sites;</li> <li>The foundation design will consider the volume of excavation spoil that will be generated and any opportunities for reuse of the spoil in the construction of other site infrastructure and any constraints in stockpiling the material;</li> <li>Soil compaction resulting from vehicle access and laying of materials will be remediated after construction activities have been completed in the affected area;</li> <li>Where possible, access routes and tracks will be confined to already disturbed areas.</li> </ul> | Proponent and Contractor | ✓             |   | ✓ |
| 12.02       | <b>Creation of unstable landforms and loss of topsoil from construction activities and infrastructure layout</b> | Stabilise steep slopes  | <ul style="list-style-type: none"> <li>Subsoil will be separated from topsoil for reinstatement purposes. On steep slopes, topsoil will be stabilised;</li> <li>Any spoil stockpiles from foundation excavation and access road construction will be protected against erosion and sedimentation until the material is carted away for reuse or offsite disposal. Stockpiles to be retained longer than four weeks on site will be stabilised.</li> </ul>   | Contractor               | ✓             |   |   |
| 12.03       | <b>Soil Contamination</b>  | Manage any contaminated material from past land uses  | <ul style="list-style-type: none"> <li>The involved property owners will be consulted to identify any potential areas of contamination resulting from past land use;</li> <li>An unexpected finds protocol will be prepared to outline the procedures to manage any contamination identified or disturbed during excavation works.</li> </ul>   | Contractor and Proponent | ✓             |   |   |
| <b>13.0</b> | <b>Waste</b>   |   |   |                          |               |   |   |
| 13.01       | <b>Inefficient resource use and waste generation</b>   | Promote waste hierarchy   | <p>Waste will be managed according to a Waste Management Plan based on the hierarchy principles of resource management as follows:</p> <ul style="list-style-type: none"> <li>as a priority, unnecessary resource consumption will be avoided;</li> </ul>   | Contractor and Proponent | ✓             | ✓ |   |

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|       |  |   | <ul style="list-style-type: none"> <li>avoidance will be followed by resource recovery (including reuse of materials, reprocessing, recycling, and energy recovery); and</li> <li>disposal will be undertaken as a last resort.</li> </ul>  |                          |               |   |   |
| 13.02 | <b>Inefficient resource use</b>  | Promote efficient use of water and energy               | Energy and water conservation will be promoted through training and use of appropriate signage.   | Contractor and Proponent | ✓             | ✓ |   |
| 13.03 | <b>Missed opportunities for recycling and reuse</b>  | Maximise opportunities for recycling and reuse          | <ul style="list-style-type: none"> <li>Purchasing decisions will be made in consideration of recycled content and increased opportunities for reuse (for example, refillable printer cartridges);</li> <li>Cleared vegetation will be chipped and used as mulch for revegetation works where practical;</li> <li>Bins will be provided in construction and office areas for the collection and segregation at source of wastes and recyclables.</li> </ul>  | Contractor and Proponent | ✓             | ✓ |   |
| 13.04 | <b>Potential contamination and OHS risk from improper waste disposal</b>                                   | Control waste disposal procedures                       | <ul style="list-style-type: none"> <li>Liquid and solid waste generated from the wind farm will be classified and disposed of in accordance with a construction waste management plan;</li> <li>Any hazardous waste, including unwashed empty containers will be stored in appropriate containers on site prior to collection by licensed contractors for disposal to a licensed facility;</li> <li>All noxious weeds and exotic plant species removed will be disposed of at a licensed facility.</li> </ul> | Contractor and Proponent | ✓             | ✓ |   |
| 13.05 | <b>Loss of amenity and potential contamination from waste generation</b>                                   | Minimise risks from waste generation and waste handling | <ul style="list-style-type: none"> <li>All working areas will be kept free of rubbish and cleaned up at the end of each work day;</li> <li>Any contaminated waste will be contained then disposed of according to regulatory requirements;</li> <li>Waste generated outside of the project site will not be stored, treated, processed or disposed in the project site.</li> </ul>  | Proponent and Contractor | ✓             | ✓ |   |
| 14.0  | <b>Community</b>   |   |   |                          |               |   |   |
| 14.01 | <b>Regional community impacts as a result of the wind farm development, operation and decommissioning.</b> | Community enhancement and benefit                       | The Proponent is proposing to establish a Community Investment Fund and contribute approximately \$180,000 to the fund each year. The fund would be maintained throughout the operational life of the project for investment in community infrastructure and services, sustainability initiatives, local economic and tourist developments, community groups and events etc.  | Proponent                |               | ✓ |   |

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| 14.02 | Community information and project knowledge                                    | Dissemination of project information   | With the exception of confidential documents, the Proponent will make all documents under this Development Application available for public inspection on request.   | Proponent                                 | ✓             | ✓ | ✓ |
| 14.03 | Community information and project knowledge                                    | Dissemination of project information   | Regular newsletters and newspaper articles will be disseminated to all relevant parties (including those who have registered as part of our community information sessions), together with information on Ratch Australia Corporation LTD Website (windfarms.net.au) regarding the progress of the application through to construction   | Proponent                                 | ✓             | ✓ | ✓ |
| 14.04 | Community information and project knowledge                                    | Dissemination of project information   | The Proponent will issue newsletters on a quarterly basis throughout the planning approvals and design phase providing information regarding the progression of the project. Detailed newsletters will also be prepared throughout the duration of the construction period up to the operational phase.  | Proponent                                 | ✓             | ✓ |   |
| 15.0  | <b>Land Use</b>  |  |  |   |               |   |   |
| 15.03 | Risk of degradation of previously inaccessible environmentally sensitive areas | Minimise degradation of environmentally sensitive areas  | Access to previously inaccessible environmentally sensitive locations will be restricted to landowners and authorised personnel only through measures such as the installation of lockable gates on access tracks.   | Proponent in coordination with landowners | ✓             | ✓ |   |
| 15.04 | Impact on amenity of residents and visitors to the area                        | Minimise visual, noise and traffic impacts   | The design, construction, operation and decommissioning of the Proposal will incorporate the mitigation measures recommended in the visual, noise and other technical assessments so as to minimise any potential impacts on local amenity.  | Proponent and Contractor                  | ✓             | ✓ | ✓ |
| 16.0  | <b>Air Quality</b>   |  |  |   |               |   |   |
|       | Generation of fugitive dust  | Monitor and minimise the generation of dust from ground disturbance, spoil stockpiles and construction traffic | <ul style="list-style-type: none"> <li>A Construction Dust Management Plan (CDMP) will be prepared as part of the CEMP;</li> <li>Dust deposition gauges will be installed to monitor dust emissions and ensure emissions do not exceed 4 grams per metre squared per month, in accordance with DERM and WPH&amp;S guidelines;</li> <li>Dust levels will be visually monitored and dust suppression (e.g., water sprays) will be implemented if required;</li> <li>During dry and windy conditions a water cart or alternative chemical dust suppression will be made available and applied to access tracks and ground disturbance areas;</li> <li>Set appropriate speed limits for construction traffic on internal roads.</li> </ul> | Proponent and Contractor                  | ✓             |   | ✓ |



PLANS AND DOCUMENTS  
Referred to in the  
DEVELOPMENT APPROVAL  
24 APR 2015  
Date \_\_\_\_\_  
Queensland Government

# Mount Emerald Wind Farm

## Preliminary Environmental Management Plan

Prepared by:

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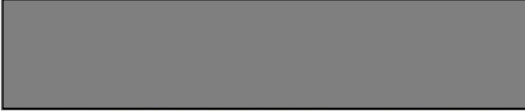


Client Manager:   
Report Number: PR100246 / R72893  
Version / Date: Draft – November 2013

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Document Status

| Version | Purpose of Document | Orig     | Review | Review Date |
|---------|---------------------|----------|--------|-------------|
| A       | EIS EMP             | MJ/SG/JM | DF     |             |
|         |                     |          |        |             |
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Approval for Issue

| Name       | Signature | Date       |
|------------|-----------|------------|
| [Redacted] |           | 29.11.2013 |

DRAFT

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## 1.0 Introduction

This Preliminary Environmental Management Plan (EMP) has been prepared for RATCH Australia Corporation Ltd (RACL) for construction, operational and decommissioning activities proposed to be carried out on the Mount Emerald Wind Farm (MEWF), in response to the EIS Guidelines of April 2012. It should be noted the document presents a framework for further development following the outcomes of the EIS/EPBCA referral and Queensland Development Application processes. Similarly, commercial details of the construction and operation phases are yet to be finalised, therefore many system and operational details are not available. Nonetheless, the EMP aims to identify sources of actual and potential environmental harm identified through the EIS process and what actions, processes and/or strategies will be adopted to avoid, prevent or minimise the likelihood of environmental harm being caused. The EMP aims to provide for the review and 'continual improvement' in the overall environmental performance of the MEWF operations.

This EMP will form the basis from which detailed EMPs will be prepared by the construction, operational and decommissioning entities. The detailed EMPs to follow the project approval may contain project design modifications; however, basic elements will be adopted and presented in the form of the following stand alone plans:

- Construction Environmental Management Plan (CEMP);
- Operational Environmental Management Plans (OEMPs); and
- Decommissioning Management Plan (DEMP).

These plans will be subject to approval by RACL and various approval agencies, including Department of the Environment (DotE).

A plan indicating the site layout (current at November 2013) is provided in **Appendix A**. This layout may be subject to modification as a result of outcomes from the approval and detailed design process.

The EMP aims to address the following matters:

- (a) Identification of environmental issues and potential impacts.
- (b) Environmental commitments - a commitment by senior management to achieve specified and relevant environmental goals.
- (c) Control measures for routine operations to minimise likelihood of environmental harm.
- (d) Contingency plans and emergency procedures for non-routine situations.
- (e) Organisational structure and responsibility.
- (f) Effective communication.
- (g) Monitoring of mitigation measures and residual impacts.
- (h) Conducting ongoing environmental impact assessments.
- (i) Staff training.
- (j) Record keeping.
- (k) Periodic review of environmental performance and continual improvement.

## 2.0 Management Systems

This section provides an outline of the proposed elements of an Environmental Management System to be adopted for the project.

### 2.1 Environmental Policy

As a developer of renewable energy in Australia, implementing sustainable measures and ensuring the protection of the environment are fundamental to RACL's long term objectives and philosophy. Investments in renewable energy are both environmentally and commercially sustainable and RACL currently owns three wind farms that are significantly reducing Australia's greenhouse emissions. In addition, RACL continues to improve the environmental ratings of its other power generation assets by continuously revising for economically possible ways of reducing its carbon emissions.

As RACL continues to grow, it strives to promote preservation and restoration of the environment, by managing and minimising the environmental impact of its operations and activities and fully respecting environmental laws and regulations.

RACL encourages employees to take care and demonstrate responsibility towards the environment and to report any incident that may have a hazardous effect. RACL continuously strives to ensure its employees are aware of how they can reduce the consumption of energy and resources and implement strategies focused on waste minimisation and recycling where possible. Ensuring the protection of the environment and implementing sustainable solutions are paramount to the success of RACL, its people and the communities in which it serves.

### 2.2 Implementation Responsibilities

A draft Site Organisation Chart outlining responsibilities for environmental design and management is presented in **Error! Reference source not found.** below.

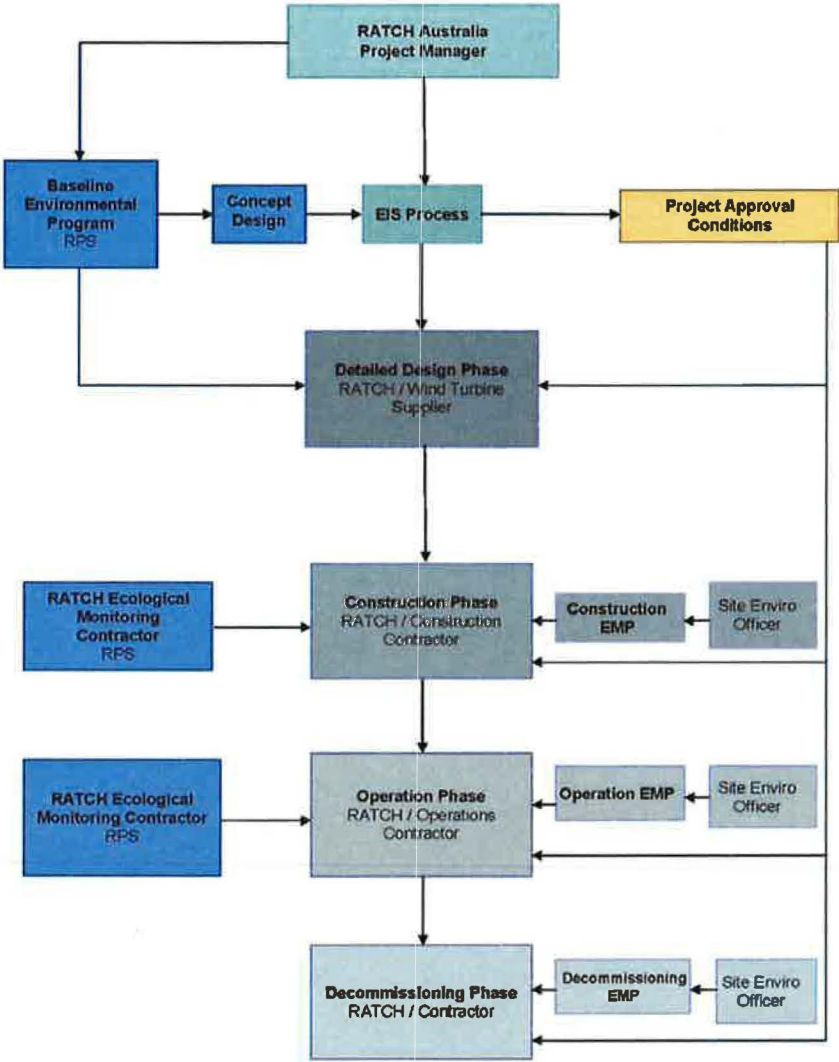


Figure 1 Draft Site Organisation Flowchart

**2.2.1 RACL Australia Project Manager**

RACL will provide a Project Manager to oversee compliance with EMPs covering construction, operation and decommissioning phases. The Project Manager will also be responsible for integration of outcomes of the EIS / approvals processes into final designs, operational plans and contractual documentation, including facilitating any preconstruction environmental programs, regular review of operational performance reports, facilitation of external environmental compliance audits. In addition the Project Manager will continually review environmental performance against all EIS/EMP commitments, conditions and audit outcomes and drive any necessary operational changes as required to maintain regulatory compliance via the Construction, Operations and Decommissioning Phase Managers. The Project Manager will also be responsible for commissioning any external environmental expertise, particularly in relation to ecological research and monitoring programs and incorporation of outputs into a range of environmental programs identified in the EMPs, in consultation with regulatory agencies as required.

### 2.2.2 Construction, Operations and Decommissioning Phase Managers

The phase managers will direct work in a manner that complies with;

- all relevant environmental procedures,
- adheres to all legislative requirements and
- ensures that the requirements of this EMP, the EIS, CEMP, OEMP and DEMP are implemented.

The phase managers will have 'stop task' and 'stop work' authority and will report to the Project Manager. They will also be responsible for initiating and managing external system audits.

### 2.2.3 Environmental Officers

The Environmental Officers (EO) will be responsible for monitoring and reporting the implementation of EMPs for all project phases. It is likely that Environmental Officers will be appointed by the Construction, Operation and Decommissioning phase entities and will report to the phase managers. Jurisdictional responsibilities between RACL and these entities will be incorporated in contractual documentation.

The Environmental Officers will also be responsible for implementation of environmental programs such as species management plans, Cultural Heritage Management Plan (CHMP), the Complaints Register and for setting up compliance audits and monitoring programs. Construction compliance auditing will be conducted against the requirements of this EMP, CEMP, OEMP, DEMP, Construction Safe Work Method Statements, License and Permit Conditions.

### 2.2.4 Ecological Monitoring Contractor

RACL will appoint an external ecological contractor to assist with all phases of the project commencing with input into the detailed design process which will be informed by a number of preconstruction ecological surveys identified below. A key function will be the preparation of detailed Significant Species Management Plans which will set out key impact management strategies including further baseline programs, design, construction and operational measures and protocols, monitoring regimes, management targets, corrective actions, timeframes and responsibilities. Elements of these plans are listed below, with details to be provided in the specific plans.

## 2.3 Training

The success of the EMP depends on all those responsible for implementation and review being thoroughly conversant with its contents, interpretation and performance measurements. RACL and its contractors will be responsible for ensuring that project personnel have sufficient knowledge and awareness to identify potential environmental issues, and that they are trained to take appropriate corrective action.

It is essential all personnel are familiar with the procedures for reporting on issues that may result in environmental degradation. This includes informing key personnel within RACL its contractors and relevant regulatory authorities.

## 2.4 Induction

All staff, including field staff, will complete a comprehensive Project induction prior to commencing work on the Project. The induction will include safety, access and a comprehensive review of environmental requirements. All Project personnel from supervisory to managerial level will have an additional detailed

training session on the use and implementation of the EMPs. It is the responsibility of the phase managers to ensure records of training are maintained.

## 2.5 Toolbox Meetings

The phase Manager will ensure supervisors hold at least weekly toolbox talks with staff and crews to discuss issues associated with the scheduled work.

This will include highlighting and discussing relevant environmental and safety issues as required. The sessions will include discussion of strategies to be implemented as identified in Job Hazard Analysis (JHA) of current work activities.

## 2.6 Job Hazard Meetings

A JHA is a simple tool that is used in helping personnel identify, analyse and manage the hazards that exist in the work they undertake. It formalises the process of hazard identification and risk management most people follow when working. The JHA requires personnel to examine the task they are about to undertake and:

- Break the job down into separate, defined steps;
- For each step identify the potential hazards (including potential environmental or cultural heritage hazards) that could occur within that job step; and
- For each potential hazard list the method to be followed to prevent the hazard causing an injury, loss, damage or environmental incident.

Weekly job hazard meetings will be held in conjunction with the Toolbox meetings.

## 2.7 Reporting and Auditing

During construction, operations and decommissioning phases there will be continuous review of the project area and individuals and work crews will be required to demonstrate the pertinent requirements of the EMPs are being adhered to. Each supervisor will be required to record daily activities including monitoring data, on which relevant EMP requirements will be addressed (daily, weekly, monthly check sheets to be prepared by the construction contractor).

RACL commissioned external audits will include as a minimum, two annual construction audits (the first within 2 months of commencement) and two annual operation phase audits for the first three years, reverting to an annual audit thereafter assuming high levels of compliance; frequency of auditing will be revised following receipt of approval conditions. Where compliance levels are unacceptable to the regulatory authorities auditing and reporting schedules may be reviewed.

The results of other environmental programs directly commissioned by RACL including any additional preconstruction baseline and construction / operation phase ecological impact monitoring will be provided to DEHP and DOTE as requested.

### 2.7.1 Incident Reporting and Non-conformance

Incident reporting will be implemented to record any safety or environmental non-conformances, incidents or complaints. These shall be recorded on an incident report form and forwarded to the relevant phase Manager for reporting within the RACL system and for a process of continuous improvement to be implemented.

All such incidents shall be investigated in a timely manner and any necessary steps implemented to minimise likelihood of recurrence. If required, the EMP shall be reviewed and updated in accordance with Section 2.9.

### 2.7.2 Reporting

Section 320 of the EP Act requires any person who becomes aware of an event that may or has caused environmental harm, reports the event / incident to their employer. Details of the nature and circumstances of the event must be provided.

Any such incidents must be immediately reported to the phase manager and recorded on an Incident Report Form. The phase manager will ensure the appropriate external agencies are notified within the appropriate timeframe.

All such incidents shall be investigated in a timely manner and any necessary steps implemented to minimise likelihood of recurrence. If required, the EMP shall be reviewed and updated in accordance with Section 2.9, in consultation with RACL and the relevant regulatory agencies.

The RACL Project Manager will be responsible for the preparation of project phase reporting as identified in approval conditions; this may include compliance reporting and the status of ongoing research and monitoring programs.

## 2.8 Complaints Procedure

All complaints about the Project will be directed to, and recorded by, the Community Liaison Officer for each phase. Contact details for the Community Liaison Officer will be provided to all affected landowners. A Register will be kept recording details of all complaints received, the action taken in response (where necessary), and any corrective actions or procedural changes implemented to prevent recurrence.

The initiator of the complaint will be advised of the results of all actions taken.

The Community Liaison Officer will review the register daily and advise the Environmental Officer of any relevant complaints. The Environmental Officer will then investigate the complaint and instigate any corrective action required.

The register will be regularly audited by the Construction Manager to ensure adequate and timely response to any verified complaint is occurring.

## 2.9 Review and Update

The EMPs will be reviewed as required (at least annually) to ensure they address environmental issues and changes in legislation, policies and guidelines including work practices.

As details of design, construction methodology and access needs are refined, so too will the EMP and site and phase specific plans. The 'living' nature of the document means it will progressively improve and will continue to provide appropriate direction for environmental protection. A key review milestone will be following project approvals.

As a number of adaptive management strategies and programs are proposed in the EIS and this EMP, ongoing review of EMP success (or otherwise) in consultation with various regulatory agencies will dictate the frequency of EMP review and modification.

**2.10 Legislative and Other Considerations**

The legislation and standards listed in Environmental legislation, policies and standards relevant to the Project has been used to guide preparation of this EMP and will form the basis for ongoing decision-making and complaint resolution in respect of the EMP.

**Table 1 Environmental legislation, policies and standards relevant to the Project**

| Element                                 | Legislative and Other Requirements   |
|---|--|
| Construction—General                    | <i>Environmental Protection Act 1994 (Qld)</i><br><i>Environmental Protection Regulation 2008 (Qld)</i><br><i>Workplace Health and Safety Act 1995 (Qld)</i><br><i>Workplace Health and Safety Regulation 1997 (Qld)</i>   |
| Noise and Vibration                     | <i>Environmental Protection (Noise) Policy 2008 (Qld)</i><br><i>Workplace Health and Safety Act 1995 (Qld)</i><br>AS 1055.1 & .2: Acoustics—Description and measurement of environmental noise<br>AS 2436: Guide to noise control on construction, maintenance and demolition<br>NZS 6808:2010 Acoustics – Wind farm noise                           |
| Air Quality                             | <i>Environmental Protection (Air) Policy 2008 (Qld)</i><br>National Health and Medical Research Council Guidelines 1985(Cwth)<br>Draft National Environmental Protection Measures and Impact Statement for Ambient Air Quality 1997(Cwth)  |
| Water Quality                           | <i>Environmental Protection (Water) Policy 1997 (Qld)</i><br>Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC 2002<br><i>Water Act 2000 (Qld)</i>   |
| Erosion and Sedimentation Control       | Soil Erosion and Sediment Control, Engineering Guidelines for Queensland Construction Sites—IEAust (Qld) 1996  |
| Contaminated Land                       | <i>Environmental Protection Act 1994 (Qld)</i>   |
| Storage and Handling of Dangerous Goods | <i>Environmental Protection Act 1994 (Qld)</i><br><i>Environmental Protection Regulation 2008 (Qld)</i><br><i>Workplace Health and Safety Act 1995 (Qld)</i><br>AS1940 – The Storage and Handling of Flammable and Combustible Liquids   |
| Transport of Dangerous Goods            | Australian Code for Transport of Dangerous Goods by Road and Rail  |
| Waste Management                        | <i>Environmental Protection (Waste Management) Policy 2000 (Qld)</i><br><i>Environmental Protection (Waste Management) Regulation 2000 (Qld)</i>   |
| Flora and Fauna                         | <i>Environment Protection and Biodiversity Conservation Act 1999 (Cwth)</i><br><i>Nature Conservation Act 1992 (Qld)</i><br><i>Nature Conservation Regulation 1994 (Qld)</i><br><i>Vegetation Management Act 1999 (Qld)</i><br><i>Environmental Protection Act ( Qld)</i><br><i>Land Protection (Pest and Stock Route Management) Act 2002 (Qld)</i> |



| Element           | Legislative and Other Requirements   |
|-------------------|--|
| Cultural Heritage | <i>Native Title Act 1993 (Cwlth)</i><br><i>Native Title (Queensland) Act 1993</i><br><i>Queensland Heritage Act 1992</i><br><i>Queensland Heritage Regulation 2003</i><br><i>Aboriginal Cultural Heritage Act 2003 (Qld)</i> |
| Land Use          | <i>Integrated Planning Act 1997(Qld)</i><br><i>Land Protection (Pest and Stock Route Management) Act 2002 (Qld)</i>  |

### 2.11 Related Documentation

The operation will be carried out generally in accordance with the following documents:

- MEWF - Environmental Impact Assessment – RPS Australia 2013 (Volumes 1-3);
- this EMP, CEMP, EOMP, DEMP documents;
- National Wind farm Guidelines
- Consolidated Conditions of Project Approval;
- Weed Management Plan
- Rehabilitation Management Plan
- Fire Management Plan
- Translocation Plans
- Significant Species Management Plans

If there is any inconsistency between the Conditions of Approval and a document listed above, the Conditions of Approval shall prevail to the extent of the inconsistency. If there is any inconsistency between documents listed above (other than the Conditions of Approval) then the most recent document shall prevail to the extent of the inconsistency.

All persons involved with the operational phase of the MEWF shall undertake their respective activities in accordance with the relevant requirements of the OEMP. The OEMP shall also be read in conjunction with the following related RACL documents which exist as separate documents:

- Site Induction Handbook (Service);
- Policies and procedures contained within RACL's Environmental Management System

### 3.0 Detailed Design (Pre Construction) EMP

The Pre-construction EMP contains a program of works aimed at avoiding, minimising or mitigating impacts through closing information gaps and preparation of a number of detailed management plans which will guide operations through subsequent construction, operation and decommissioning phases.

| Species  | Potential Impact   | Impacting Phase            | Proposed Mitigation Strategy  | Essential Information Gaps  | Management Actions Required   | Monitoring, Reporting  | Timing  | Responsibilities                                       | Relevant Agency |
|--|--|----------------------------|---|---|---|--|---|--|-----------------|
| <b>Fauna</b>                                   |  |                            |   |   |   |  |   |  |                 |
| Bare-rumped Shearwater                         | Turbine Collision & Barotrauma                                     | Operation                  | Turbine operation curtailment (increased cut-in speed & targeted turbine shut-down during high risk conditions or detected collision mortality) | 1. Relationship between environmental factors (weather, insect abundance) and call activity.<br>2. Utilisation of the turbine rotor sweep area (RSA) (abundance and flight height data) | 1. Continue and expand ultrasonic call surveys; sample within Rotor Swept Area (RSA) (higher towers & balloons)<br>2. Collect weather and insect abundance/height data<br>3. Identify high-risk conditions/times and seasons<br>4. Conduct radar utilisation at call survey locations sampling at RSA; quantify abundance and flight heights<br>5. Conduct numerical risk modelling (for <i>S. saccolaimus only</i> or for entire microchiropteran bat community – depending on radar data quality) | Prepare Microchiropteran Bat Management Plan   | Pre-construction  | External Ecologist / Specialist (inc. Biostatistician) | DoE<br>DERM     |
| Spectacled Flying-fox / Grey-headed Flying Fox | Turbine Collision  | Operational Phase          | Turbine curtailment during high-risk conditions (active) or excessive mortality events (reactive)   | 1. Utilisation of the RSA (abundance and flight height data)<br>2. Population Viability Analysis (PVA) to determine sustainable collision mortality levels                              | 1. Conduct radar utilisation surveys<br>2. Support CSIRO researchers to conduct satellite telemetry of more individuals from nearest colonies to site (Mareeba and Tolga Scrub)<br>3. Conduct numerical collision risk modelling (using radar/telemetry data)   | Prepare Flying Fox Management Plan   | Pre-construction  | External Ecological/Specialist                         | DoE<br>DERM     |
| Northern Quoll                                 | Habitat Loss   | Construction               | Avoid clearing high-quality denning and foraging habitats   | 1. Denning and foraging habitat preferences especially of breeding females<br>2. Estimates of dispersion for PVA model  | Preconstruction<br>1. Undertake additional telemetry studies on the project site to determine whether proposed turbine ridge habitats are used preferentially, particularly females with young; and offsite, to collect data on dispersion rates to refine the PVA (to assess the significance of potential impacts)<br>2. Redesign infrastructure layout to avoid high quality foraging or maternal denning habitat and/or inform Quoll Management Plan  | Prepare Quoll Management Plan  | Pre-construction  | External Specialist                                    | DoE<br>DERM     |
|  | Habitat Degradation (late dry season wild fires and weed invasion) | Construction and Operation | 1. Weed monitoring and control<br>2. Implementation of Ecological Fire Management (to avoid extensive wild fire in late dry season)             | 1. Long-term fine-scale fire history of site  | 1. Fire-scale mapping using Landsat imagery<br>2. Control of existing weed infestations (especially invasive grasses along Kippen Drive and access tracks)  | Prepare Weed Management Plan and Fire Management Plan  | Pre-construction  | External Specialist                                    | DoE<br>DERM     |
| Sarus Crane                                    | Turbine Collision  | Operational Phase          | Turbine curtailment during high-risk conditions (active) or excessive mortality events (reactive)   | 1. Utilisation of the RSA (abundance and flight height data)<br>2. Population Viability Analysis (PVA) to determine sustainable collision mortality levels                              | 1. Conduct radar utilisation surveys<br>2. Support CSIRO researchers to conduct satellite telemetry of more individuals from nearest colonies flocks<br>3. Conduct numerical collision risk modelling (using radar/telemetry data) - updated  | Prepare Bird Adaptive Management Plan  | Pre-construction  | External Ecological / Specialist                       | DoE<br>DERM     |
| <b>Flora</b>                                   |  |                            |   |   |   |  |   |  |                 |
| Significant Plants                             | Clearing of Conservation Significant Plants                        | Construction               | Avoidance and micro-siting of turbines.   | Detailed distribution of significant plants<br>Relocation and translocation strategies.   | Avoidance of disturbance to key plant habitats (see next point).<br>Detailed plant survey of south-west montane heath habitat - GPS mapping of avoidance patches.<br>Micro positioning of turbines to minimise clearing and disturbance to conservation significant plants and important vegetation types.  | Final site-based floristic records.<br>Records of seed collections as per Rehabilitation Plan. | Preconstruction and ongoing throughout construction phase.<br>Seed collection every 3 months after construction | External Botanist                                      | DoE<br>DERM     |

| Species                 | Potential Impact                            | Impacting Phase                              | Proposed Mitigation Strategy  | Essential Information Gaps  | Management Actions Required   | Monitoring, Reporting   | Timing  | Responsibilities  | Relevant Agency |
|-------------------------|---|--|---|---|---|---|---|---|-----------------|
|                         |   |  |   |   | Presence of Botanical advisor in pre clearance team. Instigate site-based seed and propagule collection for future rehabilitation work.   | Conservation Significant Plant Management Plan  | for at least 5 years.   |   |                 |
|                         | Clearing of Conservation Significant Plants | Operation / Decommissioning                  | Translocation and revegetation strategies   | Propagation viability of significant plants. Plant successional traits. | Prepare Significant Plant Management Plans including :<br>Research propagation of <i>Homoranthus porteri</i> , <i>Melaleuca uxorum</i> , <i>Plectranthus amoenus</i> and <i>Grevillea glossadenia</i> .<br>Conduct Revegetation trials.<br>Investigate plant successional traits. | Conservation Significant Plant Management Plan<br><br>Annual Revegetation Trial report  | Preconstruction and ongoing as required<br><br>First 3 years of operation       | External botanist/ Nursery<br><br>External Specialist                         | DoE<br>DERM     |
| <b>Water Quality</b>    |   |  |   |   |   |   |   |   |                 |
| Aquatic Flora and Fauna | Reduced downstream water quality            | Construction / Decommissioning and Operation | Maintenance of downstream water quality through water monitoring and management in accordance with a detailed Erosion and Sediment Control Plan | Background Water Quality( pH, Electrical Conductivity, Turbidity)       | Conduct preconstruction water quality monitoring to inform construction water quality targets<br>Prepare Detailed Erosion And Sediment Control Plan ( ESCP).  | as per Approval Conditions and CEMP<br>Annual Baseline Water Quality Assessment Report<br>Monthly reporting against approval conditions | preconstruction and event based during construction and first year of operation | Pre-construction - External Specialist<br>Construction- Environmental Officer | DEHP<br>DoE     |

## 4.0 Construction EMP

### 4.1 Flora

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| <b>Policy</b>                 | To minimise the effect on vegetation and habitat for flora, and to promote regeneration of native vegetation on the WTG access tracks and turbine sites.  |
| <b>Performance Objectives</b> | <ul style="list-style-type: none"> <li>▪ Minimise impacts to native vegetation and disturbance to important plant habitats.</li> <li>▪ Rehabilitation with native plants of available cleared areas</li> <li>▪ Where practicable, avoid disturbance to significant species (endangered, vulnerable and rare flora species).</li> <li>▪ Minimise habitat fragmentation and maintain absolute minimum width clearing along ridges.</li> <li>▪ Prevent weeds and plant pest diseases spreading as a result of construction activities.</li> <li>▪ Offset of any rare, endangered or vulnerable plants disturbed by construction by translocating species where practicable, and providing additional rehabilitation areas where revegetation trials can be established.</li> </ul>   |
| <b>Management Strategies</b>  | <ul style="list-style-type: none"> <li>▪ Conduct activities in accordance with Conservation Significant Plant Management Plan.</li> <li>▪ Preconstruction survey (early works package) undertaken to identify locations of rare and threatened species and other significant plants (including habitat trees) along the preferred WTG access tracks/turbine sites will be undertaken to allow designers to avoid and minimise clearing of these species and communities during construction. Any seed or plant propagules should be collected, stored and labelled by a botanist or qualified person to accumulate a seed bank for future rehabilitation.</li> <li>▪ Topsoil is a rare commodity on the site and soil and rock spoil should be stockpiled separately and adjacent to where the material was taken, or the very nearest suitable storage area. Stockpiles of material (particularly soil) will not exceed a height of 1 (one) metre.</li> <li>▪ Placement of physical barriers around significant vegetation areas in order to restrict access and prevent disturbance.</li> <li>▪ Transplanting trials of suitable plants to be practiced as a rehabilitation/conservation measure if feasible. Transplanting will occur when ground conditions are best suited to plant growth (i.e. some longer term moisture is available in the soil).</li> <li>▪ Windrowed vegetation should not be burnt. Respreading of cleared native vegetation over areas available for rehabilitation ( i.e. laydown areas, track batters, temporary crane pads) to occur following construction.</li> <li>▪ Conduct rehabilitation success trials particularly in relation to significant species and trials as per Conservation Significant Plant Management Plan</li> <li>▪ Preconstruction survey (early works package) to identify location of weeds along the proposed WTG access tracks and turbine sites and existing tracks.</li> <li>▪ Control environmental weeds by approved methods and in accordance with the Weed Management Plan along the WTG access tracks and turbine sites prior to clearing and grading. This should be undertaken at least 2 weeks prior to construction work commencing in the respective areas.</li> <li>▪ Declared weeds to be controlled by an approved method prior to clearing and grading.</li> <li>▪ All soil and rock material is to be stockpiled <i>in situ</i>. All imported construction material (road base, sand, rock-fill etc.) is to be free of weed seed and propagules, and be sourced from clean suppliers in the local region.</li> <li>▪ All vehicles and machinery to be washed down and certified weed free prior to entering site and in accordance with the Weed Management Plan. Vehicles and machinery is to be monitored at the site entry point (washdown bay).</li> <li>▪ Vehicles, plant and equipment is to be washed down following work in areas affected by weeds.</li> <li>▪ Vehicles and machinery working in internal weed infested areas are not to continue work in weed-free zones unless certified clean and weed free. Mobile washdown facilities will be established.</li> </ul> |

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| <p><b>Performance Indicators</b></p>                      | <ul style="list-style-type: none"> <li>▪ Minimum impact to ecosystems and plant species of National Environmental Significance and species known to be of interest to conservation.</li> <li>▪ Minimal disturbance of flora during construction of the WTG access tracks and turbine sites and associated camp sites.</li> <li>▪ Achievement of Conservation Significant Plant Management Plan targets</li> <li>▪ No damage to protected species without relevant permit and approval.</li> <li>▪ No presence of environmental and declared weeds (e.g. grader grass, sicklepod, Lantana, thatch grass etc. - refer to Weed Management Plan).</li> <li>▪ Survival and persistence of species planted for the offset programme and Translocation Plan.</li> </ul>  |
| <p><b>Monitoring, Reporting and Corrective Action</b></p> | <ul style="list-style-type: none"> <li>▪ Photographic records are to be maintained throughout the year (monthly basis). Fixed photo monitoring points are to be established.</li> <li>▪ Daily Check Sheets to include weed presence – completed and reviewed by manager/supervisor, and supervising botanist when on site</li> <li>▪ Regular inspections, third party audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> <li>▪ Prepare Annual Conservation Significant Plant Management Plan and Rehabilitation Plan reports.</li> <li>▪ Additional weed control as required with supplementary weed surveys within 14 days following rainfall events.</li> <li>▪ Offset rehabilitation planting to be monitored for a period of 3 years following rehabilitation to ensure survival, persistence and performance, as well as replacement of mortalities.</li> </ul> |
| <p><b>Responsible Person</b></p>                          | <ul style="list-style-type: none"> <li>▪ Environmental Officer and supervising botanist</li> <li>▪ Annual site rehabilitation assessment by supervising botanist</li> </ul>   |
| <p><b>Associated Documentation</b></p>                    | <ul style="list-style-type: none"> <li>▪ Conservation Significant Plant Management Plan</li> <li>▪ Rehabilitation Plan</li> <li>▪ Weed Management Plan</li> <li>▪ Translocation Plan</li> <li>▪ Offset Programme</li> <li>▪ EIS technical reports</li> </ul>  |

4.2 Fauna

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| <b>Policy</b>                                      | To minimise the effect on fauna and habitat.   |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ Minimise impacts to native fauna.</li> <li>▪ Where practicable, avoid disturbance to endangered, vulnerable and rare fauna species.</li> <li>▪ Minimise habitat fragmentation and promote habitat regeneration where practicable.</li> <li>▪ Pest animals and animal pest diseases not spread as a result of construction activities.</li> </ul>  |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ Spotter catcher present prior to and during all clearing activities.</li> <li>▪ Implementation of Quoll Management Plan Construction Phase Protocols. Key draft elements include: <ul style="list-style-type: none"> <li>▪ Saturation trapping and collaring of all quolls prior to commencement of section clearing and daily radio tracking/sniffer dog surveys to confirm absence of quolls in proposed clearing area. Trapping to confirm stage of reproduction cycle as this can vary from year to year.</li> <li>▪ Daily clearing to commence only once all tracked animals are confirmed clear of the area.</li> <li>▪ Carry out primary earthworks during February to October period to avoid mortality of dependant juveniles (left in den sites). If earthworks is to occur during November to January period conduct sniffer dog searches in advance of clearing to confirm presence/ absence. If present delay clearing in that area until maternal removal. This is dependent on trapping activities.</li> </ul> </li> <li>▪ Implementation of Bird Management Plan Construction Phase Protocols. Key draft elements to include: <ul style="list-style-type: none"> <li>▪ Avoidance of clearing of any roosting trees identified during preconstruction surveys and micro siting of turbine and track location.</li> <li>▪ Minimizing area of cleared vegetation</li> <li>▪ Implementation of Micro bat Management Plan Construction Phase protocols. Key draft elements to include: <ul style="list-style-type: none"> <li>▪ Avoidance of clearing of any roosting trees identified during preconstruction surveys and micro siting of turbine and track location.</li> </ul> </li> <li>▪ Minimizing area of cleared vegetation</li> <li>▪ Avoid vehicular use of site at night where possible</li> <li>▪ Restrict speed limits at night</li> <li>▪ Weed monitoring and control</li> <li>▪ Develop and implement ecological burning regime</li> </ul> </li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Mortality of endangered species within approved limits; and</li> <li>▪ Compliance with species management plans</li> </ul>  |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic records are to be maintained throughout the year (monthly basis). Fixed photo monitoring points are to be established.</li> <li>▪ Daily Spotter Catcher records including quoll tracking records – reviewed by manager / supervisor, and supervising botanist when on site</li> <li>▪ Clearing scheduling to be determined by Construction Manager in consultation with Spotter Catcher and External Ecological Contractor</li> <li>▪ Regular inspections, third party audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> <li>▪ Prepare Annual Conservation Significant Plant Management Plan and Rehabilitation Plan reports.</li> <li>▪ Additional weed control as required with supplementary weed surveys within 14 days following rainfall events.</li> <li>▪ Offset rehabilitation planting to be monitored for a period of 3 years following rehabilitation to ensure survival, persistence and performance, as well as replacement of mortalities.</li> </ul>   |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Environmental Officer</li> </ul>  |

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|                                 | <ul style="list-style-type: none"><li>▪ External Ecological Contractor / Spotter Catcher</li><li>▪ Construction Manger to authorize clearance only</li></ul> |
| <b>Associated Documentation</b> | <ul style="list-style-type: none"><li>▪ Species Management Plans</li><li>▪ Approval permits</li></ul>  |

4.3 Erosion and Sediment Control

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| <b>Policy</b>                                      | To provide effective erosion and sediment practices to mitigate the potential effects of construction on watercourses, land use and the general environment.  |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ Minimise soil erosion.</li> <li>▪ Minimise sedimentation of land.</li> <li>▪ Minimise modification to drainage patterns.</li> <li>▪ Prevent as far as practical, sediment transport to adjacent watercourses.</li> </ul>   |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ Conduct all earthworks in accordance with a detailed Erosion and Sediment Control Plan prepared by a suitably experienced professional (e.g. Certified Professional in Erosion and Sediment Control )</li> <li>▪ Minimise the quantity and duration of soil exposure.</li> <li>▪ Protect topsoil, root and seed stock.</li> <li>▪ Protect critical areas during and after construction by reducing the velocity of stormwater flow and redirecting runoff onto undisturbed areas.</li> <li>▪ Install and maintain temporary erosion and sediment control measures during construction.</li> <li>▪ Replace topsoil and seed stock on turbine laydown pads and track verges to facilitate revegetation as soon as practicable following construction.</li> <li>▪ Inspect disturbed areas and maintain erosion and sediment controls as necessary during and after construction until stabilisation is achieved.</li> <li>▪ Should the cabling trench require dewatering in wet weather, then this is to be pumped out and disposed across grass and not directly discharged to any stormwater drain or creek.</li> <li>▪ Strict implementation of permanent stormwater diversion drains on all hilly slopes (approximately 20 m intervals, depending on slope).</li> <li>▪ Strict implementation of silt mesh fencing, and stormwater diversion drains on the banks of all waterways containing flowing water during construction.</li> <li>▪ Highly erodible soils are identified by visual inspection of the site to identify the extent and location of existing soil erosion.</li> <li>▪ Where highly erodible soils are identified, and if the area cannot be reasonably avoided, the following controls should be implemented: <ul style="list-style-type: none"> <li>▪ Keep the work area to a minimum so that the smallest possible ground area is disturbed.</li> <li>▪ Place erosion control structures such as diversion drains and silt fences at key locations to capture the suspended sediment.</li> <li>▪ Divert stormwater away from the exposed soil to reduce overland flow or channel flow on the vulnerable soils.</li> </ul> </li> <li>▪ Stormwater Diversion <ul style="list-style-type: none"> <li>▪ In areas which are subject to erosion potential (slopes &gt;5%), stormwater diversion banks / drains (whoa-boys) should be placed diagonally across the tracks to divert stormwater to adjacent undisturbed grassed areas following completion of construction. Spacing of such diversion drains can be approximately 50 m to 70 m apart. Where slopes are &gt;5%, then more frequent spacing is required.</li> </ul> </li> <li>▪ Adequate monitoring and follow-up work following construction to ensure any initiated erosion is arrested early.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Achievement of downstream water quality targets (Turbidity, TSS)</li> <li>▪ No large scale erosion or sedimentation caused to adjacent land uses as a result of construction activities.</li> <li>▪ No evidence of additional sedimentation in watercourses as a result of erosion from construction activities.</li> <li>▪ Reinstatement of watercourses to original profile.</li> <li>▪ Adequate spacing of stormwater diversion drains in areas of erosion potential</li> </ul>   |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting)</li> </ul>   |



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|                                 | <p>undertaken in accordance with EMP and recommendations and corrective actions implemented.</p> <ul style="list-style-type: none"> <li>▪ Construction audits will include all watercourse crossings.</li> <li>▪ A post-construction audit which will evaluate revegetation, erosion control, weed control, water course bank stability will be conducted annually for two years following completion of construction.</li> </ul> |
| <b>Responsible Person</b>       | <ul style="list-style-type: none"> <li>▪ Environmental Officer</li> <li>▪ Construction Superintendant</li> <li>▪ Construction Manager</li> </ul>  |
| <b>Associated Documentation</b> | <ul style="list-style-type: none"> <li>▪ Detailed Erosion and Sediment Control Plan</li> </ul>  |

#### 4.4 Management of Flammable and Combustible Substances

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| <b>Policy</b>                                      | To ensure storage and handling of flammable and combustible substances onsite does not cause environmental harm or harm to persons.  |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ To minimise potential for land contamination.</li> <li>▪ To ensure the on-going safety of construction personnel.</li> </ul>  |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ An Emergency Response Plan shall be in place and employees inducted in its application.</li> <li>▪ Flammable and combustible substances are stored, handled, separated and signed as required by the Flammable and Combustible Liquids Regulations and AS1940.</li> <li>▪ Transportation of dangerous goods will be in accordance with the Regulations and with AS 1678, AS 2809 and AS 2931.</li> <li>▪ A qualified person will be appointed as Site Safety Officer.</li> <li>▪ An on-site set of the relevant MSDS for all flammable and combustible substances and dangerous goods used during construction will be maintained and available.</li> <li>▪ Waste flammable and combustible substances which cannot be recycled will be transported to a designated disposal site as approved by Local Government.</li> <li>▪ No refuelling of plant and equipment over or within 100m of watercourses.</li> <li>▪ Spill kits containing absorbent and containment material (e.g. absorbent matting) will be available where hazardous materials are used and stored and personnel trained in their correct use.</li> <li>▪ Spills of flammable and combustible substances will be rendered harmless and collected for treatment and / or remediation or disposal at a designated site, including cleaning materials, absorbents and contaminated soils and reinstatement made to the affected area.</li> <li>▪ Personal protective equipment (PPE) appropriate to the materials in use will be provided.</li> <li>▪ Relevant Local Government permits will be held and conditions of permits met.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ No hazardous goods contamination of the environment..</li> <li>▪ Ensure appropriate remedial action has been implemented for any spills.</li> <li>▪ Major incidents reported to relevant authorities and their directions followed.</li> <li>▪ Spill kits and PPE available and used as appropriate.</li> </ul>   |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Regular inspection of storage facilities and work practices in the handling of flammable and combustible substances or other dangerous substances.</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>  |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Construction Manager</li> <li>▪ Environmental Officer</li> </ul>  |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Nil</li> </ul>  |

#### 4.5 Noise and Vibration

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| <b>Policy</b>                                      | To minimise the impact of construction noise nuisance and vibration to nearby residences.   |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ Minimise noise nuisance generated by construction activities.</li> <li>▪ Minimise any vibration nuisance to nearby residences.</li> </ul>  |
| <b>Management Strategy</b>                         | <ul style="list-style-type: none"> <li>▪ Provide advance notice of any scheduled atypical noise events to nearby residents.</li> <li>▪ equipment maintained in accordance with manufacturer's specifications.</li> <li>▪ Schedule atypical noise events for appropriate times.</li> <li>▪ Any blasting is to be carried out in accordance with current practice standards with particular reference to AS 2187.</li> <li>▪ Maintain liaison with nearby residents.</li> <li>▪ Noisy construction activities in proximity to residences to be limited to 7.00 am to 6.00 pm Monday to Saturday or in accordance with local permits.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Number of noise related complaints received from residents during construction.</li> <li>▪ Evidence of repair and replacement of faulty equipment as soon as possible.</li> <li>▪ Evidence of condition surveys.</li> </ul>  |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Complaints Register – recorded and closed out.</li> <li>▪ Noise survey in the event of complaint.</li> <li>▪ Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>  |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Construction Manager</li> </ul>  |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Complaints Register</li> <li>▪ Marshall Day Accoustics Report November 2013</li> </ul>   |

4.6 Air Emissions

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| <b>Policy</b>                                      | To complete the installation of each WTG line in a manner to maintain ambient air quality of the local area.   |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ To maintain acceptable limits of vehicular and machinery operating emissions and to receive zero complaints from local landholders regarding air quality.</li> <li>▪ To minimise the generation of fugitive dust emissions produced during construction.</li> </ul>   |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ Vehicles and machinery shall be maintained in accordance with manufacturer's specifications.</li> <li>▪ Watering of construction site and access tracks will be carried out on an as required basis, particularly on dry and windy days and especially near residences.</li> <li>▪ Avoid smoke generation by a strict no burning policy.</li> <li>▪ Implement fire control measures during welding operations.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Visual observations of dust emissions during windy / dry periods</li> <li>▪ Receipt of dust nuisance complaints from nearby residents</li> <li>▪ Excessive visual dust cloud during construction activities.</li> </ul>   |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Complaints Register – recorded and closed out.</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>  |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Construction Manager</li> <li>▪ Environmental Officer</li> </ul>  |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Nil</li> </ul>  |

4.7 Waste Management

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| <b>Policy</b>                                      | To minimise waste generation and maximise reuse and recycling of construction waste products.  |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ Minimise impacts related to waste management.</li> <li>▪ No evidence of litter or refuse generated from construction related activities.</li> </ul>   |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ Stockpiling and salvaging reusable and recyclable wastes, such as timber skids, pallets, drums and scrap metals.</li> <li>▪ Collecting and removing waste oil and solvents from site for recycling, reuse or disposal at approved locations.</li> <li>▪ Disposing of sewage and sullage from camp site via a packaged mini sewerage treatment plant (greywater may be discharged to land in accordance with local approvals).</li> <li>▪ Collection of chemical wastes in 200 L drums (or similar sealed container), appropriately labelled, for safe transport to an approved chemical waste depot or collection by a liquid waste treatment service.</li> <li>▪ All binding material and dunnage from transport vehicles and unloading areas is to be collected and transported off the easement to designated disposal areas.</li> <li>▪ Collecting and transporting general refuse to a Local Government approved disposal site.</li> <li>▪ Ensure wastes are not accessible by stock or wildlife.</li> <li>▪ Refuse containers will be located at each worksite.</li> <li>▪ Where practical, wastes will be segregated and reused / recycled (e.g. scrap metal).</li> <li>▪ All personnel shall be instructed in project waste management practices as a component of the environmental induction process.</li> <li>▪ Spraying of declared plants and disposal to regulated landfill.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Clean and waste-efficient construction site</li> <li>▪ Percentage of waste recycled</li> <li>▪ Litter left onsite during construction</li> </ul>  |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Complaints Register – recorded and closed out.</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular housekeeping checks and a waste audit to be conducted. The camp site area is to be inspected after relocation.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>  |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Construction Manager</li> <li>▪ Environmental Officer</li> </ul>  |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Material Safety Data Sheets</li> </ul>  |

#### 4.8 Fire Management

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| <b>Policy</b>                                      | To minimise the potential for vegetation to catch fire from construction activities.  |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ No fires deliberately lit or allowed to remain alight along the WTG line or other project related worksites.</li> <li>▪ No build-up of flammable material during construction near hot work areas.</li> </ul>  |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ Open fires will be banned on the project. Fires include open barbeques, billy fires, brush burning and rubbish burning.</li> <li>▪ Adoption of lightning protection measures for both turbines and substations.</li> <li>▪ Unnecessary build-up of flammable material near working areas will be prevented, with vegetation and other flammable material being stockpiled well clear of hot work activities.</li> <li>▪ Water trucks (also used for dust suppression) will be available for use as fire trucks in the event of fire.</li> <li>▪ All vehicles will be equipped with portable fire extinguishers.</li> <li>▪ Fire extinguishers and a water cart will be available to the welding crew. All appropriate crew members will be trained in the use of fire fighting equipment.</li> <li>▪ Emergency Response Plan shall include details on local contacts for fire fighting assistance.</li> <li>▪ Construction management liaison with local Rural Fire Service personnel during high fire periods.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Fire frequency.</li> <li>▪ Ignition from lightning strikes</li> <li>▪ Build-up of flammable material near hot work areas.</li> <li>▪ Emergency Response Plan in place.</li> <li>▪ Permits and approvals as required.</li> </ul>  |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>   |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Environmental Officer</li> <li>▪ Construction Supervisor</li> </ul>  |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ RACL Fire Management Plan</li> </ul>   |

## 5.0 Operational EMP

### 5.1 Access and Landholder Relationships

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| <b>Policy</b>                     | To minimise the impact on surrounding landholders.  |
| <b>Performance Objectives</b>     | <ul style="list-style-type: none"> <li>▪ Minimise impacts to adjoining native flora and fauna</li> <li>▪ Eliminate the likelihood of the spread of weeds off site</li> <li>▪ Minimise disruption to landholder activities along Kippin Drive</li> <li>▪ Maintain regular liaison with landholders along the route</li> </ul>  |
| <b>Management Strategies</b>      | <ul style="list-style-type: none"> <li>▪ Restrict site entry to designated access track</li> <li>▪ Maintain regular liaison with landholders</li> <li>▪ Landholder concerns are addressed promptly</li> <li>▪ Erosion and sediment control measures will be maintained as required.</li> <li>▪ Ensure gates are locked where access can be obtained from a road (to ensure unauthorised users are excluded).</li> </ul> |
| <b>Performance Indicators</b>     | <ul style="list-style-type: none"> <li>▪ Complaints from land owners minimised</li> <li>▪ Erosion and sediment control in place</li> </ul>  |
| <b>Monitoring &amp; Reporting</b> | <ul style="list-style-type: none"> <li>▪ Complaint Register</li> <li>▪ Easement inspection check sheet</li> <li>▪ Independent audit every two years</li> </ul>  |
| <b>Responsible Person</b>         | <ul style="list-style-type: none"> <li>▪ Site Manager</li> </ul>  |
| <b>Associated Documentation</b>   | <ul style="list-style-type: none"> <li>▪</li> </ul>   |

### 5.2 Flora Management

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| <b>Policy</b>                     | To promote vegetation re-establishment, and promote a stable landform.  |
| <b>Performance Objectives</b>     | <ul style="list-style-type: none"> <li>▪ Promote the establishment of ground cover plants and zones of native vegetation (including shrubs and trees) on all areas of disturbance.</li> <li>▪ Promote natural regeneration of native plant communities on temporarily cleared areas.</li> <li>▪ In addition to typical regenerating vegetation, planting and transplanting of conservation significant plant species in appropriate areas wherever possible.</li> <li>▪ Maintenance of revegetation and rehabilitation areas in accordance with the Rehabilitation Plan and Conservation Significant Plant Management Plan.</li> <li>▪ Ensure that weeds are not spread along WTG access tracks, particularly environmental weeds, declared plants and invasive grasses.</li> </ul> |
| <b>Management Strategies</b>      | <ul style="list-style-type: none"> <li>▪ Promote low regrowth of native plants along access track verges. Pads required for crane access during maintenance may be grassed with native species or a species certified to be sterile and non-weed forming. This may require spreading native grass seed following rain.</li> <li>▪ Monthly weed survey by supervising botanist (monthly during wet season for first 2 years after construction); control of weeds along the WTG access tracks, turbine pads and contractors yard implemented.</li> </ul>   |
| <b>Performance Indicators</b>     | <ul style="list-style-type: none"> <li>▪ Track verges, turbine pads stabilized and revegetated or rehabilitated according to Rehabilitation Plan.</li> <li>▪ Nil declared, invasive or environmental weeds present. All outbreaks controlled before setting flowers and seeds.</li> </ul>   |
| <b>Responsible Person</b>         | <ul style="list-style-type: none"> <li>▪ Site Manager and supervising botanist.</li> </ul>  |
| <b>Monitoring &amp; Reporting</b> | <ul style="list-style-type: none"> <li>▪ Monthly and weekly inspection check sheets</li> <li>▪ Independent audit every year</li> <li>▪ Weed records to be maintained according to Weed Management Plan.</li> </ul>  |

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| <b>Responsible Person</b>       | <ul style="list-style-type: none"> <li>▪ Site Manager and supervising botanist</li> <li>▪ Ratch Project Manager</li> </ul> |
| <b>Associated Documentation</b> | <ul style="list-style-type: none"> <li>▪</li> </ul>  |

### 5.3 Fauna Management

|                                   |  |
|-----------------------------------|--|
| <b>Policy</b>                     | To minimise the effect on fauna and habitat.   |
| <b>Performance Objectives</b>     | <ul style="list-style-type: none"> <li>▪ Minimise impacts to native fauna.</li> <li>▪ Where practicable, avoid disturbance to endangered, vulnerable and rare fauna species.</li> <li>▪ Minimise habitat fragmentation and promote habitat regeneration where practicable.</li> <li>▪ Pest animals and animal pest diseases not spread as a result of construction activities.</li> <li>▪ Prevent introduction and spread of declared and invasive weeds</li> </ul>  |
| <b>Management Strategies</b>      | <ul style="list-style-type: none"> <li>▪ Adaptive management strategies in accordance with Significant Species management Plans. Key elements of these plans to include: <ul style="list-style-type: none"> <li>▪ Trial visual and acoustic automated collision detection systems (TADS/WT-Bird etc.)</li> <li>▪ Conduct carcass searches (calibrated for scavenger removal and detectability); validate collision risk model.</li> <li>▪ Conduct call activity surveys at turbines within RSA</li> <li>▪ Curtail operation of all/some of turbines during high-risk conditions or in response to detected excessive collision mortality</li> <li>▪ Operate avian and bat radar SCADA system to implement automatic turbine shut-down</li> </ul> </li> </ul> |
| <b>Performance Indicators</b>     | <ul style="list-style-type: none"> <li>▪ Mortality of endangered species within approved limits; and</li> <li>▪ Compliance with species management plans</li> </ul>  |
| <b>Monitoring &amp; Reporting</b> | <ul style="list-style-type: none"> <li>▪ Annual (quarterly for first 2 years) reports in accordance with Significant Species Management Plans and approval conditions, including mortality surveys</li> </ul>  |
| <b>Responsible Person</b>         | <ul style="list-style-type: none"> <li>▪ Site Manager</li> <li>▪ RACL Project Manager</li> </ul>   |
| <b>Associated Documentation</b>   | <ul style="list-style-type: none"> <li>▪</li> </ul>  |

### 5.4 Erosion and Sediment Control

|                               |   |
|-------------------------------|---|
| <b>Policy</b>                 | To ensure erosion and sediment control measures along access tracks and turbine pads are effectively maintained.  |
| <b>Performance Objectives</b> | <ul style="list-style-type: none"> <li>▪ Minimise soil erosion</li> <li>▪ Minimise sedimentation of land</li> <li>▪ Minimise modification to drainage patterns</li> <li>▪ Prevent as far as practical, sediment transport to adjacent watercourses.</li> </ul>  |
| <b>Management Strategies</b>  | <ul style="list-style-type: none"> <li>▪ Inspect all disturbed areas monthly and maintain erosion and sediment controls as necessary.</li> <li>▪ Place additional erosion control structures such as diversion banks / drains, rock check dams, rock armouring, whoa-boys) at key locations if additional erosion is detected along tracks.</li> <li>▪ Divert stormwater away from tracks if necessary.</li> <li>▪ Ensure replacement of any erosion control measures as required.</li> <li>▪ Monitor downs stream water quality (turbidity) for first 12 months after construction.</li> </ul> |
| <b>Performance Indicators</b> | <ul style="list-style-type: none"> <li>▪ No large scale erosion or sedimentation caused to adjacent land uses as a result of construction activities.</li> <li>▪ No evidence of additional sedimentation in watercourses as a result of erosion from operational activities.</li> </ul>   |



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|-----------------------------------|--|
|                                   | <ul style="list-style-type: none"> <li>▪ Compliance with water quality targets</li> </ul>                                |
| <b>Monitoring &amp; Reporting</b> | <ul style="list-style-type: none"> <li>▪ inspection check sheets</li> <li>▪ Independent audit every two years</li> </ul> |
| <b>Responsible Person</b>         | <ul style="list-style-type: none"> <li>▪ Site Manager</li> </ul>   |
| <b>Associated Documentation</b>   | <ul style="list-style-type: none"> <li>▪</li> </ul>  |

**5.5 Management of Flammable and Combustible Substances**

|                                   |   |
|-----------------------------------|---|
| <b>Policy</b>                     | To ensure that storage and handling of flammable and combustible substances onsite Does not cause environmental harm or harm to persons.  |
| <b>Performance Objectives</b>     | <ul style="list-style-type: none"> <li>▪ To minimise potential for land contamination.</li> <li>▪ To ensure the on-going safety of operational personnel.</li> </ul>  |
| <b>Management Strategies</b>      | <ul style="list-style-type: none"> <li>▪ An Emergency Response Plan in place and employees inducted in its application.</li> <li>▪ Flammable and combustible substances are stored, handled, separated and signed as required by the Flammable and Combustible Liquids Regulations and AS 1940.</li> <li>▪ Relevant MSDS for all flammable and combustible substances and dangerous goods maintained.</li> <li>▪ Waste flammable and combustible substances which cannot be recycled will be transported to a designated disposal site as approved by Local Government.</li> <li>▪ Spill kits containing absorbent and containment material (e.g. absorbent matting) will be available where hazardous materials are used and stored and personnel trained in their correct use.</li> <li>▪ Spills of flammable and combustible substances will be rendered harmless and collected for treatment and / or remediation or disposal at a designated site, including cleaning materials, absorbents and contaminated soils and affected area reinstated.</li> <li>▪ Personal protective equipment (PPE) appropriate to the materials in use, will be provided.</li> <li>▪ Relevant Local Government permits will be held and conditions of permits met.</li> </ul> |
| <b>Performance Indicators</b>     | <ul style="list-style-type: none"> <li>▪ No hazardous goods contamination of the environment.</li> <li>▪ Ensure appropriate remedial action has been implemented for any spills.</li> <li>▪ Spill kits and PPE available for use.</li> </ul>  |
| <b>Monitoring &amp; Reporting</b> | <ul style="list-style-type: none"> <li>▪ HSE check list and annual audit</li> </ul>   |
| <b>Responsible Person</b>         | <ul style="list-style-type: none"> <li>▪ Site Manager</li> </ul>  |
| <b>Associated Documentation</b>   | <ul style="list-style-type: none"> <li>▪</li> </ul>   |

5.6 Noise

|                                   |  |
|-----------------------------------|--|
| <b>Policy</b>                     | To minimise the impact of noise nuisance from wind farm maintenance activities to nearby residences.   |
| <b>Performance Objectives</b>     | <ul style="list-style-type: none"> <li>▪ Minimise noise nuisance generated by operation and maintenance activities.</li> </ul>   |
| <b>Management Strategy</b>        | <ul style="list-style-type: none"> <li>▪ Provide advance notice of any scheduled maintenance activities to nearby residents.</li> <li>▪ Schedule noisy maintenance activities to appropriate times.</li> <li>▪ Maintain liaison with nearby residents.</li> <li>▪ Advise nearby residents in advance if any planned venting or other noisy activities are to be undertaken.</li> <li>▪ Conduct Noise impact monitoring of operation within three months of commencement and review mitigation measures as necessary</li> </ul> |
| <b>Performance Indicators</b>     | <ul style="list-style-type: none"> <li>▪ Number of noise related complaints received from residents.</li> </ul>  |
| <b>Monitoring &amp; Reporting</b> | <ul style="list-style-type: none"> <li>▪ Complaint Register</li> <li>▪ Independent audit every year (years 1-3) then every two years</li> </ul>  |
| <b>Responsible Person</b>         | <ul style="list-style-type: none"> <li>▪ Site Manger</li> <li>▪ RACL Project Manager</li> </ul>  |
| <b>Associated Documentation</b>   | <ul style="list-style-type: none"> <li>▪</li> </ul>  |

5.7 Waste Management

|                                   |  |
|-----------------------------------|--|
| <b>Policy</b>                     | To minimise waste generation and maximise reuse and recycling of waste products.   |
| <b>Performance Objectives</b>     | <ul style="list-style-type: none"> <li>▪ Minimise impacts related to waste management.</li> <li>▪ No evidence of litter or refuse generated from maintenance activities.</li> </ul>  |
| <b>Management Strategies</b>      | <ul style="list-style-type: none"> <li>▪ Collecting and removing waste oil and solvents for recycling, reuse or disposal at approved locations.</li> <li>▪ Where practical, wastes will be segregated and reused / recycled (e.g. scrap metal).</li> <li>▪ All maintenance personnel shall be instructed in waste management practices as a component of their induction process.</li> </ul> |
| <b>Performance Indicators</b>     | <ul style="list-style-type: none"> <li>▪ Percentage of waste recycled</li> <li>▪ Litter left onsite after maintenance activities</li> </ul>  |
| <b>Monitoring &amp; Reporting</b> | <ul style="list-style-type: none"> <li>▪ Easement inspection check sheet</li> </ul>  |
| <b>Responsible Person</b>         | <ul style="list-style-type: none"> <li>▪ Site Manager</li> </ul>   |
| <b>Associated Documentation</b>   | <ul style="list-style-type: none"> <li>▪</li> </ul>  |

## 6.0 Decommissioning EMP

### 6.1 Access

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| <b>Policy</b>                                       | <p>Existing cleared areas and access tracks shall be used to access the WTG's so as to minimise the impact on vegetation and existing land use and minimise potential for weed invasion.</p> <p>Safely manage the transportation of wind turbine components in accordance with the Traffic Management Plan.</p>   |
| <b>Performance Objectives</b>                       | <ul style="list-style-type: none"> <li>▪ Minimise impacts to native flora and fauna.</li> <li>▪ Minimise impacts to soil and water.</li> <li>▪ Avoid adverse impacts on cultural and historic heritage sites.</li> <li>▪ Reduce the likelihood of the spread of weeds and fauna pests.</li> <li>▪ As far as reasonably practicable, prevent movement of pest animals across declared barrier fences.</li> <li>▪ Safely manage the transportation of WTG elements.</li> <li>▪ Minimise any new access tracks and the number of access tracks.</li> <li>▪ Minimise disruption to landholder activities and third parties.</li> <li>▪ Manage road and track usage, and achieve satisfactory road and site rehabilitation.</li> <li>▪ Minimise damage to existing road networks.</li> <li>▪ Stakeholder consultation plan implemented.</li> </ul>   |
| <b>Management Strategies</b>                        | <ul style="list-style-type: none"> <li>▪ Existing roads and tracks will be used where practicable.</li> <li>▪ New access tracks and any diversions will generally be avoided, but if necessary, will be selected to minimise impacts on sensitive vegetation, erosion-prone soils and watercourse crossings; avoid any significant cultural heritage sites in accordance with the CHMP and minimise noise to nearby residents. New access tracks and diversions will only be used by agreement with the landholder.</li> <li>▪ Consultation shall occur between Decommissioning Manager and senior police management at Mareeba and Atherton to ensure any potential cumulative impacts are mitigated.</li> <li>▪ Disturbance (including access) to No-go areas shall be avoided. These shall be marked with flagging tape, paraweb fencing or equivalent.</li> <li>▪ Wash down of plant and equipment (including vehicles) following work in any declared plant area.</li> <li>▪ Erosion and sediment control measures will be used as and where required.</li> <li>▪ Speed and weight restrictions will be applied to project vehicles as appropriate.</li> <li>▪ Any damage to existing roads and tracks shall be repaired regularly.</li> <li>▪ Safely manage the transport of WTG components in accordance with the TMP to be developed in conjunction with local governments, QPS and DTMR.</li> <li>▪ Undertake a road condition survey of roads used by the Project.</li> </ul> |
| <b>Performance Indicators</b>                       | <ul style="list-style-type: none"> <li>▪ Access readily manageable and able to be rehabilitated using standard techniques.</li> <li>▪ Complaints from land owners, authorities and public are minimised.</li> <li>▪ Erosion and sediment control in place.</li> <li>▪ Condition of existing roads and tracks are maintained.</li> <li>▪ WTG components managed in line with transport management plan.</li> <li>▪ Road condition not deteriorated as a result of project activities or made good following deterioration caused by project activities.</li> </ul>   |
| <b>Monitoring, reporting and corrective actions</b> | <ul style="list-style-type: none"> <li>▪ Photographic records</li> <li>▪ Complaint Register – complaints recorded and closed out.</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>   |



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| <b>Responsible Person</b>       | <ul style="list-style-type: none"><li>▪ Environmental Officer / Community Liaison Officer</li></ul>  |
| <b>Associated Documentation</b> | <ul style="list-style-type: none"><li>▪ Biosecurity (including weeds) Management Strategy</li><li>▪ Decommissioning Safety Management Plan</li><li>▪ Road condition assessment</li><li>▪ Maps of access tracks</li></ul> |

## 6.2 Flora and Fauna Management

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| <b>Policy</b>                 | To minimise additional impacts and effects on vegetation and habitat for flora and fauna during the decommissioning of the wind farm, including infrastructure such as turbine pads, compounds and yards and laydown areas and the access tracks.   |
| <b>Performance Objectives</b> | <ul style="list-style-type: none"> <li>▪ Prevent impacts to native vegetation and rehabilitation and conservation areas.</li> <li>▪ Prevent weeds from entering the site. Continue application of Weed Management Plan and washdown facilities.</li> <li>▪ No spread of weeds, and plant pest diseases within the site as a result of decommissioning activities. The site will be left free of serious weeds (environmental and declared, as well as introduced pasture grasses).</li> <li>▪ Where practicable, avoid disturbance to endangered, vulnerable, rare and poorly known flora species that have regenerated adjacent to or in original construction zones. Avoid all impacts to these types of plants and habitats outside of the original construction zone.</li> <li>▪ No net loss of habitat connectivity or additional habitat fragmentation to occur.</li> <li>▪ Offset programme for rare, endangered or vulnerable plants has been successful and the objectives have been met as outlined in respective Management Plans.</li> </ul>  |
| <b>Management Strategies</b>  | <ul style="list-style-type: none"> <li>▪ A post-decommissioning survey undertaken to identify rare and threatened species within the decommissioning zone.</li> <li>▪ Flag individual significant plant species (including habitat trees) which are located in the decommissioning zone so they may be avoided where practicable during operational work.</li> <li>▪ Placement of physical barriers around significant vegetation areas in order to restrict access and avoid further disturbance.</li> <li>▪ Harvesting seeds for replacement use in rehabilitation zones, where natural regeneration was not successful.</li> <li>▪ Ensure adequate measures are in place to safeguard and assist the movement of fauna from the decommissioning zone.</li> <li>▪ All weeds established within the site are to be recorded in a decommissioning weed survey.</li> <li>▪ Control environmental and declared weeds within and adjacent to the decommissioning zone. This should be performed in accordance with the methods and control measures detailed in the Weed Management Plan;</li> <li>▪ Management strategies for the continued health and population growth of conservation significant flora and fauna are implemented and have a success rate that meets criteria detailed in respective species' management plans.</li> </ul>   |
| <b>Performance Indicators</b> | <ul style="list-style-type: none"> <li>▪ Vegetation, ecosystems, habitats and conservation significant species of flora and fauna are not suffering from adverse impacts,</li> <li>▪ Matters of National Environmental Significance are maintained in their current condition with negligible declines in population dynamics and the numbers of species present on the site.</li> <li>▪ Minimal disturbance to flora and fauna has occurred as a result of decommissioning the wind farm.</li> <li>▪ Restoration (successful rehabilitation) has resulted from progressive rehabilitation and environmental management of the wind farm site. Vegetation communities have recovered with a major proportion of the flora comprising native species.</li> <li>▪ No failure or irreversible decline of rehabilitation measures.</li> <li>▪ The dominant ground cover adjacent to tracks and turbine pads comprises native species and not introduced pasture grasses or legumes.</li> <li>▪ No damage to protected species or designated conservation zones without relevant approval and supervision.</li> <li>▪ Ensure relevant permits are effective before removing any protected species.</li> <li>▪ Declared plants and environmental weeds are adequately controlled, and no fauna pests are introduced into the site</li> <li>▪ Plant species planted for the offset programme are self-sustaining and do not require</li> </ul> |

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|  | human assistance to survive. Rehabilitated plant communities should be persistent in the landscape able to function without intervention.  |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic records to be maintained.</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> <li>▪ Offset planting to be monitored for a period of 3 years following rehabilitation to ensure survival and replacement of mortalities.</li> </ul> |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Environmental Officer and respective environmental advisors.</li> </ul>   |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Weed Management Plan</li> <li>▪ Conservation Significant Plant Species Management Plan</li> <li>▪ Threatened Plant Species Translocation Plan</li> <li>▪ Environmental Offsets Plan Conservation Significant Plant Management Plan</li> <li>▪ Rehabilitation Plan</li> <li>▪ Offset Programme</li> <li>▪ EIS technical reports</li> </ul>   |

### 6.3 Erosion and Sediment Control

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| <b>Policy</b>                 | To provide effective erosion and sediment practices to mitigate the potential effects of construction on watercourses, land use and the general environment.   |
| <b>Performance Objectives</b> | <ul style="list-style-type: none"> <li>▪ Minimise soil erosion.</li> <li>▪ Minimise sedimentation of land.</li> <li>▪ Minimise modification to drainage patterns.</li> <li>▪ Prevent as far as practical, sediment transport to adjacent watercourses.</li> </ul>  |
| <b>Management Strategies</b>  | <ul style="list-style-type: none"> <li>▪ Conduct activities in accordance with a detailed Erosion and Sediment Control Plan (ESCP).</li> <li>▪ Minimise the quantity and duration of soil exposure.</li> <li>▪ Protect topsoil, root and seed stock.</li> <li>▪ Protect critical areas during and after construction by reducing the velocity of stormwater flow and redirecting runoff onto undisturbed areas.</li> <li>▪ Install and maintain temporary erosion and sediment control measures during construction.</li> <li>▪ Re-contour modified landforms to their original condition as soon as practicable including any erosion controls established prior to construction.</li> <li>▪ Replace topsoil and seed stock to facilitate revegetation as soon as practicable following construction.</li> <li>▪ Inspect disturbed areas and maintain erosion and sediment controls as necessary during and after construction until stabilisation is achieved.</li> <li>▪ Strict implementation of permanent stormwater diversion drains on all hilly slopes (approximately 20 m intervals, depending on slope).</li> <li>▪ Strict implementation of silt mesh fencing and stormwater diversion drains on the banks of all waterways containing flowing water during construction.</li> <li>▪ Highly erodible soils are identified by visual inspection of the site to identify the extent and location of existing soil erosion.</li> <li>▪ Where highly erodible soils are identified, and if the area cannot be reasonably avoided, the following controls should be implemented:             <ul style="list-style-type: none"> <li>▪ Keep the work area to a minimum so that the smallest possible ground area is disturbed.</li> <li>▪ Place erosion control structures such as diversion drains and silt fences at key locations to capture the suspended sediment.</li> <li>▪ Divert stormwater away from the exposed soil to reduce overland flow or channel flow on the vulnerable soils.</li> </ul> </li> </ul> |

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|  | <ul style="list-style-type: none"> <li>▪ For wet crossings, the following sediment controls should be implemented:</li> <li>▪ Place erosion control structures such as rock check dams and sand bags in the channel to slow velocity and capture suspended sediment.</li> <li>▪ Divert stormwater away from disturbed channels or swales to minimise the flow of water and erosion potential.</li> <li>▪ Minimise disturbance to the existing channel. This may involve constructing a temporary access across small swales and channels.</li> <li>▪ If flow modification is necessary during construction, reinstate the channel on completion of works.</li> <li>▪ Reinstate all existing erosion control structures on completion of works.</li> <li>▪ Stormwater Diversion</li> <li>▪ In areas which are subject to erosion potential (slopes &gt;5%), stormwater diversion banks / drains (whoa-boys) should be placed diagonally across access tracks to divert stormwater to adjacent undisturbed grassed areas following completion of construction. Spacing of such diversion drains can be approximately 50 m to 70 m apart. Where slopes are &gt;5%, then more frequent spacing is required.</li> <li>▪ Adequate monitoring and follow-up work following construction to ensure any initiated erosion is arrested early.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ No large scale erosion or sedimentation caused to adjacent land uses as a result of construction activities.</li> <li>▪ No evidence of additional sedimentation in watercourses as a result of erosion from construction activities.</li> <li>▪ Reinstatement of watercourses to original profile.</li> <li>▪ Adequate spacing of stormwater diversion drains in areas of erosion potential.</li> </ul>   |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> <li>▪ Construction audits will include all watercourse crossings.</li> <li>▪ A post-construction audit which will evaluate revegetation, erosion control, weed control, water course bank stability will be conducted annually for two years following completion of construction.</li> </ul>  |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Environmental Officer and Community Liaison Officer</li> </ul>  |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Erosion and Sediment Control Plan</li> </ul>  |

**6.4 Management of Flammable and Combustible Substances**

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| <b>Policy</b>                                      | To ensure storage and handling of flammable and combustible substances onsite does not cause environmental harm or harm to persons.  |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ To minimise potential for land contamination.</li> <li>▪ To ensure the on-going safety of construction personnel.</li> </ul>  |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ An Emergency Response Plan shall be in place and employees inducted in its application.</li> <li>▪ Flammable and combustible substances are stored, handled, separated and signed as required by the Flammable and Combustible Liquids Regulations and AS1940.</li> <li>▪ Transportation of dangerous goods will be in accordance with the Regulations and with AS 1678, AS 2809 and AS 2931.</li> <li>▪ A qualified person will be appointed as Site Safety Officer.</li> <li>▪ An on-site set of the relevant MSDS for all flammable and combustible substances and dangerous goods used during construction will be maintained and available.</li> <li>▪ Waste flammable and combustible substances which cannot be recycled will be transported to a designated disposal site as approved by Local Government.</li> <li>▪ No refuelling of plant and equipment over or within 100m of watercourses.</li> <li>▪ Spill kits containing absorbent and containment material (e.g. absorbent matting) will be available where hazardous materials are used and stored and personnel trained in their correct use.</li> <li>▪ Spills of flammable and combustible substances will be rendered harmless and collected for treatment and / or remediation or disposal at a designated site, including cleaning materials, absorbents and contaminated soils and reinstatement made to the affected area.</li> <li>▪ Personal protective equipment (PPE) appropriate to the materials in use will be provided.</li> <li>▪ Relevant Local Government permits will be held and conditions of permits met.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ No hazardous goods contamination of the environment.</li> <li>▪ Cut off flowpath to drains / watercourses e.g. sand bags, earthen bund, in the event of a spill.</li> <li>▪ Ensure appropriate remedial action has been implemented for any spills.</li> <li>▪ Major incidents reported to relevant authorities and their directions followed.</li> <li>▪ Spill kits and PPE available and used as appropriate.</li> </ul>  |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Regular inspection of storage facilities and work practices in the handling of flammable and combustible substances or other dangerous substances.</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>  |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Construction Manager</li> </ul>   |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Flammable and Combustible Liquids Regulations and AS1940</li> </ul>   |



6.5 Noise and Vibration

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| <b>Policy</b>                                      | To minimise the impact of construction noise nuisance and vibration to nearby residences.  |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ Minimise noise nuisance generated by construction activities.</li> <li>▪ Minimise any vibration nuisance to nearby residences.</li> </ul>   |
| <b>Management Strategy</b>                         | <ul style="list-style-type: none"> <li>▪ Provide advance notice of any scheduled atypical noise events to nearby residents.</li> <li>▪ Ensure camp sites are located a sufficient distance from residences to limit any noise nuisance.</li> <li>▪ Equipment maintained in accordance with manufacturer's specifications.</li> <li>▪ Schedule atypical noise events for appropriate times.</li> <li>▪ Any blasting is to be carried out in accordance with current practice standards with particular reference to AS 2187.</li> <li>▪ Maintain liaison with nearby residents.</li> <li>▪ Noisy construction activities in proximity to homesteads to be limited to 7.00 am to 6.00 pm Monday to Saturday or as stipulated in approval permits.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Number of noise related complaints received from residents during construction.</li> <li>▪ Evidence of repair and replacement of faulty equipment as soon as possible.</li> <li>▪ Evidence of condition surveys.</li> </ul>   |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Complaints Register – recorded and closed out.</li> <li>▪ Noise survey in the event of complaint.</li> <li>▪ Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>   |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Construction Manager</li> </ul>   |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Complaints Register</li> </ul>  |

6.6 Air Emissions

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| <b>Policy</b>                                      | To complete the installation of each WTG and access track in a manner to maintain ambient air quality of the local area.   |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ To maintain acceptable limits of vehicular and machinery operating emissions and to receive zero complaints from local landholders regarding air quality.</li> <li>▪ To minimise the generation of fugitive dust emissions produced during construction.</li> </ul>   |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ Vehicles and machinery shall be maintained in accordance with manufacturer's specifications.</li> <li>▪ Watering of construction site and access tracks will be carried out on an as required basis, particularly on dry and windy days and especially near residential homesteads.</li> <li>▪ Avoid smoke generation by a strict no burning policy.</li> <li>▪ Implement fire control measures during welding operations.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Visual observations of dust emissions during windy / dry periods</li> <li>▪ Receipt of dust nuisance complaints from nearby residents</li> <li>▪ Excessive visual dust cloud during construction activities.</li> </ul>   |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Complaints Register – recorded and closed out.</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>  |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Construction Manager</li> </ul>   |

|                                 |   |
|---------------------------------|---|
| <b>Associated Documentation</b> | <ul style="list-style-type: none"> <li>▪ Nil</li> </ul> |
|---------------------------------|---|

**6.7 Waste Management**

|  |  |
|--|--|
| <b>Policy</b>                                      | To minimise waste generation and maximise reuse and recycling of construction waste products.  |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ Minimise impacts related to waste management.</li> <li>▪ No evidence of litter or refuse generated from construction related activities.</li> </ul>   |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ Stockpiling and salvaging reusable and recyclable wastes, such as timber skids, pallets, drums and scrap metals.</li> <li>▪ Collecting and removing waste oil and solvents from site for recycling, reuse or disposal at approved locations.</li> <li>▪ Disposing of sewage and sullage from camp sites via a packaged mini sewerage treatment plant (greywater may be discharged to land).</li> <li>▪ Collection of chemical wastes in 200 L drums (or similar sealed container), appropriately labelled, for safe transport to an approved chemical waste depot or collection by a liquid waste treatment service.</li> <li>▪ All binding material and dunnage from transport vehicles and unloading areas is to be collected and transported off the easement to designated disposal areas.</li> <li>▪ Collecting and transporting general refuse to a Local Government approved disposal site.</li> <li>▪ Ensure wastes are not accessible by stock or wildlife.</li> <li>▪ Refuse containers will be located at each worksite.</li> <li>▪ Where practical, wastes will be segregated and reused / recycled (e.g. scrap metal).</li> <li>▪ All personnel shall be instructed in project waste management practices as a component of the environmental induction process.</li> <li>▪ Spraying of declared plants and disposal to regulated landfill.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Clean and waste-efficient construction site</li> <li>▪ Percentage of waste recycled</li> <li>▪ Nil litter left onsite during construction</li> </ul>  |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic Records</li> <li>▪ Complaints Register – recorded and closed out.</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular housekeeping checks and a waste audit to be conducted. The camp site area is to be inspected after relocation.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>  |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Construction Manager</li> </ul>   |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Nil</li> </ul>  |

## 6.8 Fire Management

|  |   |
|--|---|
| <b>Policy</b>                                      | To minimise the potential for vegetation to catch fire from construction activities.  |
| <b>Performance Objectives</b>                      | <ul style="list-style-type: none"> <li>▪ No fires deliberately lit or allowed to remain alight at WTG sites or access tracks or other project related worksites.</li> <li>▪ No build-up of flammable material during construction near hot work areas.</li> </ul>   |
| <b>Management Strategies</b>                       | <ul style="list-style-type: none"> <li>▪ Open fires will be banned on the project. Fires include open barbeques, billy fires, brush burning and rubbish burning.</li> <li>▪ Unnecessary build-up of flammable material near working areas will be prevented, with vegetation and other flammable material being stockpiled well clear of hot work activities.</li> <li>▪ Water trucks (also used for dust suppression) will be available for use as fire trucks in the event of fire.</li> <li>▪ All vehicles will be equipped with portable fire extinguishers.</li> <li>▪ Fire extinguishers and a water cart will be available to the welding crew. All appropriate crew members will be trained in the use of fire fighting equipment.</li> <li>▪ Emergency Response Plan shall include details on local contacts for fire fighting assistance.</li> <li>▪ Construction management liaison with local Rural Fire Service personnel during high fire periods.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ Nil Construction related fires</li> <li>▪ Build-up of flammable material near hot work areas.</li> <li>▪ Emergency Response Plan in place.</li> <li>▪ Permits and approvals as required.</li> </ul>  |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Complaints Register – recorded and closed out.</li> <li>▪ Daily Check Sheets – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> </ul>   |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Environmental Officer and Community Liaison Officer</li> </ul>   |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Emergency Response Plan</li> </ul>   |

## 6.9 Clean up and Rehabilitation

|                               |  |
|-------------------------------|--|
| <b>Policy</b>                 | To restore the land to a status that is comparable to the condition of the pre-construction environmental characteristics.   |
| <b>Performance Objectives</b> | <ul style="list-style-type: none"> <li>▪ Minimise soil erosion</li> <li>▪ WTG line stable</li> <li>▪ Minimise modification of drainage patterns</li> <li>▪ Minimise weed invasion</li> <li>▪ Minimise visual impact</li> <li>▪ Minimise adverse impacts on other land uses</li> </ul>  |
| <b>Management Strategies</b>  | <ul style="list-style-type: none"> <li>▪ Stockpiled topsoil and seed stock will be respread on prepared surfaces in an even layer to assist natural regeneration. Minor surface roughness will be encouraged when spreading topsoil to trap water and seed.</li> <li>▪ Visual markers used to identify clearing boundaries and sensitive features, will be removed.</li> <li>▪ Hollow-bearing logs and coarse woody debris are to be repositioned on decommissioned sites to provide habitat for fauna.</li> <li>▪ Where ground conditions allow, compaction relief will be undertaken where required by scarifying soils along the contours.</li> <li>▪ Former turbine pads will be re-profiled according to the nearest and most appropriate landform (i.e. additional slopes will not be created).</li> </ul> |

|  |   |
|--|---|
|  | <ul style="list-style-type: none"> <li>▪ Erosion and sediment control measures will be installed where necessary. Existing soil erosion measures will be reinstated to a condition at least equal to the pre-existing state.</li> <li>▪ All waste materials and equipment will be removed from the site following decommissioning.</li> <li>▪ Soil material is to be returned to the same general area from which it was extracted to minimise the risk of the spread of weeds, pests and diseases.</li> <li>▪ Where disturbed areas are to be re-planted or re-seeded, only local provenance native species sourced from a local seed bank will be used. If direct-seeding is recommended for particular situations as detailed in the Rehabilitation Plan, the seed mixtures will be formulated for the conditions of the area.</li> <li>▪ Where applied, seed will be evenly spread over the entire disturbed area.</li> <li>▪ Direct-seeding will take place as soon as practicable during clean up and when ground conditions are most conducive to seed germination.</li> <li>▪ Fertilisers and soil supplements will be used only if prescribed in the Rehabilitation Plan or approved through specific expert advice.</li> <li>▪ Two monitoring sites for each Regional Ecosystem to be rehabilitated are required to be established as a benchmark from which to measure performance of rehabilitation.</li> </ul> |
| <b>Performance Indicators</b>                      | <ul style="list-style-type: none"> <li>▪ No new weed species introduced</li> <li>▪ Weed Management implemented</li> <li>▪ Groundcover re-established</li> <li>▪ No change in drainage pattern leading to soil erosion</li> <li>▪ Stable landforms</li> </ul>  |
| <b>Monitoring, Reporting and Corrective Action</b> | <ul style="list-style-type: none"> <li>▪ Photographic records from monitoring sites.</li> <li>▪ Check Sheets (recorded at monitoring sites) – completed and reviewed by manager / supervisor.</li> <li>▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented.</li> <li>▪ Post Construction Audits</li> <li>▪ Regular Easement Inspections</li> </ul>   |
| <b>Responsible Person</b>                          | <ul style="list-style-type: none"> <li>▪ Environmental Officer and Construction Manager</li> </ul>  |
| <b>Associated Documentation</b>                    | <ul style="list-style-type: none"> <li>▪ Rehabilitation Plan</li> </ul>   |

# Mount Emerald Wind Farm Traffic Impact Assessment

RATCH-AUSTRALIA CORPORATION LIMITED

## Technical Note 2 - Traffic Impact Assessment Engineering Response

Traffic Impact Questions 23 to 26 | Rev 1

Response to Ministerial Call-In Information Request - TRAFFIC

29 August 2014

PLANS AND DOCUMENTS  
 Referred to in the  
 DEVELOPMENT APPROVAL  
 Date 24 APR 2015  
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**JACOBS**

**Mount Emerald Wind Farm Traffic Impact Assessment**

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## Executive Summary

This technical note responds to queries from the State Government regarding the potential traffic impact of the proposed Mount Emerald Wind Farm (MEWF). Traffic Impact queries are addressed in Questions 23 to 26.

**Question 23: Provide a clear description of all possible access routes (in their entirety) to the site for oversized vehicles. This should include at least a high level identification of constraints along the network and identification of measures that would be put in place to allow State Government and council to assess these impacts.**

In response to Question 23, two possible access routes for oversized vehicles were identified: the first via the Palmerston Highway, the second via the Kennedy Highway. A high-level investigation of constraints suggests that checks should be conducted for the full length of each route to determine restrictions to oversized vehicles. Such restrictions include horizontal and vertical geometry, horizontal and vertical clearance, and the structural integrity of culvert and bridge crossings. Appropriate permits and escorts may need to be obtained, and traffic control measures may need to be implemented to allow passage of the proposed oversized vehicles.

**Question 24: An assessment of the access to site (along Hansen Road and Springmount Road) for vertical geometry which utilises recent survey data.**

In response to Question 24, it was noted that more recent survey data or appropriate 3D mapping does not exist to provide a more detailed vertical geometry assessment of Hansen Road and Springmount Road. GPS long section drawings are provided from a previous technical note (SKM 2012) identifying possible points of conflict.

**Question 25: Provide further information on how staff travel to site can be managed in a way that will allow the maximum number of staff vehicles to remain below 30 vehicles per day as indicated in the Traffic Impact Assessment.**

In response to Question 25, the estimate of 30 vehicles per day for construction staff traffic is achievable based on eight 30-seater busses, eight light vehicles, and a nominal 10 additional vehicles for various purposes. These figures were based on pre-feasibility estimates of worker numbers and construction schedules that would need to be confirmed by the nominated contractor in their construction traffic management plan. It is recommended that this plan be developed in consultation with relevant stakeholders.

**Question 26: Should sufficient measures to restrict staff traffic to 30 vehicles per day not be provided, a new assessment identifying the worst case traffic impact on the road network should be provided.**

In response to Question 26, a new assessment identifying the worst case traffic impact on the road network is not required as it is possible to restrict staff traffic to less than 30 vehicles per day.

These conclusions are given strictly in accordance with and subject to the following limitations and recommendations:

The sole purpose of this report and the associated services performed by Jacobs is to respond to an information request as part of ministerial call-in by the State Government for the assessment of the MEWF Project as proposed by RATCH-Australia Corporation Limited in accordance with the scope of services set out in the contract between Jacobs and the Client (RATCH-Australia Corporation Limited). That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations, and conclusions expressed in this report.



Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations, and findings expressed in this report, to the extent permitted by law.

This report should be read in full and in conjunction with the following reports:

- Mount Emerald Wind Farm Traffic Impact Assessment (TIA) – 8 August 2011 undertaken by SKM. This report will be referred to as SKM 2011
- Technical Note: Mount Emerald Wind Farm Traffic Impact Assessment Engineering Responses - 19 December 2012 undertaken by SKM. The report will be referred to as SKM 2012

No excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

Specific limitations include:

- Estimations of worker numbers, vehicle numbers, and types of vehicles required were provided by the Client, and parent company Transfield Services (Australia) Pty Limited, as noted in the above-mentioned reports
- Client-imposed budget and time restraints in obtaining more recent survey data, other than that gathered for the above-mentioned reports

This report has been prepared on behalf of, and for the exclusive use of, Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

## 1. Introduction

### 1.1 Purpose of this Document

Jacobs Group (Australia) Pty Ltd (Jacobs) has been commissioned by RATCH-Australia Corporation Ltd (RATCH-Australia) to provide a technical response to a further round of information requests. The proposed Mount Emerald Wind Farm (MEWF) project has been called-in by the State Government for assessment. The purpose of this report is to provide engineering input to the State Government's queries regarding the impact of traffic generated by the proposed MEWF (Questions 23 to 26).

### 1.2 Background and Current Situation

The proposed project is situated on the Atherton Tableland within the jurisdiction of Tablelands Regional Council (TRC) and is located approximately 50 kilometres south-west of Cairns in Far North Queensland. More specifically, the site is 18 kilometres south of the township of Mareeba, 15 kilometres north of Atherton, and 6 kilometres south-west of Walkamin.

The major road adjacent to the proposed site is the Kennedy Highway, which runs in a north-south direction between Mareeba and Atherton. This road forms part of the planned route for the transport of the wind tower components from their delivery location. This State-Controlled road is a two lane, two-way, sealed road with sealed shoulders, unsealed verges, and is a gazetted 23-25 m B-double route.

From the Kennedy Highway at Walkamin, the recommended (and most viable) route to the proposed MEWF site is via Hansen Road and Springmount Road, and direct access to the site is off Kippen Drive. All of these roads are locally controlled by TRC and are generally two lane, two-way, sealed roads with unsealed shoulders and verges. Kippen Drive, however, is an unbound gravel road/track.

Based on information received from RATCH-Australia, a maximum of 75 wind turbines are planned for construction. A tourist viewing facility is also likely to be built but its location is currently undetermined.

Jacobs (previously Sinclair Knight Merz) provided technical assistance with the Mount Emerald Wind Farm Traffic Impact Assessment (TIA), dated 8 August 2011. Following this, TRC requested further information. This was provided as Technical Note: Mount Emerald Wind Farm Traffic Impact Assessment Engineering Responses, dated 19 December 2012. The proposed MEWF project has now been called-in by the State Government for assessment. As part of this process, there has been a request for additional information. The following sections address Questions 23 to 26 regarding the potential traffic impact of the proposed MEWF project.

## 2. Response to Question 23

### 2.1 Query

Provide a clear description of all possible access routes (in their entirety) to the site for oversized vehicles. This should include at least a high level identification of constraints along the network and identification of measures that would be put in place to allow State Government and council to assess these impacts.

### 2.2 Response

Two possible access routes for oversized vehicles were analysed in their entirety from Cairns Port to Mount Emerald. Maps detailing these two routes have been included in Appendix A of this report. A summary of each route is detailed in Table 2-1 below:

Table 2-1 Possible access routes for oversized vehicles from Cairns Port to Mount Emerald

| Route No. | Traversed Roads   |
|-----------|---|
| 1         | Dutton Street, Kenny Street, Draper Street, Bruce Highway (Ray Jones Drive), Bruce Highway (Innisfail – Cairns), Palmerston Highway (Innisfail – Ravenshoe), Millaa Millaa – Malanda Road, Malanda – Atherton Road, Mars Lane, Tinaroo Falls Dam Road, Kairi Road, Lawson Street, Kennedy Highway (Mareeba – Ravenshoe), Hansen Road, Springmount Road, Kippen Drive. |
| 2         | Dutton Street, Kenny Street, Port Connection Road (Bunda Street), Martyn Street, Mulgrave Road, Sheridan Street, Captain Cook Highway (Cairns - Mossman), Kennedy Highway (Cairns - Mareeba), Kennedy Highway (Mareeba - Ravenshoe), Hansen Road, Springmount Road, Kippen Drive  |

Of the roads listed in each route above, Dutton Street and Kenny Street (partial) are controlled by Cairns Regional Council, and Marks Lane, Kiari Road, Lawson Street, Hansen Road, Springmount Road and Kippen Drive are controlled by TRC. All other listed roads are state controlled roads maintained by the Department of Transport and Main Roads (TMR). It is noted that all roads forming *Route 1* to Hanson Road are gazetted B-Double routes while the Kennedy Highway (Cairns – Mareeba) which forms a section of *Route 2* is a non-approved B-Double route. It is suggested that Lawson Street is utilised for both directions of travel on *Route 2* to avoid traversing through the township of Tolga when transporting large material components despite being a gazetted B-Double route for south bound traffic only.

A high level identification of constraints and measures, which may be required to be implemented, has been completed for each route to allow State Government and Councils to assess the impact of these constraints:

It is recommended that a horizontal and vertical (crests and sags) geometry check, in addition to checking the vehicle envelope, is completed for the full length of each route. Due to their generally narrower road widths, it is noted that the horizontal geometry of Council-controlled roads should be checked. Horizontal geometry limits and overhanging rainforest canopy experienced on the Kennedy Highway (Cairns – Mareeba) via *Route 2* will not permit the turn paths and the large envelope exhibited by the B-Doubles when transporting larger components (such as the rotor blade, hub, machine house components and steel sections). Contrary to this, there may be the potential for vehicle configurations with a smaller vehicle envelope and tighter turn path to utilise *Route 2* when transporting smaller components under a permit as it is significantly shorter in comparison to *Route 1*.

Due to the substantial turn paths and large vehicle envelope exhibited by the oversized vehicles and material components, traffic control may be required at intersections where over-dimensional vehicles

(wide loads) are required to turn. These intersections have been identified for both Routes 1 and 2 and are detailed in Table 2-2 and Table 2-3, respectively (refer below). Also listed for each intersection are minor works and additional control measures that may need to be implemented.

Table 2-2 Intersections potentially requiring traffic control and measures involving minor works – Route 1

| Intersection  | Potential measures/works that may be require implementation  |
|---|--|
| Dutton St / Kenny St  | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> <li>• Check clearance to railway crossing signals</li> <li>• Check clearance to overhead power lines</li> </ul> |
| Kenny St / Draper St (roundabout)   | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> <li>• Check clearance to overhead power lines</li> </ul>  |
| Draper St / Bruce Highway (Ray Jones Drive)                                     | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> <li>• Check clearance to signal mast arms</li> </ul>  |
| Bruce Highway (Innisfail - Cairns) / Palmerston Highway (Innisfail - Ravenshoe) | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> </ul>   |
| Millaa Millaa - Malanda Road / Malanda - Atherton Road                          | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Check clearance to overhead power lines</li> </ul>   |
| Malanda - Atherton Road / Marks Lane  | <ul style="list-style-type: none"> <li>• Traffic Control</li> </ul>  |
| Marks Lane / Tinaroo Falls Dam Road   | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> </ul>   |
| Tinaroo Falls Dam Road / Kiari Road   | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Check clearance to overhead power lines</li> </ul>   |
| Kiari Road / Lawson St  | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Check clearance to overhead power lines</li> <li>• Remove and re-erect signage</li> </ul>  |
| Lawson St / Kennedy Highway (Mareeba - Ravenshoe)                               | <ul style="list-style-type: none"> <li>• Traffic Control</li> </ul>  |
| Kennedy Highway (Mareeba - Ravenshoe) / Hanson Road                             | <ul style="list-style-type: none"> <li>• Traffic Control</li> </ul>  |

Table 2-3 Intersections potentially requiring traffic control and measures involving minor works – Route 2

| Intersection  | Potential measures/works that may be require implementation  |
|---|--|
| Dutton St / Kenny St  | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> <li>• Check clearance to railway crossing signals</li> <li>• Check clearance to overhead power lines</li> </ul> |
| Kenny St / Port Connection Road (Bunda Street)  | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> <li>• Check clearance to overhead power lines</li> </ul>  |
| Port Connection Road (Bunda Street) / Martyn Street                                       | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> <li>• Check clearance to overhead power lines</li> </ul>  |
| Martyn Street / Mulgrave Road   | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> <li>• Check clearance to overhead power lines</li> </ul>  |
| Mulgrave Road / Captain Cook Highway (Sheridan Street)                                    | <ul style="list-style-type: none"> <li>• Traffic Control</li> <li>• Remove and re-erect signage</li> </ul>   |
| Captain Cook Highway (Cairns - Mossman) / Kennedy Highway (Cairns - Mareeba) (Roundabout) | <ul style="list-style-type: none"> <li>• Traffic Control</li> </ul>  |
| Kennedy Highway (Mareeba - Ravenshoe) / Hanson Road                                       | <ul style="list-style-type: none"> <li>• Traffic Control</li> </ul>  |

Any areas requiring a temporary lane closure must comply with the *Far North Queensland – Table of Allowable Lane Closures (TALC)* and will require an approved Traffic Guidance Scheme and Traffic Management Plan prior to implementation. It is also suggested that a Community Liaison Officer is utilised to communicate lane closures with the relevant Local Authorities; local business or organisations which may be affected; and the general public. It should be noted that these issues are not restricted to the locations noted above and the following issues may be experienced along the entire route:

- Vertical clearance of vehicle envelope to overhead power lines, gantry signs, signal mast arms, street lights and overhead fauna crossings (rope bridge, Palmerston Highway and Kennedy Highway (Cairns – Mareeba)) should be assessed to determine if there is a requirement to consult/engage the Department of Transport and Main Roads (TMR), Cairns Regional Council, Tablelands Regional Council or Ergon Energy as applicable for any adjustments that may be required to their assets.
- Structural integrity of culvert and bridge crossings should be determined by consulting TMR, Cairns Regional Council or Tablelands Regional Council as applicable to request recent inspections including details of type of inspection carried out. Further assessments may be required depending on the completeness of previous inspections.
- Requirement for permits and escorts to traverse the detailed routes should be identified and obtained as required.

It is recommended that a visual inspection is completed to identify areas of potential conflict along the entirety of the route prior to the commencement of any localised detailed investigations (if required).

## **3. Response to Question 24**

### **3.1 Query**

An assessment of the access to site (along Hansen Road and Springmount Road) for vertical geometry which utilises recent survey data.

### **3.2 Response**

To the best of our knowledge, recent survey or adequate topographical data does not exist at this time to allow a more detailed assessment of the access to site via Hansen Road and Springmount Road. Several sources were investigated, including the Queensland Government's Physical Road Network, and Geoscience Australia's Digital Topographic Data. However, at the time of this report, the Digital Elevation Model (DEM) has insufficient detail to perform such an investigation, and the Physical Road Network currently provides horizontal geometry only. In addition, survey from remote-sensing methods, such as Light Detection and Ranging (LiDAR), does not currently exist.

The Technical Note: Mount Emerald Wind Farm Traffic Impact Assessment Engineering Responses, undertaken by SKM 2012, provides a response to a query from the TRC, "Demonstrating the capability of the vertical profiles of Hansen and Springmount Roads accommodating any proposed drop deck or low loader transport of turbine components." This assessment of vertical geometry was based on a best fit to the GPS data recorded during a vehicle drive-through of the route as no detailed survey existed. The response to TRC 51 is included for information in Appendix B and the longitudinal sections, issued as Appendix C of the SKM 2012 technical report, are included in Appendix C of this report.

## 4. Response to Question 25

### 4.1 Query

Provide further information on how staff travel to site can be managed in a way that will allow the maximum number of staff vehicles to remain below 30 vehicles per day as indicated in the Traffic Impact Assessment.

### 4.2 Response

To respond to the Question 25 of the ministerial call (dated 11 June 2014), the following reports were reviewed:

- Technical Note: Mount Emerald Wind Farm Traffic Impact Assessment Engineering Responses - 19 December 2012 undertaken by SKM. The report will be referred to as SKM 2012
- Mount Emerald Wind Farm Traffic Impact Assessment (TIA) – 8 August 2011 undertaken by SKM. This report will be referred to as SKM 2011

Based on the information reviewed, the SKM 2011 TIA report assumes a maximum of 30 vehicles per day for workers during the construction stage of the project. Appendix B of the SKM 2012 technical report outlines in detail the estimated number of workers per month for the two year construction phase. Figure 4-1 summarises the estimated total number of workers during the construction phase (based on the information provided within Appendix D (From SKM 2012 Appendix B)).

Figure 4-1 outlines the total estimated workers for the project during the construction phase (blue line) which includes the estimated construction-related workers (green line) and the estimated skilled/unskilled contract labourers (red line).

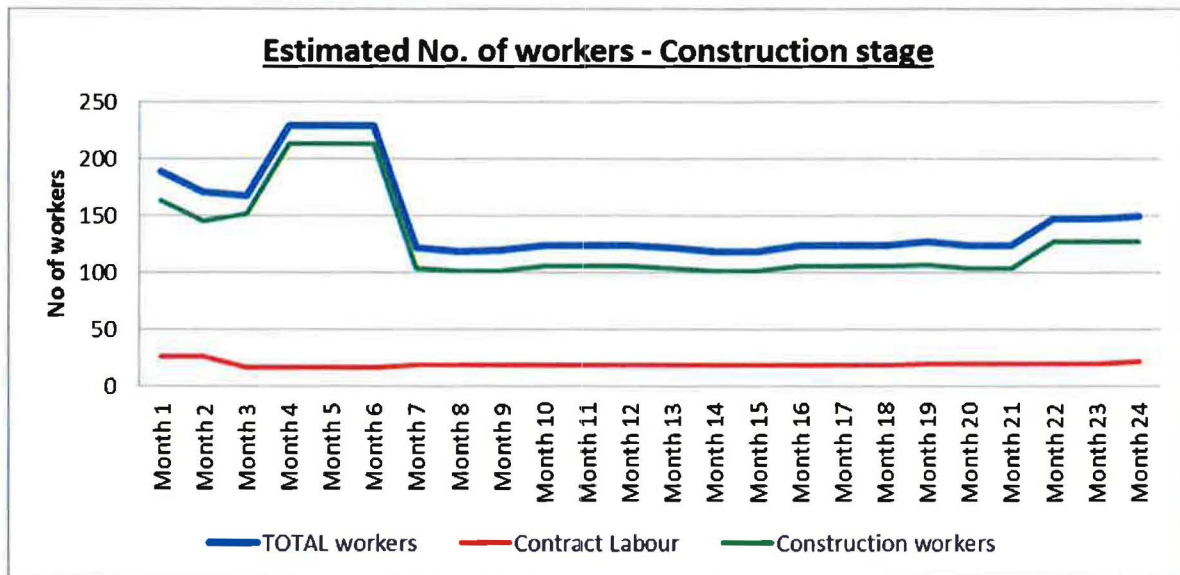


Figure 4-1 Estimated total number of workers during construction stage (24 months)

The estimated maximum numbers of workers expected to be on site during month 4 to month 6 of the construction phase is approximately 229. Of these 229 workers, 16 workers will be contract skilled and unskilled labourers and are expected to arrive and depart the site via individual or shared private vehicles.

The following assumptions (which are consistent with the previous traffic reports) have been adopted for the assessment:

- All construction workers are expected to arrive and depart the project site via dedicated 30 seater worker buses. These buses will have several pick up and drop off points at key townships
- All skilled and unskilled contract labourers are expected to arrive and depart the project site via their own vehicles. It is expected that some skilled and unskilled labourers arriving and departing the project site will carpool. Given the remote location of the project site to key townships, a conservative carpooling ratio of two people per car for the skilled and unskilled contract labours was adopted for this assessment

Based on the assumptions above, the maximum number of trips generated by the estimated number of workers during the construction is expected to be 16 vehicles per day, which comprise eight 30-seater buses and eight light vehicles. To provide a robust assessment, a nominal 10 additional vehicles per day has been added to allow for unscheduled visits, deliveries, private vehicles, miscellaneous tasks, and for construction workers who need to bring their own vehicles with trade specific tools. This makes an estimated total of 26 vehicle movements at the site per day.

Therefore, the estimated number of worker-related vehicles travelling to/from the project site is expected to be 26 vehicles per day which is expected to occur for only 3 of 24 months during the construction phase. The worker-related vehicles generated per day for the remaining 21 months will be less than the anticipated 26 vehicles per day experienced during the peak construction phase.

The estimated number of worker-related vehicles to /from the project site is less than the assumed 30 vehicles per day outlined within the SKM 2011 TIA report and SKM 2012 technical note. However, to maintain the number of worker-related vehicles arriving/departing the project site at or below the expected 30 vehicles per day, the following recommendations should be adopted by the client and the nominated construction contractor during the construction phase:

- The nominated construction contractor will provide a 30-seater shuttle bus services for construction workers arriving and departing the project site.
- The 30-seater shuttle bus will service the key townships where the construction workers live.
- Provide minimal or restricted on-site parking to discourage workers arriving to and departing from the project site via private vehicles.

These measures should be outlined in detail within the construction management plan to be developed in close consultation with the relevant Local Authorities and stakeholders.

Note that the estimated work-related vehicles per day outlined within this assessment are for a pre-feasibility design level. The construction schedule and estimated number of workers for each task may vary depending on the construction methods adopted by the nominated contractor for this project. Detailed worker numbers and construction schedules would become available once the project execution contracts have been awarded, which can only occur once this project is approved. Any changes to the construction worker numbers and schedules would be captured within a detailed construction traffic management plan which should be undertaken during the post approval stage in close consultation with the relevant Local Authorities and stakeholders.



## 5. Response to Question 26

### 5.1 Query

Should sufficient measures to restrict staff traffic to 30 vehicles per day not be provided, a new assessment identifying the worst case traffic impact on the road network should be provided.

### 5.2 Response

It should be noted that the estimated work-related vehicles per day outlined within this assessment is for a pre-feasibility design level. The construction schedule and estimated number of workers for each task may vary depending on the construction methods adopted by the nominated contractor for this project. Detailed worker numbers and construction schedules would become available once the project execution contracts have been awarded, which can only occur once this project is approved. Any changes to the construction worker numbers and schedules would be captured within a detailed construction traffic management plan which should be undertaken during the post approval stage in close consultation with the relevant Local Authorities and stakeholders.

## 6. Conclusion

This technical note has addressed the queries from the State Government, Questions 23 to 26, regarding the potential traffic impact of the proposed MEWF project.

In response to Question 23, two possible access routes for oversized vehicles were described: the first via Palmerston Highway, and the second via Kennedy Highway. A high-level investigation of constraints detected oversized vehicle restrictions; possible horizontal and vertical geometry and clearance limitations; and potential structural integrity issues for culvert and bridge crossings. Checks should be conducted for the full length of each route to determine geometry, clearance, and culvert/bridge restrictions to the vehicle and its envelope. Appropriate permits and escorts will need to be obtained for the passage of oversized vehicles, and control measures will need to be implemented to accommodate the substantial turn paths and envelope of larger vehicles.

As noted in the response to Question 24, more recent survey data does not exist to provide a more detailed vertical geometry assessment of Hansen Road and Springmount Road. Points of possible vertical geometry conflict were provided from the SKM 2012 technical note.

The response to Question 25 confirms that travel to site could be managed so that the number of staff vehicles remains below 30 vehicles per day during the busiest construction stage. This is based on a pre-feasibility estimate of eight 30-seater busses, eight light vehicles, and a nominal 10 additional vehicles for various purposes. Detailed worker numbers and construction schedules would need to be confirmed by the nominated contractor for the project prior to submission of a construction traffic management plan developed in consultation with the relevant Local Authorities and stakeholders.

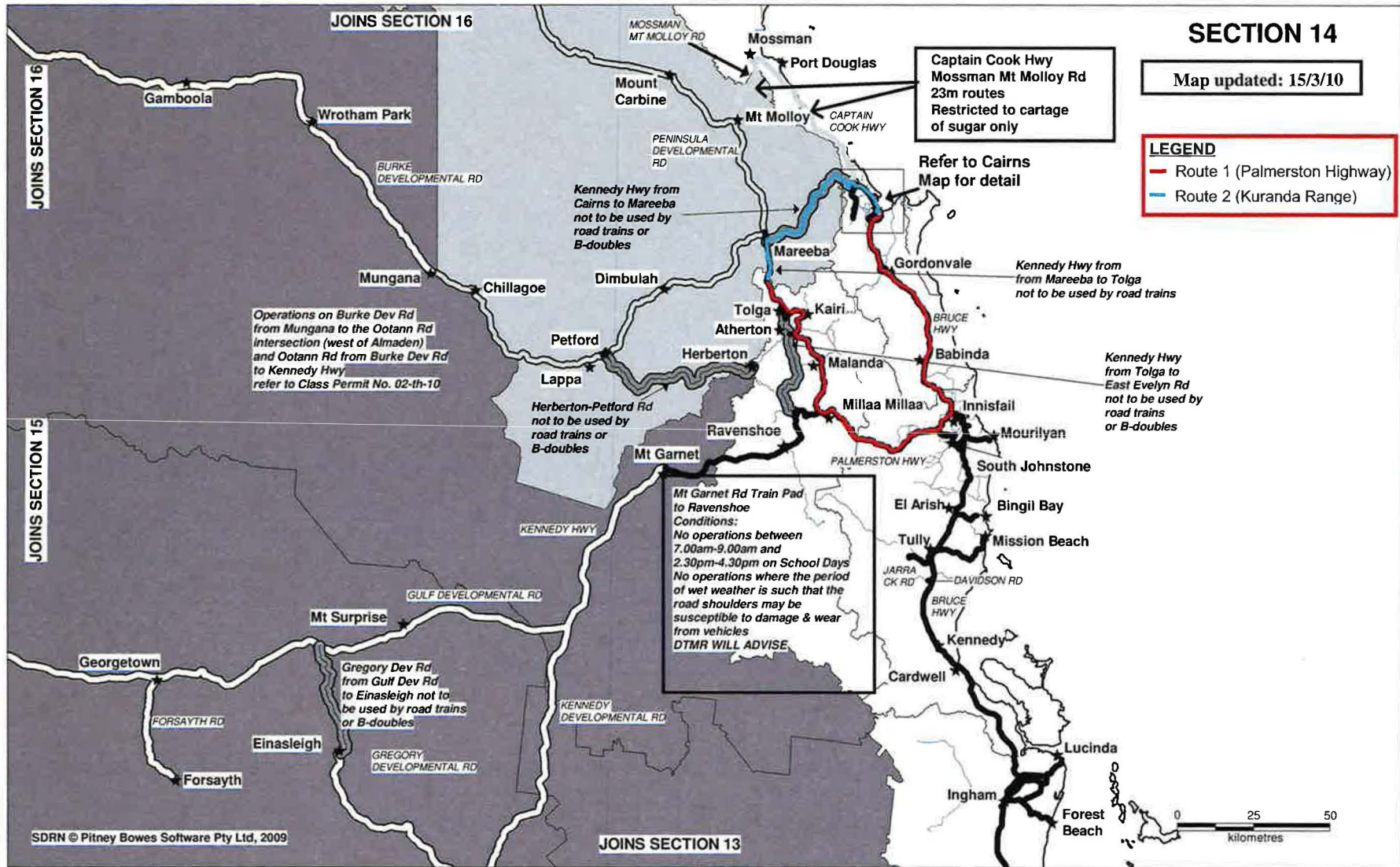
As noted in the response to Question 25, it is possible to restrict staff traffic to 30 vehicles per day. Therefore, a new assessment identifying the worst case traffic impact on the road network is not required for Question 26.

As stated previously, this report should be read in full and in conjunction with the following reports:

- Mount Emerald Wind Farm Traffic Impact Assessment (TIA) – 8 August 2011 undertaken by SKM. This report will be referred to as SKM 2011
- Technical Note: Mount Emerald Wind Farm Traffic Impact Assessment Engineering Responses - 19 December 2012 undertaken by SKM. The report will be referred to as SKM 2012

## **Appendix A. Multi-Combination Routes in Queensland: selection of maps with proposed routes**

MULTI-COMBINATION ROUTES IN QUEENSLAND

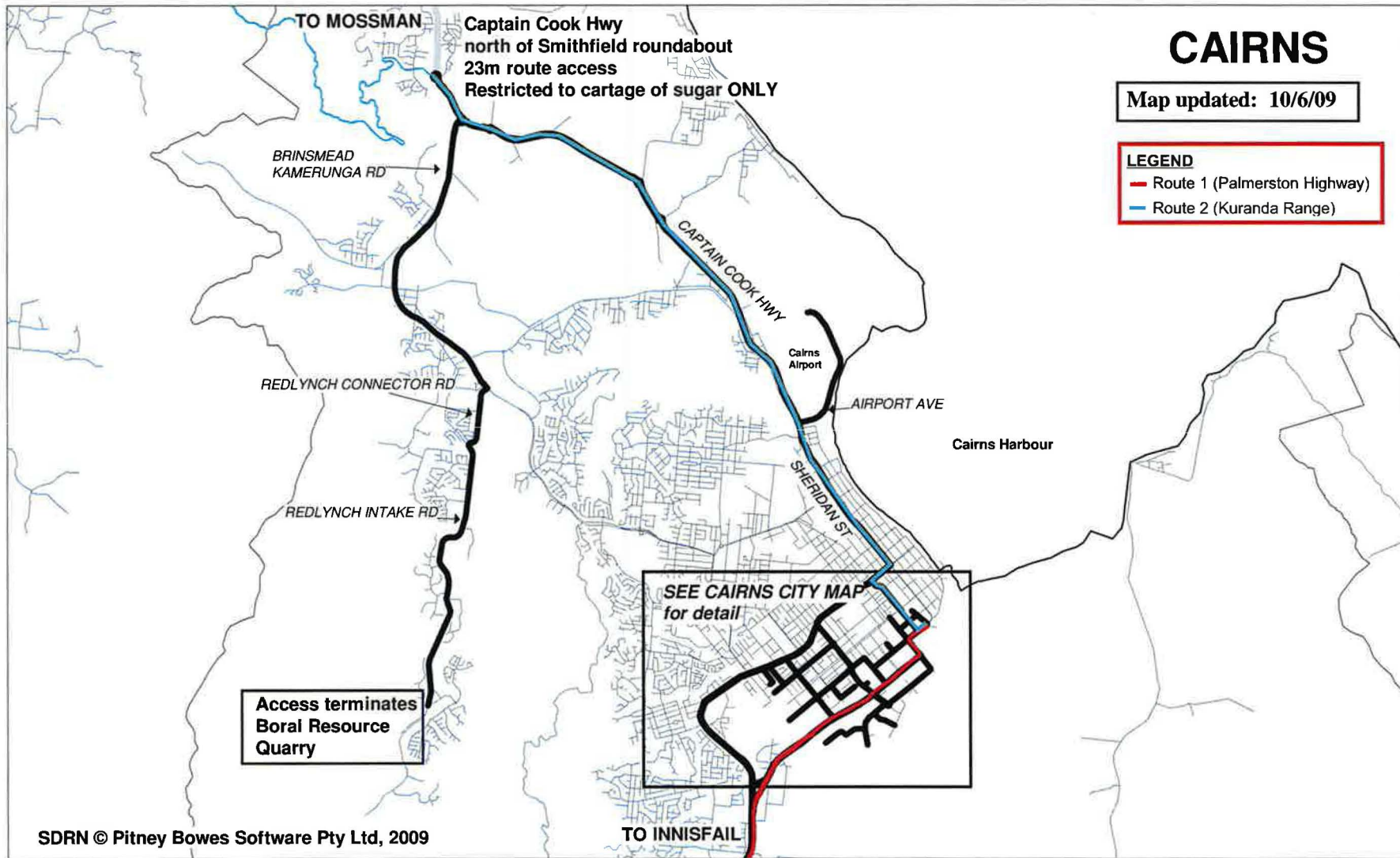


**B-DOUBLES**  
 — 23 metre routes  
 — 23 & 25 metre routes

**ROAD TRAINS**  
 — Type 1 routes  
 — Type 1 & 2 routes

**NO ROAD TRAINS or B-DOUBLES**

**REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS**

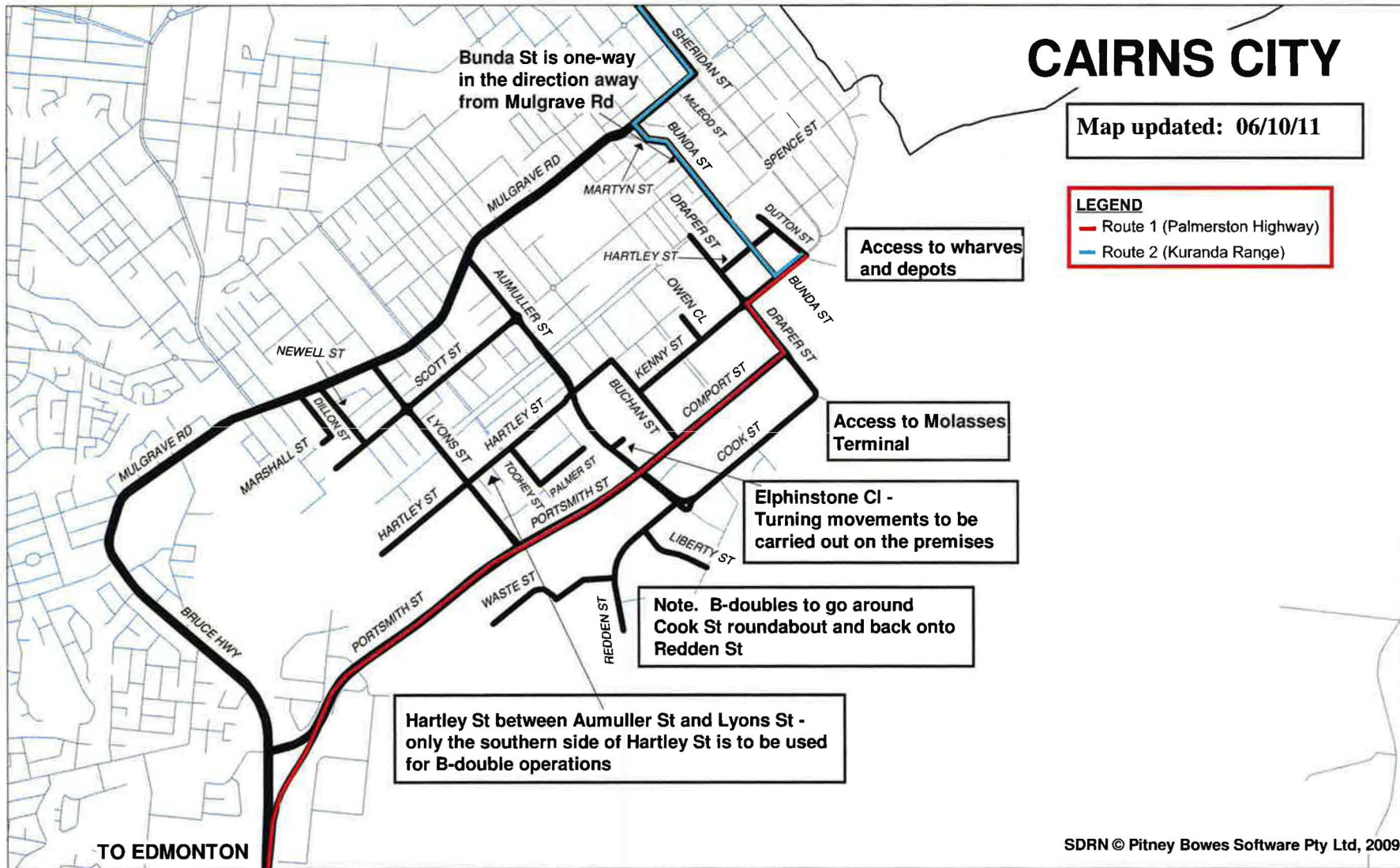


**B-DOUBLES**  
 23 metre routes  
 23 & 25 metre routes

**ROAD TRAINS**  
 Type 1 routes  
 Type 1 & 2 routes

**NO ROAD TRAINS or B-DOUBLES**

**REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS**  
 Note: 23 & 25 metre B-doubles can access Type 1 & 2 road train routes

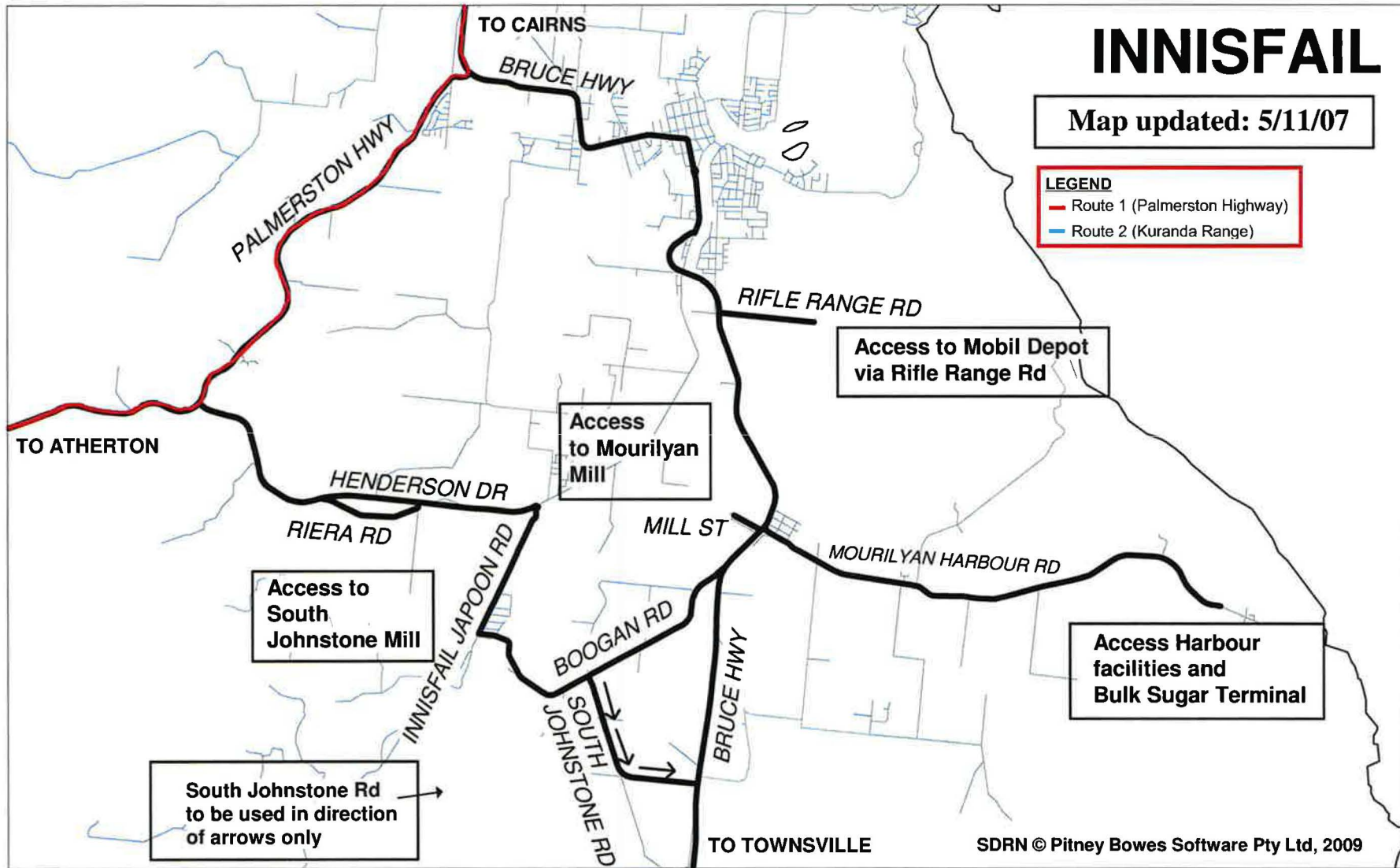


**B-DOUBLES**  
 - 23 metre routes  
 - 23 & 25 metre routes



**ROAD TRAINS**  
 - Type 1 routes  
 - Type 1 & 2 routes

**NO ROAD TRAINS or B-DOUBLES**

**REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS**  
 Note: 23 & 25 metre B-doubles can access Type 1 & 2 road train routes



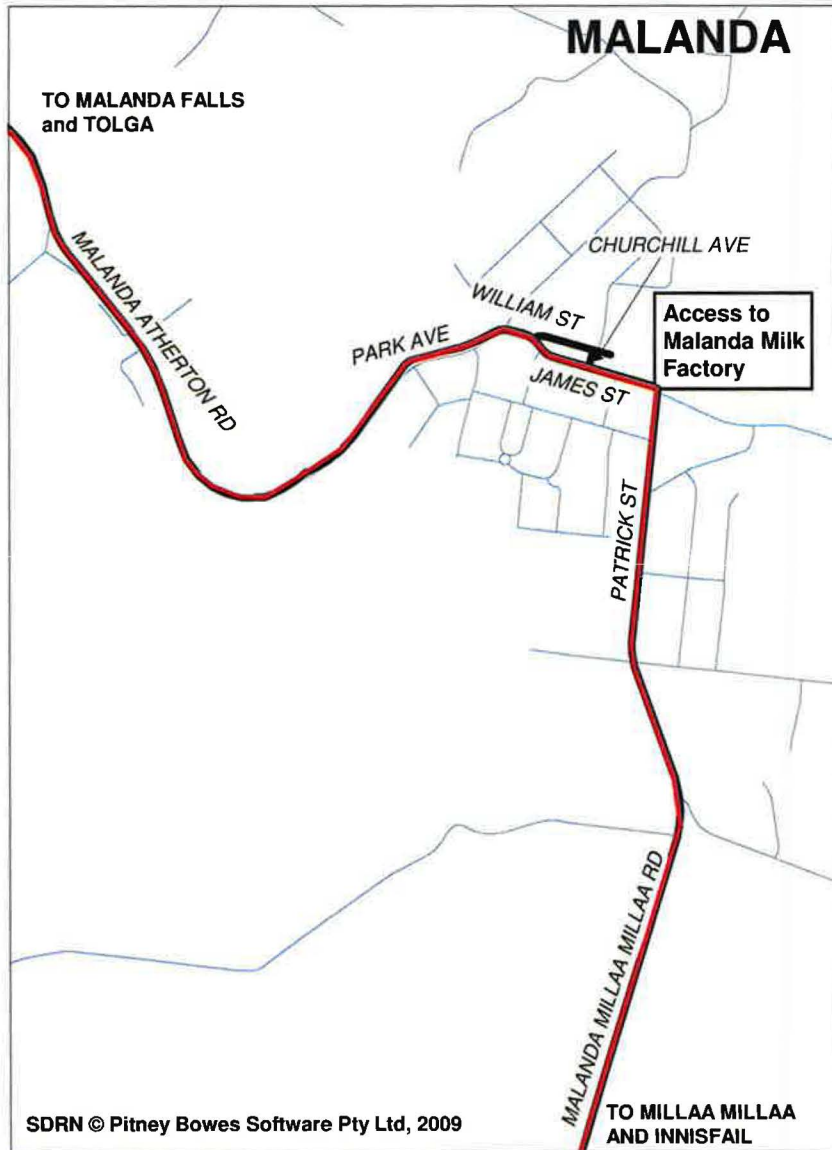
| B-DOUBLES   |                      |
|---|----------------------|
|  | 23 metre routes      |
|  | 23 & 25 metre routes |

| ROAD TRAINS   |                   |
|---|-------------------|
|  | Type 1 routes     |
|  | Type 1 & 2 routes |

| NO ROAD TRAINS or B-DOUBLES   |  |
|---|--|
|  |  |

**REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS**

**MULTI-COMBINATION ROUTES IN QUEENSLAND**



**LEGEND**

- Route 1 (Palmerston Highway)
- Route 2 (Kuranda Range)

**B-DOUBLES**

- 23 metre routes
- 23 & 25 metre routes

**ROAD TRAINS**

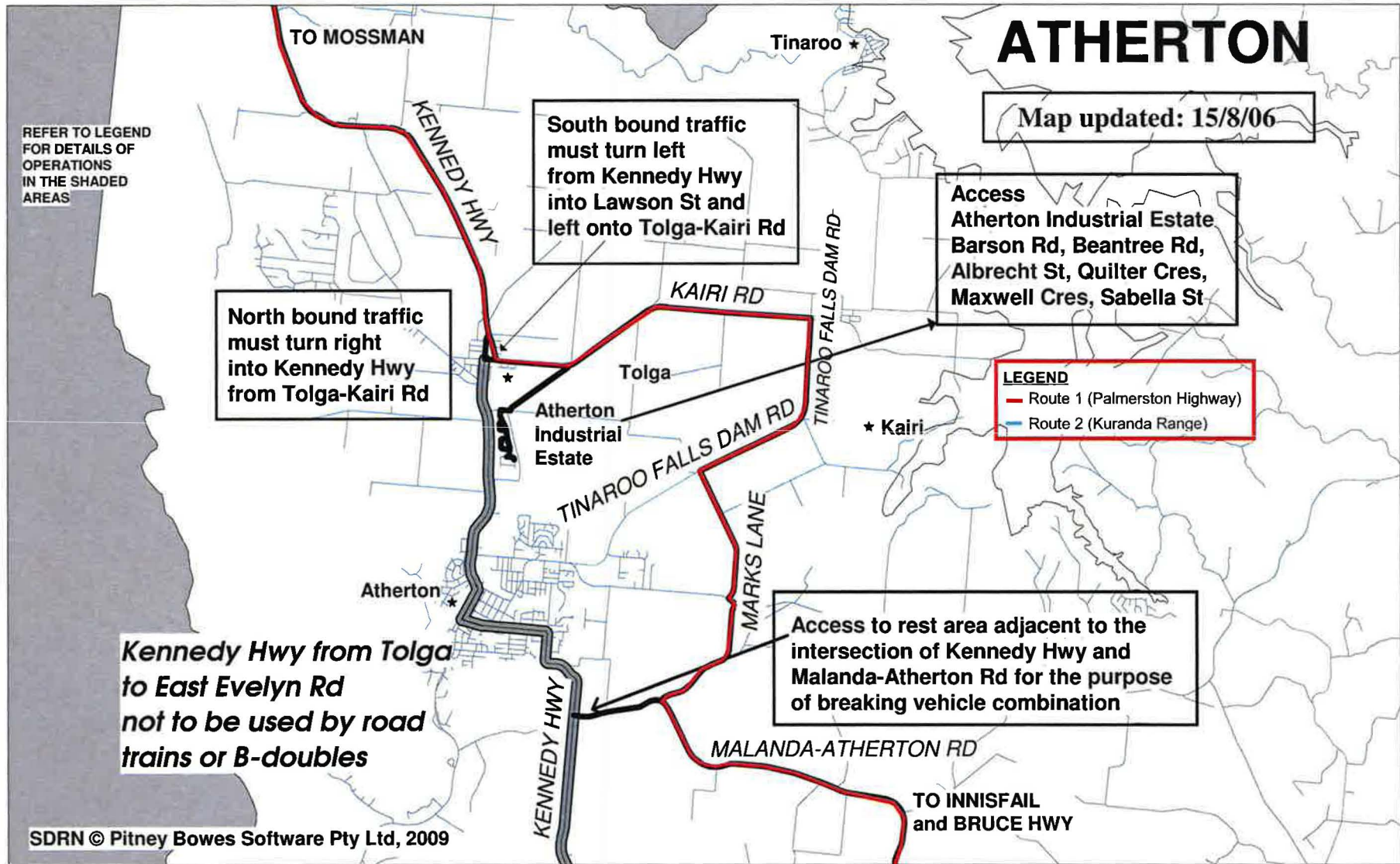
- Type 1 routes
- Type 1 & 2 routes



**NO ROAD TRAINS or B-DOUBLES**



- 


**REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS**





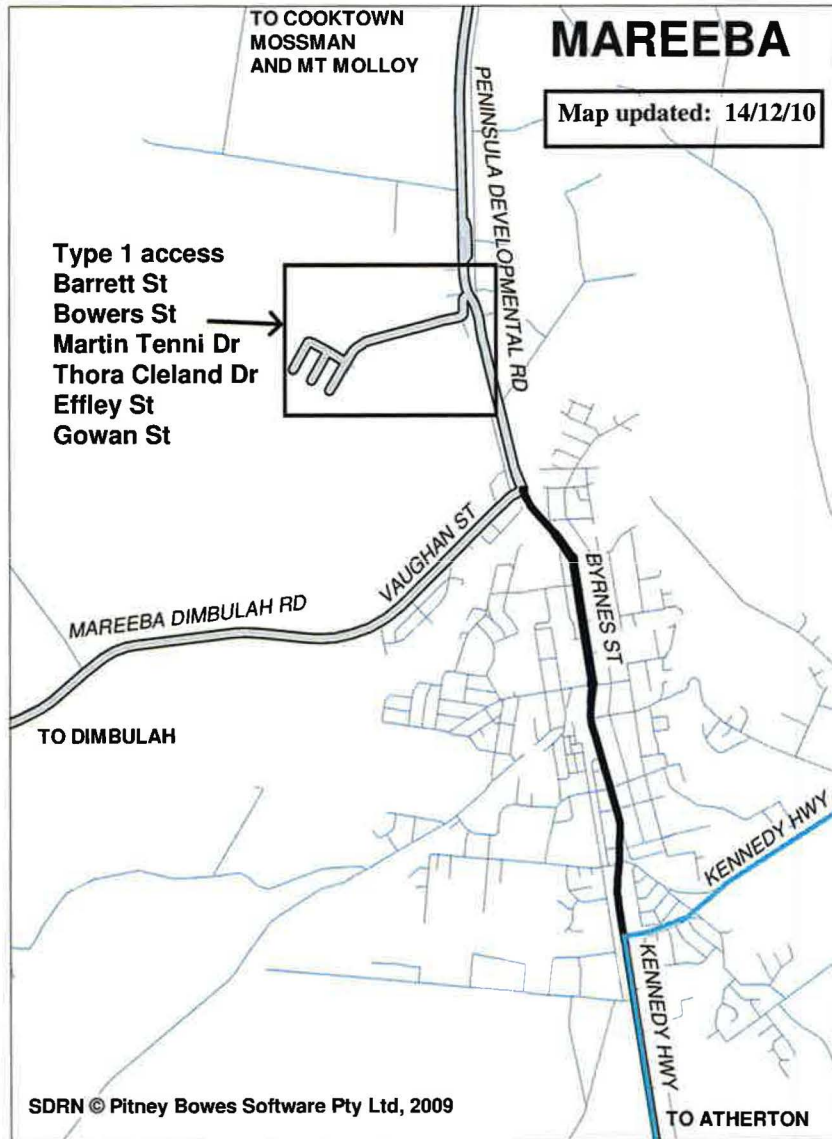
| B-DOUBLES   |                      |
|---|----------------------|
|  | 23 metre routes      |
|  | 23 & 25 metre routes |

| ROAD TRAINS   |                   |
|---|-------------------|
|  | Type 1 routes     |
|  | Type 1 & 2 routes |

| NO ROAD TRAINS or B-DOUBLES   |  |
|---|--|
|  |  |

**REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS**

# MULTI-COMBINATION ROUTES IN QUEENSLAND



**LEGEND**

- Route 1 (Palmerston Highway)
- Route 2 (Kuranda Range)

**B-DOUBLES**

- 23 metre routes
- 23 & 25 metre routes

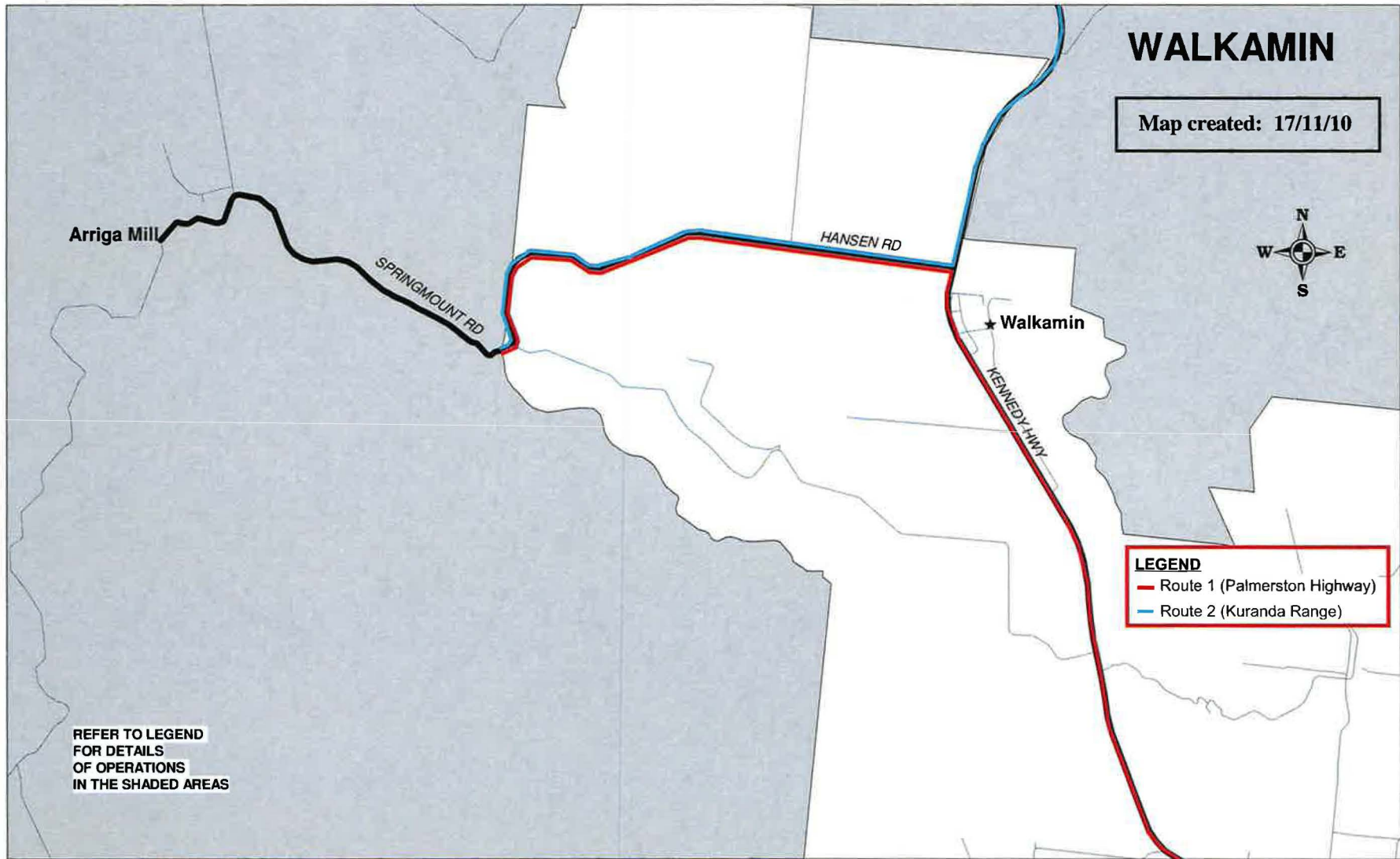
**ROAD TRAINS**



- Type 1 routes
- Type 1 & 2 routes



**NO ROAD TRAINS or B-DOUBLES**


- 

**REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS**  
**Note: 23 & 25 metre B-doubles can access Type 1 & 2 road train routes**



| B-DOUBLES   |                      |
|---|----------------------|
|  | 23 metre routes      |
|  | 23 & 25 metre routes |

| ROAD TRAINS   |                   |
|---|-------------------|
|  | Type 1 routes     |
|  | Type 1 & 2 routes |

| NO ROAD TRAINS or B-DOUBLES   |  |
|---|--|
|  |  |

**REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS**

## **Appendix B. Engineering Reponse to TRC 51 (From SKM 2012)**

## 2. Engineering Response to TRC 51

- TRC 51 Demonstrating the capability of the vertical profiles of Hansen and Springmount Roads accommodating any proposed drop deck or low loader transport of turbine components

The assessment of the route to transport the turbine components along Hansen Road and Springmount Road to the site access at Kippen Drive has been carried out based on the following critical dimensions from "Acciona Windpower's Transportation Manual" and "REPOWER Systems Manual for Transportation, access tracks and Crane Pads".

### 2.1. Assumptions

- It is assumed that RATCH Australia will undertake a separate route assessment for this project
- Horizontal layout check was not undertaken as part of this report as it is included in the previous report.
- Blades are transported on a truck and rear steerable dolly/trailer, thus making the horizontal geometry not being a constraint on this route.
- The blades and tower components are mounted high above the ground so it is deemed that the transport of blades will not have vertical conflicts. (This is based on the REPOWER Systems document which details vertical crest clearances to be no greater than 1.75m over 50m lengths).
- Rotor/hub/nacelle are transported on low loaders and vertical crest curves were assessed based on the following requirements.

### 2.2. Vertical profile requirements

As per "Acciona Windpower's Transportation Manual – AW3000", short crest curves (less than 26m long) must not have the crest higher than 300mm or low loader transport vehicles will not be able to traverse the crest curve.

- The requirement for gradients has been checked against the requirements mentioned in section 2.4 RE Power Systems' 'Wind Power - MM82/MM92/3.2M114/3.4M104 Specification for transportation, transport roads, access tracks and crane pads'. The sections of the road which does not meet the criteria are shown in Table 1 and highlighted in the attached drawings included in **Appendix C**.
- The minimum vertical clearance height is 5 metres. Vertical clearance to overhead services and structures is not undertaken as part of this report. The report focuses on the vertical profile of the Hansen road.
- No detailed survey was available.
- Vertical geometry was developed as a best fit to the GPS data recorded during a vehicle drive through of the route.

Crests curve vertical geometry checked and shown in Table 1. Long sections and plans have been produced for two roads of approximately 10.9km in length. Refer to the drawings in **Appendix C** of this report.

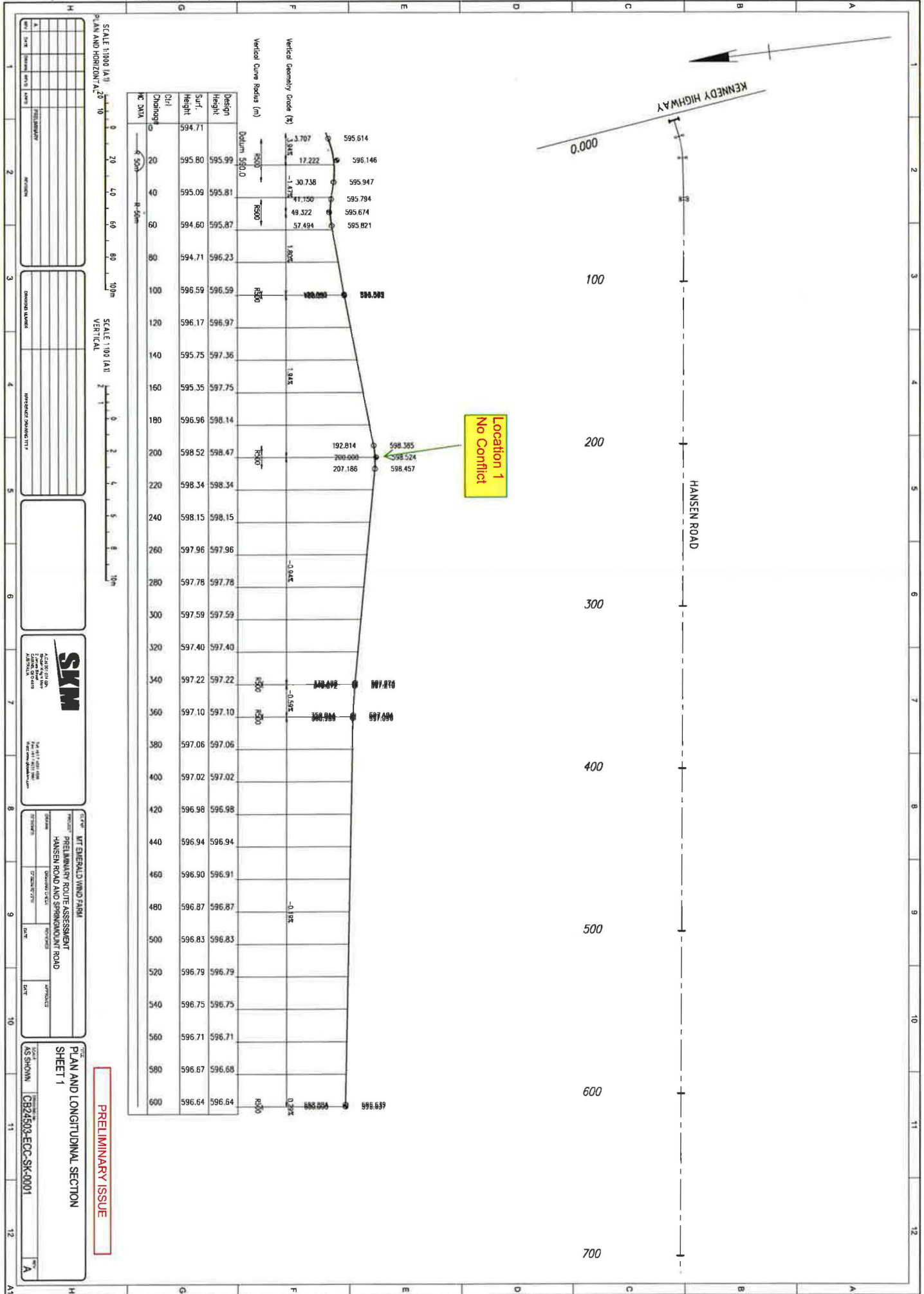
Table 1: Review of vertical profiles of Hansen and Springmount Road

| Review of Vertical profiles along Hansen and Springmount Road |          |   |  |
|---|----------|---|--|
| Location  | Chainage | Possible conflict with vertical profile | Comments   |
| 1   | 200      | Checked - no conflict                   | Refer Drawings in Appendix B   |
| 2   | 1620     | Checked - no conflict                   | Refer Drawings in Appendix B   |
| 3   | 1920     | Checked - no conflict                   | Refer Drawings in Appendix B   |
| 4   | 2900     | Checked - no conflict                   | Refer Drawings in Appendix B   |
| 5   | 3440     | Checked - no conflict                   | Refer Drawings in Appendix B   |
| 6   | 4170     | Checked - no conflict                   | Refer Drawings in Appendix B   |
| 7   | 4420     | Checked - no conflict                   | Refer Drawings in Appendix B   |
| 8   | 5320     | Checked - no conflict                   | Refer Drawings in Appendix B   |
| 9   | 5775     | Checked - possible conflict             | * Eastern approach to Granite Creek causeway. As per Acciona Windpower AW3000 specification for low loaders, there is possible conflict. However, acceptable per REPower Systems Specification for blade transportation. It should be noted that this assessment was done purely from GPS survey coordinates and the road may have flatter surface profiles in reality. Recommend detail survey or refer to as constructed drawings to confirm crest details from ch 5740 to 5820. |

Mitigation for Location 9

- Detail survey for the section of the road should be undertaken.
- After review of the survey and detailed reassessment of the conflict section, if the conflict remains, improvement to the vertical curve is recommended.

**Appendix C. Vertical Geometry Drawings (From SKM 2012,  
Appendix C)**



PRELIMINARY ISSUE

PLAN AND LONGITUDINAL SECTION  
 SHEET 1

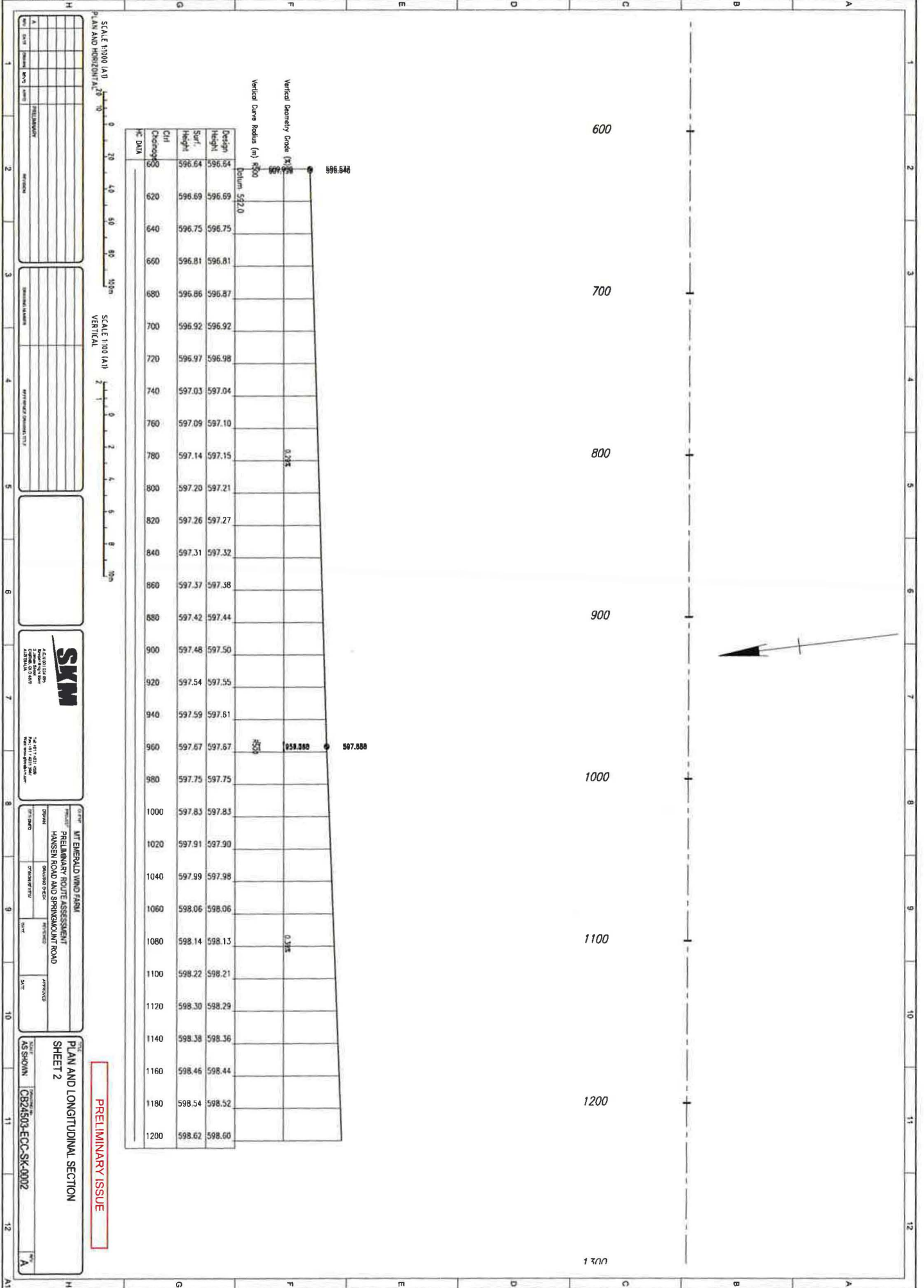
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 PRELIMINARY ROUTE ASSESSMENT  
 HANSEN ROAD AND SPRINGDALE ROAD

SKM  
 S.K. MURPHY  
 2 JAMES STREET  
 ADELAIDE SA 5000  
 TEL: 08 8411 8111  
 WWW.SKMGROUP.COM

DESIGNED DRAWN TITLE  
 CHECKED DRAWN TITLE  
 APPROVED DRAWN TITLE

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PRELIMINARY ISSUE

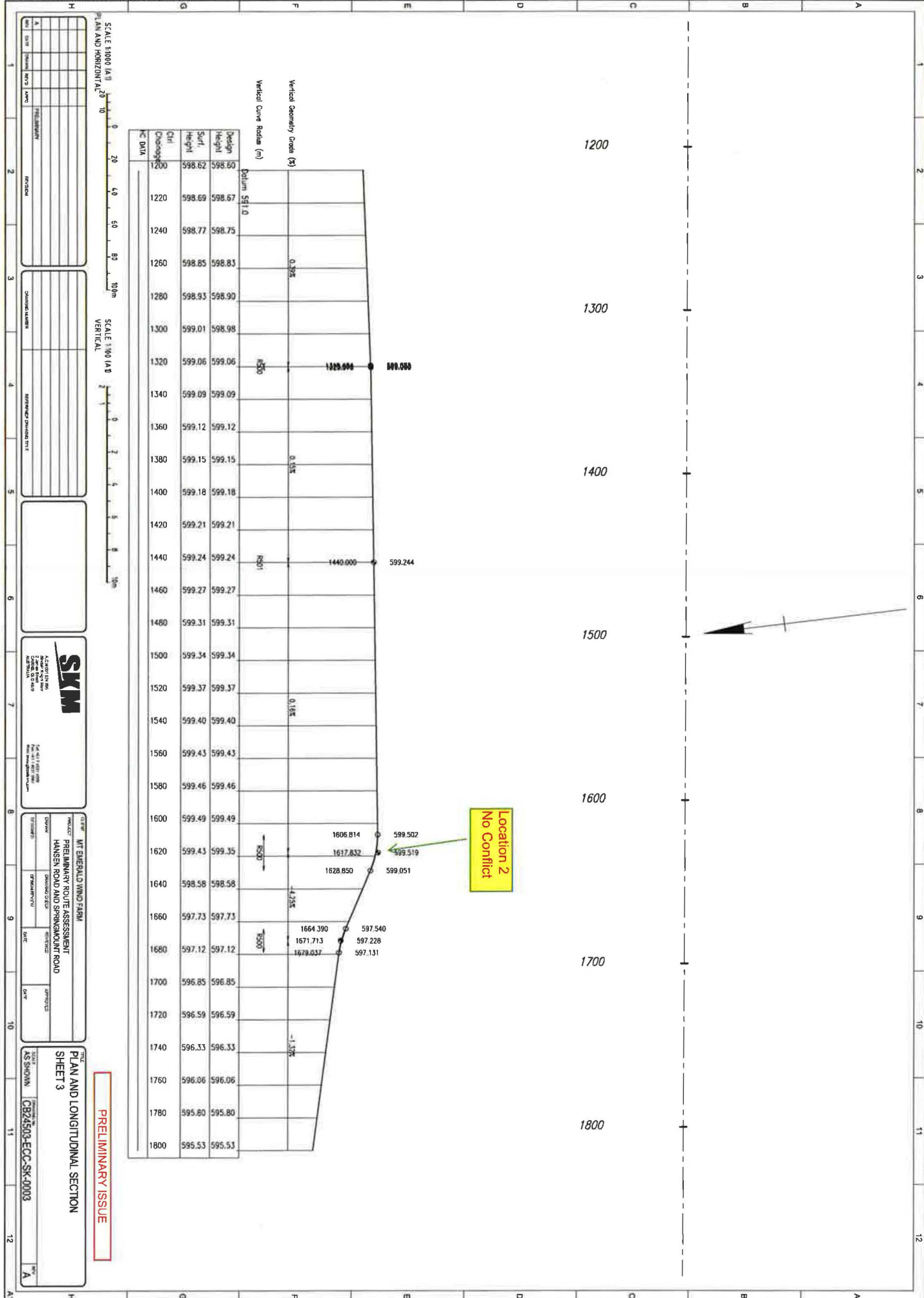


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 PRELIMINARY ROUTE ASSESSMENT  
 HANSEN ROAD AND SPRINGMOUNT ROAD

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APPROVED BY: [ ]  
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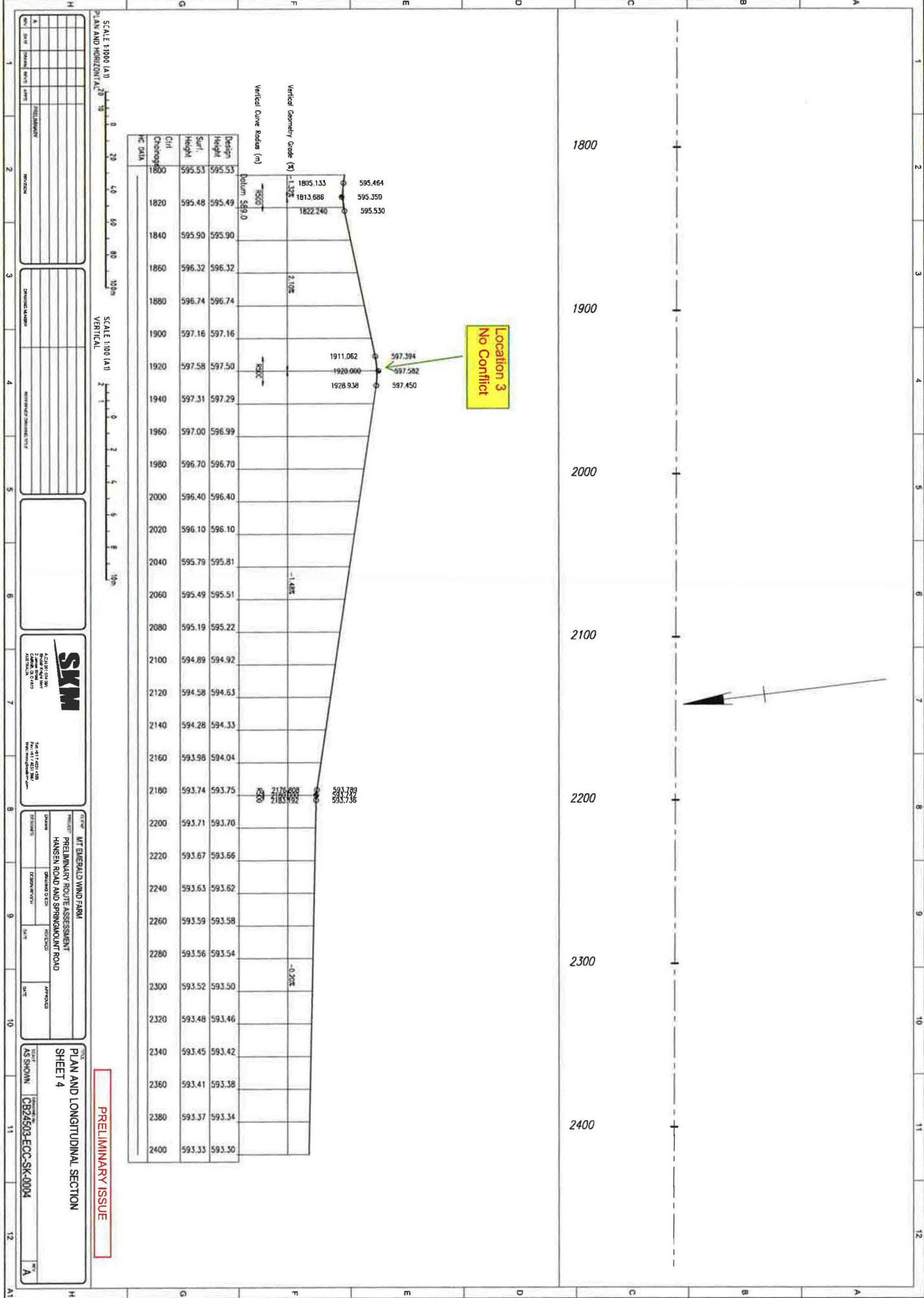
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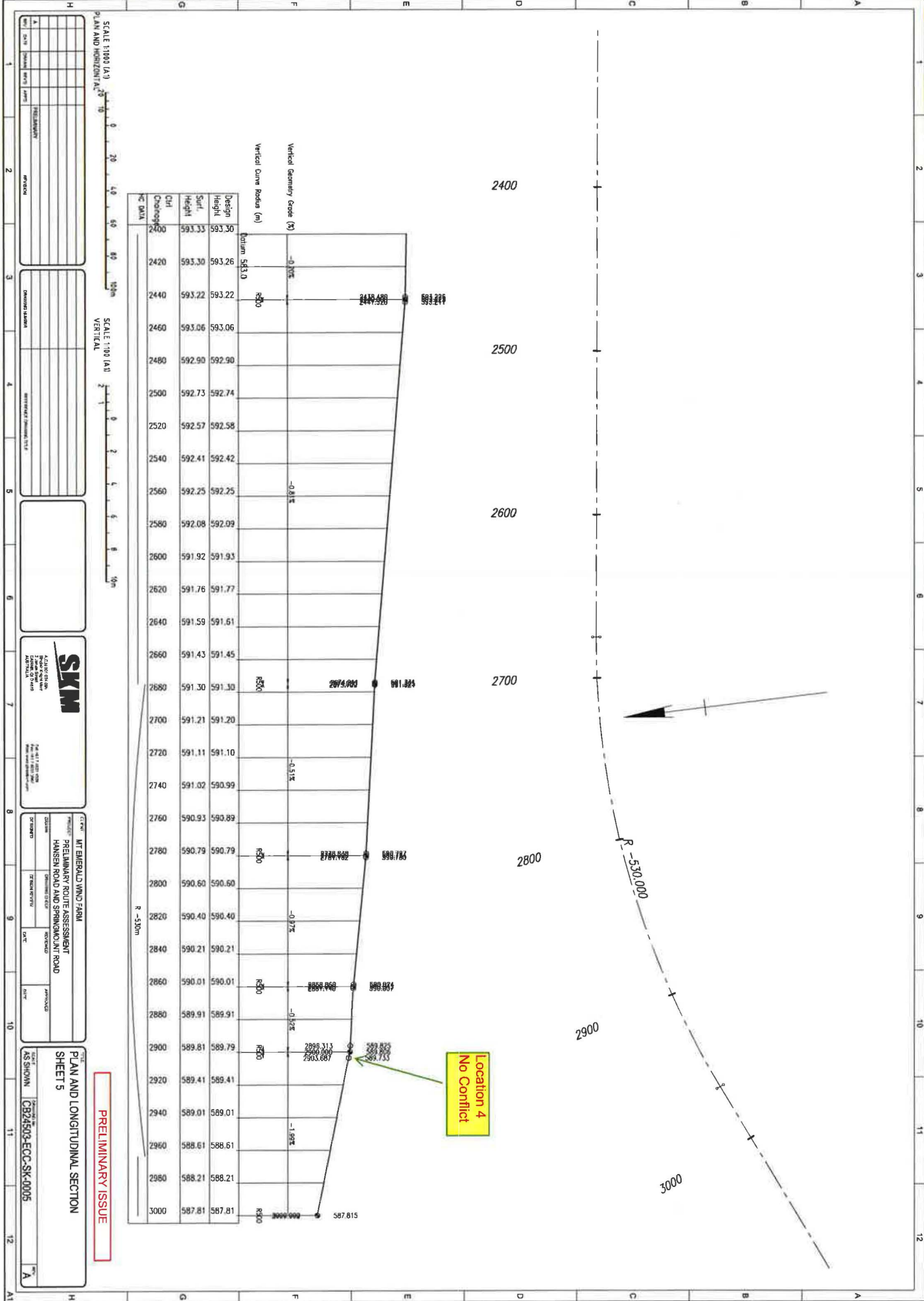
Location 2  
No Conflict

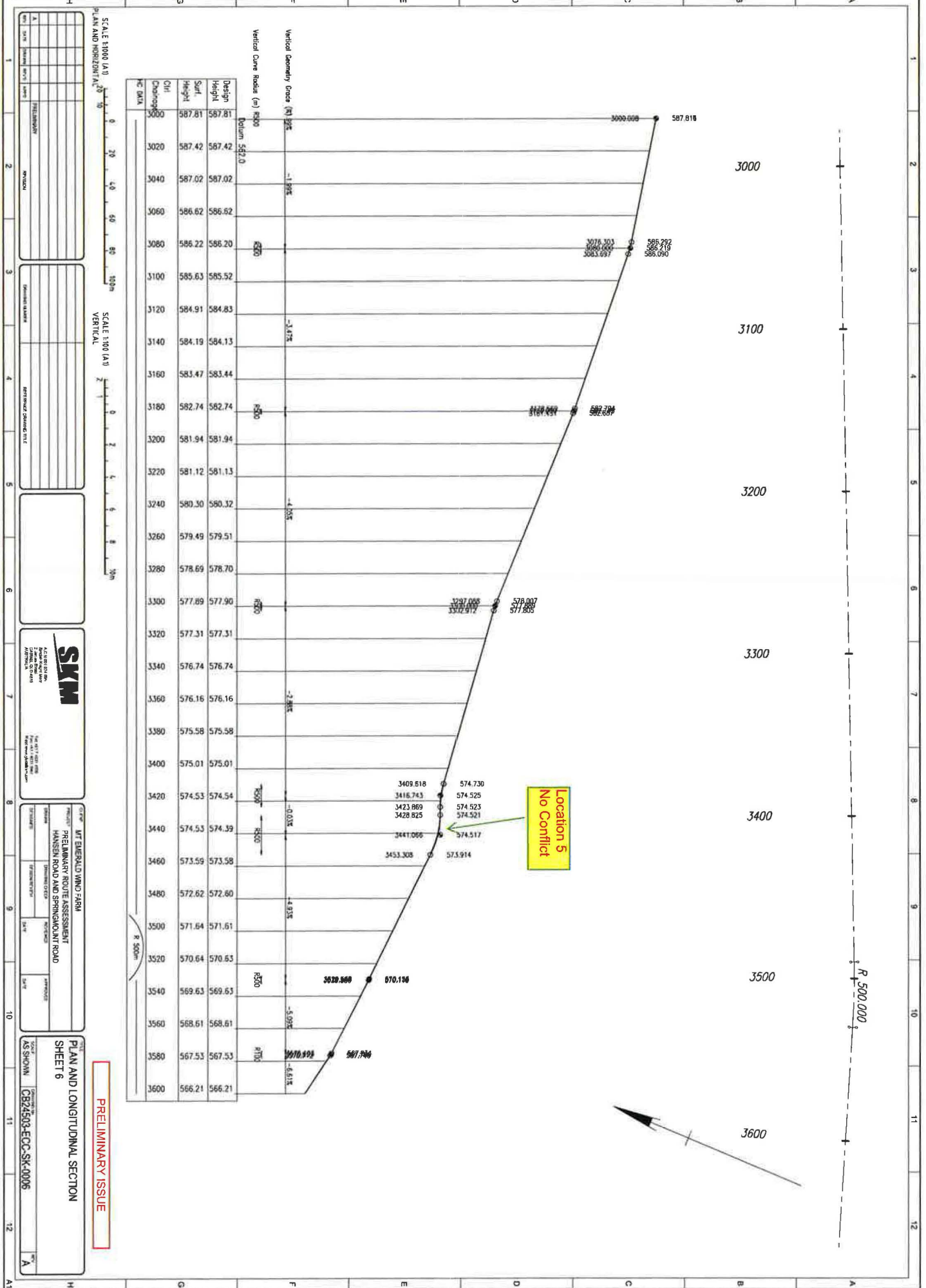


PROJECT: MT EBERHARD WIND FARM  
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 HANSEN ROAD AND SPRINGMOUNT ROAD

SHEET 3  
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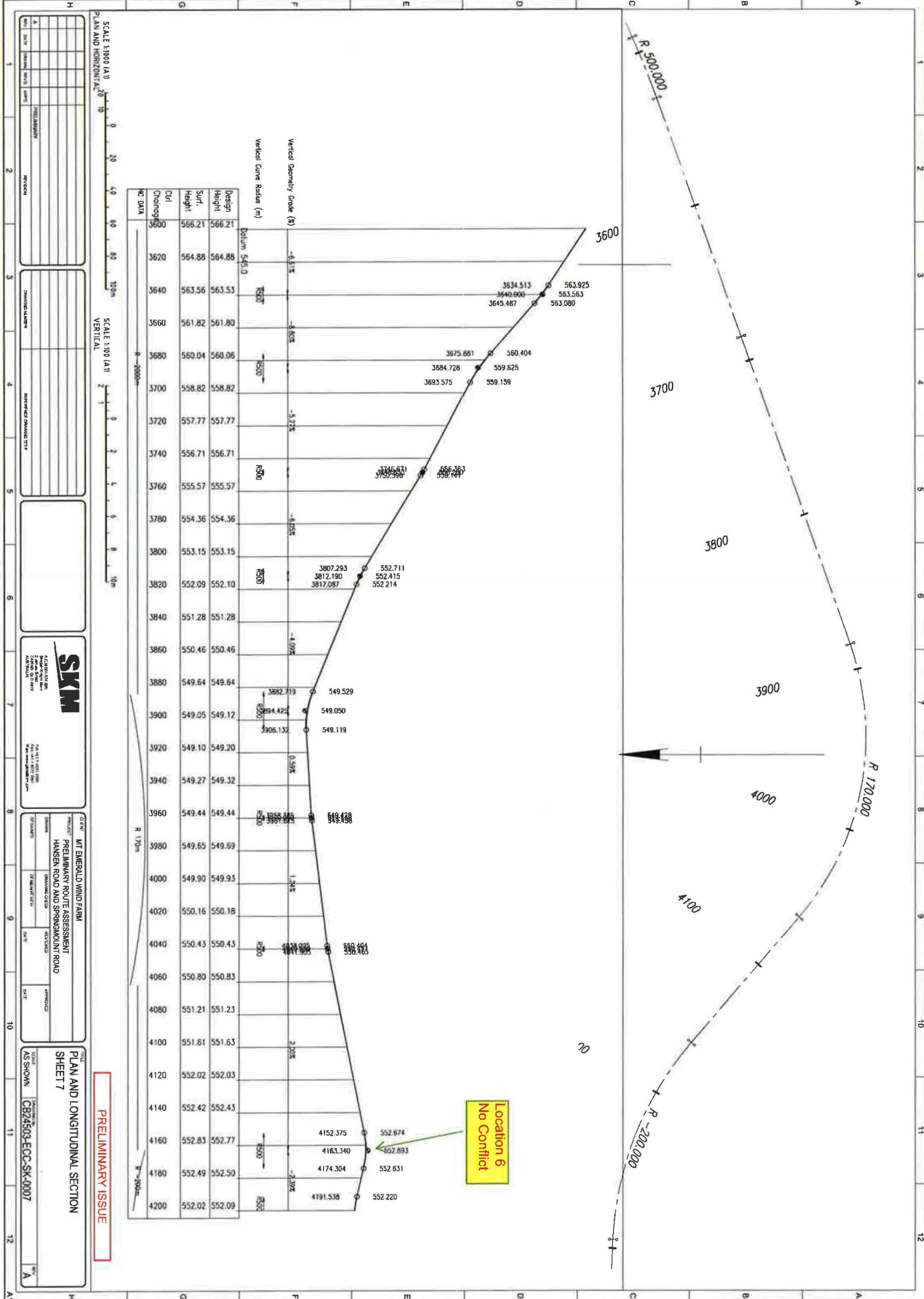






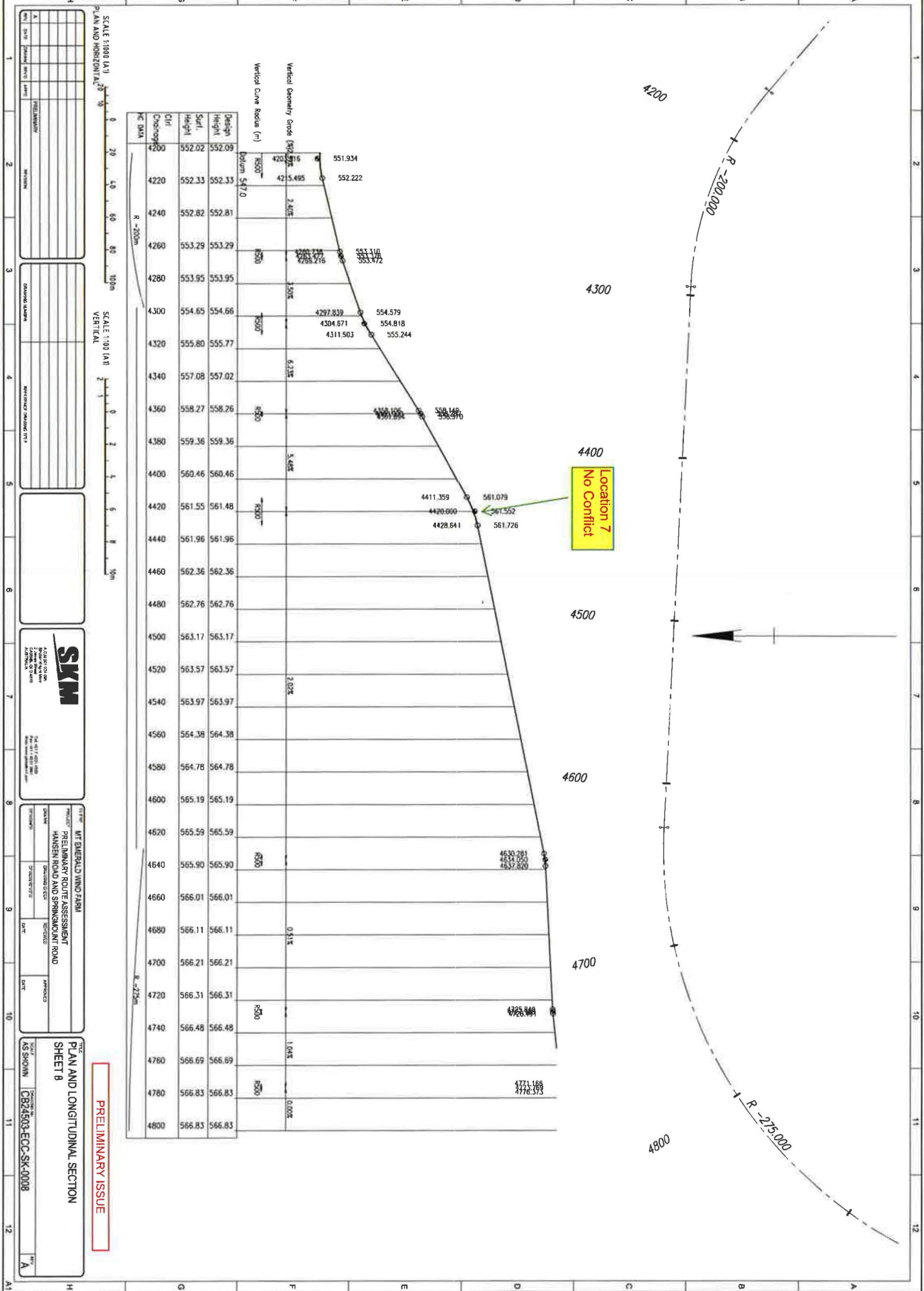
PRELIMINARY ISSUE

Location 5  
No Conflict



PRELIMINARY ISSUE

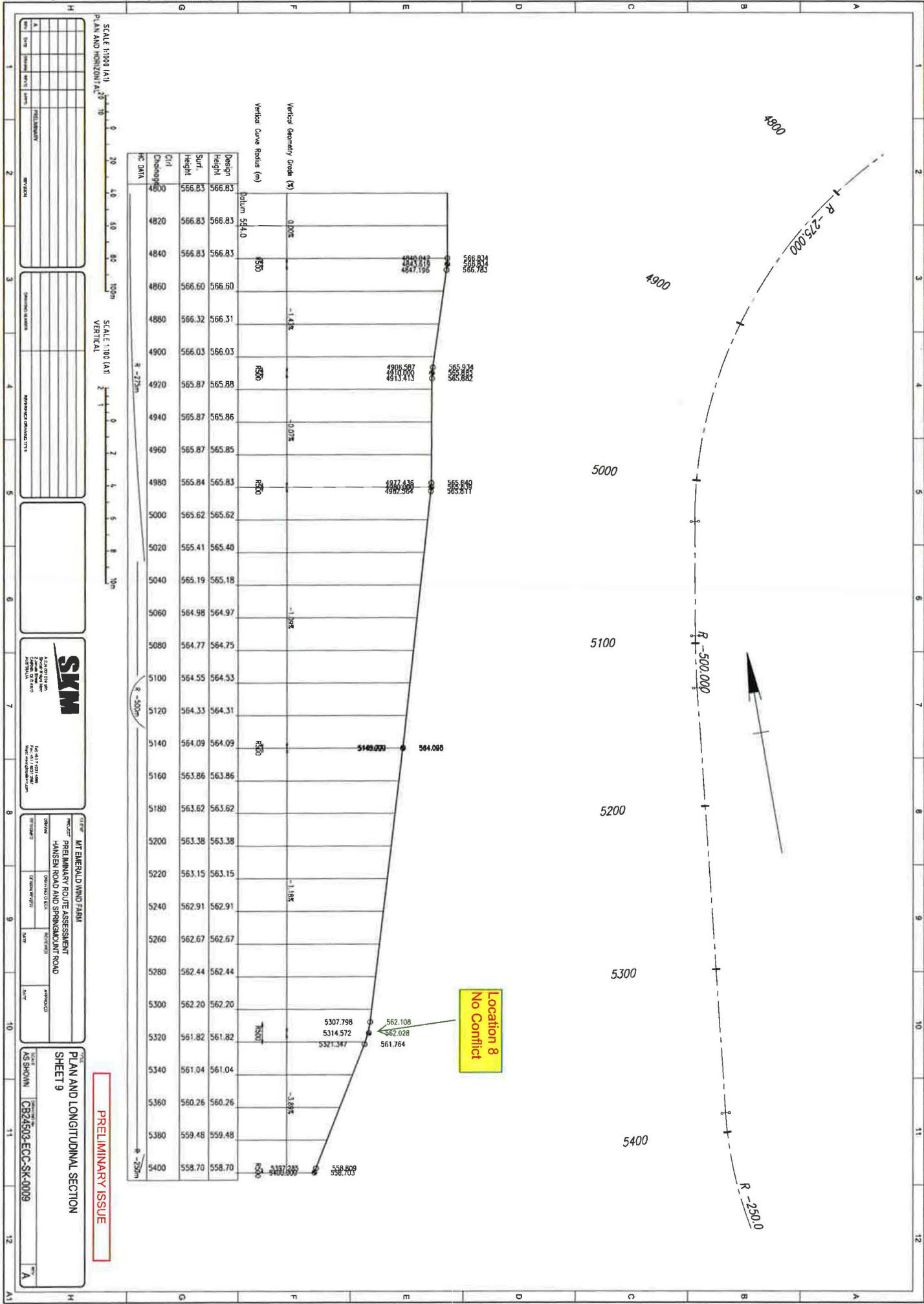
Location 6  
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PRELIMINARY ISSUE

Location 7  
No Conflict

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| DATE   | DATE   |
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| SHEET NO.  | SHEET 8  |
| SCALE  | SCALE 1:100 (A1)   |



| Station | Design Height | Surf Height | Vertical Curve Radius (m) | Vertical Geometry Grade (%) | Elevation |
|---------|---------------|-------------|---------------------------|-----------------------------|-----------|
| 4800    | 568.95        | 566.83      | Bottom 554.0              | 0.00%                       | 568.95    |
| 4820    | 566.83        | 566.83      | R=500                     | -1.43%                      | 566.83    |
| 4840    | 566.83        | 566.83      | R=500                     | -1.43%                      | 566.83    |
| 4860    | 566.60        | 566.60      | R=500                     | -1.43%                      | 566.60    |
| 4880    | 566.32        | 566.31      | R=500                     | -1.43%                      | 566.32    |
| 4900    | 566.03        | 566.03      | R=500                     | -1.43%                      | 566.03    |
| 4920    | 565.87        | 565.88      | R=500                     | -1.43%                      | 565.87    |
| 4940    | 565.87        | 565.86      | R=500                     | -1.43%                      | 565.87    |
| 4960    | 565.87        | 565.85      | R=500                     | -1.43%                      | 565.87    |
| 4980    | 565.84        | 565.83      | R=500                     | -1.43%                      | 565.84    |
| 5000    | 565.62        | 565.62      | R=500                     | -1.43%                      | 565.62    |
| 5020    | 565.41        | 565.40      | R=500                     | -1.43%                      | 565.41    |
| 5040    | 565.19        | 565.18      | R=500                     | -1.43%                      | 565.19    |
| 5060    | 564.98        | 564.97      | R=500                     | -1.43%                      | 564.98    |
| 5080    | 564.77        | 564.75      | R=500                     | -1.43%                      | 564.77    |
| 5100    | 564.55        | 564.53      | R=500                     | -1.43%                      | 564.55    |
| 5120    | 564.33        | 564.31      | R=500                     | -1.43%                      | 564.33    |
| 5140    | 564.09        | 564.09      | R=500                     | -1.43%                      | 564.09    |
| 5160    | 563.86        | 563.86      | R=500                     | -1.43%                      | 563.86    |
| 5180    | 563.62        | 563.62      | R=500                     | -1.43%                      | 563.62    |
| 5200    | 563.38        | 563.38      | R=500                     | -1.43%                      | 563.38    |
| 5220    | 563.15        | 563.15      | R=500                     | -1.43%                      | 563.15    |
| 5240    | 562.91        | 562.91      | R=500                     | -1.43%                      | 562.91    |
| 5260    | 562.67        | 562.67      | R=500                     | -1.43%                      | 562.67    |
| 5280    | 562.44        | 562.44      | R=500                     | -1.43%                      | 562.44    |
| 5300    | 562.20        | 562.20      | R=500                     | -1.43%                      | 562.20    |
| 5320    | 561.82        | 561.82      | R=500                     | -1.43%                      | 561.82    |
| 5340    | 561.04        | 561.04      | R=500                     | -1.43%                      | 561.04    |
| 5360    | 560.26        | 560.26      | R=500                     | -1.43%                      | 560.26    |
| 5380    | 559.48        | 559.48      | R=500                     | -1.43%                      | 559.48    |
| 5400    | 558.70        | 558.70      | R=500                     | -1.43%                      | 558.70    |

Location 8  
No Conflict

PRELIMINARY ISSUE

SCALE 1:100 (A1)  
 PLAN AND HORIZONTAL SECTION

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 PRELIMINARY ROUTE ASSESSMENT  
 HANSEN ROAD AND SPRINGMOUNT ROAD

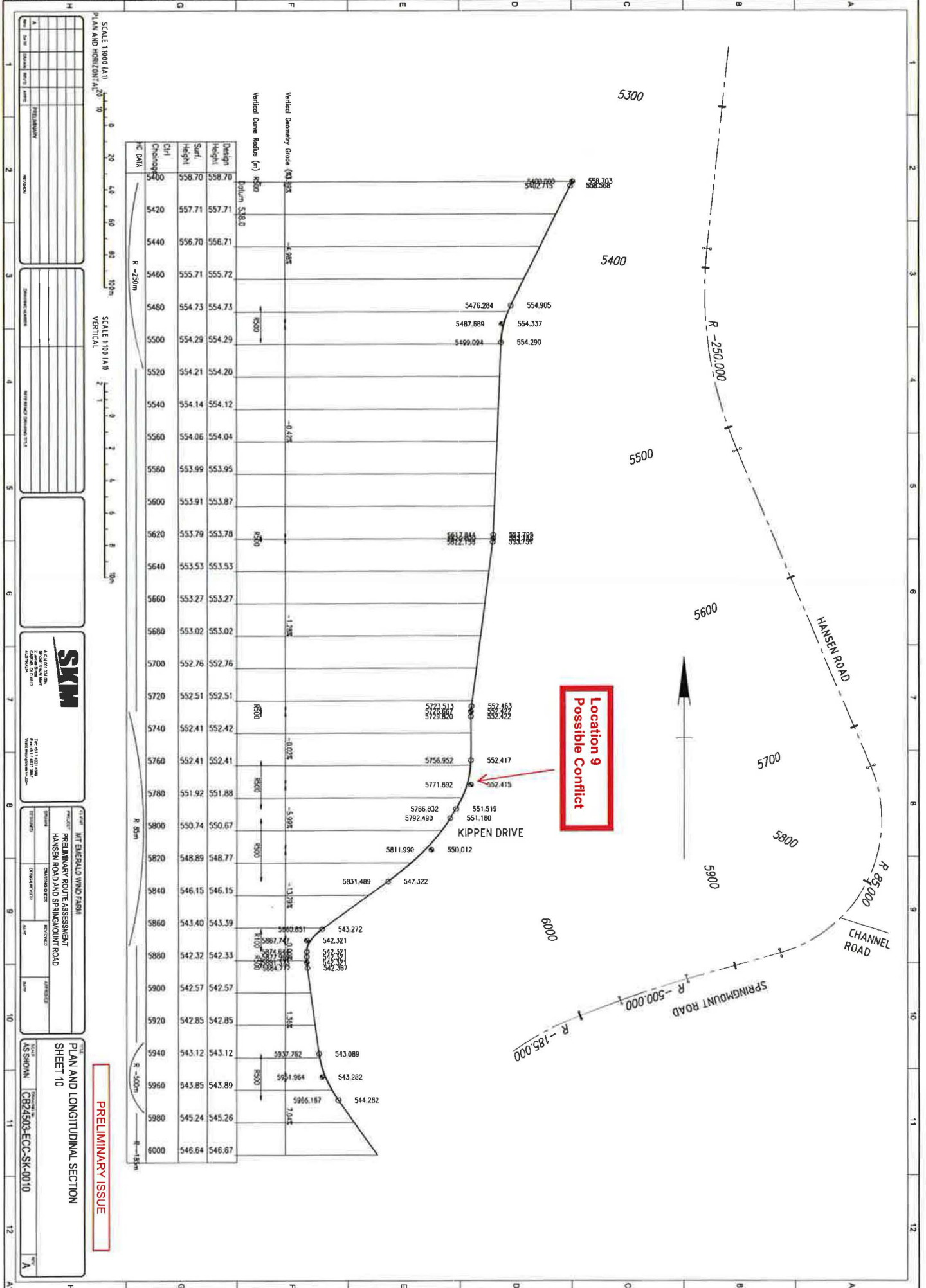
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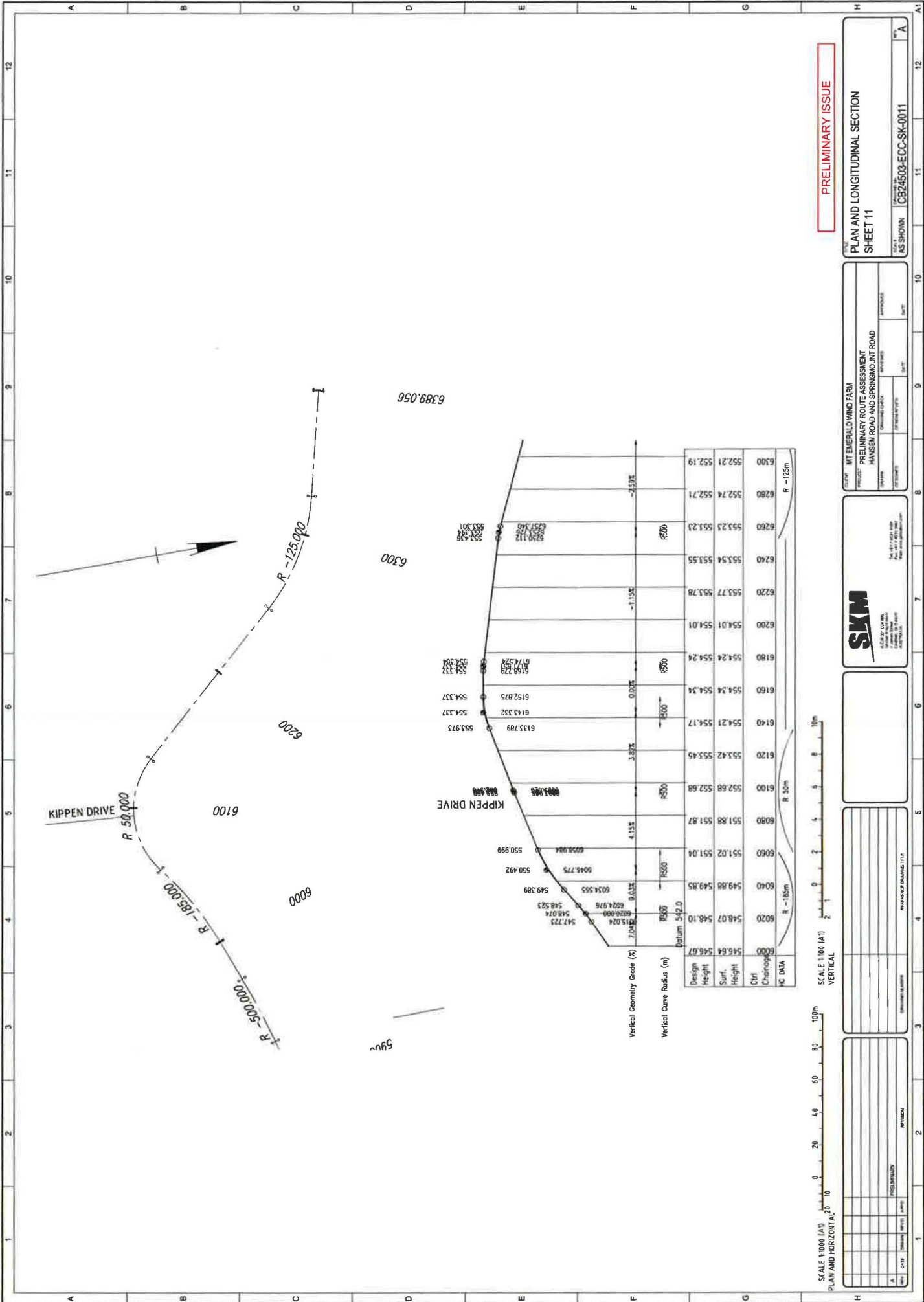
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PRELIMINARY ISSUE



PRELIMINARY ISSUE

PROJECT: **MT EMERALD WIND FARM**  
 PRESENT: **PRELIMINARY ROUTE ASSESSMENT**  
 HANSEN ROAD AND SPRINGMOUNT ROAD  
**SHEET 11**  
 DATE: **AS SHOWN** / **CB24503-ECC-SK-0011**

CLIENT: **MT EMERALD WIND FARM**  
 PROJECT: **PRELIMINARY ROUTE ASSESSMENT**  
 HANSEN ROAD AND SPRINGMOUNT ROAD  
**SHEET 11**



SCALE 1:100 (A1)  
 SCALE 1:100 (A1)  
 PLAN AND HORIZONTAL  
 VERTICAL

| Station | Design Height | Surf Height | Chg Height | Chg DATA    |
|---------|---------------|-------------|------------|-------------|
| 6300    | 552.21        | 552.71      |            | R - 125m    |
| 6280    | 553.23        | 553.55      |            | R 800       |
| 6260    | 553.77        | 553.78      |            | R 800       |
| 6220    | 554.01        | 554.01      |            | R 800       |
| 6200    | 554.24        | 554.24      |            | R 800       |
| 6180    | 554.34        | 554.34      |            | R 800       |
| 6160    | 554.21        | 554.17      |            | R 800       |
| 6140    | 553.42        | 553.45      |            | R 500       |
| 6120    | 552.68        | 552.68      |            | R 500       |
| 6100    | 551.88        | 551.87      |            | R 500       |
| 6080    | 551.02        | 551.04      |            | R 500       |
| 6060    | 549.88        | 549.85      |            | R 500       |
| 6040    | 548.07        | 548.10      |            | R 500       |
| 6020    | 546.84        | 546.67      |            | R 500       |
| 6000    |               |             |            | Datum 542.0 |

**Appendix D. Calculation for Vehicle Movements & Worker  
Numbers (From SKM 2012, Appendix B)**



**Mt. Emerald Wind Farm - Quantities Estimate**

| PRELIMINARY INFORMATION |  |          |                |                   |                                |   |
|-------------------------|--|----------|----------------|-------------------|--------------------------------|---|
| Location                | Mount Emerald, Walkemini                           |          |                |                   |                                |   |
| Tower Model             | Siemens SWT-2.3-101 WTG                            |          |                |                   |                                |   |
| No. of Towers           | 75   |          |                |                   |                                |   |
| No. Of working days     | 300  |          |                |                   |                                |   |
| Total Output            | 225 MW   |          |                |                   |                                |   |
| ITEM                    | DESCRIPTION  | QUANTITY | UNIT           | VEHICLE MOVEMENTS | TYPE OF PLANT                  | COMMENTS / ASSUMPTIONS  |
| 1.0                     | <b>Roads</b>                                       |          |                |                   |                                |   |
|                         | Length of access road                              | 44.6     | km             |                   |                                | Kippen Drive, internal access roads within Wind Farm Site & Hansen Road (if required)   |
|                         | Carriageway width                                  | 5.0      | m              |                   |                                | Total length of unsealed access road within wind farm site 33.2km, Kippen Drive 5.3km & Hansen Rd 6.1km   |
|                         | Total pavement width                               | 7.0      | m              |                   |                                | Minimum required for transport of turbine components  |
|                         | Strip existing surface                             | 100      | mm             | 5                 | EME - Excavator                | 1.0 m shoulder either side of carriageway   |
|                         | Volume of top-soil                                 | 31,200   | m <sup>3</sup> |                   |                                | Remove top-soil along proposed access roads   |
|                         | Tonnage of top-soil                                | 62,440   | tonnes         | 2,313             | Trucks - 10 yd with trailers   | Assuming no cut to fill, CCM of top-soil is 2.0 tons/m <sup>3</sup> , each truck/trailer carries 27 tonnes  |
|                         | Pavement thickness                                 | 300      | mm             |                   |                                | Gravel compacted to minimum 300 mm thickness, axle loading of 15 tonnes   |
|                         | Volume of gravel                                   | 93,660   | m <sup>3</sup> |                   |                                |   |
|                         | Tonnage of gravel                                  | 224,784  | tonnes         | 8,325             | Trucks - 10 yd with trailers   | Assuming CCM of gravel is 2.4 tons/m <sup>3</sup> , each truck/trailer carries 27 tonnes  |
|                         | Spread gravel road base evenly                     |          |                | 4                 | EME - Bulldozer                |   |
|                         | Roll gravel  |          |                | 4                 | EME - Vibrating Roller         |   |
|                         | Grade road surface                                 | 312,200  | m <sup>2</sup> | 2                 | EME - Grader                   |   |
| 2.0                     | <b>Foundations</b>                                 |          |                |                   |                                |   |
|                         | Construct WTG foundations                          | 75       | no.            |                   |                                |   |
|                         | Foundation plan area                               | 289      | m <sup>2</sup> |                   |                                | 17 x 17 m square pad footing  |
|                         | Slab thickness                                     | 1.4      | m              |                   |                                |   |
|                         | Volume of concrete per footing                     | 405      | m <sup>3</sup> |                   |                                | 32 MPa concrete (if a rock anchor type is used (as is highly likely for MEWF) then this reduces to 100m <sup>3</sup> )                                |
|                         | Total volume of concrete                           | 30,345   | m <sup>3</sup> |                   |                                | 75 WTG footings in total, sand & gravel aggregates  |
|                         | Tonnage of concrete                                | 72,828   | tonnes         | 2,073             | Trucks - 10 yd with Trailers   | Assuming MO of concrete is 2.4 tons/m <sup>3</sup> , concrete mix is 25% water  |
|                         | Water trucks for concrete mix                      |          |                | 90                | Trucks - Water Tanker          | Supply by water tanker (20,000L)  |
|                         | Mx concrete  |          |                | 4                 | Trucks - Agitator              | Assuming batching plant on site   |
|                         | Deliver WTG footing rings                          | 75       | no.            | 75                | Trucks - Flat Tray             |   |
|                         | Install WTG footing rings                          | 75       | no.            | 2                 | Crane - 50t plus capacity      | Steel flange connection ring for lower WTG section, (2 trips to site and 2 trips from site)   |
|                         | Install WTG footing steel reo                      | 40       | tonnes         |                   |                                | 40 tonne steel per footing  |
|                         | Total volume of steel reo                          | 3,000    | tonnes         | 300               | Trucks - Flat Tray             | 75 WTG footings in total  |
| 3.0                     | <b>Hardstands</b>                                  |          |                |                   |                                |   |
|                         | Construct WTG hardstand areas                      | 75       | no.            |                   |                                |   |
|                         | Hardstand plan area                                | 800      | m <sup>2</sup> |                   |                                | Construction area for assembling WTG by crane   |
|                         | Base thickness                                     | 300      | mm             |                   |                                | 40 x 20 m, max. gradient of 1%, bearing capacity > 200 kN/m <sup>2</sup>  |
|                         | Volume of gravel per hardstand                     | 240      | m <sup>3</sup> |                   |                                | Gravel compacted to 300 mm thickness  |
|                         | Total volume of gravel                             | 18,000   | m <sup>3</sup> |                   |                                |   |
|                         | Tonnage of gravel                                  | 43,200   | tonnes         | 1,600             | Trucks - 10 yd with Trailers   | Assuming CCM of gravel is 2.4 tons/m <sup>3</sup> , each truck/trailer carries 27 tonnes  |
|                         | Disperse gravel base                               |          |                | 2                 | EME - Bulldozer                |   |
|                         | Roll gravel base                                   |          |                | 1                 | EME - Vibrating Roller         |   |
|                         | Grade hardstand area                               | 800      | m <sup>2</sup> | 1                 | EME - Grader                   |   |
| 4.0                     | <b>Cabling</b>                                     |          |                |                   |                                |   |
|                         | Trenching, laying and covering                     | 44.6     | km             | 2                 | EME - Excavator                | Excavation of cable trench  |
|                         | Cable and Earthing in Wind Farm                    | 44.6     | km             | 8                 | Semi/Low Loader                | Approximately 49 drums of cabling, 8 tonnes each  |
| 5.0                     | <b>WTG Construction</b>                            |          |                |                   |                                |   |
|                         | Main crane assembly                                | 1        | no.            | 2                 | Crane - 50t plus capacity      | 2 trips to site and 2 trips from site   |
|                         | Construction of main WTG sections                  | 75       | no.            | 20                | Crane - 400t plus capacity     | 75 WTG in total, assembly by using main crane (400 tonne plus capacity) (10 trucks to bring the crane and its components to site and 10 to remove it) |
|                         | Nacelle section                                    | 75       | no.            | 75                | Semi/Low Loader                |   |
|                         | Tower upper section                                | 75       | no.            | 75                | Semi/Low Loader                |   |
|                         | Tower mid section                                  | 75       | no.            | 75                | Semi/Low Loader                |   |
|                         | Tower lower section                                | 75       | no.            | 75                | Semi/Low Loader                |   |
|                         | Tower hub section                                  | 75       | no.            | 25                | Semi/Low Loader                | 1 truck for every 3 hubs  |
|                         | Tower blade section                                | 225      | no.            | 225               | Semi/Low Loader                | 3x blades per WTG, single blade transport   |
| 6.0                     | <b>Transmission Lines</b>                          |          |                |                   |                                |   |
|                         | Nitrogen Conductor                                 | 150      | km             | 15                | Trucks - Flat Tray             | 3 x 50 km transmission lines, 5 km per drum, 5-6 tonnes each  |
|                         | OPGW   | 55       | km             | 6                 | Trucks - Flat Tray             | Optical ground wire cable, 5 km per drum  |
|                         | Suspension Poles                                   | 102      | no.            | 17                | Semi/Low Loader                | Disassembled in 40 ft containers, assumed 6 per container   |
|                         | Strain Poles                                       | 24       | no.            | 6                 | Semi/Low Loader                | Disassembled in 40 ft containers, assumed 4 per container   |
|                         | Termination Poles                                  | 23       | no.            | 6                 | Semi/Low Loader                | Disassembled in 40 ft containers, assumed 4 per container   |
|                         | Insulators   | 1        | lot            | 1                 | Trucks - Flat Tray             | Delivered in boxes, on pallets  |
|                         | Line Fittings                                      | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | OPGW Splice Enclosures                             | 14       | no.            | 1                 | Trucks - Flat Tray             |   |
|                         | Earthing and Labels                                | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | Container Demurrage                                | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | Electrical Installation                            | 1        | lot            | 3                 | Trucks - Flat Tray             | Installation of electrical items such as lighting, A/C, telecomms, etc.   |
|                         | Construction and assembly of transmission poles    |          |                | 1                 | Crane - 20t plus capacity      | Pole components lifted into position by crane   |
|                         | Installation of transmission lines                 |          |                | 1                 | Trucks - EPV                   |   |
|                         | Installation of transmission lines                 |          |                | 2                 | Light Vehicles - 4WD           |   |
|                         | Installation of transmission lines                 |          |                | 1                 | Light Vehicles - Winch Trailer |   |
|                         | Concrete footings for transmission poles           |          |                | 1                 | Trucks - Agitator              |   |
| 7.0                     | <b>Control Building and Switchyard</b>             |          |                |                   |                                |   |
|                         | 110kV Circuit Breaker                              | 2        | no.            | 1                 | Semi/Low Loader                |   |
|                         | 110kV Disconnector AJD                             | 3        | no.            | 1                 | Trucks - Flat Tray             | 1 pallet  |
|                         | 110kV Earth Switch                                 | 1        | no.            | 1                 | Trucks - Flat Tray             | 1 pallet  |
|                         | 110kV VT   | 3        | no.            | 1                 | Trucks - Flat Tray             | 1 pallet  |
|                         | 110kV Post Insulators                              | 40       | no.            | 4                 | Trucks - Flat Tray             | 4 pallets   |
|                         | 110kV Surge Arrestors                              | 6        | no.            | 1                 | Trucks - Flat Tray             | 1 pallet  |
|                         | 110/22kV 80MVA Transformer                         | 2        | no.            | 3                 | Semi/Low Loader                | 75 tonne for transformer, 25 tonne for oil container  |
|                         | 22kV Main Switchboard                              | 1        | no.            | 1                 | Trucks - Flat Tray             | 7-8 panels, 1 tonne each  |
|                         | 22kV WTG Switchgear                                | 75       | no.            | 75                | Trucks - Flat Tray             |   |
|                         | 22kV WTG Transformers                              | 75       | no.            | 75                | Trucks - Flat Tray             | 8 tonne per transformer   |
|                         | Protection   | 1        | lot            | 1                 | Trucks - Flat Tray             | < 1 tonne   |
|                         | SCADA and Telecommunications                       | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | AC/DC Aux  | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | Steel  | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | Rushers  | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | Cable and Earthing in Sub-station                  | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | Ancillary Equipment incl. installation (AC/DC Aux) | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | Electrical Installation                            | 1        | lot            | 1                 | Trucks - Flat Tray             |   |
|                         | Installation of Switchyard Equipment               |          |                | 0                 | Crane - 50t plus capacity      | 50t crane already on site   |
|                         | Installation of Switchyard Equipment               |          |                | 4                 | Light Vehicles - 4WD           |   |
|                         | Installation of Switchyard Equipment               |          |                | 1                 | Trucks - EPV                   |   |
|                         | Concrete foundation for switchyard                 |          |                | 2                 | Trucks - Agitators             |   |
| 8.0                     | <b>Miscellaneous</b>                               |          |                |                   |                                |   |
|                         | Labour Transport                                   | 229      | no.            | 4,080             | Light Vehicles - 30 seater Bus | Transport workers to site by coach/bus (max 229 on site during peak construction)   |
|                         | Contractor Vehicle Access                          | 6        | no.            | 3,600             | Light Vehicles - 4WD           |   |
|                         | Site Camp and Temporary Offices                    |          |                | 3                 | Trucks - Flat Tray             |   |
|                         | Staff Amenities                                    |          |                | 1                 | Trucks - Flat Tray             |   |
|                         | Waste Transfer/Storage Facilities                  |          |                | 2                 | Trucks - Flat Tray             |   |