

4.5 Noise and Vibration

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

4.6 Air Emissions

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

4.7 Waste Management

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

4.8 Fire Management

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

5.0 Operational EMP

5.1 Access and Landholder Relationships

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

5.2 Flora Management

Policy	To promote vegetation re-establishment, and promote a stable landform.
Performance Objectives	<ul style="list-style-type: none"> ▪ Promote the establishment of ground cover plants and zones of native vegetation (including shrubs and trees) on all areas of disturbance. ▪ Promote natural regeneration of native plant communities on temporarily cleared areas. ▪ In addition to typical regenerating vegetation, planting and transplanting of conservation significant plant species in appropriate areas wherever possible. ▪ Maintenance of revegetation and rehabilitation areas in accordance with the Rehabilitation Plan and Conservation Significant Plant Management Plan. ▪ Ensure that weeds are not spread along WTG access tracks, particularly environmental weeds, declared plants and invasive grasses.
Management Strategies	<ul style="list-style-type: none"> ▪ 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. ▪ 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.
Performance Indicators	<ul style="list-style-type: none"> ▪ Track verges, turbine pads stabilized and revegetated or rehabilitated according to Rehabilitation Plan. ▪ Nil declared, invasive or environmental weeds present. All outbreaks controlled before setting flowers and seeds.
Responsible Person	<ul style="list-style-type: none"> ▪ Site Manager and supervising botanist.
Monitoring & Reporting	<ul style="list-style-type: none"> ▪ Monthly and weekly inspection check sheets ▪ Independent audit every year ▪ Weed records to be maintained according to Weed Management Plan.

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

5.3 Fauna Management

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

5.4 Erosion and Sediment Control

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

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

5.5 Management of Flammable and Combustible Substances

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

5.6 Noise

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

5.7 Waste Management

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

6.0 Decommissioning EMP

6.1 Access

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



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

6.2 Flora and Fauna Management

Policy	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.
Performance Objectives	<ul style="list-style-type: none"> ▪ Prevent impacts to native vegetation and rehabilitation and conservation areas. ▪ Prevent weeds from entering the site. Continue application of Weed Management Plan and washdown facilities. ▪ 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). ▪ 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. ▪ No net loss of habitat connectivity or additional habitat fragmentation to occur. ▪ Offset programme for rare, endangered or vulnerable plants has been successful and the objectives have been met as outlined in respective Management Plans.
Management Strategies	<ul style="list-style-type: none"> ▪ A post-decommissioning survey undertaken to identify rare and threatened species within the decommissioning zone. ▪ 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. ▪ Placement of physical barriers around significant vegetation areas in order to restrict access and avoid further disturbance. ▪ Harvesting seeds for replacement use in rehabilitation zones, where natural regeneration was not successful. ▪ Ensure adequate measures are in place to safeguard and assist the movement of fauna from the decommissioning zone. ▪ All weeds established within the site are to be recorded in a decommissioning weed survey. ▪ 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; ▪ 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.
Performance Indicators	<ul style="list-style-type: none"> ▪ Vegetation, ecosystems, habitats and conservation significant species of flora and fauna are not suffering from adverse impacts, ▪ 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. ▪ Minimal disturbance to flora and fauna has occurred as a result of decommissioning the wind farm. ▪ 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. ▪ No failure or irreversible decline of rehabilitation measures. ▪ The dominant ground cover adjacent to tracks and turbine pads comprises native species and not introduced pasture grasses or legumes. ▪ No damage to protected species or designated conservation zones without relevant approval and supervision. ▪ Ensure relevant permits are effective before removing any protected species. ▪ Declared plants and environmental weeds are adequately controlled, and no fauna pests are introduced into the site ▪ Plant species planted for the offset programme are self-sustaining and do not require

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

6.3 Erosion and Sediment Control

Policy	To provide effective erosion and sediment practices to mitigate the potential effects of construction on watercourses, land use and the general environment.
Performance Objectives	<ul style="list-style-type: none"> ▪ Minimise soil erosion. ▪ Minimise sedimentation of land. ▪ Minimise modification to drainage patterns. ▪ Prevent as far as practical, sediment transport to adjacent watercourses.
Management Strategies	<ul style="list-style-type: none"> ▪ Conduct activities in accordance with a detailed Erosion and Sediment Control Plan (ESCP). ▪ Minimise the quantity and duration of soil exposure. ▪ Protect topsoil, root and seed stock. ▪ Protect critical areas during and after construction by reducing the velocity of stormwater flow and redirecting runoff onto undisturbed areas. ▪ Install and maintain temporary erosion and sediment control measures during construction. ▪ Re-contour modified landforms to their original condition as soon as practicable including any erosion controls established prior to construction. ▪ Replace topsoil and seed stock to facilitate revegetation as soon as practicable following construction. ▪ Inspect disturbed areas and maintain erosion and sediment controls as necessary during and after construction until stabilisation is achieved. ▪ Strict implementation of permanent stormwater diversion drains on all hilly slopes (approximately 20 m intervals, depending on slope). ▪ Strict implementation of silt mesh fencing and stormwater diversion drains on the banks of all waterways containing flowing water during construction. ▪ Highly erodible soils are identified by visual inspection of the site to identify the extent and location of existing soil erosion. ▪ 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"> ▪ Keep the work area to a minimum so that the smallest possible ground area is disturbed. ▪ Place erosion control structures such as diversion drains and silt fences at key locations to capture the suspended sediment. ▪ Divert stormwater away from the exposed soil to reduce overland flow or channel flow on the vulnerable soils.

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

6.4 Management of Flammable and Combustible Substances

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

6.5 Noise and Vibration

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

6.6 Air Emissions

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

Associated Documentation	<ul style="list-style-type: none"> ▪ Nil
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6.7 Waste Management

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

6.8 Fire Management

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

6.9 Clean up and Rehabilitation

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

	<ul style="list-style-type: none"> ▪ 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. ▪ All waste materials and equipment will be removed from the site following decommissioning. ▪ 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. ▪ 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. ▪ Where applied, seed will be evenly spread over the entire disturbed area. ▪ Direct-seeding will take place as soon as practicable during clean up and when ground conditions are most conducive to seed germination. ▪ Fertilisers and soil supplements will be used only if prescribed in the Rehabilitation Plan or approved through specific expert advice. ▪ 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.
Performance Indicators	<ul style="list-style-type: none"> ▪ No new weed species introduced ▪ Weed Management implemented ▪ Groundcover re-established ▪ No change in drainage pattern leading to soil erosion ▪ Stable landforms
Monitoring, Reporting and Corrective Action	<ul style="list-style-type: none"> ▪ Photographic records from monitoring sites. ▪ Check Sheets (recorded at monitoring sites) – completed and reviewed by manager / supervisor. ▪ Regular inspections, audits and reviews (non-compliance and incident reporting) undertaken in accordance with EMP and recommendations and corrective actions implemented. ▪ Post Construction Audits ▪ Regular Easement Inspections
Responsible Person	<ul style="list-style-type: none"> ▪ Environmental Officer and Construction Manager
Associated Documentation	<ul style="list-style-type: none"> ▪ Rehabilitation Plan

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
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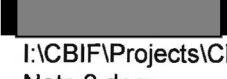
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Mount Emerald Wind Farm Traffic Impact Assessment

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

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

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

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

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

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

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).

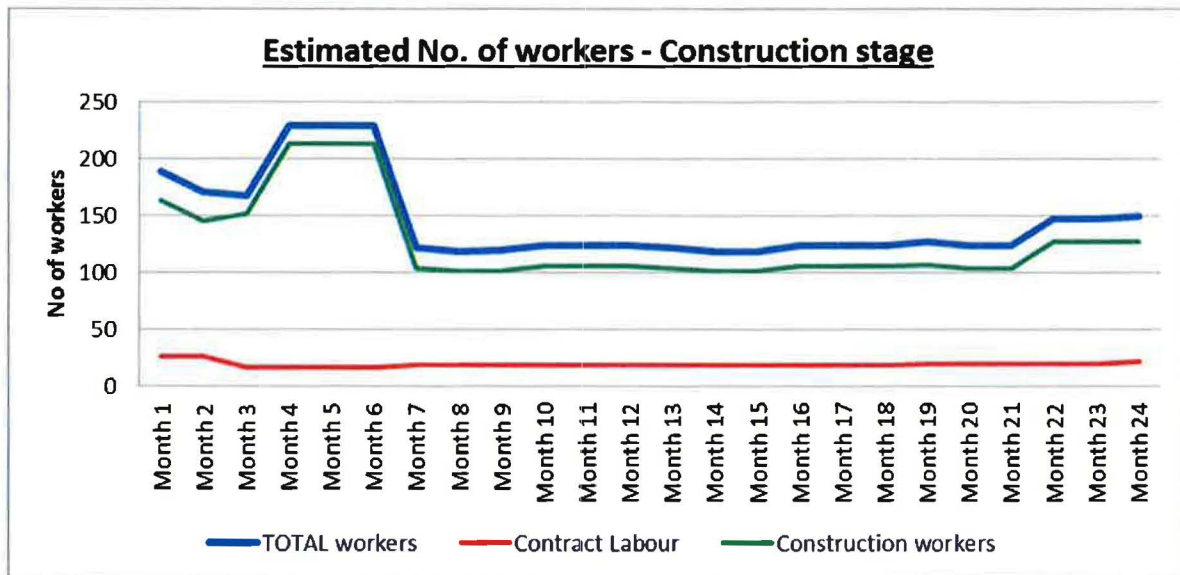


Figure 4-1 Estimated total number of workers during construction stage (24 months)

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.

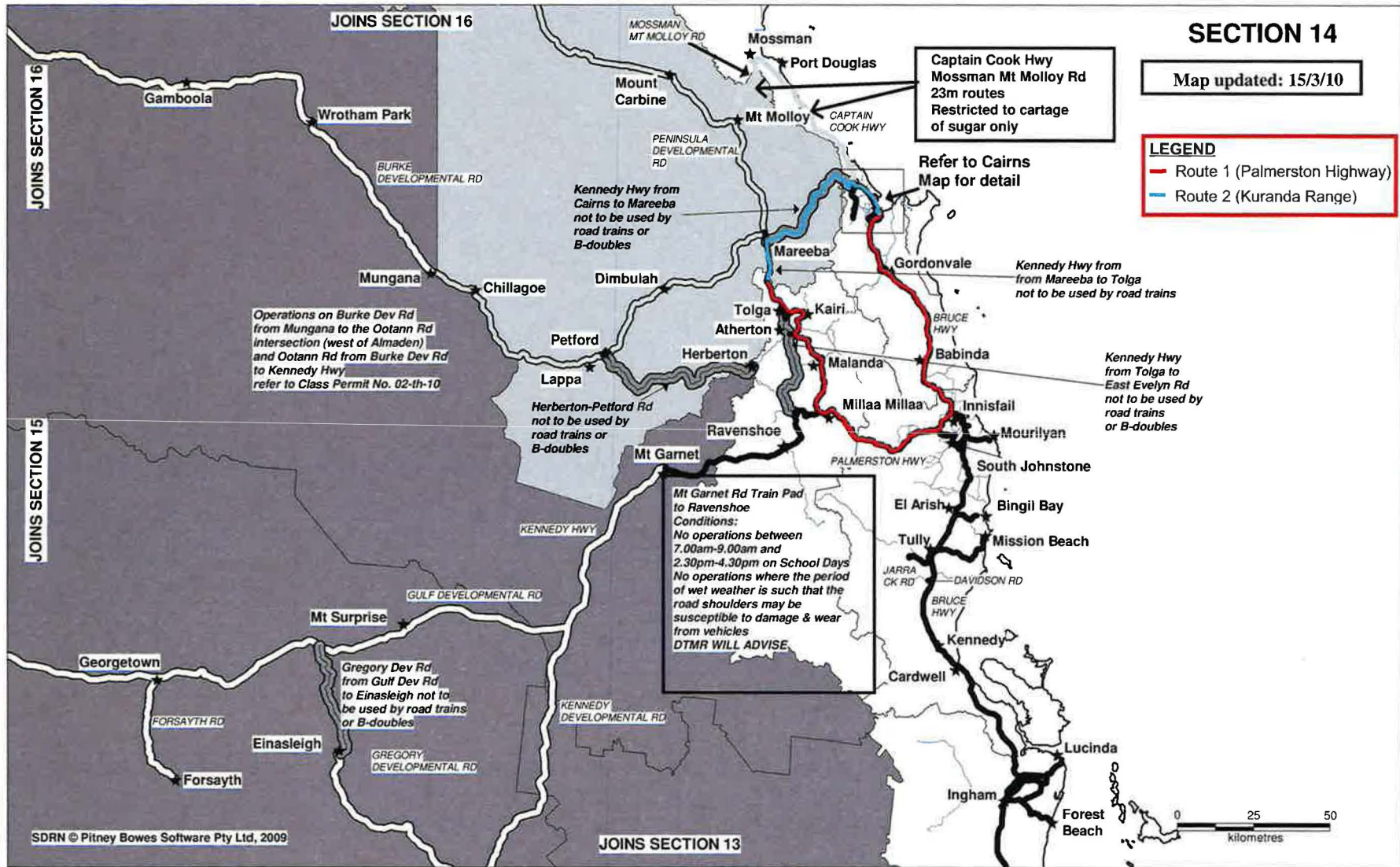
As noted in the response to Question 25, it is possible to restrict staff traffic to 30 vehicles per day. Therefore, a new assessment identifying the worst case traffic impact on the road network is not required for Question 26.

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

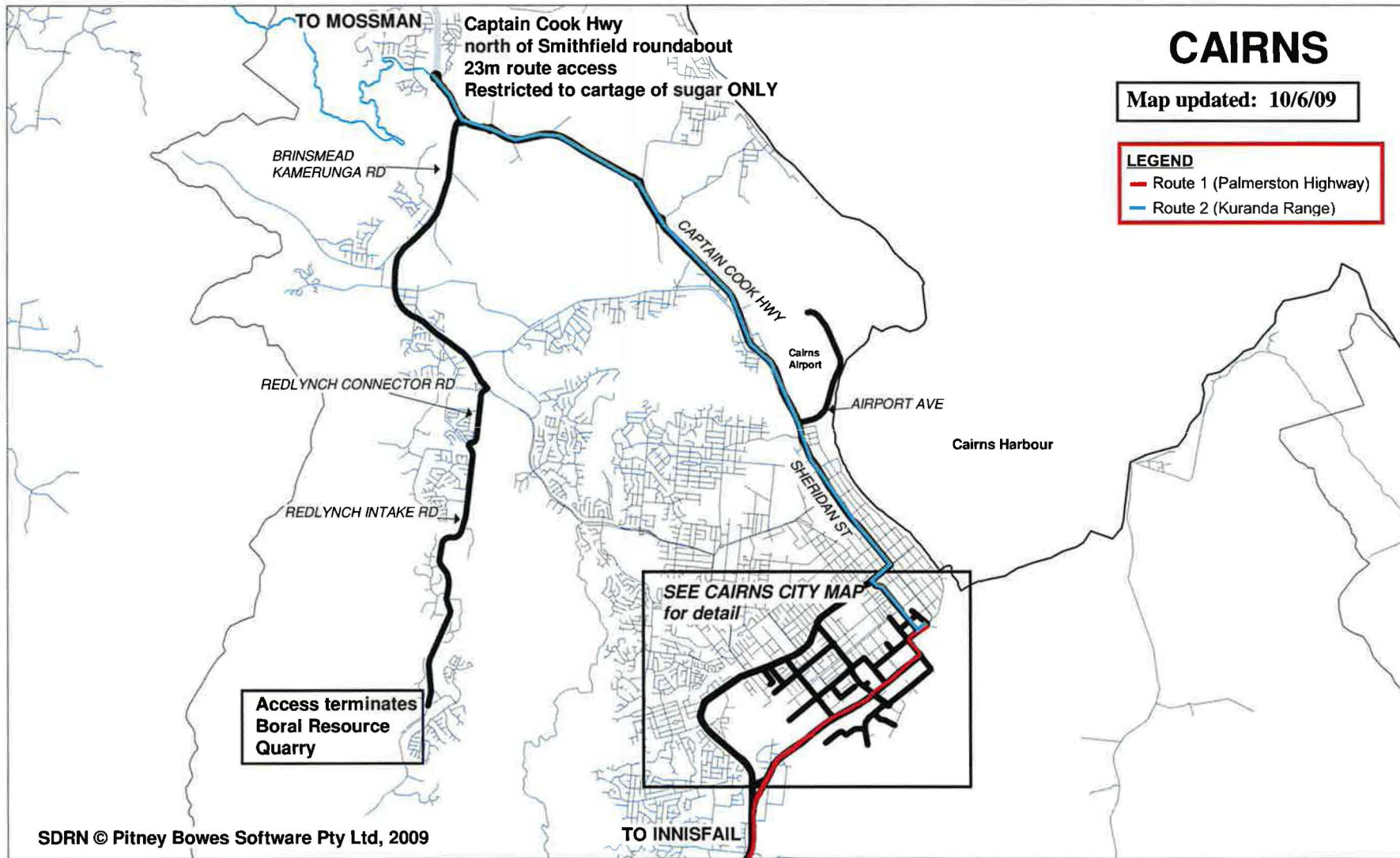


B-DOUBLES
 - 23 metre routes
 - 23 & 25 metre routes

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

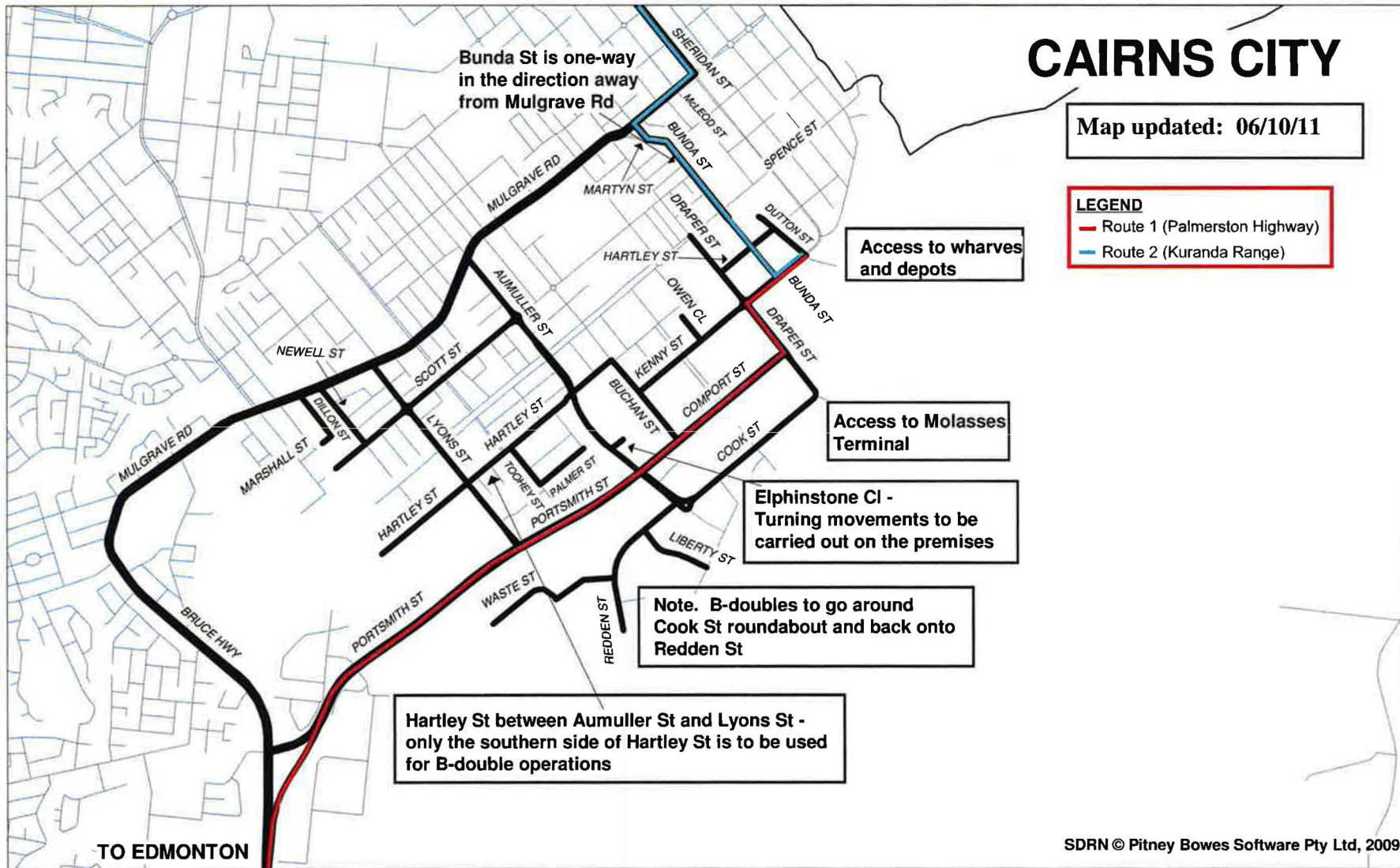


B-DOUBLES
 23 metre routes
 23 & 25 metre routes

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

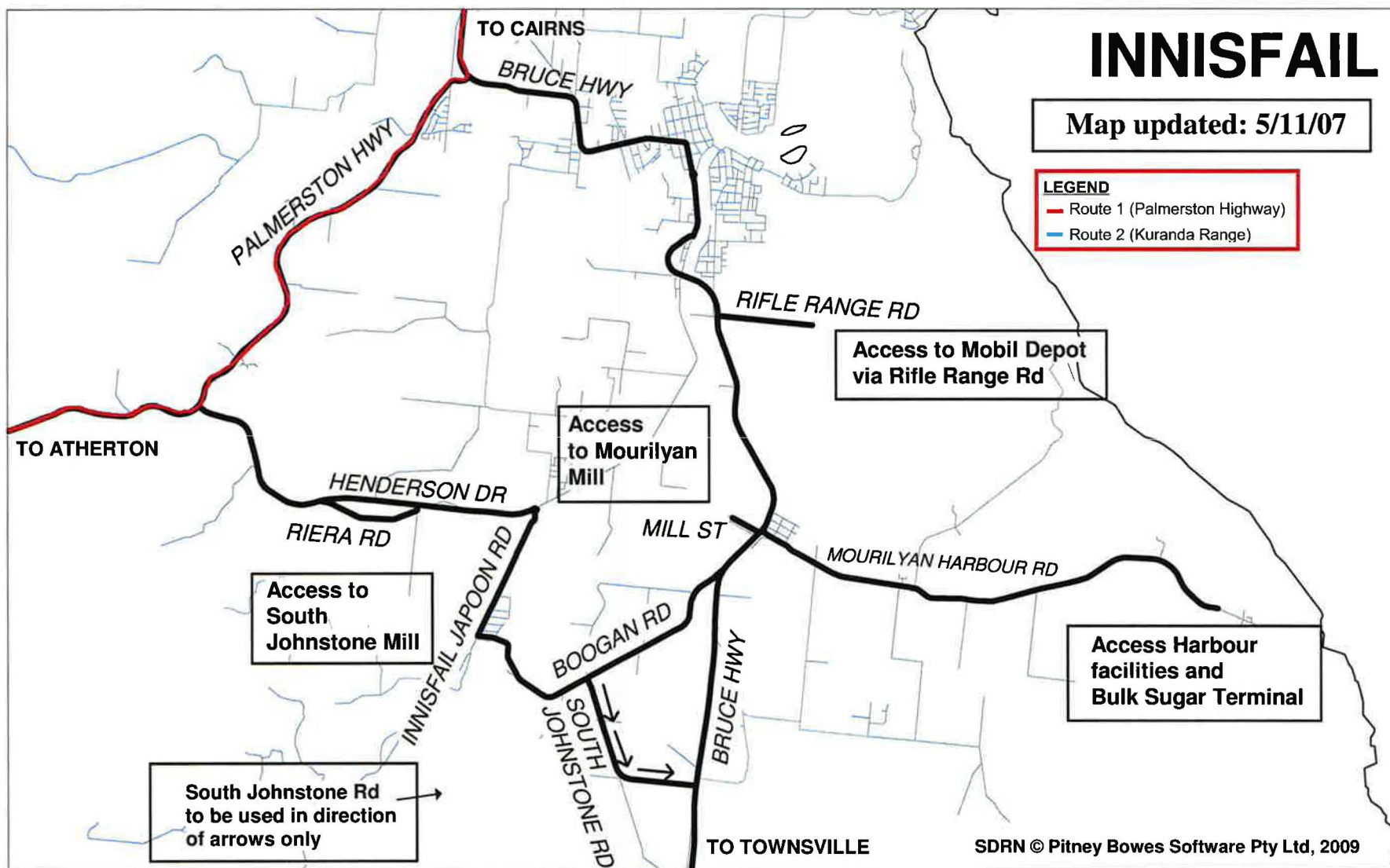
ROAD TRAINS

- 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



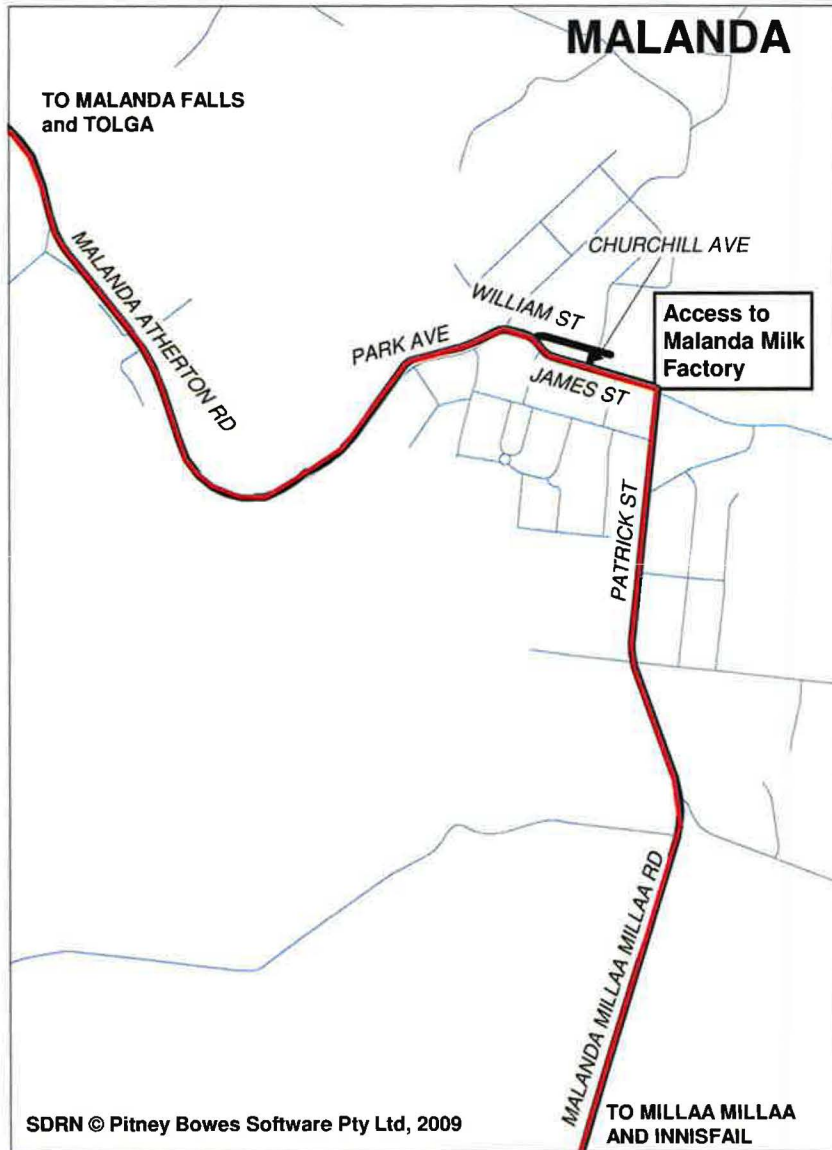
B-DOUBLES	
	23 metre routes
	23 & 25 metre routes

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

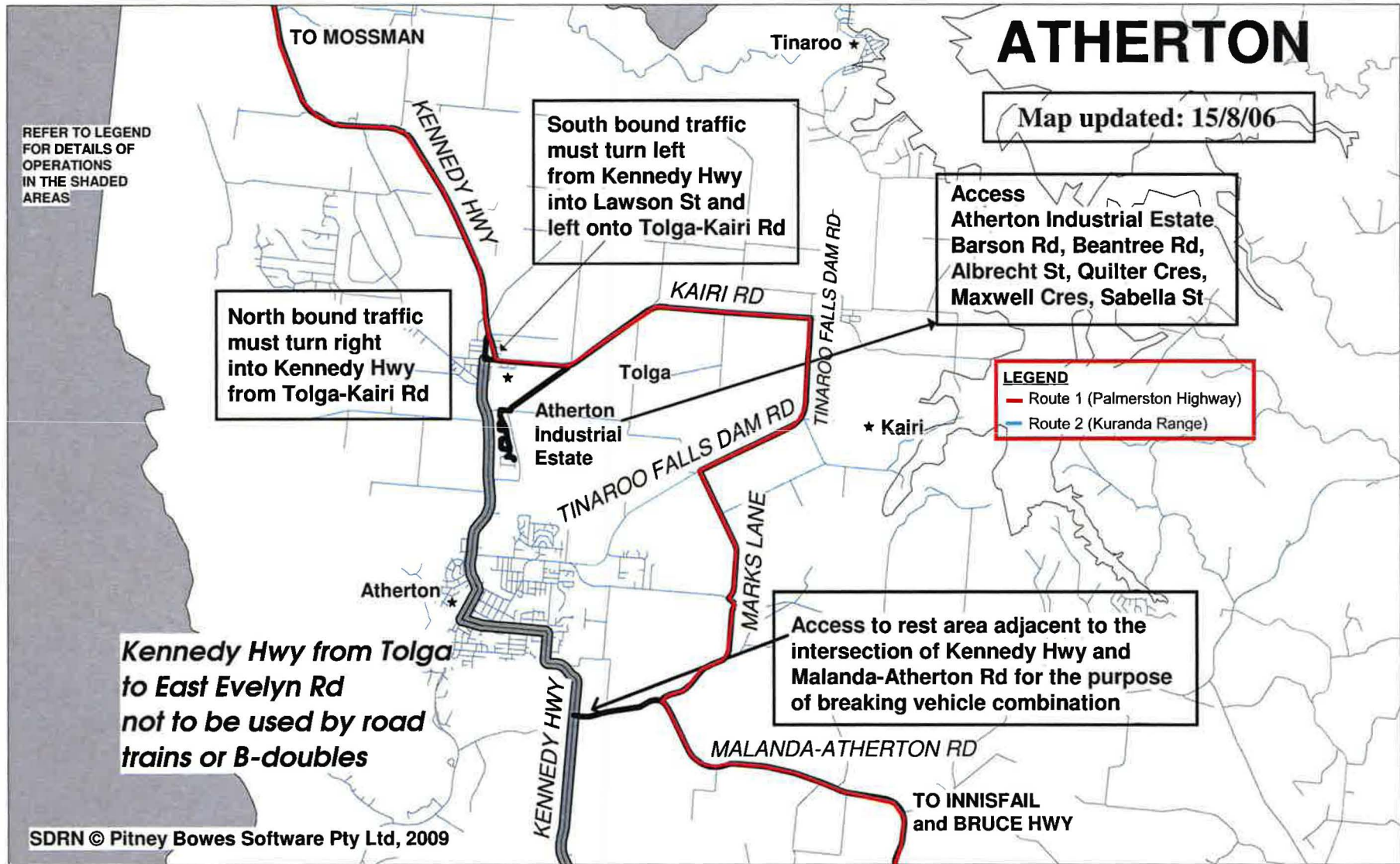
ROAD TRAINS



- Type 1 routes
- Type 1 & 2 routes



NO ROAD TRAINS or B-DOUBLES


-

REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS



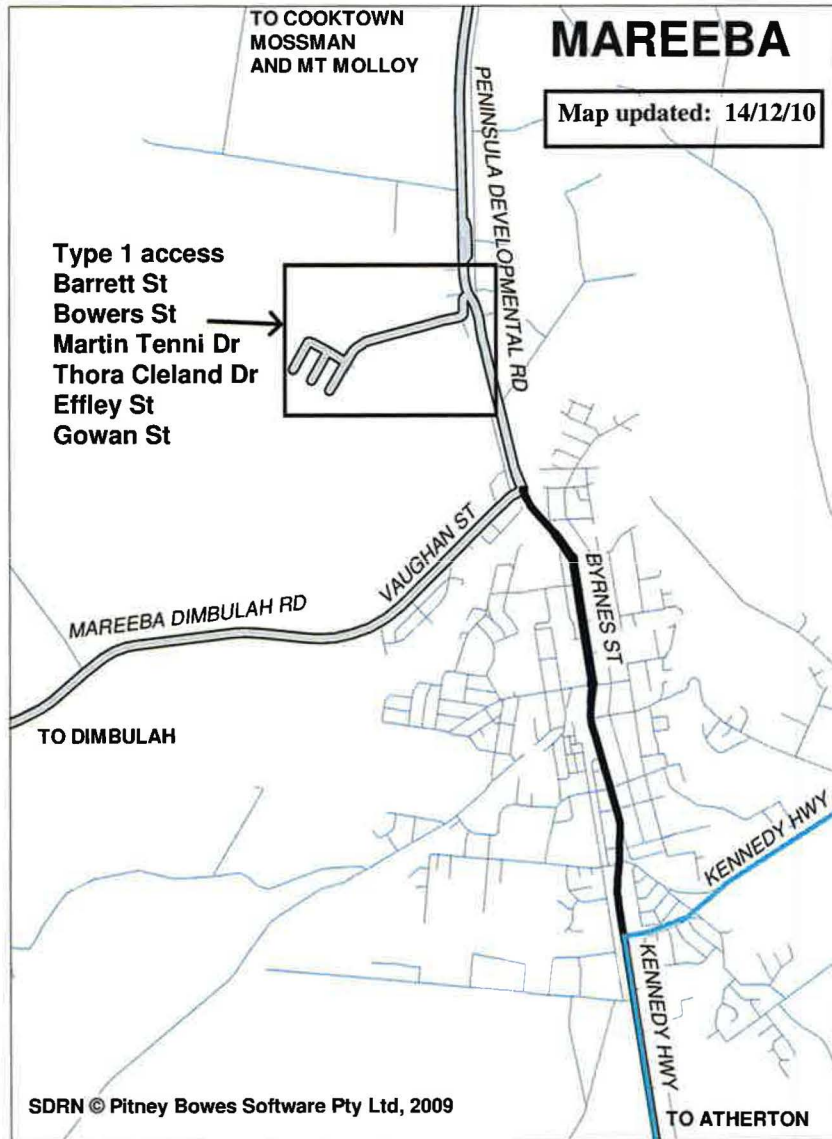
B-DOUBLES	
	23 metre routes
	23 & 25 metre routes

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

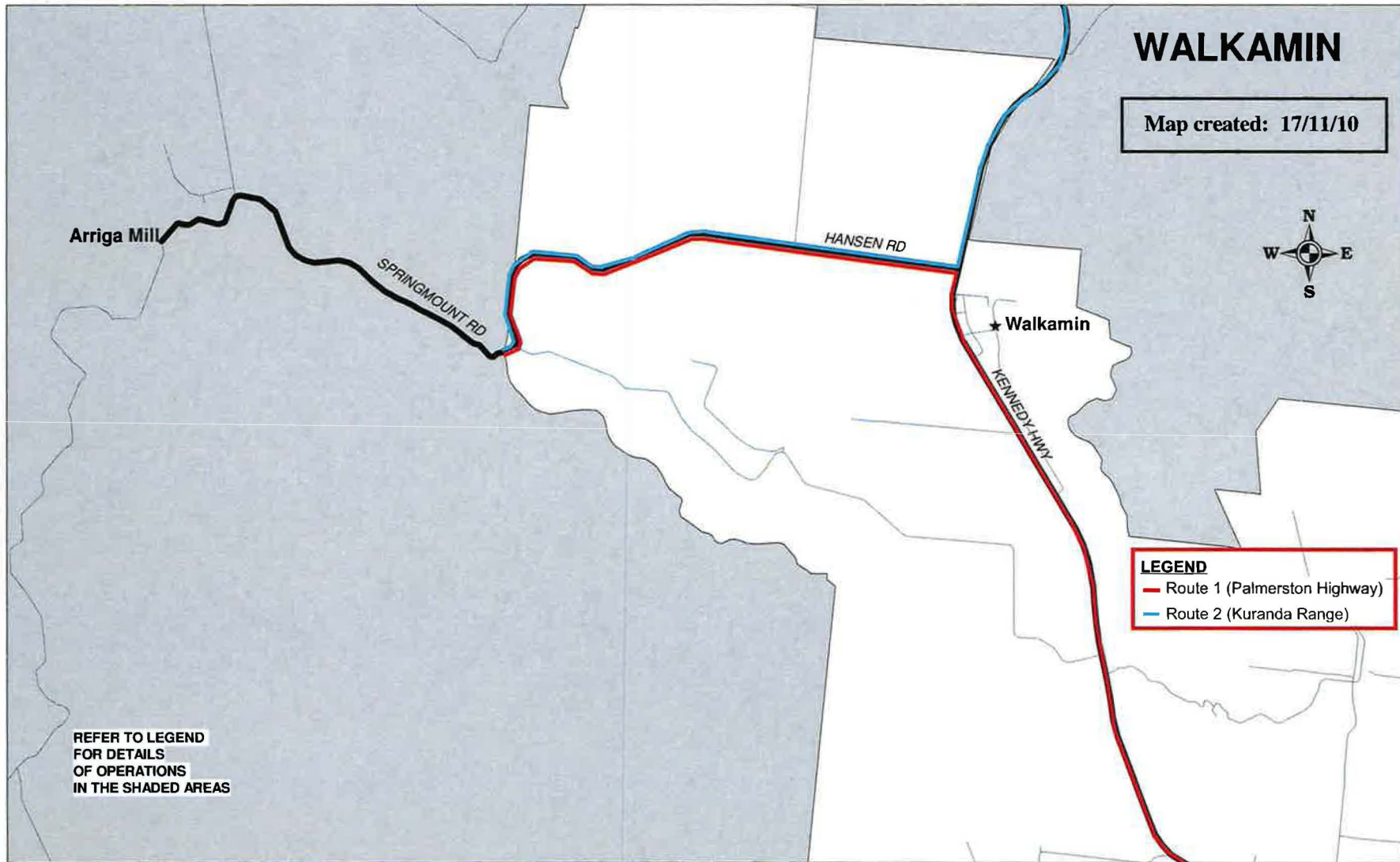
ROAD TRAINS

- 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.

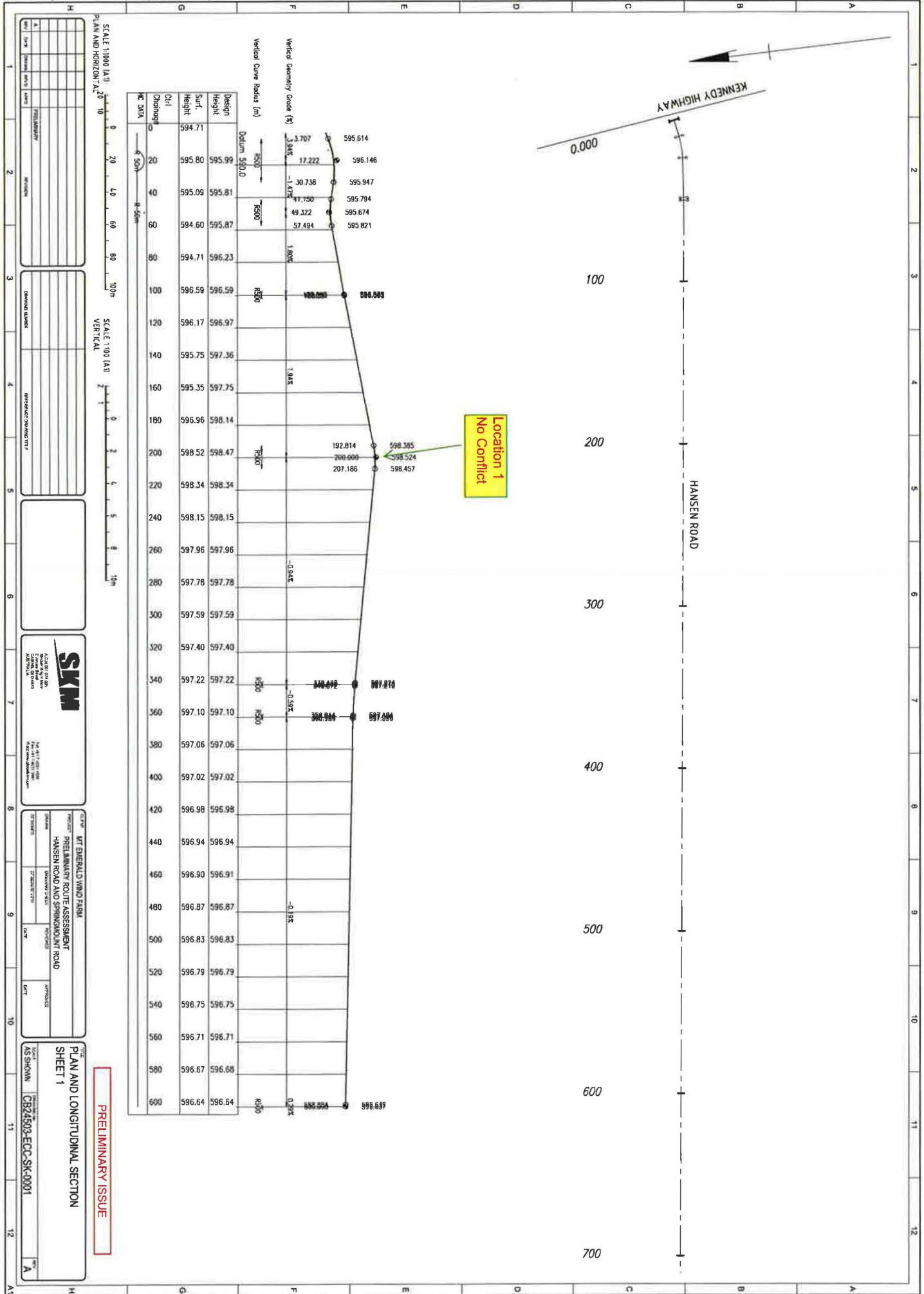
Table 1: Review of vertical profiles of Hansen and Springmount Road

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)**

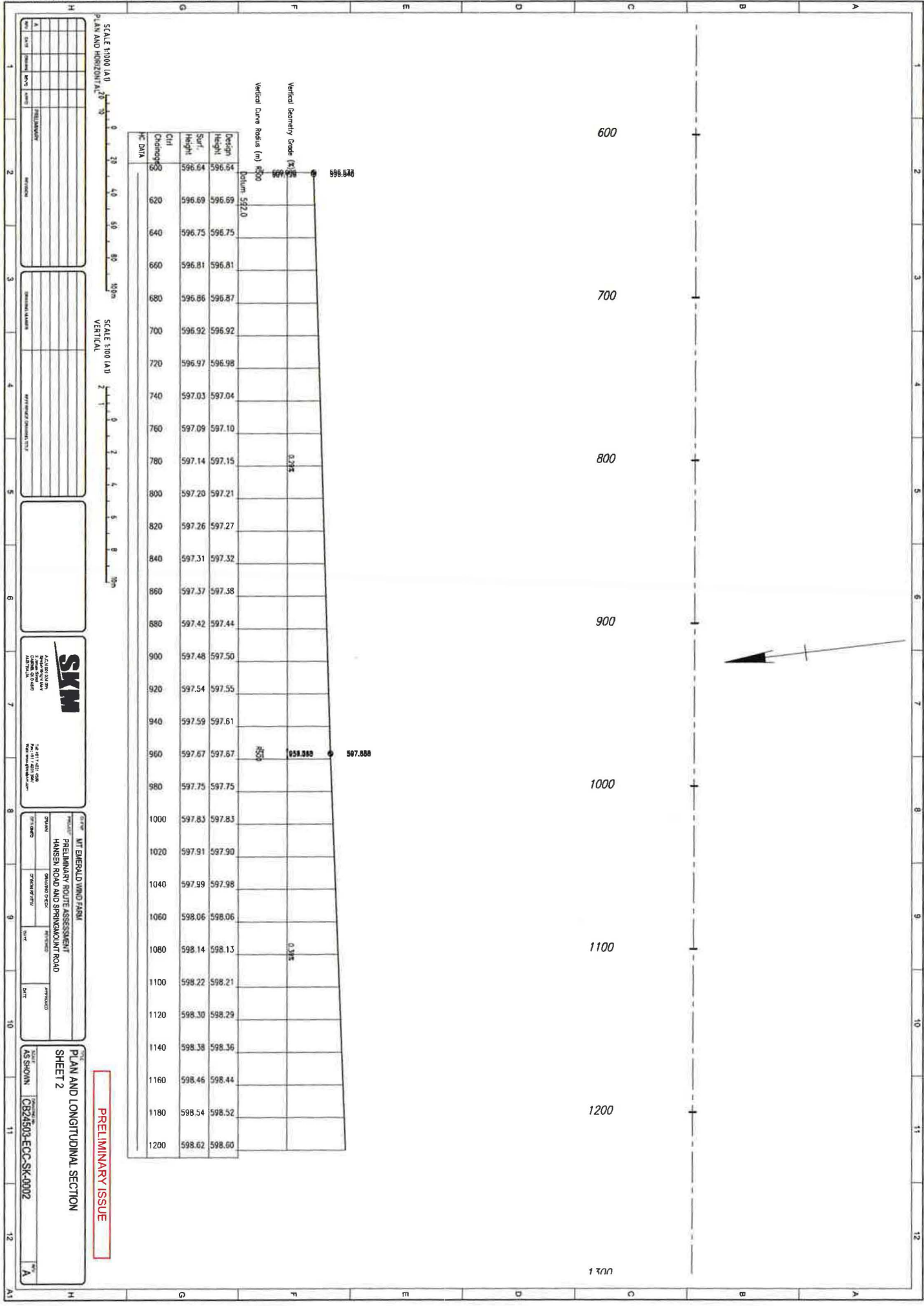


PRELIMINARY ISSUE

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PROJECT: MT EMERALD WIND FARM
 PRELIMINARY ROUTE ASSESSMENT
 HANSEN ROAD AND SPRINGDALE ROAD
 DRAWN BY: [Name]
 CHECKED BY: [Name]
 DATE: [Date]

THE PLAN AND LONGITUDINAL SECTION
 SHEET 1
 LOCAL AS SHOWN
 CB24503-ECC-SK-0001



SCALE 1:100 (A1)
 PLAN AND HORIZONTAL

SCALE 1:100 (A1)
 VERTICAL

Station	Design Height	Surf. Height	Chit Change
600	596.64	596.64	600
620	596.69	596.69	
640	596.75	596.75	
660	596.81	596.81	
680	596.86	596.87	
700	596.92	596.92	
720	596.97	596.98	
740	597.03	597.04	
760	597.09	597.10	
780	597.14	597.15	
800	597.20	597.21	
820	597.26	597.27	
840	597.31	597.32	
860	597.37	597.38	
880	597.42	597.44	
900	597.48	597.50	
920	597.54	597.55	
940	597.59	597.61	
960	597.67	597.67	
980	597.75	597.75	
1000	597.83	597.83	
1020	597.91	597.90	
1040	597.99	597.98	
1060	598.06	598.06	
1080	598.14	598.13	
1100	598.22	598.21	
1120	598.30	598.29	
1140	598.38	598.36	
1160	598.46	598.44	
1180	598.54	598.52	
1200	598.62	598.60	

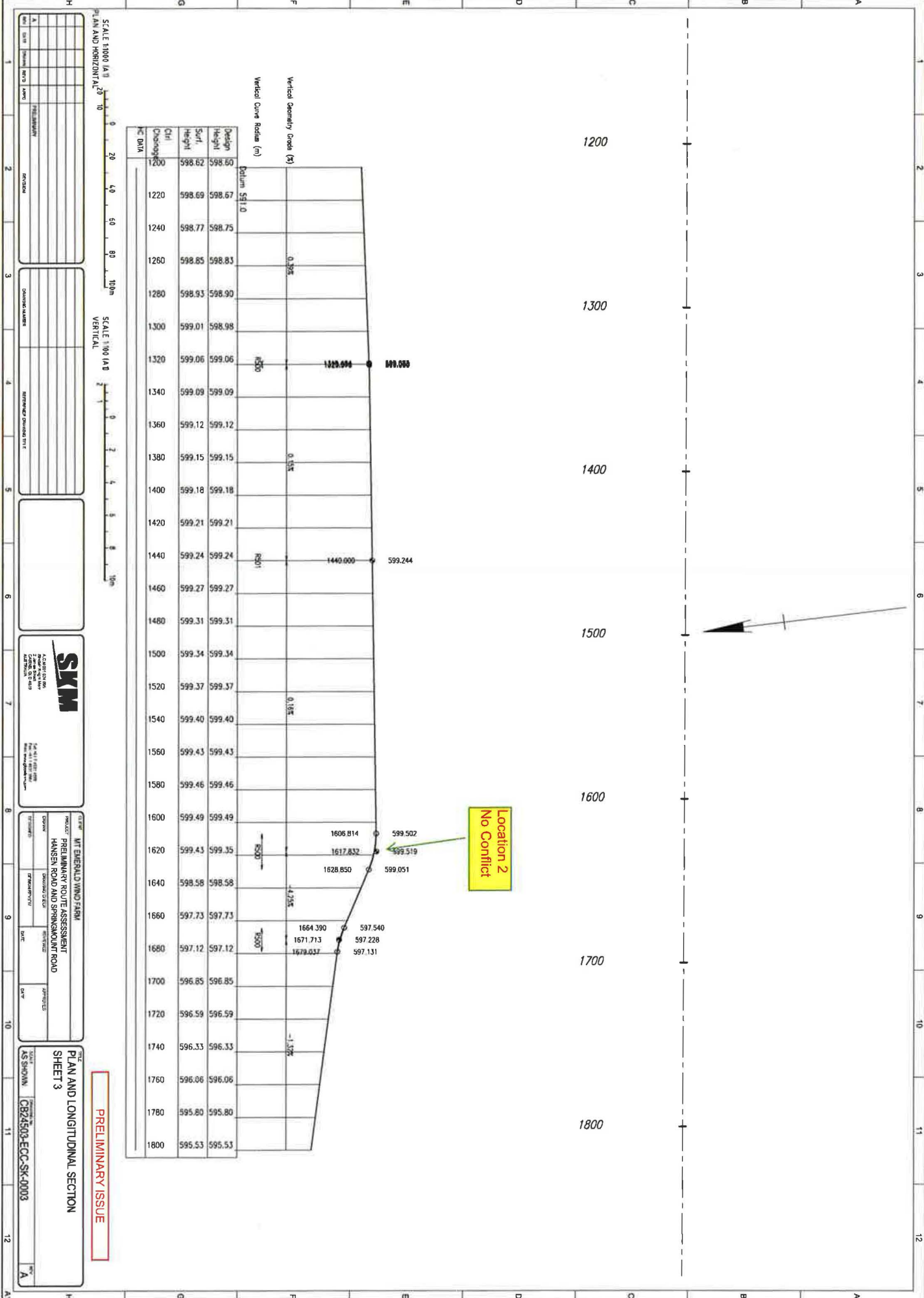
PRELIMINARY APPROVED	PRELIMINARY APPROVED	PRELIMINARY APPROVED	PRELIMINARY APPROVED
NAME TITLE	NAME TITLE	NAME TITLE	NAME TITLE

SKM
 45 ALBERTA AVENUE
 CALGARY, ALBERTA T2C 2K5
 TEL: 403.243.4300
 FAX: 403.243.4301
 WWW.SKMGROUP.COM

PROJECT: MT EMERALD WIND FARM
 PRELIMINARY ROUTE ASSESSMENT
 HANSEN ROAD AND SPRINGMOUNT ROAD
 DRAWN BY: []
 CHECKED BY: []
 DATE: []

SHEET 2
 AS SHOWN CB24503-ECC-SK-0002

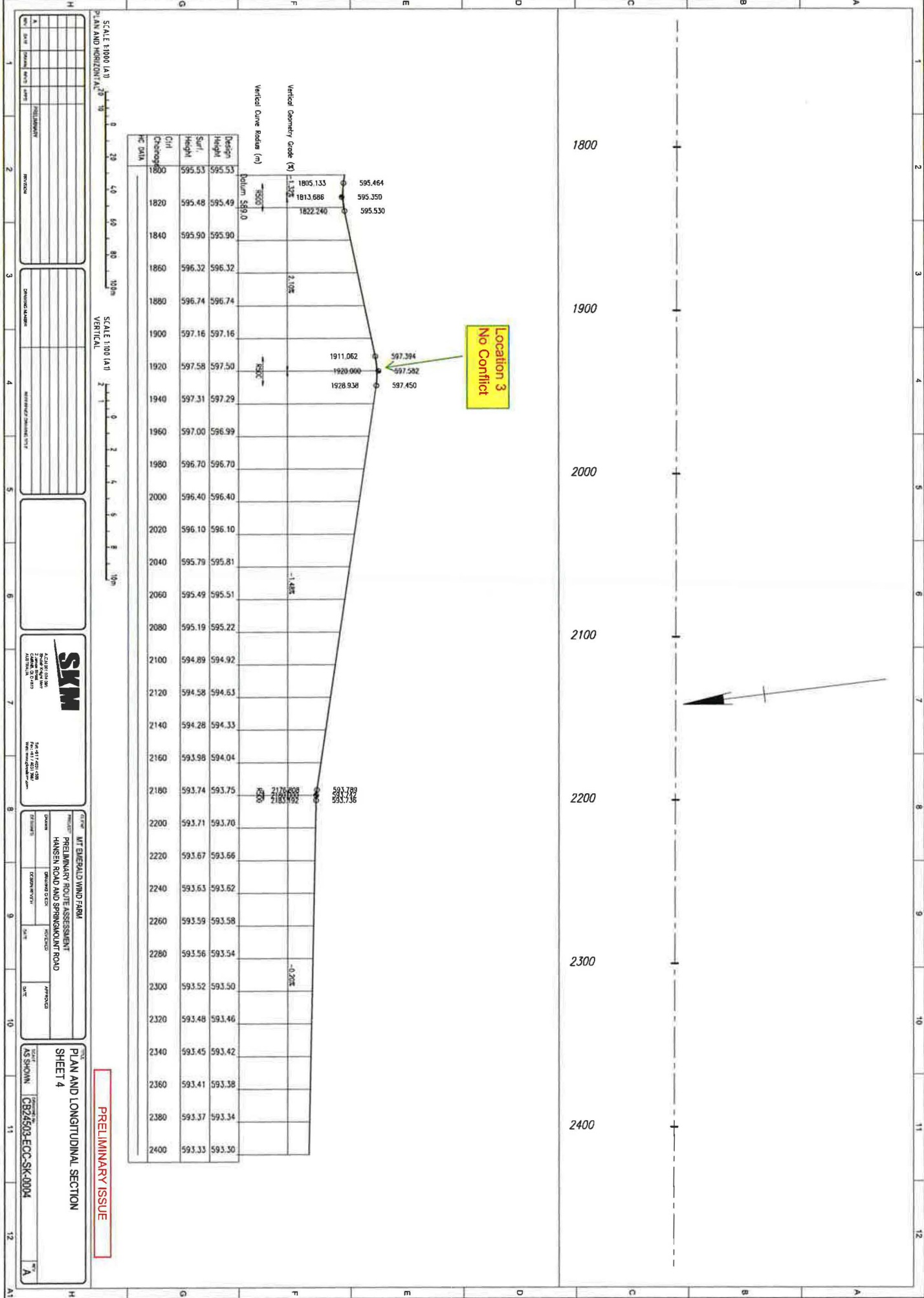
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Location 2
No Conflict

PRELIMINARY ISSUE

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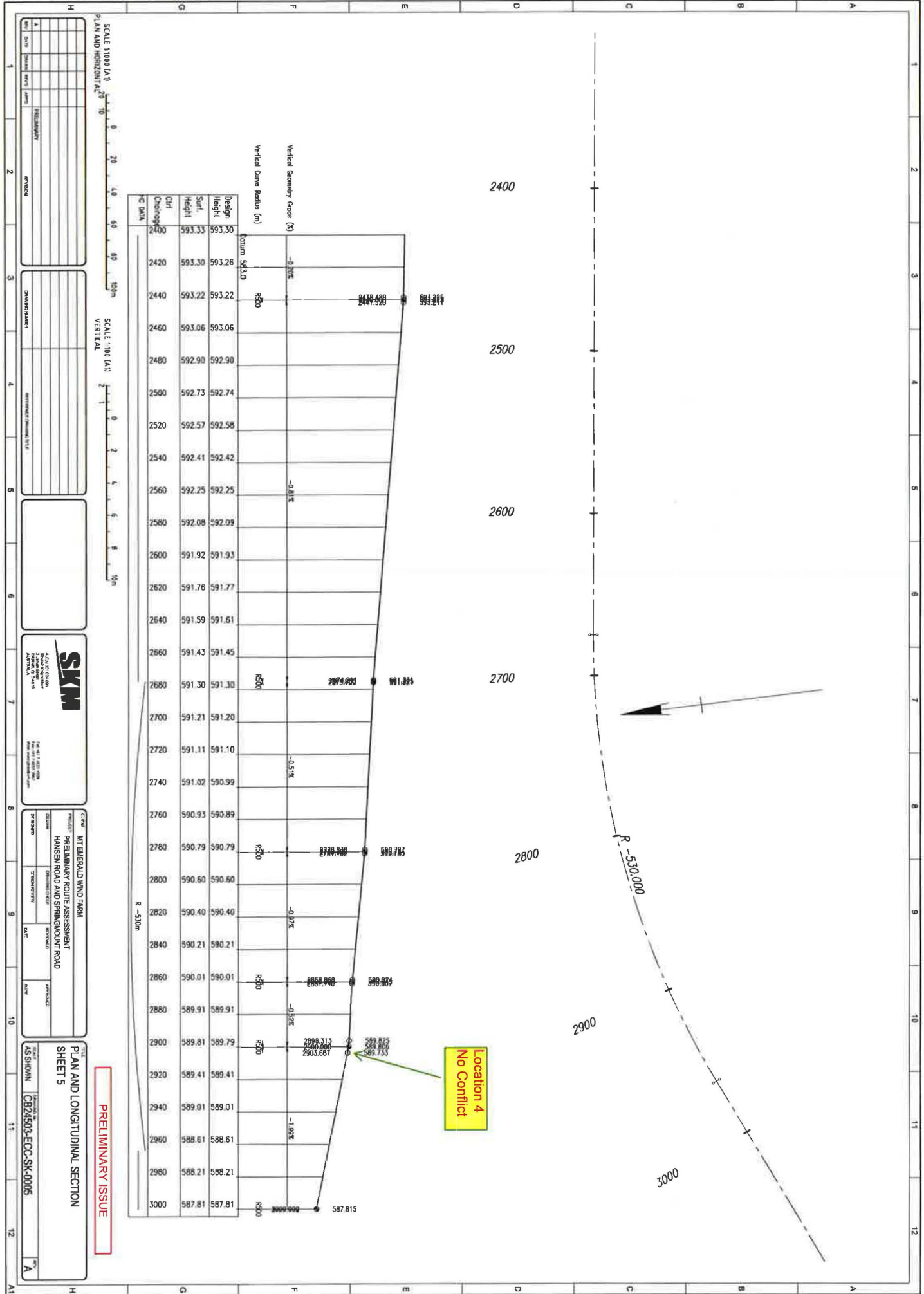
Location 3
No Conflict

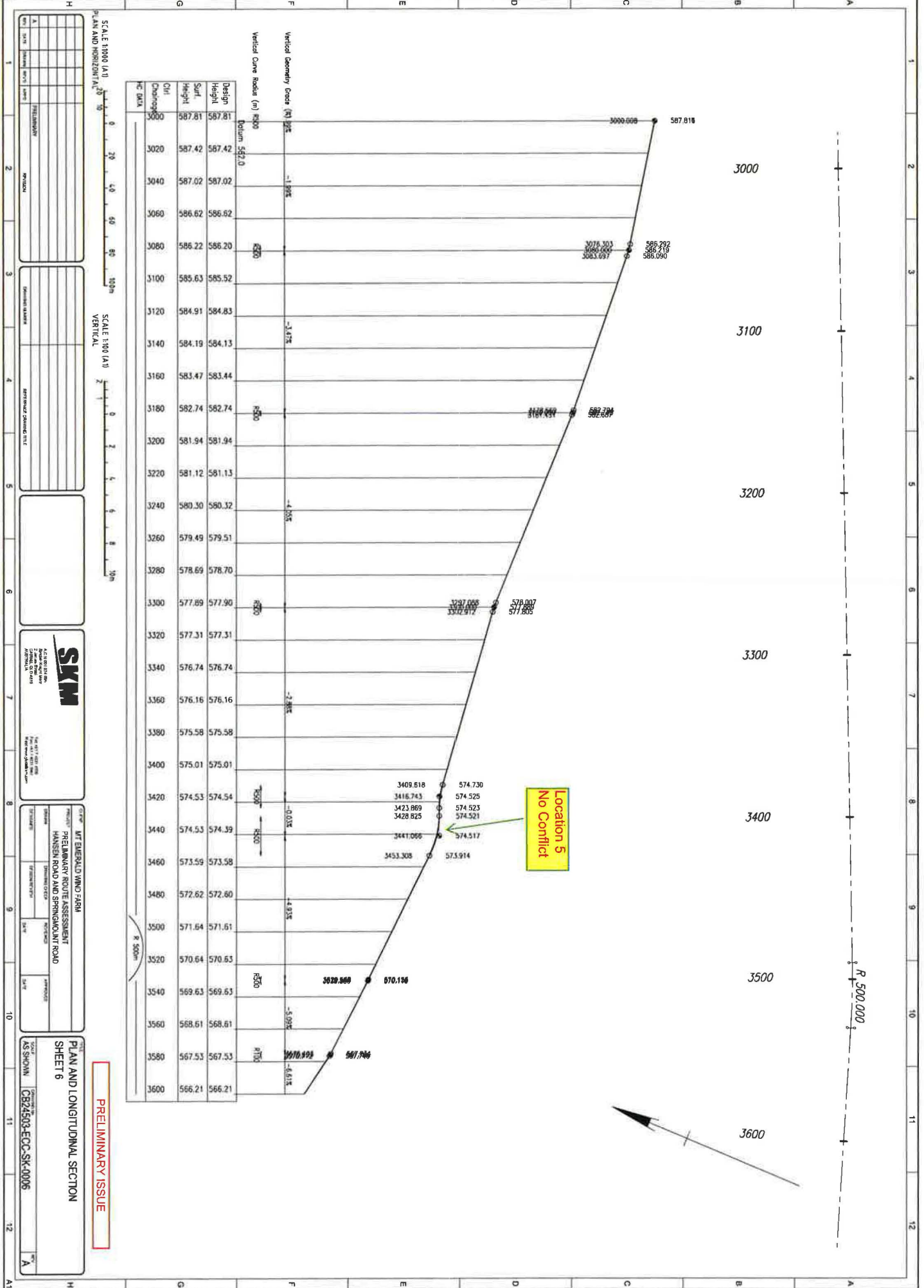
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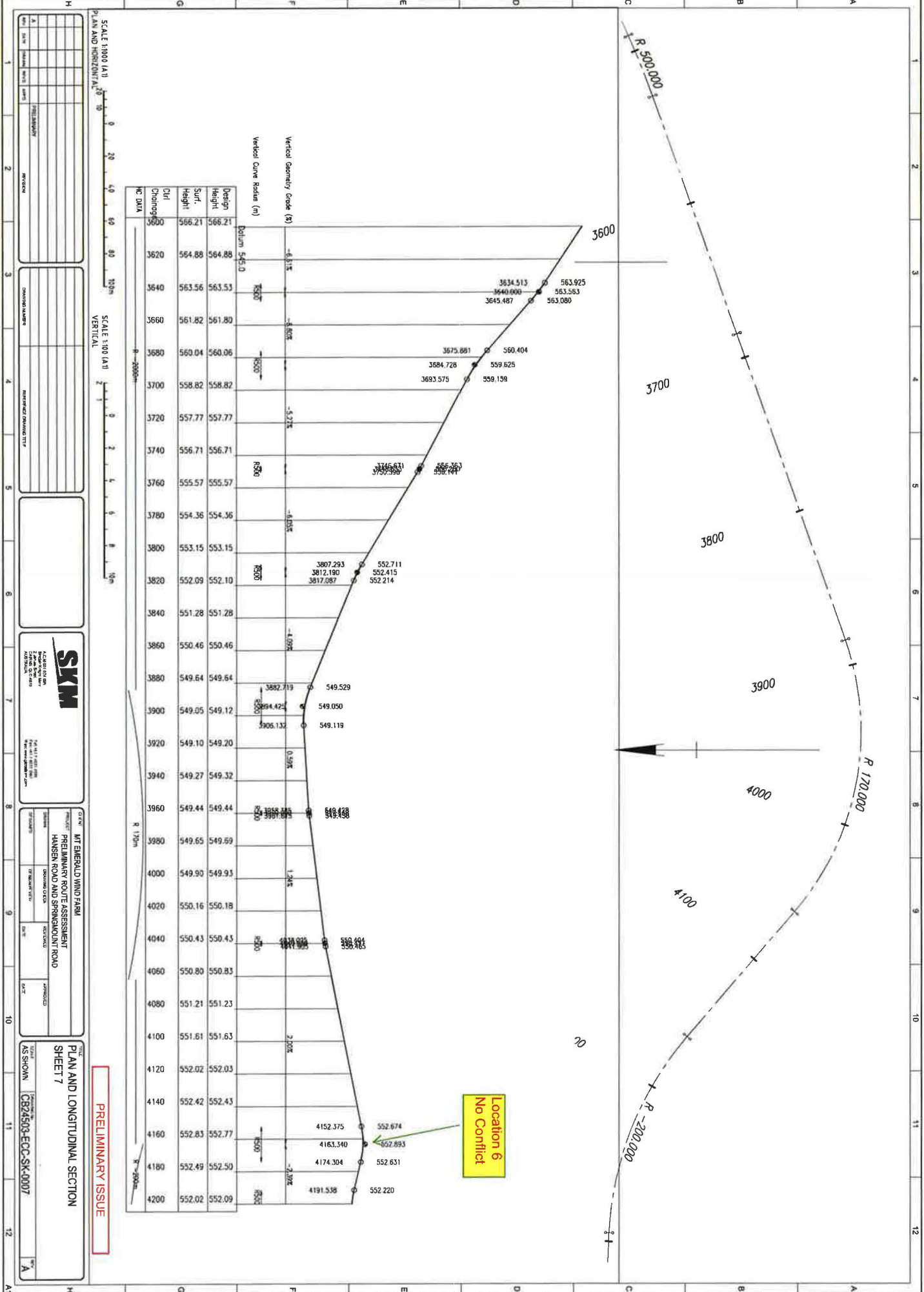
MT EMBALD WIND FARM
 PRELIMINARY ROUTE ASSESSMENT
 HANSEN ROAD AND SPRINGMOUNT ROAD
 SHEET 4

DATE: 11/12/2012
 DRAWN BY: JEREMY TRUNDLE
 CHECKED BY: JEREMY TRUNDLE
 APPROVED BY: JEREMY TRUNDLE

PROJECT NO: CB24503-ECC-SK-0004
 SHEET NO: 4







SCALE 1:100 (A1)
 PLAN AND HORIZONTAL

SCALE 1:100 (A1)
 VERTICAL

CH CHAINAGE	DESIGN SURF. HEIGHT	DESIGN HEIGHT	VERTICAL CURVE GRADE (%)	VERTICAL CURVE RADIUS (m)	EXISTING SURF. HEIGHT	EXISTING SURF. CHAINAGE
3600	566.21	566.21	-6.1%	545.0	3634.513	3600
3620	564.88	564.88	-6.1%	545.0	3640.000	3620
3640	563.56	563.53	-5.6%	545.0	3645.487	3640
3660	561.82	561.80	-5.6%	545.0	3675.881	3660
3680	560.04	560.06	-5.2%	545.0	3684.728	3680
3700	558.82	558.82	-5.2%	545.0	3693.575	3700
3720	557.77	557.77	-6.0%	545.0	3745.511	3720
3740	556.71	556.71	-6.0%	545.0	3750.390	3740
3760	555.57	555.57	-6.0%	545.0	3765.263	3760
3780	554.36	554.36	-6.0%	545.0	3807.293	3780
3800	553.15	553.15	-6.0%	545.0	3812.190	3800
3820	552.09	552.10	-6.0%	545.0	3817.087	3820
3840	551.28	551.28	+0.9%	545.0	3882.719	3840
3860	550.46	550.46	+0.9%	545.0	3894.425	3860
3880	549.64	549.64	+0.9%	545.0	3906.132	3880
3900	549.05	549.12	0.9%	545.0	3958.885	3900
3920	549.10	549.20	0.9%	545.0	3968.885	3920
3940	549.27	549.32	1.2%	545.0	3978.885	3940
3960	549.44	549.44	1.2%	545.0	3988.885	3960
3980	549.65	549.59	1.2%	545.0	3998.885	3980
4000	549.90	549.95	1.2%	545.0	4008.885	4000
4020	550.16	550.18	2.0%	545.0	4018.885	4020
4040	550.43	550.43	2.0%	545.0	4028.885	4040
4060	550.80	550.83	2.9%	545.0	4038.885	4060
4080	551.21	551.23	2.9%	545.0	4048.885	4080
4100	551.61	551.63	2.9%	545.0	4058.885	4100
4120	552.02	552.03	2.9%	545.0	4068.885	4120
4140	552.42	552.43	2.9%	545.0	4078.885	4140
4160	552.83	552.77	2.9%	545.0	4088.885	4160
4180	552.49	552.50	2.9%	545.0	4098.885	4180
4200	552.02	552.09	2.9%	545.0	4108.885	4200

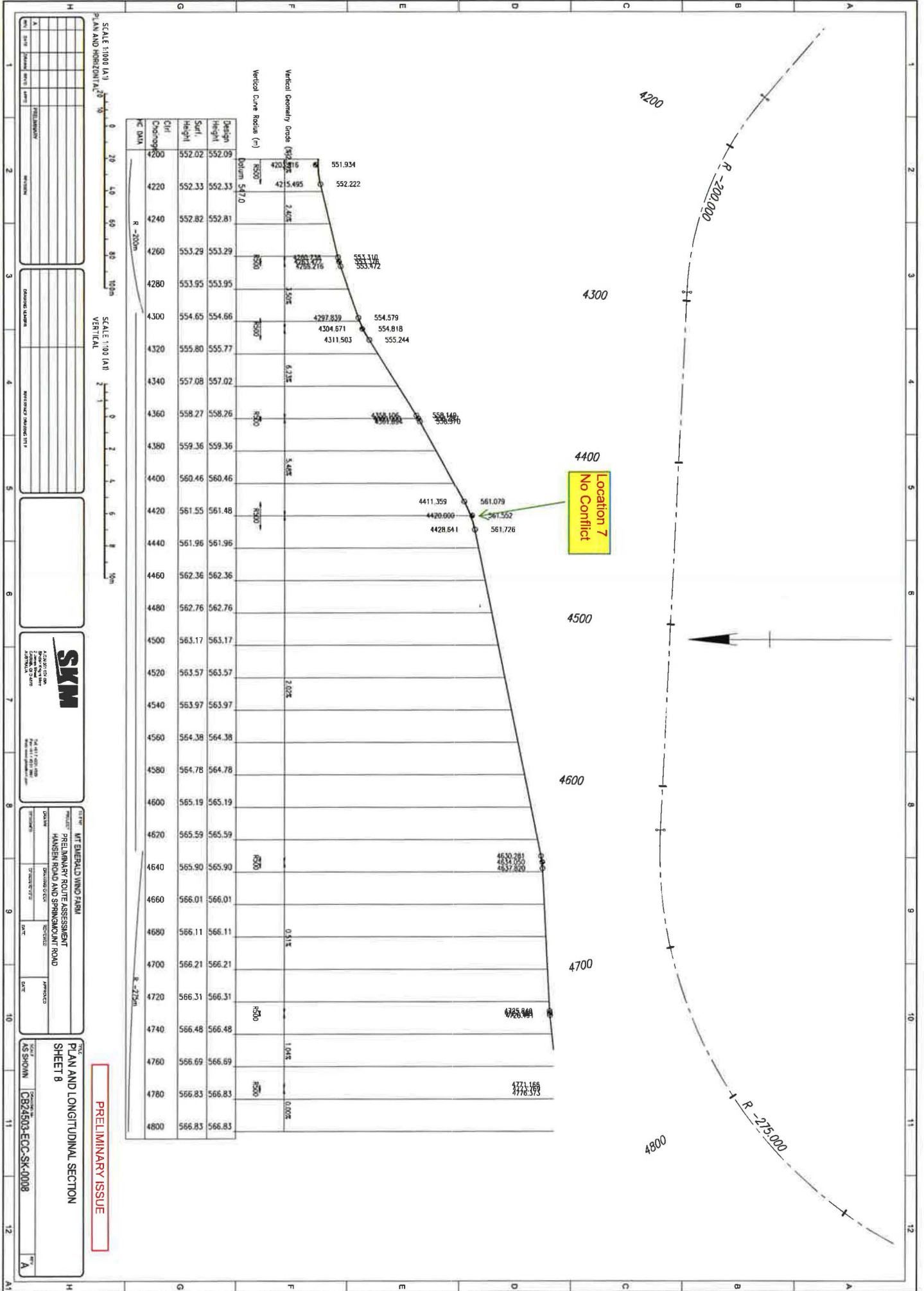
Location 6
 No Conflict

PRELIMINARY ISSUE



MT EMERALD WIND FARM
 PRELIMINARY ROUTE ASSESSMENT
 HANSEN ROAD AND SPRINGMOUNT ROAD

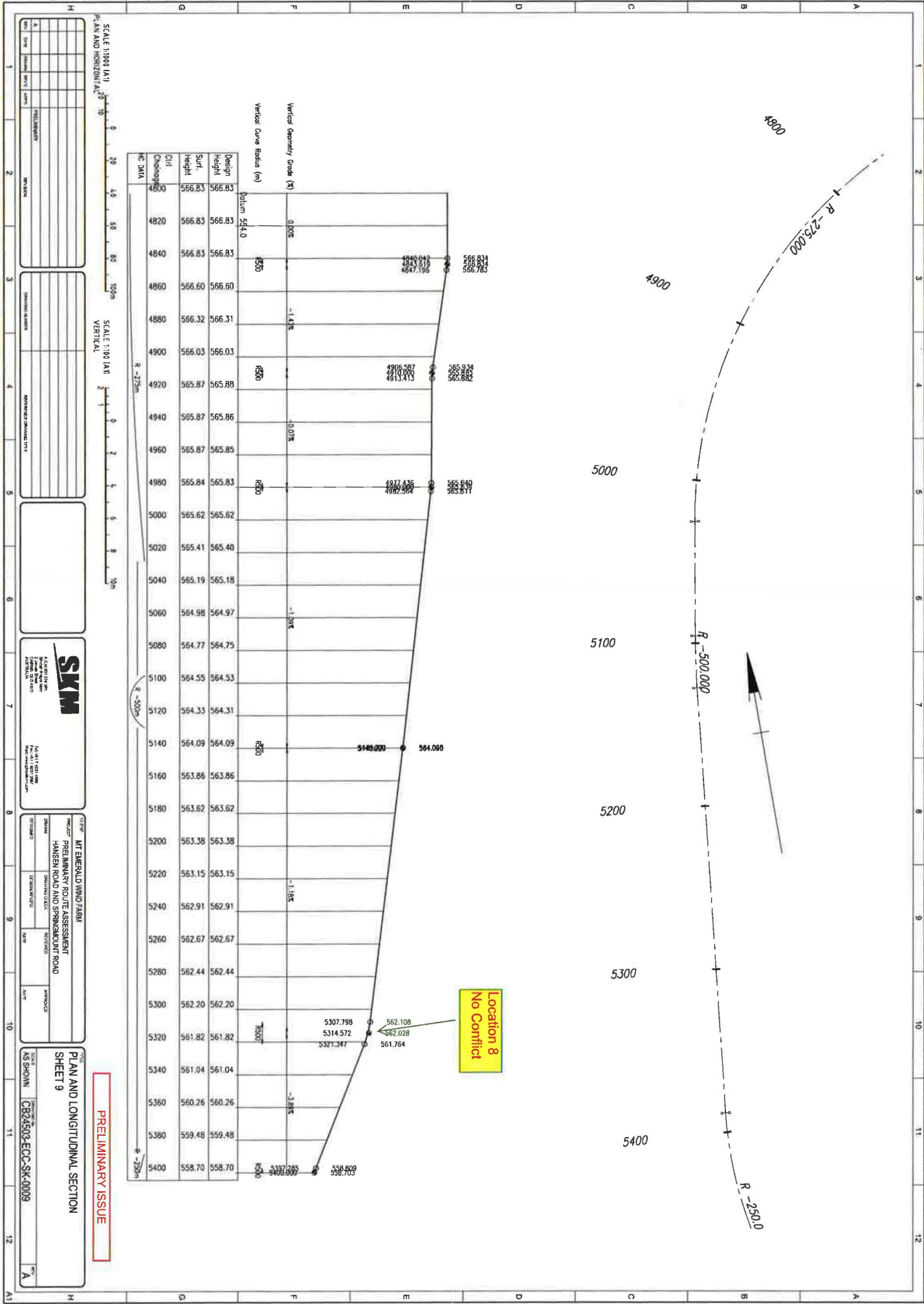
PLAN AND LONGITUDINAL SECTION
 SHEET 7



Location 7
No Conflict

PRELIMINARY ISSUE

SKM Structural & Civil Engineering 15/11/11 11:11 AM 15/11/11 11:11 AM	
PROJECT PRELIMINARY ROUTE ASSESSMENT HANSEN ROAD AND SPRINGMOUNT ROAD	DATE 27/02/12
DRAWING NO. CB24503-ECC-SK-0008	SHEET NO. 8
SCALE 1:1000 (V)	DATE 27/02/12
PROJECT NO. CB24503-ECC-SK-0008	SHEET NO. 8

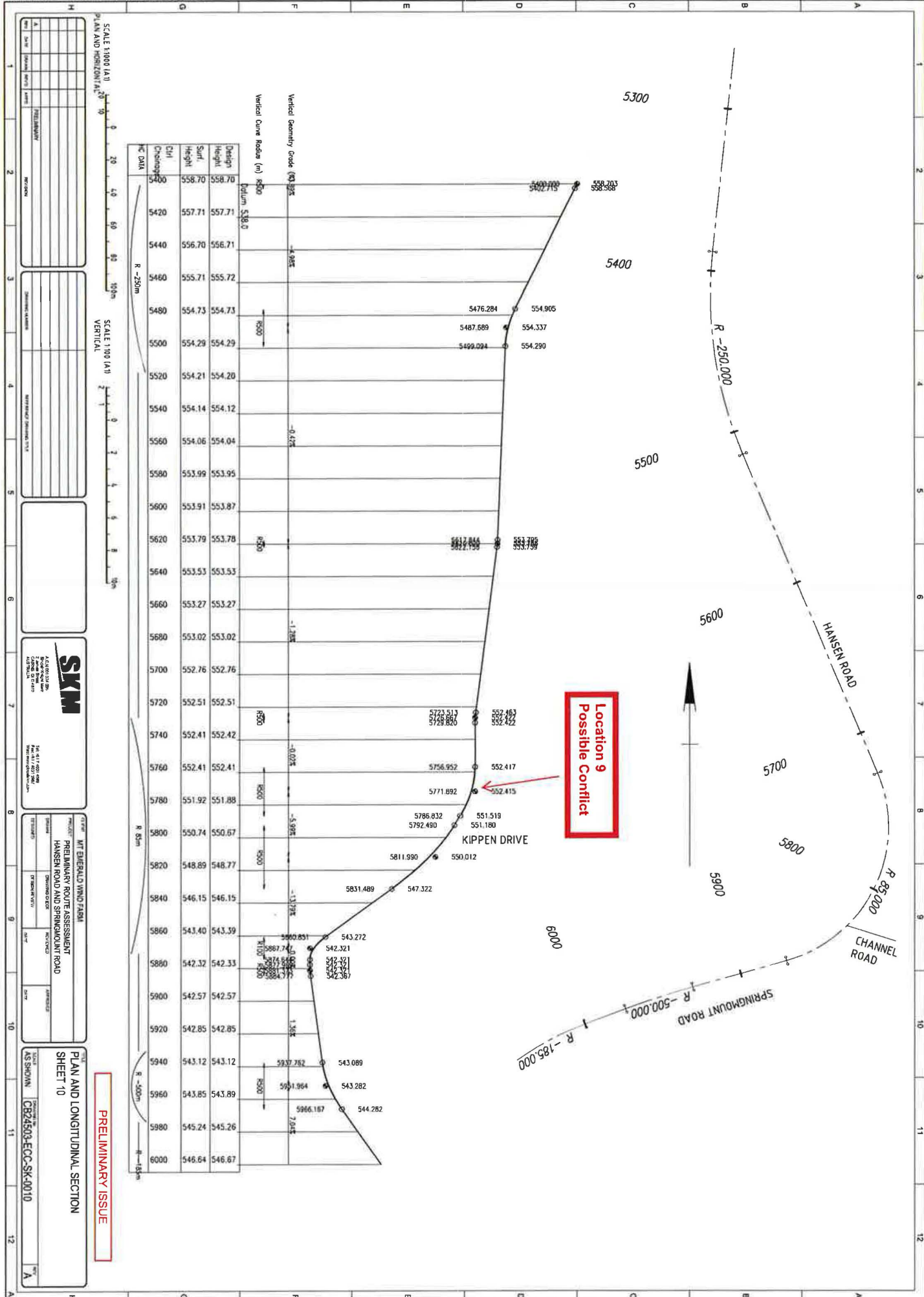


Station	Design Height	Surf Height	Vertical Curve Radius (m)	Vertical Geometry Grade (%)	Point	Point Elevation
4800	568.95	566.83	Bottom 544.0	0.00%	4800.000	568.95
4820	566.83	566.83	R=500	-1.43%	4820.000	566.83
4840	566.83	566.83	R=500	-1.43%	4840.000	566.83
4860	566.60	566.60	R=500	-1.43%	4860.000	566.60
4880	566.32	566.31	R=500	-1.43%	4880.000	566.32
4900	566.03	566.03	R=500	-1.43%	4900.000	566.03
4920	565.87	565.88	R=500	-1.43%	4920.000	565.87
4940	565.87	565.86	R=500	-1.43%	4940.000	565.87
4960	565.87	565.85	R=500	-1.43%	4960.000	565.87
4980	565.84	565.83	R=500	-1.43%	4980.000	565.84
5000	565.62	565.62	R=500	-1.43%	5000.000	565.62
5020	565.41	565.40	R=500	-1.43%	5020.000	565.41
5040	565.19	565.18	R=500	-1.43%	5040.000	565.19
5060	564.98	564.97	R=500	-1.43%	5060.000	564.98
5080	564.77	564.75	R=500	-1.43%	5080.000	564.77
5100	564.55	564.53	R=500	-1.43%	5100.000	564.55
5120	564.33	564.31	R=500	-1.43%	5120.000	564.33
5140	564.09	564.09	R=500	-1.43%	5140.000	564.09
5160	563.86	563.86	R=500	-1.43%	5160.000	563.86
5180	563.62	563.62	R=500	-1.43%	5180.000	563.62
5200	563.38	563.38	R=500	-1.43%	5200.000	563.38
5220	563.15	563.15	R=500	-1.43%	5220.000	563.15
5240	562.91	562.91	R=500	-1.43%	5240.000	562.91
5260	562.67	562.67	R=500	-1.43%	5260.000	562.67
5280	562.44	562.44	R=500	-1.43%	5280.000	562.44
5300	562.20	562.20	R=500	-1.43%	5300.000	562.20
5320	561.82	561.82	R=500	-1.43%	5320.000	561.82
5340	561.04	561.04	R=500	-1.43%	5340.000	561.04
5360	560.26	560.26	R=500	-1.43%	5360.000	560.26
5380	559.48	559.48	R=500	-1.43%	5380.000	559.48
5400	558.70	558.70	R=500	-1.43%	5400.000	558.70

Location 8
No Conflict

PRELIMINARY ISSUE

SCALE 1:100 (A1) PLAN AND HORIZONTAL		SCALE 1:100 (A1) VERTICAL	
NO.	DATE	BY	CHKD.
1			
2			
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12			

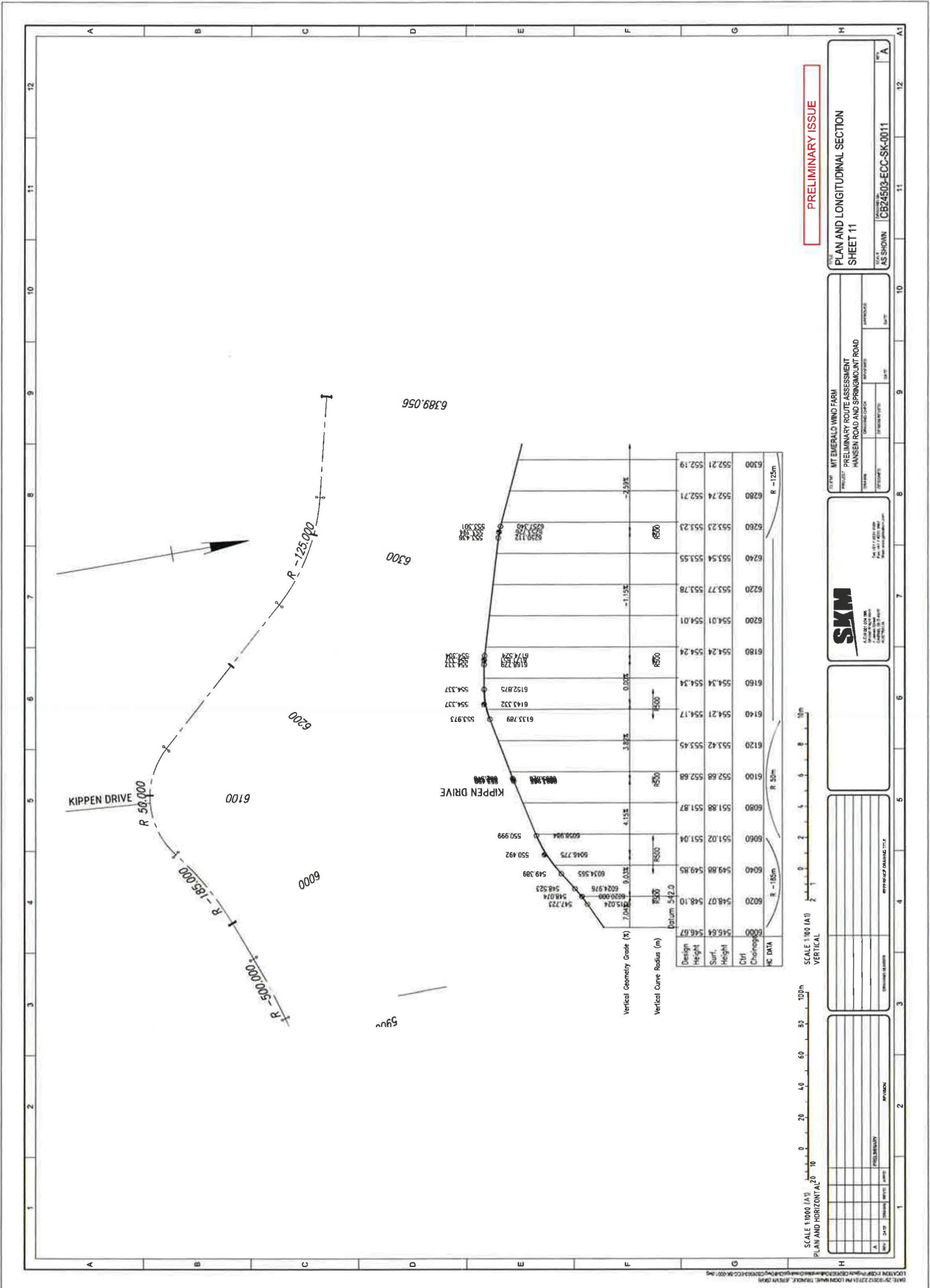


Station	Design Height	Surf Height	CH Height	HC Data
5400	558.70	558.70		
5420	557.71	557.71		
5440	556.70	556.71		
5460	555.71	555.72		
5480	554.73	554.73		
5500	554.29	554.29		
5520	554.21	554.20		
5540	554.14	554.12		
5560	554.06	554.04		
5580	553.99	553.95		
5600	553.91	553.87		
5620	553.79	553.78		
5640	553.53	553.53		
5660	553.27	553.27		
5680	553.02	553.02		
5700	552.76	552.76		
5720	552.51	552.51		
5740	552.41	552.42		
5760	552.41	552.41		
5780	551.92	551.88		
5800	550.74	550.67		
5820	548.89	548.77		
5840	546.15	546.15		
5860	543.40	543.39		
5880	542.32	542.33		
5900	542.57	542.57		
5920	542.85	542.85		
5940	543.12	543.12		
5960	543.85	543.89		
5980	545.24	545.26		
6000	546.64	546.67		

**Location 9
Possible Conflict**

PRELIMINARY ISSUE

<p>SCALE 1:1000 (A1) PLAN AND HORIZONTAL SECTION</p>	<p>SCALE 1:100 (A1) VERTICAL</p>	<p>DATE: 25/10/2012 PROJECT: PRELIMINARY ROUTE ASSESSMENT HANSEN ROAD AND SPRINGMOUNT ROAD</p>	<p>DATE: 25/10/2012 PROJECT: PRELIMINARY ROUTE ASSESSMENT HANSEN ROAD AND SPRINGMOUNT ROAD</p>	<p>DATE: 25/10/2012 PROJECT: PRELIMINARY ROUTE ASSESSMENT HANSEN ROAD AND SPRINGMOUNT ROAD</p>
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Station	Design Height	Surf Height	Chg Height	Chg DATA
6000	546.64	546.67	546.67	
6020	548.07	548.10	548.10	
6040	549.88	549.85	549.85	
6060	551.02	551.04	551.04	
6080	551.88	551.87	551.87	
6100	552.68	552.68	552.68	
6120	553.42	553.45	553.45	
6140	554.21	554.17	554.17	
6160	554.34	554.34	554.34	
6180	554.24	554.24	554.24	
6200	554.01	554.01	554.01	
6220	553.77	553.78	553.78	
6240	553.54	553.55	553.55	
6260	553.23	553.23	553.23	
6280	552.74	552.71	552.71	
6300	552.21	552.19	552.19	

PRELIMINARY ISSUE

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

SKM
 CONSULTANTS
 15/150 GLENVIEW ROAD
 GLENVIEW VIC 3145
 TEL: 03 9477 9000
 FAX: 03 9477 9001
 WWW.SKMGROUP.COM

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

PROJECT: HANSEN ROAD AND SPRINGMOUNT ROAD
 SHEET 11
 DRAWN BY: AS SHOWN
 CHECKED BY: CB24503-ECC-SK-0011
 DATE: 11/11/11

PROJECT: HANSEN ROAD AND SPRINGMOUNT ROAD
 SHEET 11
 DRAWN BY: AS SHOWN
 CHECKED BY: CB24503-ECC-SK-0011
 DATE: 11/11/11

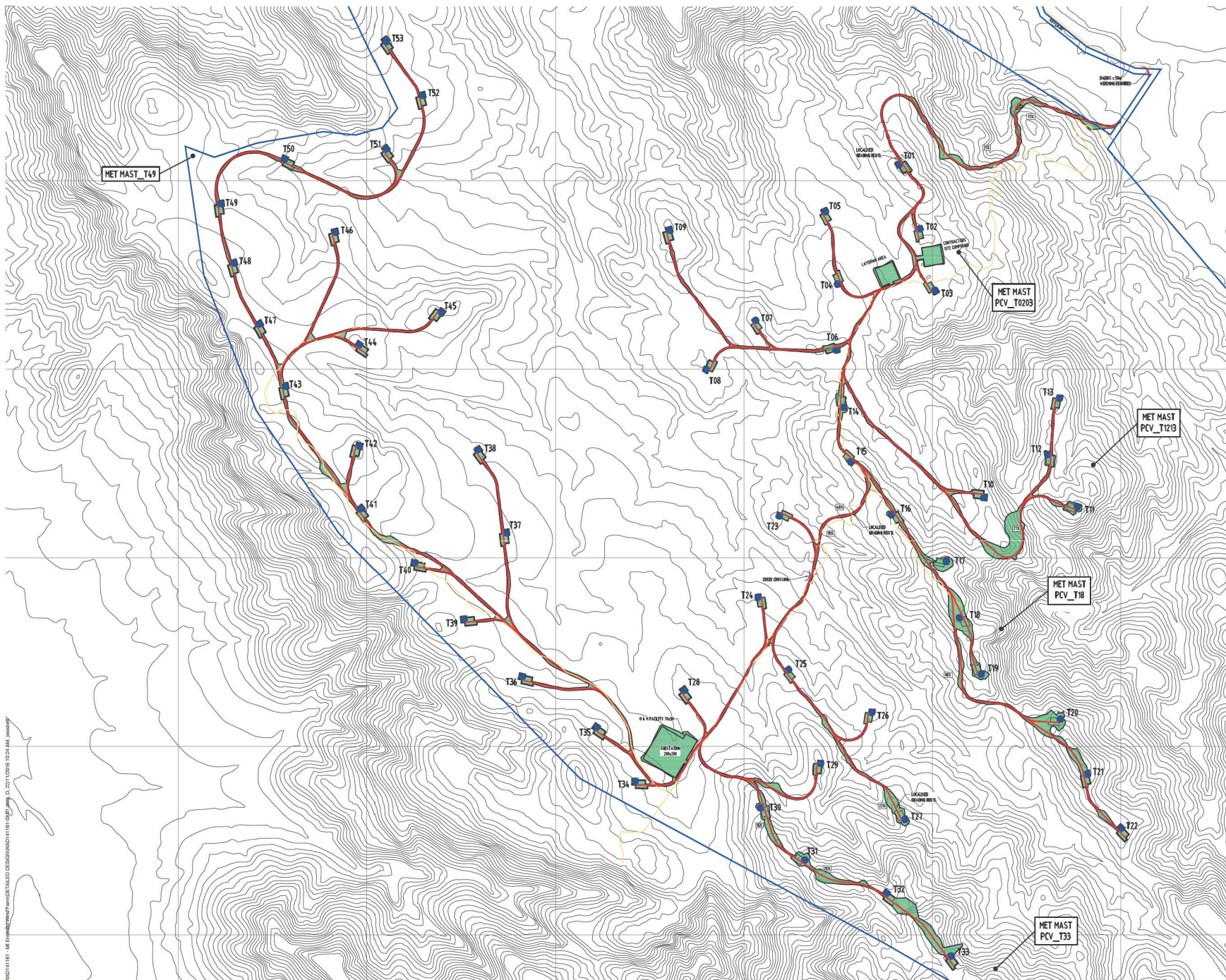
PROJECT: HANSEN ROAD AND SPRINGMOUNT ROAD
 SHEET 11
 DRAWN BY: AS SHOWN
 CHECKED BY: CB24503-ECC-SK-0011
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PROJECT: HANSEN ROAD AND SPRINGMOUNT ROAD
 SHEET 11
 DRAWN BY: AS SHOWN
 CHECKED BY: CB24503-ECC-SK-0011
 DATE: 11/11/11

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

Mt. Emerald Wind Farm - Quantities Estimate

PRELIMINARY INFORMATION						
Location	Mount Emerald, Walkemtn					
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	Roads					
	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 ³			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 ³ , 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 ³			
	Tonnage of gravel	224,784	tonnes	8,325	Trucks - 10 yd with trailers	Assuming CCM of gravel is 2.4 tons/m ³ , 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 ²	2	EME - Grader	
2.0	Foundations					
	Construct WTG foundations	75	no.			
	Foundation plan area	289	m ²			17 x 17 m square pad footing
	Slab thickness	1.4	m			
	Volume of concrete per footing	405	m ³			32 MPa concrete (if a rock anchor type is used (as is highly likely for MEWF) then this reduces to 100m ³)
	Total volume of concrete	30,345	m ³			75 WTG footings in total, sand & gravel aggregates
	Tonnage of concrete	72,828	tonnes	2,073	Trucks - 10 yd with Trailers	Assuming MOO of concrete is 2.4 tons/m ³ , 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	Hardstands					
	Construct WTG hardstand areas	75	no.			
	Hardstand plan area	800	m ²			Construction area for assembling WTG by crane
	Base thickness	300	mm			40 x 20 m, max. gradient of 1%, bearing capacity > 200 kN/m ²
	Volume of gravel per hardstand	240	m ³			Gravel compacted to 300 mm thickness
	Total volume of gravel	18,000	m ³			
	Tonnage of gravel	43,200	tonnes	1,600	Trucks - 10 yd with Trailers	Assuming CCM of gravel is 2.4 tons/m ³ , each truck/trailer carries 27 tonnes
	Disperse gravel base			2	EME - Bulldozer	
	Roll gravel base			1	EME - Vibrating Roller	
	Grade hardstand areas	800	m ²	1	EME - Grader	
4.0	Cabling					
	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	WTG Construction					
	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	Transmission Lines					
	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	Control Building and Switchyard					
	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 tonnes 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 tonnes 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	Miscellaneous					
	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	



LEGEND

- T01 PROPOSED TURBINE LOCATION
- PROPOSED WIND FARM ROAD
- 10m CONTOUR
- EXISTING ROADS
- PROPOSED BATTER EXTENTS (1M 2 BATTERS)

NOTE:
 CONCEPT LAYOUT BASED ON 10m CONTOUR DATA ONLY
 AREA OF PROPOSED BATTER EXTENTS = 71.8 HECTARES

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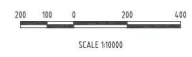
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TURBINE COORDINATES

Turbine ID	Easting	Northing
T01	E. 328792	N. 8102560
T02	E. 328903	N. 8102219
T03	E. 328983	N. 8101892
T04	E. 328466	N. 8101926
T05	E. 328402	N. 8102310
T06	E. 328458	N. 8101575
T07	E. 328024	N. 8101732
T08	E. 327768	N. 8101732
T09	E. 327574	N. 8102211
T10	E. 329242	N. 8100793
T11	E. 329738	N. 8100745
T12	E. 329581	N. 8101021
T13	E. 328944	N. 8101320
T14	E. 328498	N. 8101272
T15	E. 328537	N. 8100981
T16	E. 328753	N. 8100703
T17	E. 329043	N. 8100457
T18	E. 329115	N. 8100157
T19	E. 329228	N. 8099859
T20	E. 329648	N. 8099620
T21	E. 329790	N. 8099328
T22	E. 329970	N. 8099041
T23	E. 328757	N. 8100695
T24	E. 328045	N. 8100261
T25	E. 328206	N. 8099881
T26	E. 328648	N. 8099655
T27	E. 328824	N. 8099088
T28	E. 327652	N. 8099773
T29	E. 328376	N. 8099384
T30	E. 328058	N. 8099149
T31	E. 328292	N. 8098872
T32	E. 328726	N. 8098695
T33	E. 329067	N. 8098362
T34	E. 327392	N. 8099290
T35	E. 327187	N. 8099577
T36	E. 326793	N. 8099845
T37	E. 326708	N. 8100606
T38	E. 326556	N. 8101046
T39	E. 326484	N. 8100150
T40	E. 326222	N. 8100448
T41	E. 325941	N. 8100734
T42	E. 325931	N. 8101045
T43	E. 325539	N. 8101383
T44	E. 325930	N. 8101603
T45	E. 326364	N. 8101775
T46	E. 325805	N. 8102201
T47	E. 325402	N. 8101713
T48	E. 325266	N. 8102037
T49	E. 325197	N. 8102351
T50	E. 325535	N. 8102589
T51	E. 326071	N. 8102642
T52	E. 326283	N. 8102926
T53	E. 326071	N. 8103211

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A	06.10.16	CONCEPT INFORMATION ISSUE	B.JH	RB	
B	17.11.16	TURBINE RENUMBERED	J.W	RB	
C	21.11.16	REVISED TURBINE NUMBERING AND MET MAST LOCATIONS	J.W	RB	
D	22.11.16	REVISED TURBINE NUMBERING	J.W	RB	

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MT EMERALD WIND FARM
 TURBINE LOCATION AND
 DEVELOPMENT FOOTPRINT PLAN (TLDLP)

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