



Mt Emerald Wind Farm

Vestas Australian Wind Technologies

Construction Transport Plan

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Contents

1. Introduction1

1.1 Purpose and Scope of this Document..... 1

1.2 Construction Traffic Overview..... 1

1.3 Conditions of approval.....2

1.4 Statement of Commitments3

2. Construction Methodology5

2.1 Traffic Generation5

2.2 Dimensions of Equipment to be Delivered to Site6

2.3 Predicted Traffic Movements.....7

2.4 Construction Schedule8

3. Transport Routes9

3.1 Transport Route Details9

3.2 Upgrade of Springmount Road and Kippen Drive Intersection..... 14

3.3 Existing Condition Assessment of Hansen Road/Springmount Road/Kippen Drive..... 14

3.3.1 Objectives of this route Condition Assessment 14

3.3.2 Condition Assessment..... 14

3.3.3 Sight Distance Checks 14

3.4 Turning movements 14

4. Traffic Management Strategy 16

4.1 Mitigation and Management Measures 16

4.2 Training and Awareness..... 17

5. Consultation..... 18

5.1 Department of Transport and Main Roads 18

5.2 Cairns Regional Council..... 18

5.3 Tablelands Regional Council..... 18

5.4 Mareeba Shire Council..... 19

Appendix A. Hansen Road/Springmount Road/Kippen Drive – Condition Inspection Report

Appendix B. Hansen Road/Springmount Road/Kippen Drive - Sight distance measurements/calculations.

Appendix C. Hansen Road/Springmount Road/Kippen Drive - Route Assessment Sketches

Appendix D. Hansen Road/Springmount Road/Kippen Drive - Turning Path Sketches

Appendix E. Hansen Road/Springmount Road/Kippen Drive - Site Photos

Appendix F. Hansen Road/Springmount Road/Kippen Drive – Route Videos (digital copy only)

Appendix G. Route Study, Port to Mt Emerald by Rex J Andrews.

Important note about your report

The sole purpose of this report and the associated services performed by the Consultants is to collate the documentation associated with the Mt Emerald Wind Farm Project at Walkamin on the Atherton Tablelands. That scope of services, was developed with the Client.

In preparing this report, the Consultants have 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, the Consultants have 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.

The Consultants 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. The Consultants have 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.

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Due to the nature of this report being a compilation of information from various sources which do not require engineering certification, therefore there has been no requirement for involvement or approval by a Registered Professional Engineer of Queensland (RPEQ).

1. Introduction

1.1 Purpose and Scope of this Document

Jacobs has been commissioned by Vestas Australian Wind Technologies Pty Ltd to compile this document for the Mt Emerald Wind Farm (MEWF) project at Walkamin based on numerous existing reports and documentation.

The purpose of this report is to collate all of the existing reports and documentation that is related to the impact that the proposed MEWF development will have on the surrounding road network, including requirements for access to the project site.

Additionally, this report provides details on:

- The transport related Conditions of Approval.
- The traffic generated by construction of the wind farm.
- The mitigation and management measures.
- The consultation with local and regional government authorities.

1.2 Construction Traffic Overview

There are three separate work streams which will generate traffic during Project construction:

- Balance of Plant (BoP) civil and electrical cabling.
- Substation and Operations / Maintenance buildings.
- wind turbine supply and installation.

Construction activities for these work streams will occur in distinct periods of the Project schedule, influencing the traffic to be generated along the various access routes:

- Balance of Plant (BoP) civil and electrical cabling works starting in first quarter 2017 will include site establishment, earthworks, WTG foundations and electrical reticulation requiring transport of heavy plant and machinery, aggregate deliveries and concrete deliveries and other supplies.
- Construction of the substation and Operations / Maintenance buildings starting in first quarter 2017 will generate comparatively less traffic but does require transport of a small number of over-size and over-mass components for the substation.
- Wind turbine components are scheduled to be delivered to site starting in fourth quarter 2017, which is when the bulk of over-size and over-mass haulage will occur, including large cranes, WTG towers, nacelles and blade components.

1.3 Conditions of approval

Traffic Management		
12	<p>(a) Submit to the chief executive administering the SPA a Construction Traffic Management Plan (CTMP) prepared by an RPEQ and in consultation with the Department of Transport and Main Roads, Cairns Regional Council, Tablelands Regional Council and Mareeba Shire Council.</p> <p>The CTMP must relate to the roads proposed to be used in transporting material, personnel and equipment related to the construction and decommissioning of the wind farm.</p> <p>The CTMP must include but not limited to:</p>	(a) Prior to the commencement of site / operational / building work
	(i) an existing conditions survey of Hansen Road, Springmount Road and Kippen Drive including details of the suitability, design, condition and construction standard of the relevant public roads;	
	(ii) the designation of all vehicle access points to the site from surrounding roads. Vehicle access points must be designed and located to ensure safe sight distances, turning movements, and avoid potential through traffic conflicts;	
	(iii) the designation of appropriate pre-construction, construction/decommissioning and transport vehicle routes to and from the site;	
	(iv) engineering plans demonstrating whether, and if so how, truck movements to and from the site can be accommodated on sealed roadways and turned without encroaching onto the incorrect side of the road;	
	(v) recommendations regarding the need for road and intersection upgrades to accommodate any additional traffic or site access requirements (whether temporary or ongoing). Where upgrades are required, the traffic management plan must include:	
	<ul style="list-style-type: none"> a) detailed engineering plans showing the required works; b) the timing of when the works are to be undertaken; c) a program of regular inspections to be carried out during the construction of the wind farm to identify maintenance works necessary as a result of construction traffic; 	
	(vi) measures to be taken to manage traffic impacts associated with the ongoing operation of the wind farm on the traffic volumes and flows on surrounding roads.	
	<p>This may include, as recommended in the "Technical Note 2 - Traffic Impact Assessment Engineering Response" prepared by Jacobs dated 29/08/14:</p> <ul style="list-style-type: none"> a) providing a 30 seat shuttle bus service for construction workers arriving and departing the site, servicing the key 	

Traffic Management	
	<p>townships where the construction workers live;</p> <p>b) providing minimal or restricted on-site parking to discourage workers arriving to and departing the site via private vehicles</p>

Table 1.1 : Conditions of approval

1.4 Statement of Commitments

Traffic Management Plan (TMP) - the TMP, to be prepared in consultation with Department of Transport and Main Roads, will outline traffic movements to and from the site as well as within the construction zones. The TMP will describe measures that promote traffic safety for local and regional traffic, construction personnel and landowners who may need to access the project Site. The TMP will also establish protocols for construction deliveries, especially of large loads (e.g. cranes, turbine infrastructure);

Item	Impact	Objectives	Mitigation Task
5.0	Traffic and Transport		
5.01	Adverse impact on local and regional traffic during the construction and decommissioning phases	Minimisation of impact on local and regional traffic	<p>Large oversize materials will be transported overnight to reduce impacts on road network (subject to DTMR approval);</p> <p>No oversize or large trucks associated with the construction will operate on the Kennedy Highway or Channel/Springmount Roads during the school bus hours of 7:30am and 8:50am, and between 3:20pm and 4:30pm on school days;</p> <p>Once more detail is known about the exact type of transport vehicles and routing for the delivery of turbine components to site, more detailed swept path analysis will be undertaken along the truck route to identify any road widening and road furniture relocation works that may be required.</p>
5.02	Traffic Safety Risks from Construction Vehicles	Minimise traffic safety risks from movement of construction vehicles	<p>Upgrade Kippin Drive and Springmount Road intersection, to oversize vehicles during the construction phase.</p> <p>Upgrade of Kippin Drive to a standard required to accommodate expected vehicle types;</p> <p>Traffic controllers on Kippin Drive and Springmount / Channel Road intersection will be provided to help assist large trucks exiting the site and manage any safety risks. Advance warning signs will be placed on each approach, 200 metres from the access road with "Prepare to stop" warnings when traffic controllers are present;</p> <p>A relatively Significant increase of traffic volume on Kippin Drive, Channel and Springmount Roads could increase the risk of accidents with vehicles. Therefore, lower speed limits will be enforced on Springmount and Channel Roads and internal access roads at all times during construction.</p>

Item	Impact	Objectives	Mitigation Task
5.03	Damage to existing infrastructure	Protect to existing infrastructure	<p>Road and intersection conditions will be established by the use of field surveys and regular site inspections. When required, rehabilitation of the pavement and/or edges of seal, shoulders and verges will be carried out. At the completion of the works the access roads will be in the same or superior condition than at the commencement of the works;</p> <p>Regular road dilapidation surveys will be carried out during construction and decommissioning;</p> <p>Internal roads and turns in the project site are required to be widened up to 10m in order to transport the construction materials and the large turbines to the desired location, and will require surfacing upgrade through grading; and</p> <p>A procedure will be established to ensure the ongoing maintenance of access roads during the operation phase.</p>
5.04	Amenity impacts from construction and operation traffic.	Minimise amenity impacts from construction and operation traffic.	Procedures will be established to monitor traffic impacts on public and internal access tracks during construction, including noise, dust and travel times, and to implement modified work methods to reduce such impacts where possible
5.05	Loss of internal access roads	Retain and handover internal access roads	Internal access roads will be retained and handed over to the landowners after decommissioning.

Table 1.2 : Statement of commitments

2. Construction Methodology

2.1 Traffic Generation

Construction traffic will be present for approximately two years and will consist of:

- Over-size/over-mass vehicles – for the delivery of wind turbine components (tower sections, nacelles, hubs and blades).
- Articulated semi-trailers – for transporting plant and equipment, construction materials and temporary and permanent facility components.
- Tipper trucks – to bring imported quarry fill materials for the access tracks/hardstand sites.
- Water tankers – for cartage of potable water and water for dust suppression.
- Concrete mixers – to transport concrete to worksites from the (off-site) batching plant.
- Over-size/over-mass vehicles and articulated semi-trailers - for mobilisation and de-mobilisation of cranes for the assembly of the wind turbines.
- Light vehicles – for use by construction and the owner's personnel.

2.2 Dimensions of Equipment to be Delivered to Site

Item Description	Quantity	Length (m)	Width (m)	Height (m)	Weight (Tonnes)	Transport Vehicle
V112 Nacelle	16	12.7	4.2	3.2	120	Configuration. Prime mover with 12x8 Platform trailer. Overall length: 45.0l x 4.3w x 4.9h x 198T
V112 Hub	16	5.5	3.8	3.7	31.5	Configuration. Prime mover with 4x4 Low Loader. Overall length: 19.0l x 4.0w x 4.9h x 54.5T.
V112 Blade	16	55	4.0	2.8	14.9	Configuration. Prime mover with 1x4 dolly 4x4 Extendable Blade trailers. Overall length: 59.0l x 4.3w x 4.3h x 52.5T
V112 Tower section - base	16	22.8	4.3	4.3	79.5	Configuration. Prime mover with 6x8 Platform trailer. Overall length: 27.0l x 4.5w x 5.2h x 118.5T.
V112 Tower section - mid	16	28.8	3.9	3.9	64.5	Configuration. Prime mover with 7x8 Platform trailer. Overall length: 33.0l x 4.5w x 5.2h x 113T.
V112 Tower section - top	16	30.0	3.7	3.7	41.5	Configuration. Prime mover with 3x8 Dolly 3x8 Jinker Overall length: 45.0l x 4.3w x 5.2h x 98.5T
V117 Nacelle	37	12.7	4.2	3.2	120	Configuration. Prime mover with 12x8 Platform trailer. Overall length: 45.0l x 4.3w x 4.9h x 198T
V117 Hub	37	5.5	3.8	3.7	31.5	Configuration. Prime mover with 4x4 Low Loader. Overall length: 19.0l x 4.0w x 4.9h x 54.5T.
V117 Blade	37	57	3.9	2.8	14.9	Configuration. Prime mover with 1x4 dolly 4x4 Extendable Blade trailers. Overall length: 61.0l x 4.3w x 4.3h x 52.5T
V117 Tower section - base	37	13.9	4.2	4.2	60	Configuration. Prime mover with 6x8 Platform trailer. Overall length: 27.0l x 4.5w x 5.2h x 108.5T.
V117 Tower section – mid 1	37	17.1	4.2	4.2	47	Configuration. Prime mover with 3x8 Dolly 3x8 Jinker Overall length: 45.0l x 4.3w x 5.2h x 84T
V117 Tower section – mid 2	37	26.6	4.2	4.2	50	Configuration. Prime mover with 7x8 Platform trailer. Overall length: 33.0l x 4.5w x 5.2h x 103T.
V117 Tower section - top	37	30.0	3.7	3.7	44	Configuration. Prime mover with 3x8 Dolly 3x8 Jinker Overall length: 45.0l x 4.3w x 5.2h x 101.5T
Transformer	2	11	5.5	2	100	Configuration. Prime mover with multi-axle trailer. Overall length: 26.0l x 5.5w x 5.1h x 170T.
Control building	2	18	4	3	22	Configuration. Prime mover with 22m low bed trailer.

2.3 Predicted Traffic Movements

Item	Vehicles per month																						
	2017												2018										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Civil Mobilisation	25	5																					
Civil Plant Mobilisation	20	5																					
Concrete Delivery					516	688	688	688	688	688	602												
Quarry Product Delivery		25	25	25	25	25	25	25	25	25	25												
General Deliveries		12	15	12	15	12	12	15	12	12	15												
WTG Reinforcing Delivery				55	109	109	109	109	109	109	54												
Water Cartage		288	324	300	324	312	312	324	312	312	312												
Pipe Delivery			5	5	5	5																	
Conduit Delivery					6	8	8	8	8	8	7												
Crane Movements					6	8	8	8	8	8	7												
Fuel Delivery		24	27	25	27	27	26	26	25	26													
Site Facility Maintenance	4	8	10	8	10	8	8	10	8	8	10	4											
Civil Demobilisation																					5	25	
Plant Demobilisation											5	20											
Electrical Site Mobilisation / De-mobilisation					25	5										25							
Electrical Plant Mobilisation					20	5										25							
Concrete Delivery					60	60	60	60															
General Deliveries					15	12	12	15	4	4	5			6	8	6	8						
Equipment Deliveries / Cable					10	8	8	8	8	8													
Transformer Delivery OSOM											2												
Transformer Equipment											10												
Control Building OSOM											2												
Cranage Movements					20	16	16	20	16	16													
Tower Sections OSOM											20	20	9	9	20	20	20	20	20	18			
WTG Components OSOM											27	27	12	10	27	27	27	27	27	27			
Container deliveries					20	20	20				6	6	6	6	6	6	6	6	6	5			
Container returns							20	20	20				5	6	6	6	6	6	6	6	6	6	
Tools and equipment containers									9													9	
Crane mobilisation and de-mobilisation – OSOM									15	30						15				30			
Crane mobilisation and de-mobilisation									3	3													
Mini-bus					1						1					1						1	
Light vehicles	373	1648	1854	1742	2151	2097	2097	2178	2383	2721	2721	888	588	904	952	897	1039	688	717	745	417	367	267

2.4 Construction Schedule

TIME	2017												2018											
Activity	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Load Road Upgrades		ü	ü																					
Site Mobilisation	ü	ü	ü	ü	ü	ü																		
Road Construction				ü	ü	ü	ü	ü	ü	ü	ü													
Prepare Hardstands and Foundations				ü	ü	ü	ü	ü	ü	ü	ü	ü												
Install Cabling					ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü								
Sub Station Construction			ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü								
OandM Building Construction							ü	ü	ü	ü	ü	ü												
Deliver Turbine Components										ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü				
Erect Towers, Nacelles and Rotors										ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü			
De-mobilise Site																				ü	ü	ü		

3. Transport Routes

3.1 Transport Route Details

The Transport Route assumes the wind tower components will be delivered to the coastal port of Cairns and transported south via the Bruce highway to the Palmerston Highway intersection just to the north of Innisfail before following Milla Milla - Malanda Road north through the Malanda township. Continuing in a north-west direction along Malanda - Atherton Road, the route bypasses Atherton by following Tinaroo Falls Dam Road and Kairi Road before intersecting the Kennedy Highway approximately five kilometres north of Atherton and then onto Hansen Road/Springmount Road to Kippen Drive.

Wind Turbine components will be sourced from overseas and supplied through the Port of Cairns.

Transport from Cairns will follow the route identified in the Route Study (**Appendix G**).

Figure 3.1 shows the proposed haulage route from Cairns to the Mt Emerald Wind Farm.

Over-size and Over-mass vehicles will exit the Kennedy Highway and access the site via Hansen Road / Springmount Road and Kippen Drive.

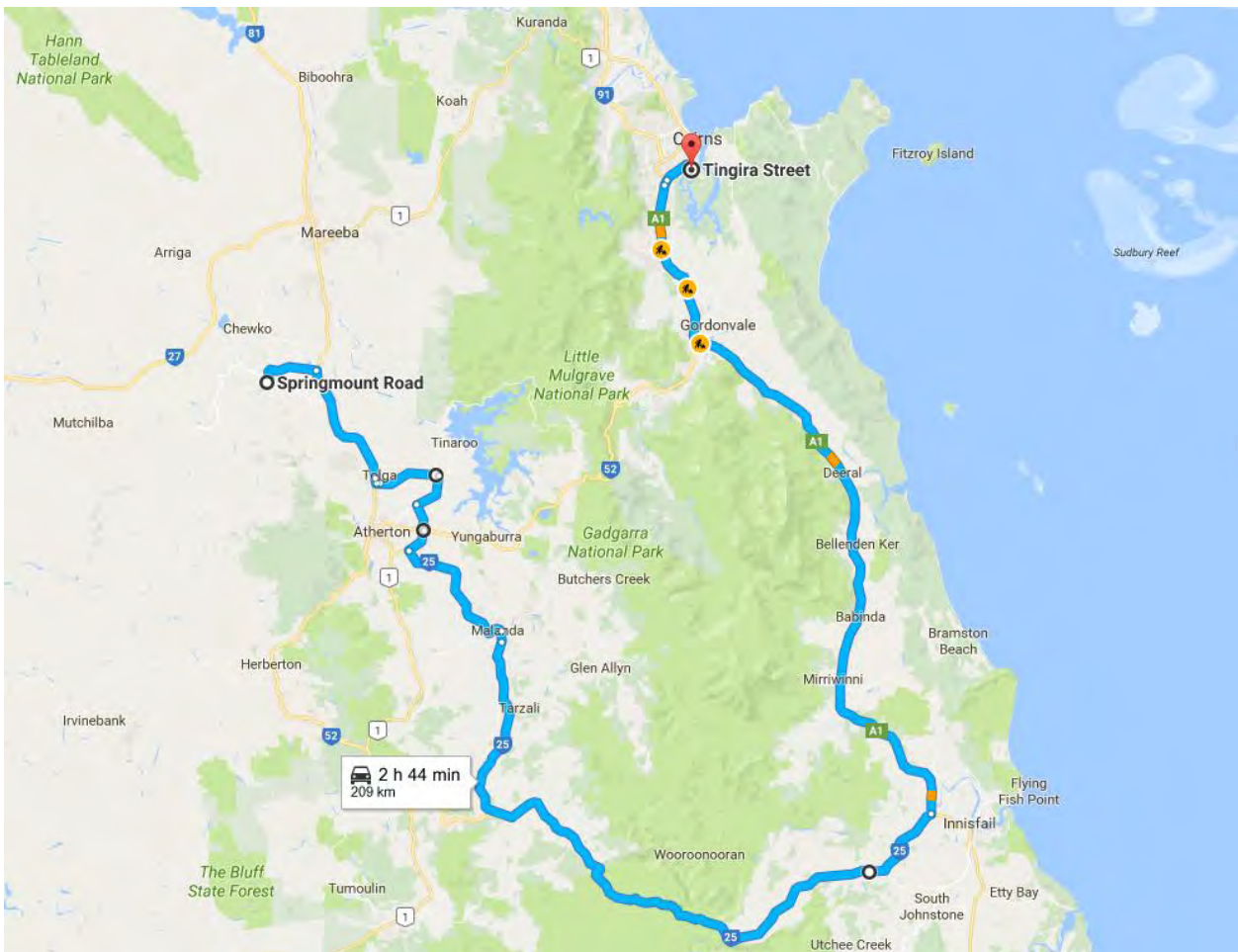


Figure 3.1 : Proposed haulage route

Plant and equipment, construction materials and temporary and permanent facility components will be sourced from local towns and major cities in Queensland.

Semi-trailers and other large trucks will travel along Kennedy Highway from the north or south and access the site via Hansen Road / Springmount Road and Kippen Drive.

Figure 3.2 shows the route details.

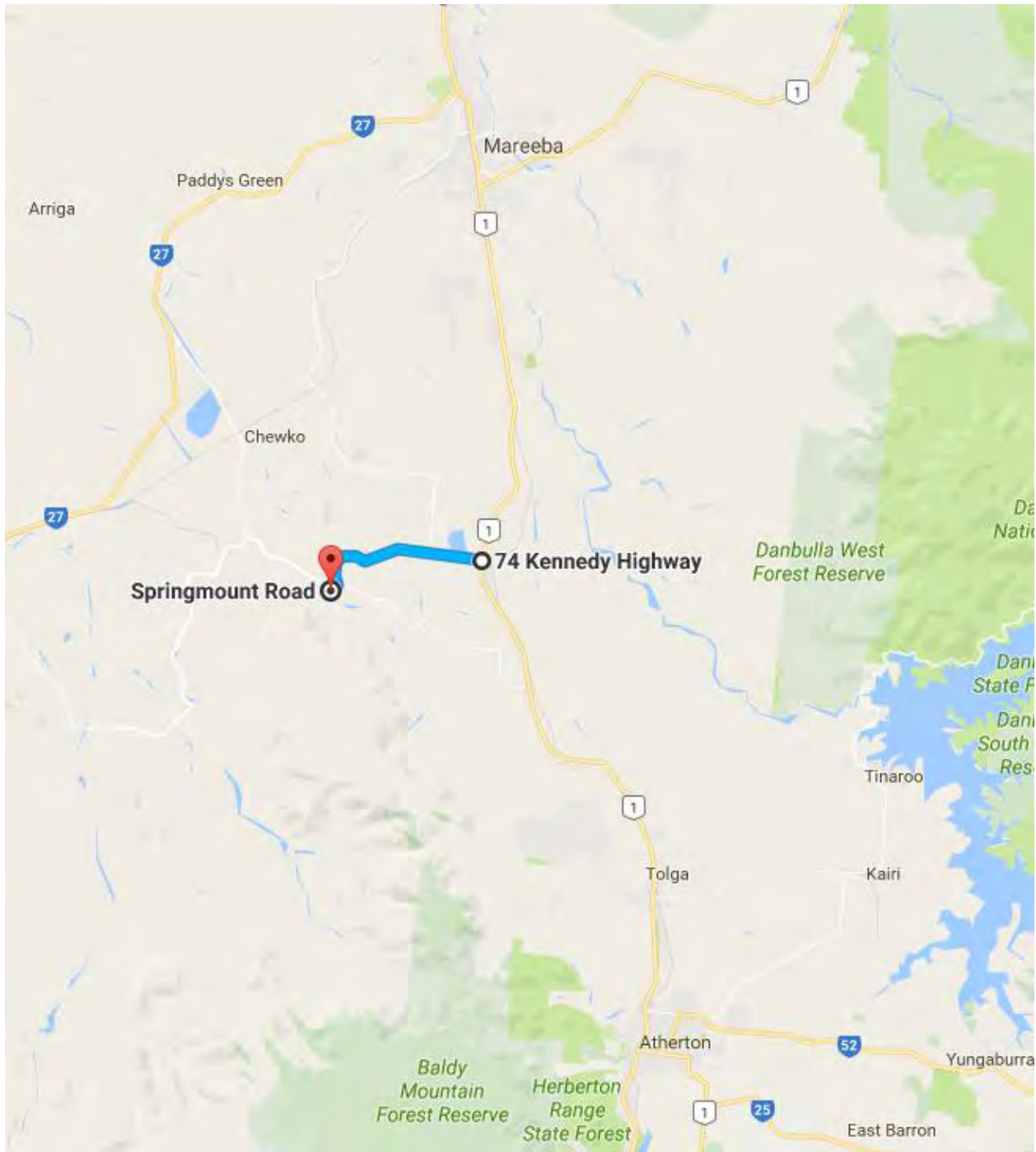


Figure 3.2 : Plant, equipment and materials route details

Quarry fill materials will be sourced from a local quarry located on Springmount Road.

Concrete will be sourced from an existing batch plant at the same location.

Tipper trucks and concrete trucks will travel along Springmount Road and access the site from Kippen Drive.

Figure 3.3 shows the route details.



Figure 3.3 : Route between batch plant and site

Water will be sourced from the open channel on Springmount Road.

Water tankers will travel along Springmount Road and access the site from Kippen Drive.

Figure 3.4 shows the route details.

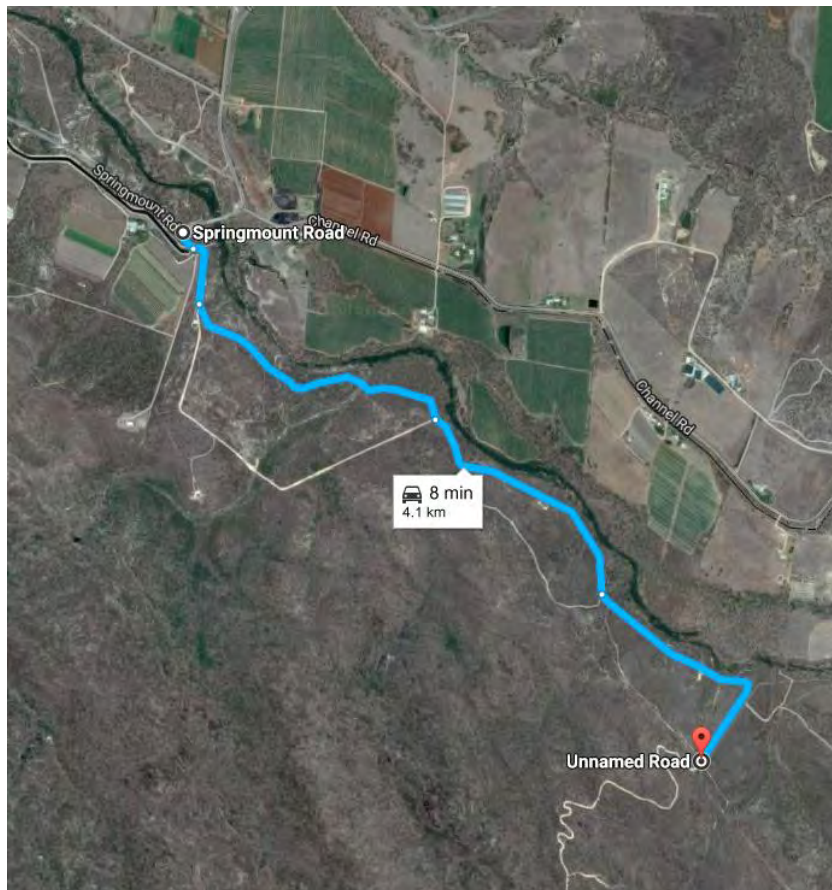


Figure 3.4 : Water source

It is expected that construction personnel will travel from local towns such as Atherton and Mareeba.

Construction personnel will travel along the Kennedy Highway from the north or south and access the site via Hansen Road / Springmount Road and Kippen Drive.

Figure 3.5 shows the route details.

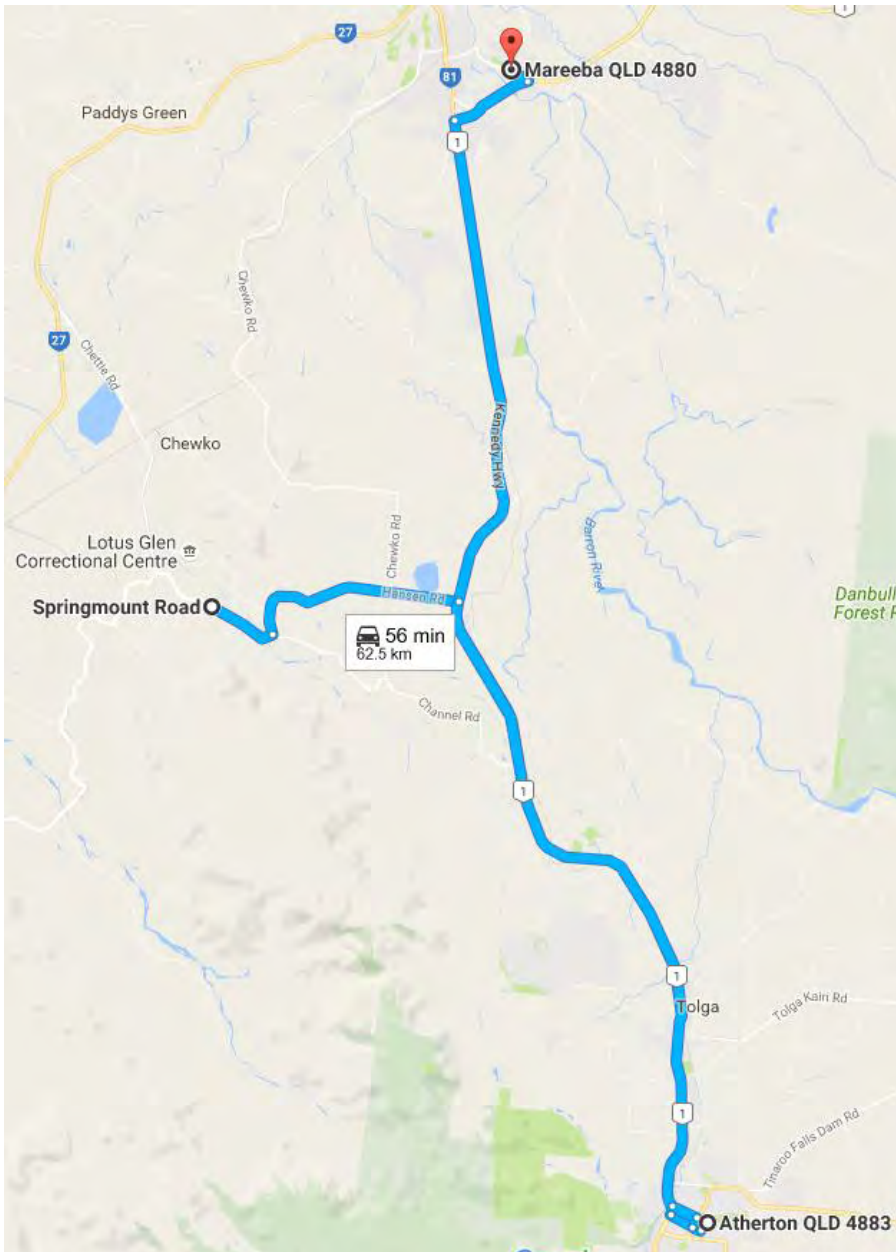


Figure 3.5 : Route for construction personnel

Refer to concept layout sketches provided by Aecom for possible Intersection Upgrade arrangements in **Appendix D**.

3.2 Upgrade of Springmount Road and Kippen Drive Intersection

The intersection of Springmount Road and Kippen Drive intersection will be upgraded to accommodate the oversize vehicle used for delivery of wind turbine and sub-station components.

A preliminary design has been developed in consultation with the Mareeba Shire Council.

The preliminary design is shown on SK-01-Layout (**Appendix D**).

The works will be carried out in Q1 2017.

3.3 Existing Condition Assessment of Hansen Road/Springmount Road/Kippen Drive

Vestas Australian Wind Technology P/L commissioned Jacobs to undertake a Road Assessment of the proposed route to be used in transporting Wind Turbine components from the Kennedy Highway at Walkamin to the proposed wind farm site at Mt Emerald on the Atherton Tablelands. The route consists of three roads, Hansen Road, Springmount Road and Kippen Drive. The total length of the assessment route is approximately 6.05km.

3.3.1 Objectives of this route Condition Assessment

- To undertake a detailed visual inspection of the road and pavement condition.
- To determine sight distance requirements and calculate sight distances achieved.

3.3.2 Condition Assessment

Detailed findings arising from the Road Condition Assessment are presented in **Appendix A**.

There were 2 main findings as a result of the condition assessment.

- 1) The pavement marking along the route is substantially faded and worn and requires repainting.
- 2) There are numerous locations where there are longitudinal cracks in the pavement surface.

3.3.3 Sight Distance Checks

A review of sight distances along the route revealed that there are some inadequacies at the intersections.

The Hansen Road - Kennedy Highway Intersection and the Hansen Road – Chewko Road Intersection appear to be acceptable but the sight distances achieved at the Hansen Road – Channel Road Intersection and the Springmount Road – Kippen Drive Intersection are insufficient for the design speeds of the roads.

Detailed findings arising from the Sight Distance calculations are presented in **Appendix B**.

3.4 Turning movements

Turning Movements have been assessed along the Route from the intersection with the Kennedy Highway/Hansend Road intersection to the Kippen Drive Access point.

There are several issues identified at the intersections and sections of road where the horizontal geometry is constrained.

- 1) Hansen Road – Kennedy Highway Intersection – Option 1.
 - Turning path encroaches onto opposing traffic lanes.
 - Conflict with intersection lighting pole.

- Widening required on the Kennedy Highway and Hansen Road.
 - Conflict with the Culvert under Hansen Road.
- 2) Hansen Road – Kennedy Highway Intersection – Option 2.
- Turning path encroaches onto opposing traffic lanes.
 - Turning path encroaches onto private property.
 - Significant earthworks/temporary pavement required.
- 3) Maude Creek S-Bend.
- Turning path encroaches onto opposing traffic lanes.
- 4) Sharp bend at Channel Road Intersection.
- Turning path encroaches onto opposing traffic lanes.
- 5) Springmount Road - Kippen Drive Intersection and approaches.
- Road widening/reconstruction/realignment required from Springmount Road to the access gate on Kippen Drive.

Turning path sketches at the locations below are located in **Appendix D**.

- Jacobs' Route Assessment report of Hansen Road/Springmount Road/Kippen Drive.

Aecom's - Kippen Drive intersection option and turning path sketches.

4. Traffic Management Strategy

4.1 Mitigation and Management Measures

Mitigation and management measures will be used to:

- Minimise adverse impacts on local and regional traffic.
- Minimise safety risks from construction vehicles.
- Monitor, maintain and repair any damage to existing road infrastructure.
- Minimise amenity impacts from construction traffic.
- Ensure no loss of internal access tracks.

The measures are:

- Out of hours transport of large wind turbine and sub-station components will be investigated with DTMR.
- No oversize or large articulated trucks associated with the construction will operate on the Kennedy Highway or Channel/Springmount Roads during the school bus hours of 7:30am and 8:50am, and between 3:20pm and 4:30pm on school days.
- Turning path analysis has been undertaken for the route from the Kennedy Highway to the site – similar checks will be undertaken for the balance of the OSOM truck route from the Port of Cairns to identify any road widening and road furniture relocation works that may be required.
- The Kippen Drive and Springmount Road intersection will be upgraded to accommodate the oversize vehicles used for delivery of wind turbine and sub-station components.
- Kippin Drive will be upgraded to a standard required to accommodate expected vehicle types.
- Traffic controllers on Kippen Drive and Springmount / Channel Road intersection will be provided to help assist large trucks exiting the site and manage any safety risks. Warning signs will be placed on each approach.
- The road authority will be consulted on lowering the speed limits on Springmount and Channel Roads and internal access roads during construction.
- Concrete delivery trucks will not exceed 60 kmh during deliveries of concrete from the off-site batch plant in Springmount Road.
- Channel Road will not be used by Mt Emerald wind farm construction vehicles.
- Road and intersection conditions will be established by the use of field surveys and regular site inspections. When required, rehabilitation of the pavement and/or edges of seal, shoulders and verges will be carried out. At the completion of the works the access roads will be in the same or superior condition than at the commencement of the works.
- Road dilapidation surveys will be carried out before and after construction.
- Procedures will be established to monitor traffic impacts on public and internal access tracks during construction, including noise, dust and travel times, and to implement modified work methods to reduce such impacts where possible.
- Internal access roads will be retained and handed over to the landowners after decommissioning.
- The Contractor will establish safe systems of work to manage traffic during the execution of the Project, which satisfy the relevant statutory and regulatory requirements, Construction Code of Practice and Australian standards.
- The contractor will ensure that there are relevant controls in place to manage the movement of traffic across the project including but not limited to the control of vehicle speeds, interaction with heavy plant and equipment.

4.2 Training and Awareness

The construction contractor will ensure that all personnel responsible for the implementing this Construction Transport Plan CTP are competent based on education, training and experience.

Site personnel (including sub-contractors and regular delivery drivers) will be inducted and provided with training appropriate to their scope of activity and level of responsibility. General staff and contractors will be inducted to the Project with training provided on potential traffic and access impacts. Ad-hoc deliveries to the site will undergo a Truck Driver/Maintenance Personnel Induction. Details of the traffic and access training and induction will focus on:

- Objectives of the CTP.
- Mitigation measures required to be implemented.
- Transport and access monitoring and reporting requirements.
- Incident investigation and response.
- Training is to be provided prior to start-up of any transport and access related management tasks and updated if task, equipment or procedures are expected to, or have changed.

5. Consultation

5.1 Department of Transport and Main Roads

Date	Method	Issues Discussed
1 Dec 16	Telephone	Project background, timing, DA requirement for consultation, DTMR requirements, contents of CTP, timing of OSOM deliveries, DTMR bridge database and SoC 5.01 re: 'transport overnight'

Table 5.1 : Department of Transport and Main Roads

5.2 Cairns Regional Council

Date	Method	Issues Discussed
10/8/2016	Meeting	Presentation to Executive Management team
9/9/2016	Forum	Major Projects Forum – CRC CEO and Infrastructure Manager

Table 5.2 : Cairns Regional Council

5.3 Tablelands Regional Council

Date	Method	Issues Discussed
30/8/2016	Meeting	Meeting with TRC planning group
22/9/2016	Meeting	General meeting with TRC Mayor Joe Pararella RE wind farm transport through TRC region, project update
18 Oct 2016	Meeting	Confirmed that Vestas would be responsible for preparation of CTMP; CTMP would include identification of intersections / junctions requiring upgrade, with broad details of proposed works Broader consultation with all stakeholders along transport routes will need to be undertaken in advance (particularly wrt long haulage routes)
4/11/2016	Site Visit	Guided tour of project site for TRC councillors

Table 5.3 : Tablelands Regional Council

5.4 Mareeba Shire Council

Date	Method	Issues Discussed
1/9/2016	Meeting	General meeting with MSC planners Brian Millard and Carl Ewin. Included discussion on transport and roads.
26/10/16	Meeting	MSC General Meeting - Informal discussion with Mayor Tom Gilmore and Councillor Nipper Brown

Table 5.4 : Mareeba Shire Council

Appendix A. Hansen Road/Springmount Road/Kippen Drive – Condition Inspection Report

Location / Report Title:	Hansen Road / Springmount Road / Kippen Drive		
Assessment Team:	Jeremy Trundle - Jacobs Tony McIntyre - Jacobs		
Assessment Date:	27 th October 2016	Report Date:	8th November 2016

Approx. chainage km	Item	Photos
Sub-title		
Ch 00 Intersection Hansen Road and Kennedy Highway.	<ul style="list-style-type: none"> - There are large areas at the intersection where the aggregate has been stripped from the road surface - There are areas of bitumen flushing - The pavement marking is faded - Raise Pavement markers are damaged and missing 	2989, 2990, 2991, 2992, 2993, 2994, 2995, 2996, 2997
Ch 50 - 70	There are ruts/slumps in the pavement in both lanes.	2998, 2999, 3000
Ch 400	There is bitumen flushing and aggregate has been stripped	3001
Ch 700	The pavement is slumping adjacent to the culvert crossing	3002, 3003
Ch 1400	The pavement is slumping/failing on the right hand side	3004, 3005
Ch 1700 Hansen Road – Chewko Road Intersection	There are longitudinal cracks in the pavement at the intersection, primarily in the Right Turn Lane.	3006, 3007, 3008, 3009
Ch 3300	The vertical grading on the descent is uneven – possible pavement slumping failures	3010
Ch 3900 -4000	There is longitudinal cracking in the pavement at the sag in the road at the large box culvert crossing and approaches.	3011, 3012, 3013, 3014
Ch 4300 - 4400	There is longitudinal cracking in the pavement in both lanes (inner and outer wheel paths)	3015, 3016, 3017, 3018
Ch 5350	There is longitudinal cracking in the pavement in the left hand lane.	3019
Ch 5750. Hansen Road – Springmount Road Intersection	<ul style="list-style-type: none"> a) The pavement marking is worn and faded at the intersection b) Raised pavement markers are missing c) The pavement has longitudinal cracking 	3020, 3021, 3022, 3023, 3024, 3025, 3027,
Ch 5775	There is a large pavement failure in the outer wheel path of the left hand lane on the descent to Granite Creek causeway	3026
Ch 5800	The bitumen surface is breaking/cracking on top of an old buried cattle grid adjacent to the Granite Creek causeway	3028

Approx. chainage km	Item	Photos
Ch 5950 Granite Creek Causeway	There is minor cracking of the slabs on the concrete causeway and some small broken pieces in the corners of slab sections.	3029, 3030, 3031, 3032
CH 6050 Springmount Road - Kippen Drive Intersection	<ul style="list-style-type: none"> a) There are minor edge drop-offs on the turnouts to the intersection. b) There is loose aggregate spread across the intersection throat c) There is pavement cracks/failures on springmount road at the intersection 	2980, 2981, 2982, 2983, 2984, 2985, 2986, 2987, 2988

Appendix B. Hansen Road/Springmount Road/Kippen Drive - Sight distance measurements/calculations.

Construction Transport Plan

Table S1 – Kennedy Highway and Hansen Road Intersection Sight Distances

Approach	Sight Distance Category	Absolute Minimum*	Desirable**	Achieved	Comment
Kennedy Hwy from Atherton	SISD (1.15m to 1.15m)	203 m	215 m	433 m	Meets SISD requirement
Kennedy Hwy from Mareeba	SISD (1.15m to 1.15m)	203 m	215 m	555 m	Meets SISD requirement
Hansen Rd from West	ASD (1.15m to 0.00m)	124 m	136 m	178 m	Meets ASD requirement

* Sight distance assuming a reaction time of 2.5 seconds

** Sight distance assuming a reaction time of 2.0 seconds

A review of the sight distances on site reveal that acceptable values are obtainable from all approaches to this intersection, with no further recommendations to upgrade this junction necessary.

Table S2 – Hansen Road and Chewko Road Intersection Sight Distances

Approach	Sight Distance Category	Absolute Minimum*	Desirable**	Achieved	Comment
Hansen Rd from West	SISD (1.15m to 1.15m)	282 m	297 m	555 m	Meets SISD requirement
Hansen Rd From East	SISD (1.15m to 1.15m)	282 m	297 m	255 m	Does not meet SISD requirement
Chewko Rd From North	ASD (1.15m to 0.00m)	190 m	205 m	112 m	Does not meet ASD requirement

* Sight distance assuming a reaction time of 2.5 seconds

** Sight distance assuming a reaction time of 2.0 seconds

Although both the desirable and absolute minimum approach sight distances on the Chewko Road approach are not readily met, the presence of an advance warning sign and clear visibility to the Give Way sign alleviates the situation.

Table S3 – Hansen Road and Channel Road Intersection Sight Distances

Approach	Sight Distance Category	Absolute Minimum*	Desirable**	Achievable	Comment
Hansen Rd from West	SISD (1.15m to 1.15m)	264 m	279 m	117 m	Does not meet SISD requirement
Hansen Rd to East	SISD (1.15m to 1.15m)	307 m	322 m	92 m	Does not meet SISD requirement
Channel Rd (from Walkamin)	ASD (1.15m to 0.00m)	124 m	136 m	112 m	Does not meet ASD requirement

* Sight distance assuming a reaction time of 2.5 seconds

** Sight distance assuming a reaction time of 2.0 seconds

A review of the sight distances at the Hansen road – Channel Road intersection revealed that there is severe inadequacy of achieving absolute minimum values on all approaches for the design speeds of the two roads. Although the presence of some suitable warning signs exist on site, this result highlights that some works would be desirable to improve sight distances and bring this intersection up to standard.

Table S4 – Springmount Road and Kippen Drive Intersection Sight Distances

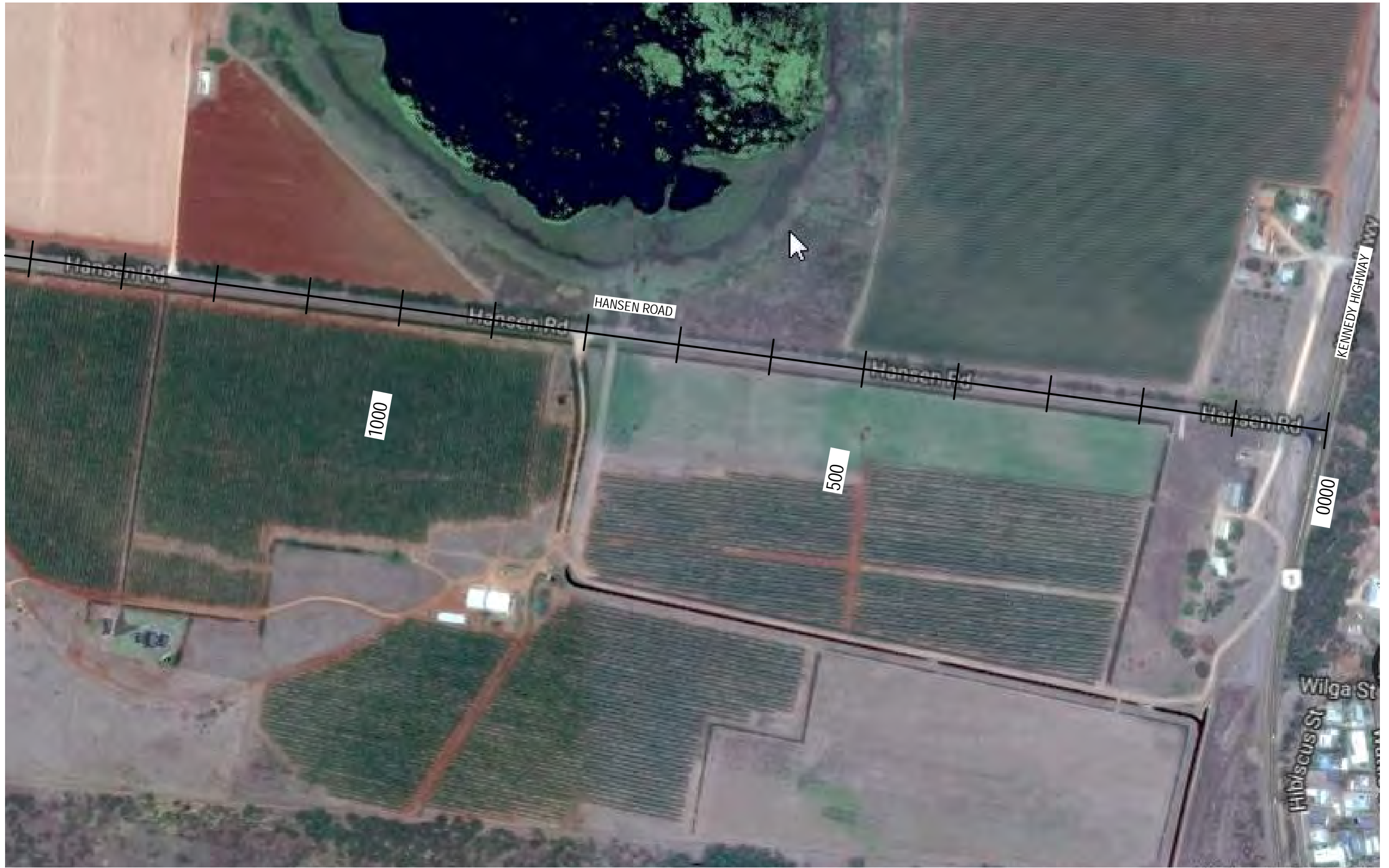
Approach	Sight Distance Category	Absolute Minimum*	Desirable**	Achievable	Comment
Springmount Rd from West	SISD (1.15m to 1.15m)	298 m	313 m	213 m	Does not meet SISD requirement
Springmount Rd from East	SISD (1.15m to 1.15m)	269 m	284 m	118 m	Does not meet SISD requirement
Kippen Dr from south	ASD (1.15m to 0.00m)	47 m	54 m	18 m	Does not meet ASD requirement

* Sight distance assuming a reaction time of 2.5 seconds

** Sight distance assuming a reaction time of 2.0 seconds

A review of the sight distances on site reveal that there is severe inadequacy of achieving absolute minimum values on all approaches for the design speeds of the two roads. Although the presence of some suitable warning signs exist on site, this result highlights that some works would be desirable to improve sight distances and bring this intersection up to standard.

Appendix C. Hansen Road/Springmount Road/Kippen Drive - Route Assessment Sketches



SCALE 1:2000 (A1) 0 40 80 120 160 200m

PRELIMINARY

REV	DATE	DRAWN	REVD	APPD	REVISION	DRAWING NUMBER	REFERENCE DRAWING TITLE



CLIENT VESTAS AUSTRALIAN WIND TECHNOLOGY P/L			
PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE ROUTE ASSESSMENT SKETCH SHEET 1		REV A
SCALE AS SHOWN	DRAWING NO. IH104500-ECC-SK-0001	



SCALE 1:2000 (A1) 0 40 80 120 160 200m

PRELIMINARY

REV	DATE	DRAWN	REVD	APPD	REVISION	DRAWING NUMBER	REFERENCE DRAWING TITLE



CLIENT VESTAS AUSTRALIAN WIND TECHNOLOGY P/L			
PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE ROUTE ASSESSMENT SKETCH SHEET 2		REV A
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0002	



SCALE 1:2000 (A1) 0 40 80 120 160 200m

PRELIMINARY

REV	DATE	DRAWN	REVD	APPD	REVISION	DRAWING NUMBER	REFERENCE DRAWING TITLE



CLIENT VESTAS AUSTRALIAN WIND TECHNOLOGY P/L			
PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE ROUTE ASSESSMENT SKETCH SHEET 3		
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0003	REV A



SCALE 1:2000 (A1) 0 40 80 120 160 200m

PRELIMINARY

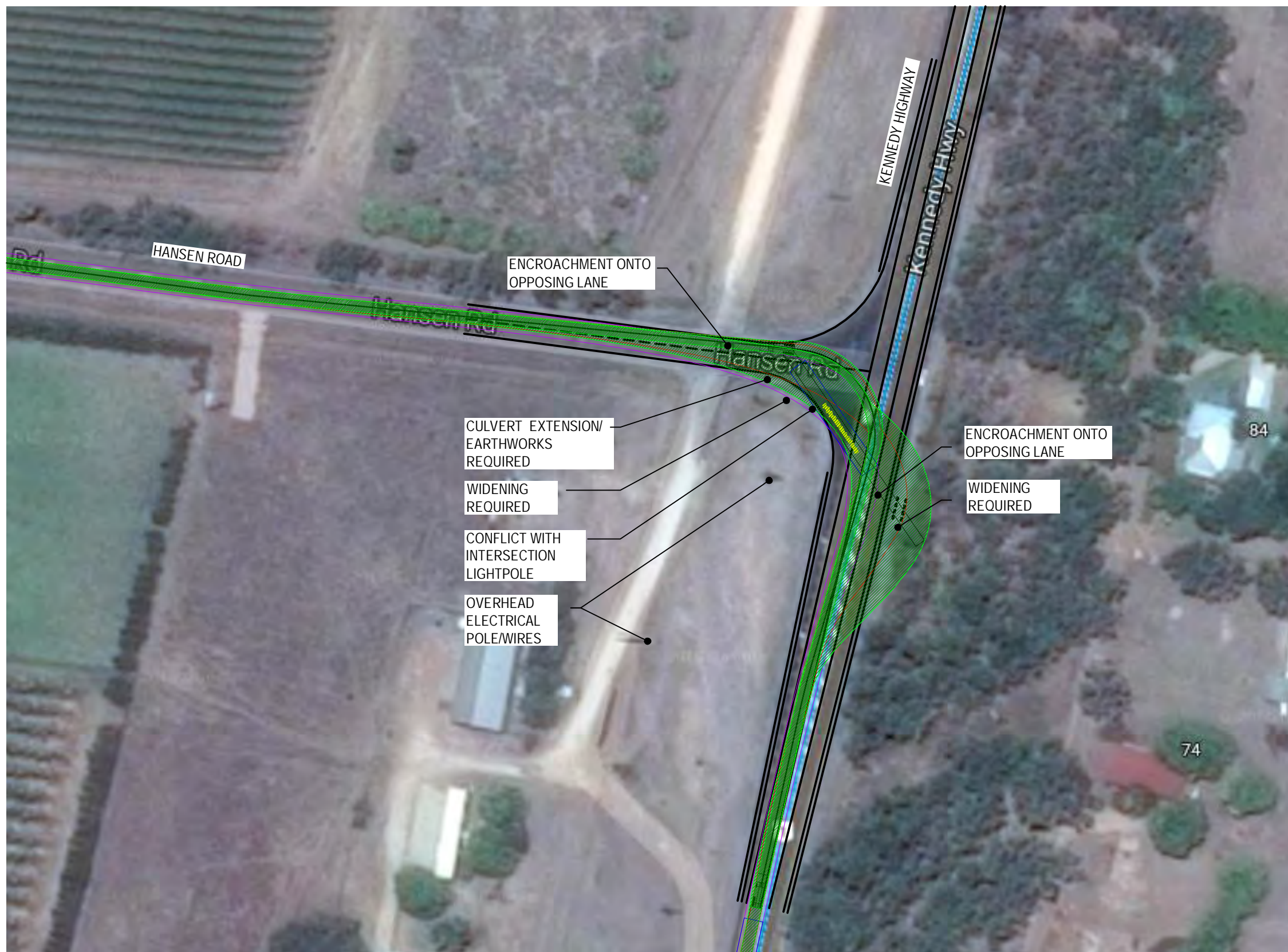
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CLIENT VESTAS AUSTRALIAN WIND TECHNOLOGY P/L			
PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

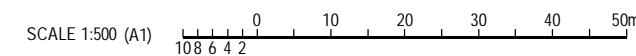
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Appendix D. Hansen Road/Springmount Road/Kippen Drive - Turning Path Sketches



LEGEND

- TRUCK WHEEL PATHS —
- OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG)



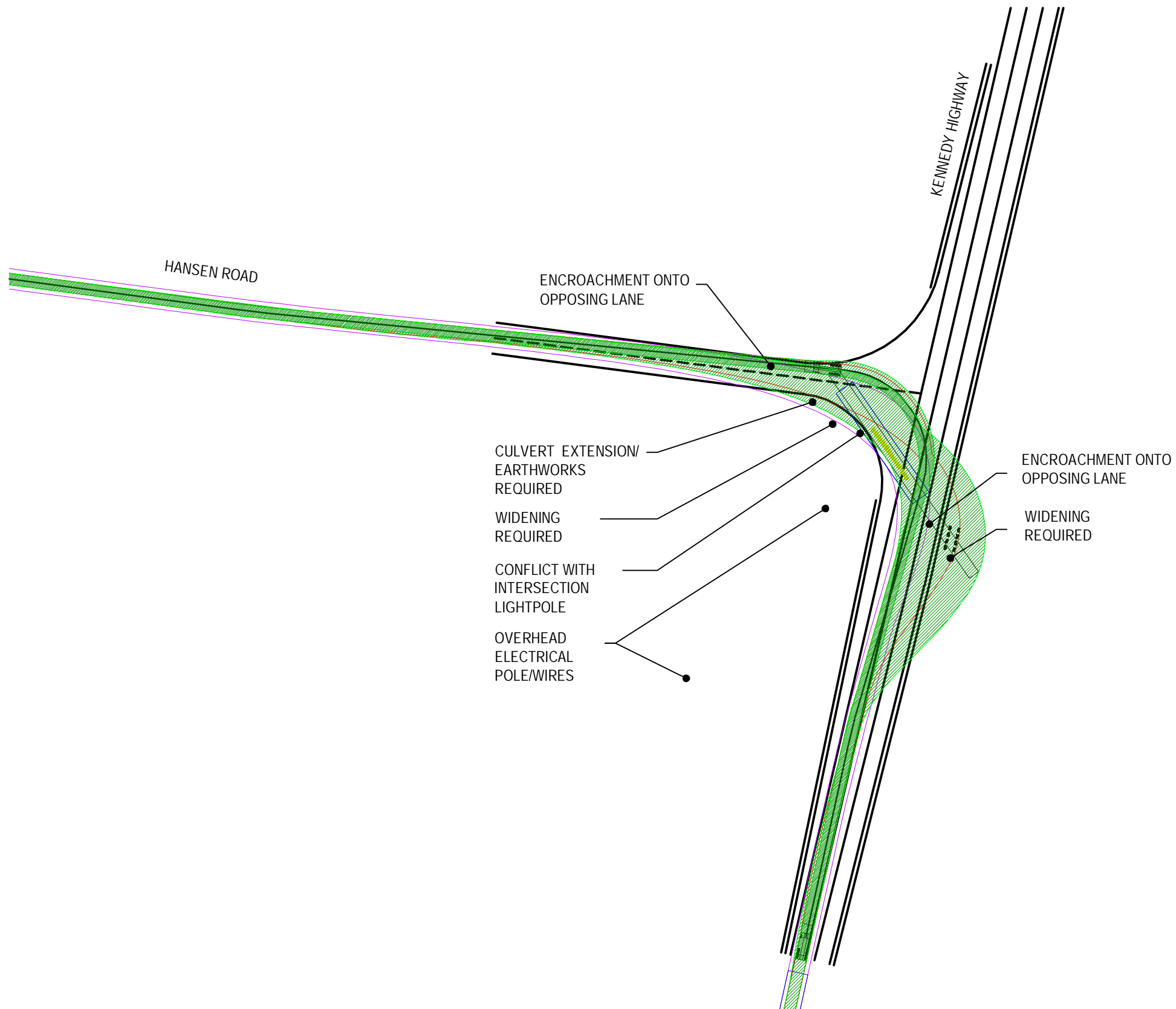
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PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS HANSEN RD - KENNEDY HWY INTERSECTION OPTION 1		
SCALE AS SHOWN	DRAWING NO. IHI104500-ECC-SK-0010	REV A



LEGEND

- TRUCK WHEEL PATHS —
- OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG)

SCALE 1:500 (A1) 0 10 20 30 40 50m

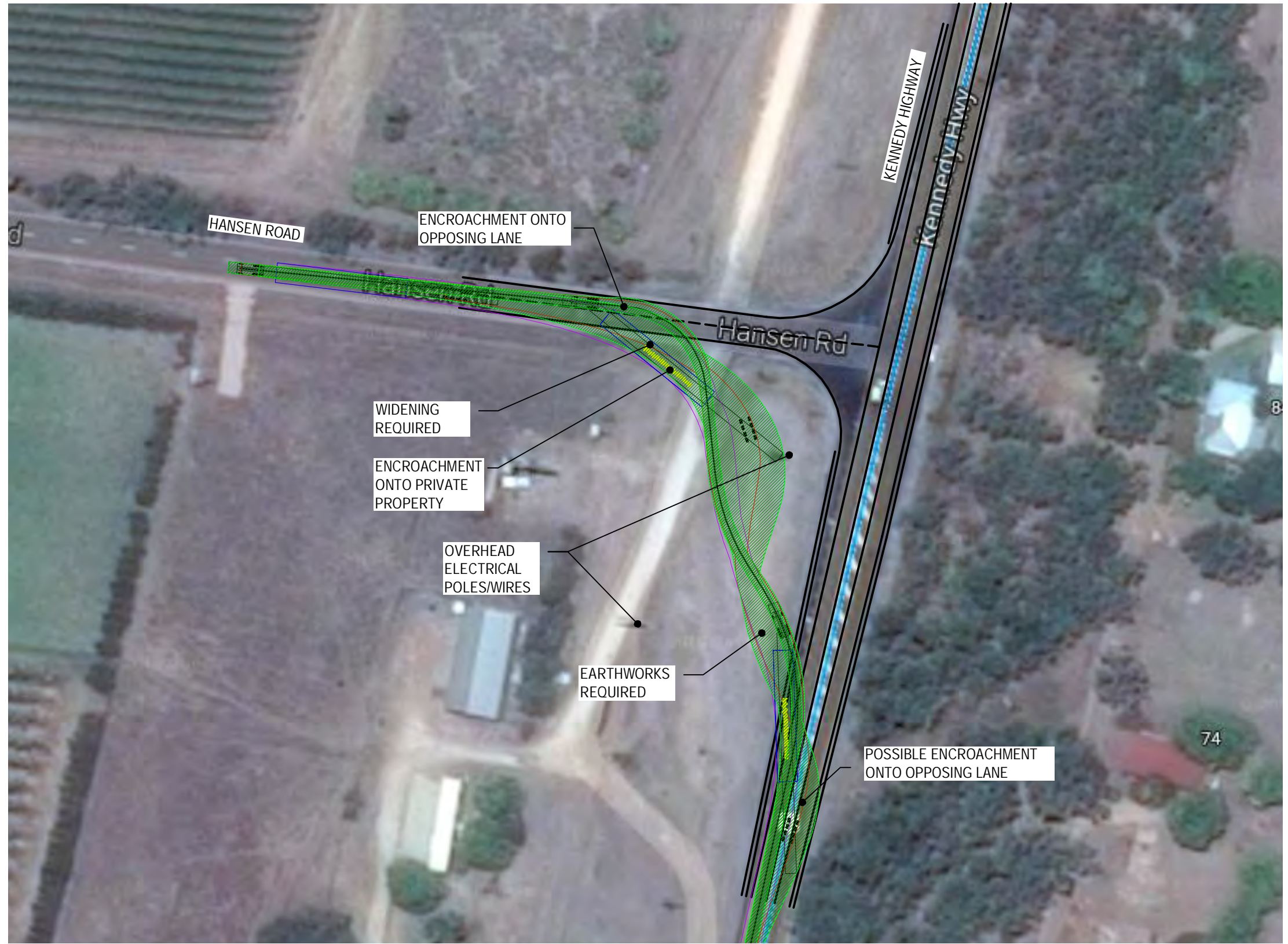
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CLIENT VESTAS AUSTRALIAN WIND TECHNOLOGY P/L			
PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS HANSEN RD - KENNEDY HWY INTERSECTION OPTION 1		
SCALE AS SHOWN	DRAWING No. IHI104500-ECC-SK-0010	REV A



LEGEND

TRUCK WHEEL PATHS	
OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG)	

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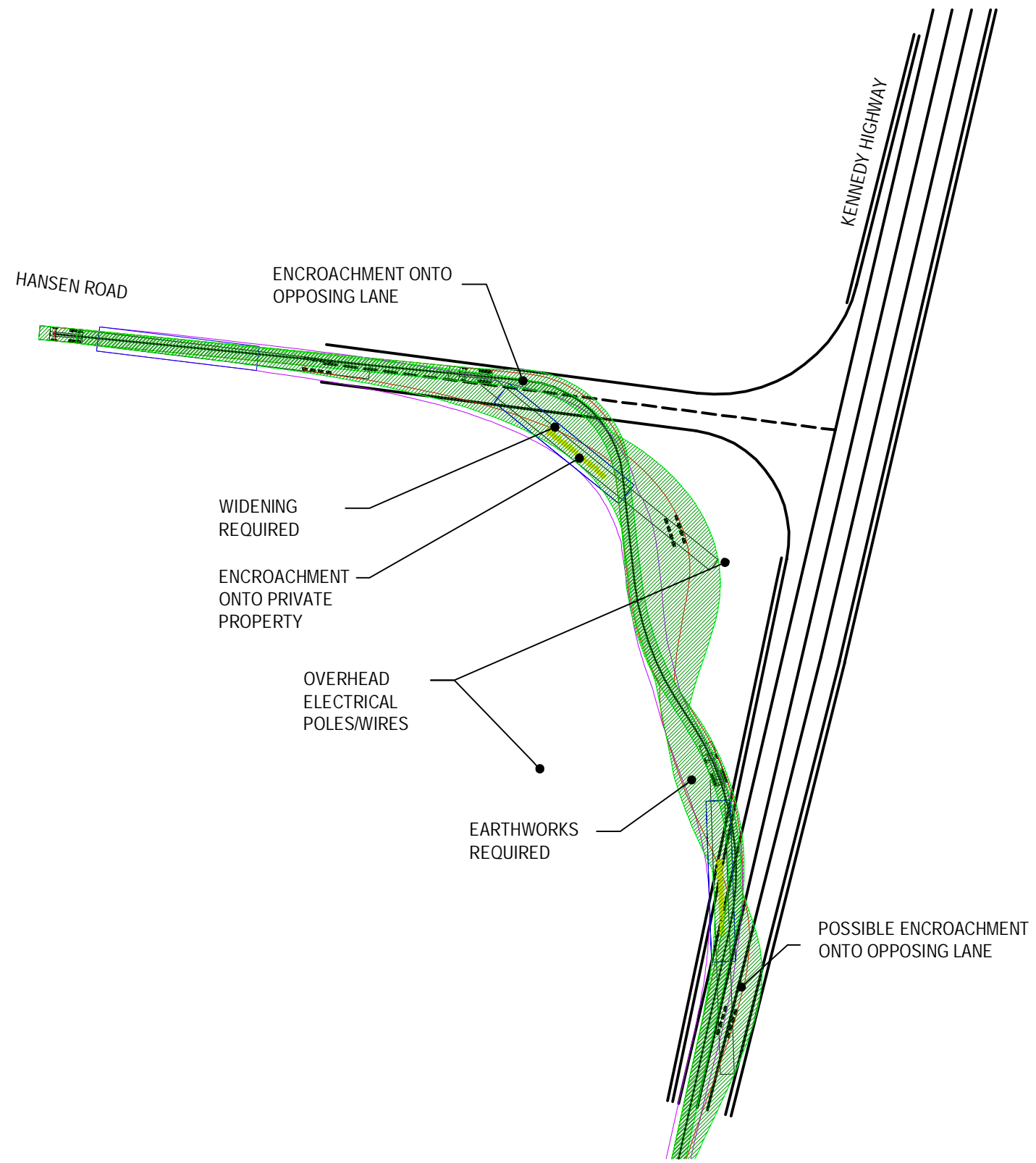
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PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS HANSEN RD - KENNEDY HWY INTERSECTION OPTION 2		
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0011	REV A



LEGEND

TRUCK WHEEL PATHS —

OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG)

SCALE 1:500 (A1)
 0 10 20 30 40 50m
 108 6 4 2

PRELIMINARY

REV	DATE	DRAWN	REVD	APPD	REVISION	DRAWING NUMBER	REFERENCE DRAWING TITLE



CLIENT VESTAS AUSTRALIAN WIND TECHNOLOGY P/L			
PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS HANSEN RD - KENNEDY HWY INTERSECTION OPTION 2	
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0011
REV A	



LEGEND

LEGEND

- TRUCK WHEEL PATHS —
- OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG)

SCALE 1:500 (A1)
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PRELIMINARY

REV	DATE	DRAWN	REVD	APPD	REVISION	DRAWING NUMBER	REFERENCE DRAWING TITLE



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PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS MAUDE CREEK S-BEND		REV A
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0012	



ENCROACHMENT ONTO
OPPOSING LANE

HANSEN ROAD

MAUDE CREEK

ENCROACHMENT ONTO
OPPOSING LANE

LEGEND

LEGEND

- TRUCK WHEEL PATHS —
- OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG)

SCALE 1:500 (A1)
 0 10 20 30 40 50m
 108 6 4 2

PRELIMINARY

REV	DATE	DRAWN	REVD	APPD	REVISION	DRAWING NUMBER	REFERENCE DRAWING TITLE



CLIENT VESTAS AUSTRALIAN WIND TECHNOLOGY P/L			
PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS MAUDE CREEK S-BEND	
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0012
REV A	



LEGEND

- TRUCK WHEEL PATHS —
- OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG) ▨

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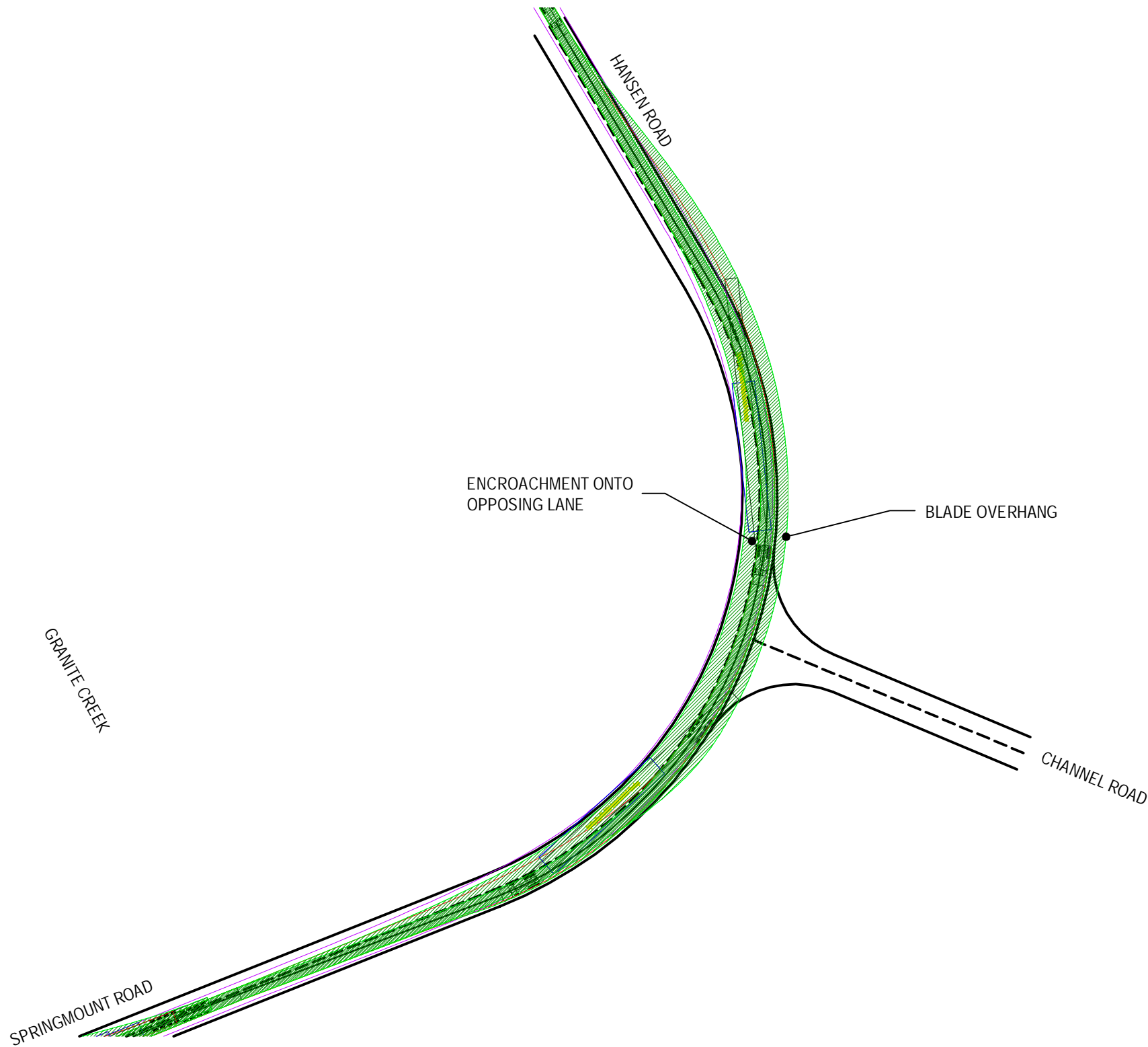
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PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS CHANNEL ROAD SECTION		
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0013	REV A



LEGEND

- TRUCK WHEEL PATHS —
- OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG)

SCALE 1:500 (A1)
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 108 6 4 2

PRELIMINARY

REV	DATE	DRAWN	REVD	APPD	REVISION	DRAWING NUMBER	REFERENCE DRAWING TITLE



CLIENT VESTAS AUSTRALIAN WIND TECHNOLOGY P/L			
PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS CHANNEL ROAD SECTION		
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0013	REV A



WIDENING / RECONSTRUCTION /
 REALIGNMENT WORKS REQUIRED

LEGEND

- TRUCK WHEEL PATHS —
- OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG)

SCALE 1:500 (A1)
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PRELIMINARY

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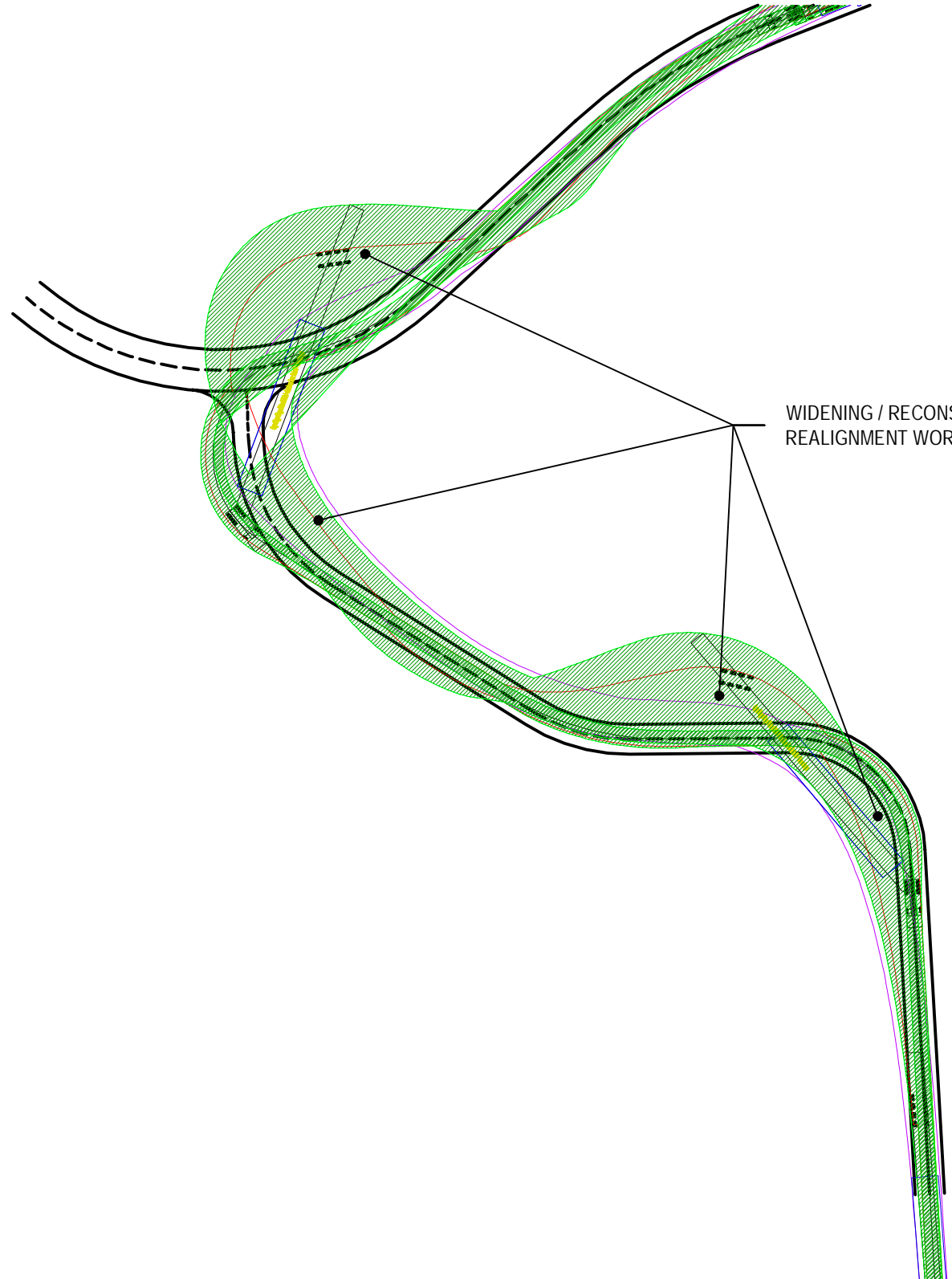


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PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS SPRINGMOUNT RD - KIPPEN DR INTERSECTION		
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0014	REV A



SPRINGMOUNT ROAD



WIDENING / RECONSTRUCTION /
 REALIGNMENT WORKS REQUIRED

KIPPEN DRIVE

LEGEND

- TRUCK WHEEL PATHS —
- OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG)

SCALE 1:500 (A1)
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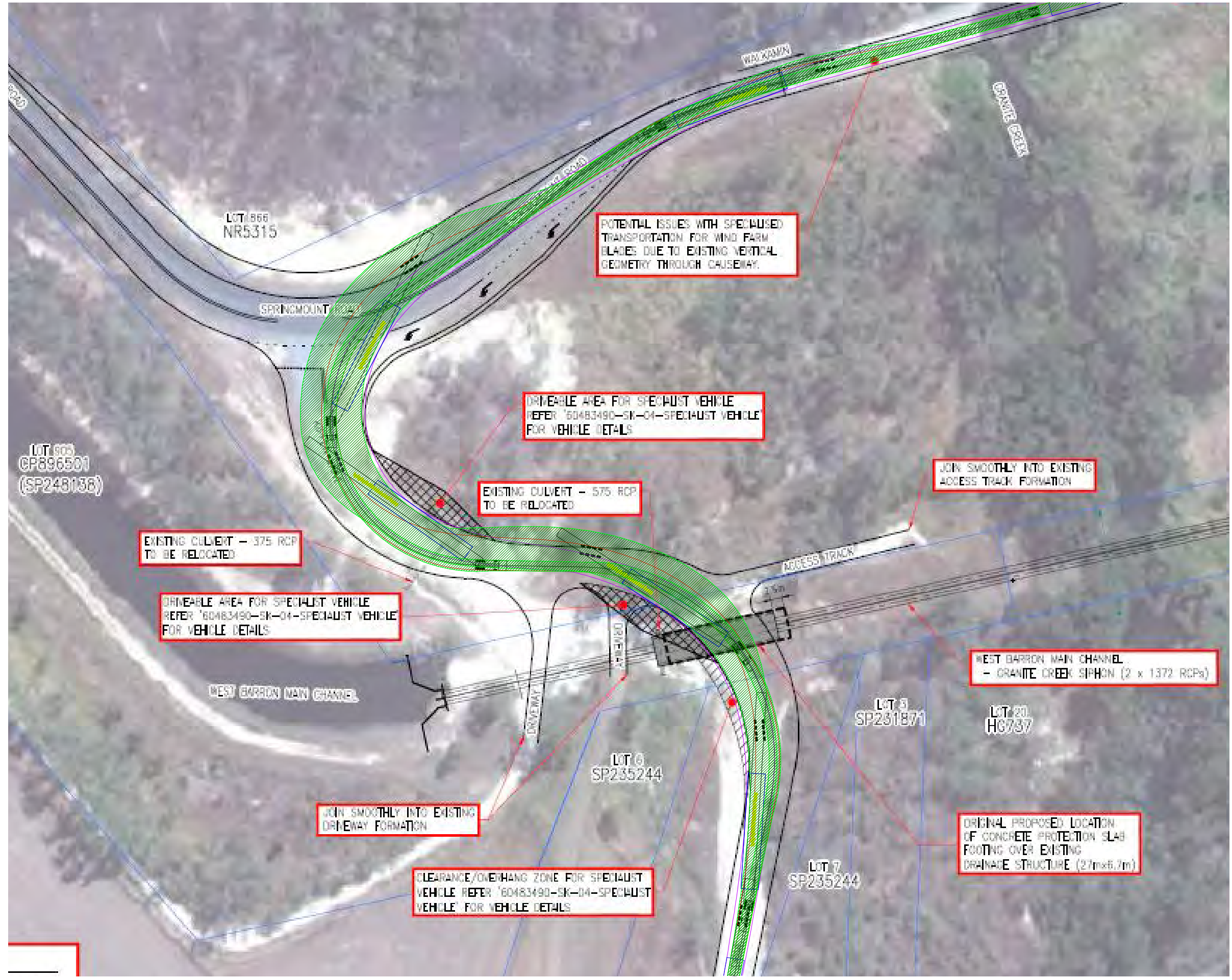
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PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS SPRINGMOUNT RD - KIPPEN DR INTERSECTION		
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0014	REV A



NOTE:
 CONCEPT INTERSECTION LAYOUT
 PROVIDED BY OTHERS.

- LEGEND
- TRUCK WHEEL PATHS —
 - OVERALL AREA REQUIREMENT (INCLUDING REAR OVERHANG) ▨

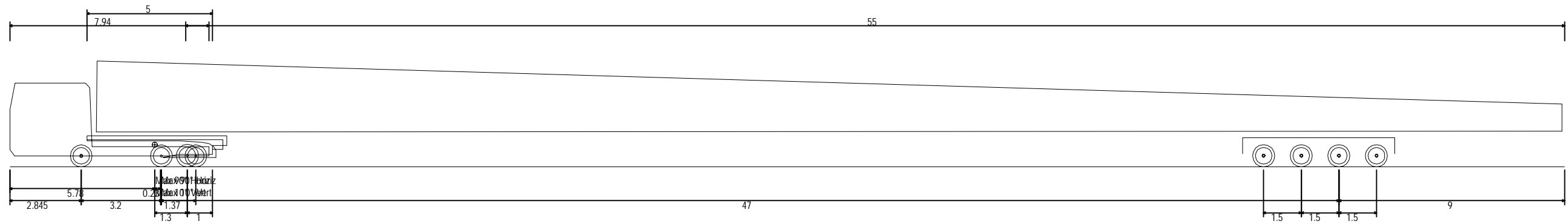
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PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK DESIGN REVIEW	REVIEWED DATE	APPROVED DATE
DESIGNED			

TITLE VEHICLE TURNING PATHS SPRINGMOUNT ROAD - KIPPEND DRIVE (CONCEPT LAYOUT BY OTHERS)		
SCALE AS SHOWN	DRAWING No. IH104500-ECC-SK-0015	REV A



Copy of Copy of Copy of Volvo FH16 8x4 + Nootboom Tower Trailer 51 + 10m overhangm
 Overall Length 62.010m
 Overall Width 2.550m
 Overall Body Height 4.900m
 Min Body Ground Clearance 0.198m
 Max Track Width 2.550m
 Lock-to-lock time 6.00s
 Wall to Wall Turning Radius 9.800m

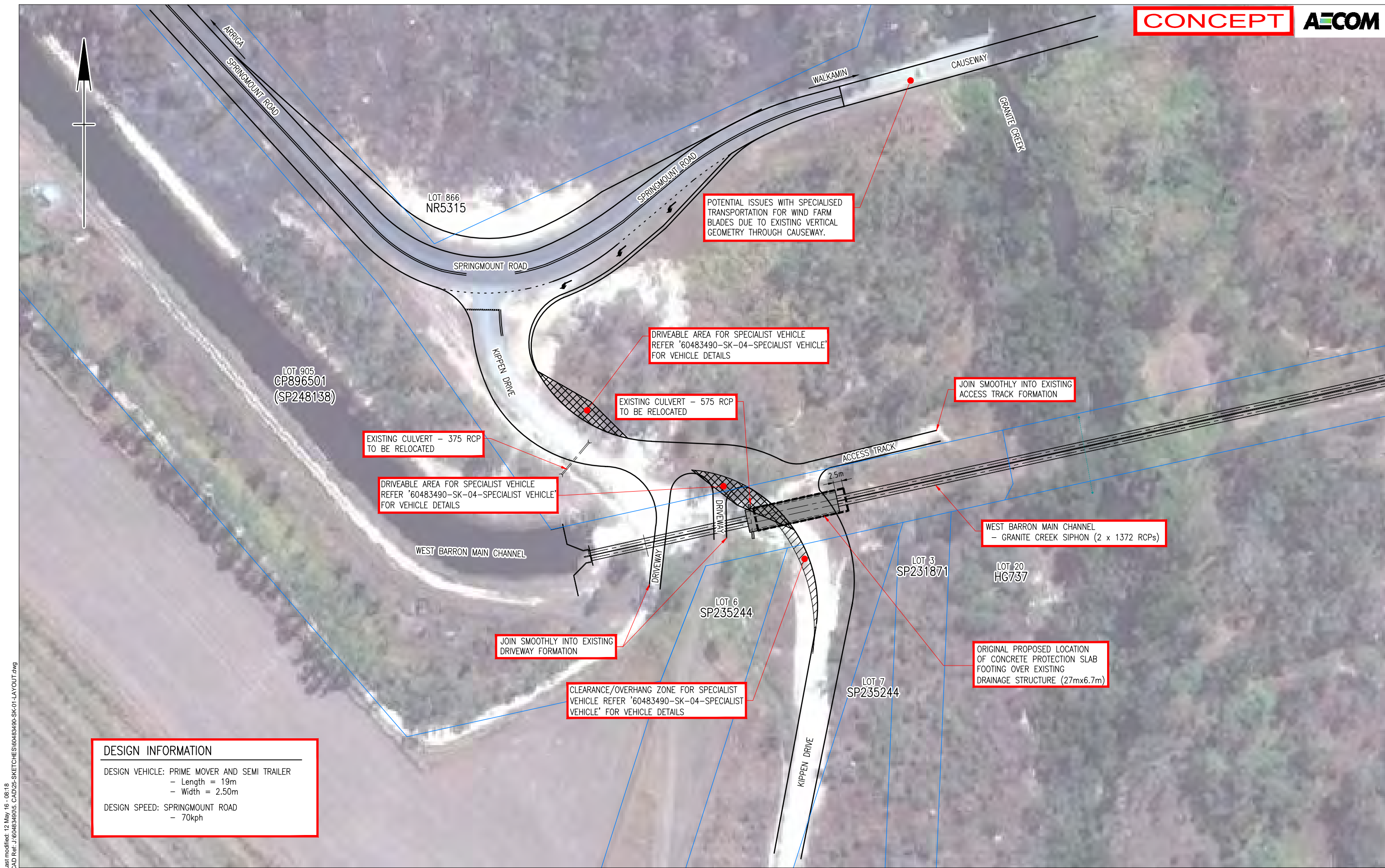
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PROJECT MT EMERALD WIND FARM			
DRAWN JPT	DRAWING CHECK	REVIEWED	APPROVED
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE VEHICLE TURNING PATHS VEHICLE TEMPLATE		
SCALE AS SHOWN	DRAWING No IH104500-ECC-SK-0016	REV A



DESIGN INFORMATION

DESIGN VEHICLE: PRIME MOVER AND SEMI TRAILER
 - Length = 19m
 - Width = 2.50m

DESIGN SPEED: SPRINGMOUNT ROAD
 - 70kph

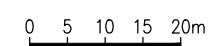
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LEGEND

	CLEAR/OVERHANG ZONE - AREAS TO BE FREE OF OBSTRUCTIONS
	DRIVEABLE AREAS
	DCDB

**NOT TO BE USED
FOR CONSTRUCTION**

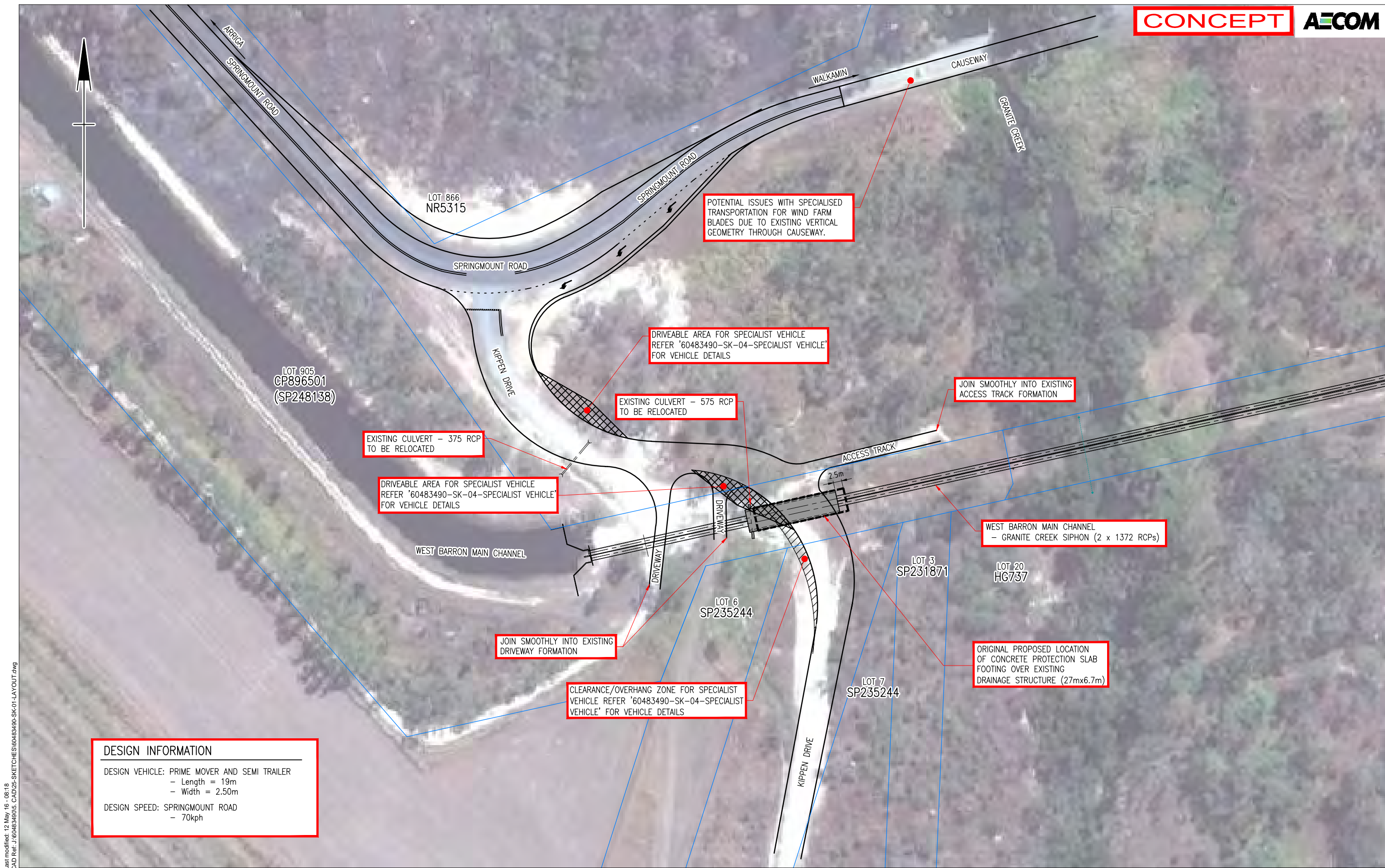
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60483490
 ISSUE 1
 12/05/16

INTERSECTION KIPPEN DRIVE AND SPRINGMOUNT ROAD
 OVERALL LAYOUT

SK-01-LAYOUT



Last modified: 12 May 16 - 08:18
CAD Ref: J:\60483490\5. CAD\25-SKETCHES\60483490-SK-01-LAYOUT.dwg

DESIGN INFORMATION

DESIGN VEHICLE: PRIME MOVER AND SEMI TRAILER
 - Length = 19m
 - Width = 2.50m

DESIGN SPEED: SPRINGMOUNT ROAD
 - 70kph

**NOT TO BE USED
FOR CONSTRUCTION**

DRAWING IN PROGRESS | DATE: 12/05/2016

LEGEND

CLEAR/OVERHANG ZONE - AREAS TO BE FREE OF OBSTRUCTIONS

DRIVEABLE AREAS

DCDB

0 5 10 15 20m

INTERSECTION KIPPEN DRIVE AND SPRINGMOUNT ROAD
OVERALL LAYOUT

SK-01-LAYOUT

60483490
ISSUE 1
12/05/16



Last modified: 12 May 16 - 08:18
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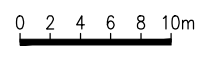
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12/05/16

LEGEND

— DCDB

**NOT TO BE USED
FOR CONSTRUCTION**

DRAWING IN PROGRESS | DATE: 12/05/2016



INTERSECTION KIPPEN DRIVE AND SPRINGMOUNT ROAD
VEHICLE TRACKS AUL

SK-02-SEMI-AUL



Last modified: 12 May 16 - 08:18
CAD Ref: J:\60483490\5. CAD\25-SKETCHES\60483490-SK-03-SEMI-BAR.dwg

60483490
ISSUE 1
12/05/16

LEGEND

— DCDB

**NOT TO BE USED
FOR CONSTRUCTION**

DRAWING IN PROGRESS | DATE: 12/05/2016

0 2 4 6 8 10m

INTERSECTION KIPPEN DRIVE AND SPRINGMOUNT ROAD
VEHICLE TRACKS BAR

SK-03-SEMI-BAR



SPECIALIST VEHICLE
 WIND TURBINE COMPONENT TRANSPORTERS
 SPECIALIST VEHICLE: VOLVO FH16 8x4 + NOOTEBOOM TOWER TRAIL
 - Length = 50.351m
 - Width = 2.55m

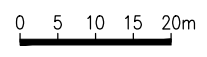
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LEGEND

	CLEAR/OVERHANG ZONE - AREAS TO BE FREE OF OBSTRUCTIONS
	DRIVEABLE AREAS
	DCDB

**NOT TO BE USED
FOR CONSTRUCTION**

DRAWING IN PROGRESS | DATE: 12/05/2016



60483490
 ISSUE 1
 12/05/16

INTERSECTION KIPPEN DRIVE AND SPRINGMOUNT ROAD
 VEHICLE TRACKS - SPECIALIST VEHICLE

SK-04-SPECIALIST VEHICLE



SPECIALIST VEHICLE

WIND TURBINE COMPONENT TRANSPORTERS

SPECIALIST VEHICLE: 14-223 Blade Truck and Trailer (with dolly)

- Length = 54.000m
- Width = 3.048m

Low Loader 3.048m wide (54m)	54.000m
Overall Length	3.048m
Overall Width	3.341m
Overall Body Height	0.417m
Min Body Ground Clearance	3.048m
Max Track Width	6.00s
Lock-to-lock time	30.00°
Max Steering Angle (Virtual)	

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CAD Ref: J:\60483490\SK-06-SPECIALIST VEHICLE.dwg

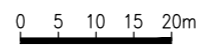
60483490
ISSUE 1
22/09/16

LEGEND

	CLEAR/OVERHANG ZONE - AREAS TO BE FREE OF OBSTRUCTIONS
	DRIVEABLE AREAS
	DCDB

**NOT TO BE USED
FOR CONSTRUCTION**

DRAWING IN PROGRESS | DATE: 22/09/2016



INTERSECTION KIPPEN DRIVE AND SPRINGMOUNT ROAD
VEHICLE TRACKS - SPECIALIST VEHICLE
WITHOUT REAR STEERING
SK-06-SPECIALIST VEHICLE



SPECIALIST VEHICLE

WIND TURBINE COMPONENT TRANSPORTERS

SPECIALIST VEHICLE: 14-223 Blade Truck and Trailer (with dolly)

- Length = 54.000m
- Width = 3.048m

Low Loader 3.048m wide (54m) rear trailer axles on pivoting bogie	
Overall Length	54.000m
Overall Width	3.048m
Overall Body Height	3.341m
Min Body Ground Clearance	0.417m
Max Track Width	3.048m
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	30.00°

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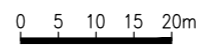
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DRAWING IN PROGRESS | DATE: 22/09/2016



INTERSECTION KIPPEN DRIVE AND SPRINGMOUNT ROAD
VEHICLE TRACKS - SPECIALIST VEHICLE
WITH REAR STEERING
SK-07-SPECIALIST VEHICLE

Appendix E. Hansen Road/Springmount Road/Kippen Drive - Site Photos



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IMG_2981.JPG



IMG_2982.JPG



IMG_2983.JPG



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IMG_2985.JPG



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Appendix F. Hansen Road/Springmount Road/Kippen Drive – Route Videos (digital copy only)

Appendix G. Route Study, Port to Mt Emerald by Rex J Andrews.

ROUTE STUDY: CAIRNS PORT TO MOUNT EMERALD
WINDFARM.

21/03/2016 REV 00

Rev.	Date	Change	Responsible	Checked
00	07/07/15	Route survey undertaken	W Andrews	✓
00	21/03/16	Report compiled	W Andrews	✓
00	29/03/16	Report completed	W Andrews	✓

Index:

INDEX:	2
INDEX:.....	2
1.0 INTRODUCTION	3
2.0 EVALUATION.....	4
3.0 PROJECT DATA.	5
4.0 SITE LOCATION.....	6
5.0 TRANSPORT SUMMARY.	7
6.0 TRANSPORT APPROVALS REQUIRED.....	8
7.0 PORT OF IMPORT.....	9
8.0 ROUTE SURVEY: CAIRNS STORAGE AREA TO MOUNT EMERALD WINDFARM.	23
9.0 CONCLUSION:	49
10.0 REFERENCES:	50

1.0 Introduction

This document describes observations on route and explains the

Transport of wind turbine components to the entrance/storage from Factory / Harbour.

The Route survey does not include any studies on site.

The Route survey does not include investigations regarding bearing Capacity of any bridges. This has to be investigated.

The route survey is based on an usual inspection on the date shown On next page and is not to be regarded as a conclusive statement on Suitability.

A dry run with an extendable trailer may be necessary in order to Determine the extend of possible modification and improvements

2.0 Evaluation

1	No Cost
2	Some Work
3	Urgent Modification
4	Extreme Amount of Work

(Mark below boxes with an X)

		1	2	3	4
A	Harbour				X
B	Road Modification			X	
C	Road Furnishings			X	
D	Trees	X			
E	Site Entrance				X
F	Bridge Calculations			X	
G					

3.0 Project data.

Date of Route Study. 07/07/2016

Survey undertaken by. (Rex J Andrews P/L)

Inspection carried out by: Warrick Andrews.

Project name. Mount Emerald Windfarm

Location. Cairns to Mount Emerald

Quantity of turbines. 53 x Vestas WTG's 3.3-96 mtr hub height.

TRANSPORT COMBINATIONS:

53 x Nacelles (12.7l x 4.2w x 3.2h x 120T)

Configuration. Prime mover with 12x8 Platform trailer.

Overall length: 45.0l x 4.3w x 4.9h x 198T.

53 x Hubs (5.5l x 3.8w x 3.7h x 31.5T)

Configuration. Prime mover with 4x4 Low Loader.

Overall length: 19.0l x 4.0w x 4.9h x 54.5T.

159 x Blades (61.7l x 4.0w x 3.4h x 18T)

Configuration. Prime mover with 1x4 dolly 4x4 Extendable Blade trailers.

Overall length: 65.0l x 4.3w x 4.9h x 52.5T.

53 x Base Towers (18.0l x 4.5w x 4.3h x 70T)

Configuration. Prime mover with 6x8 Platform trailer.

Overall length: 27.0l x 4.5w x 5.2h x 108.5T.

53 x First Mid Towers (17.0l x 4.3w x 4.3h x 70T)

Configuration. Prime mover with 7x8 Platform trailer.

Overall length: 33.0l x 4.5w x 5.2h x 118.5T.

53 x Second Mid Towers (22.0l x 4.3w x 4.3h x 70T)

Configuration. Prime mover with 7x8 Platform trailer.

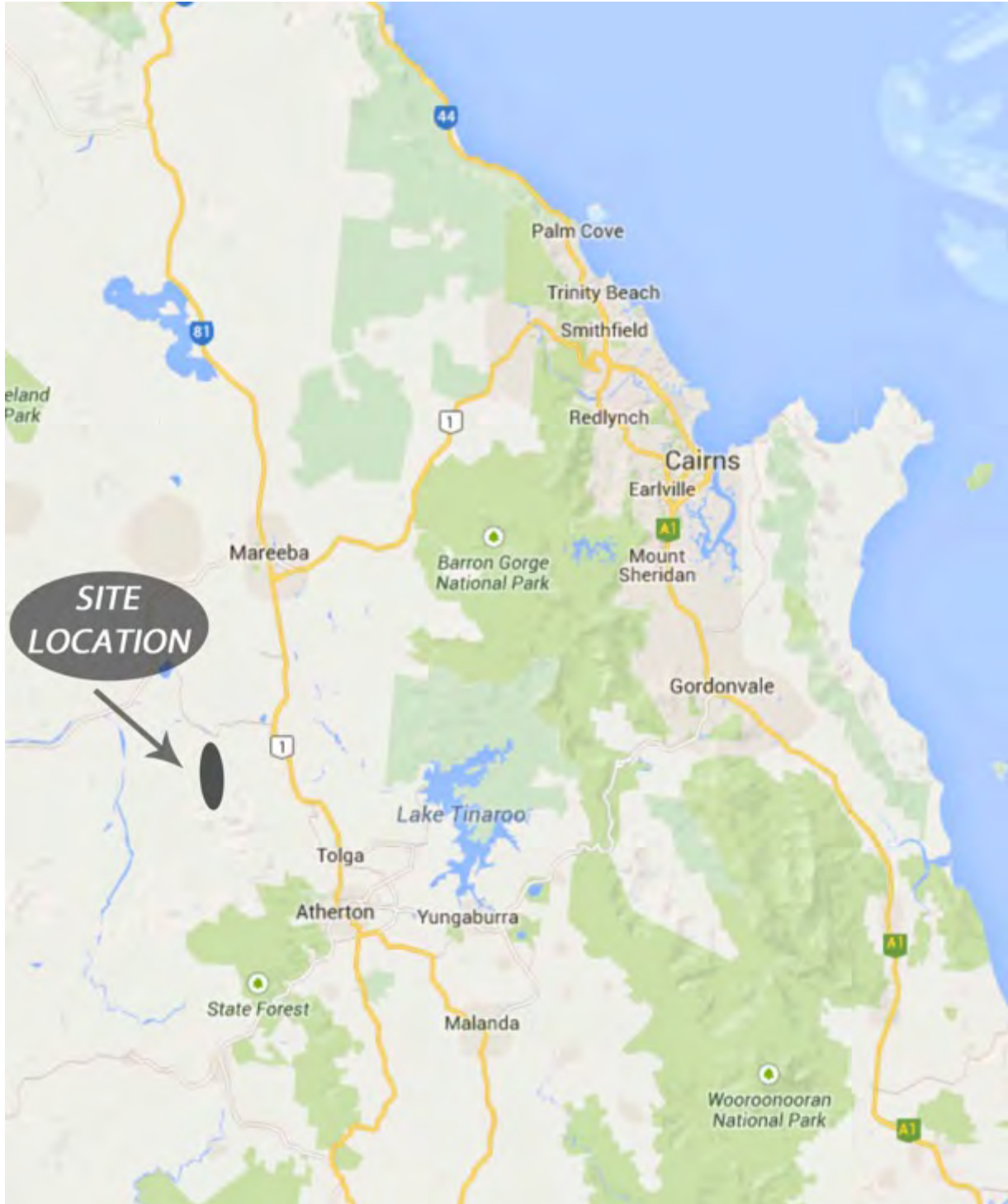
Overall length: 33.0l x 4.5w x 5.2h x 118.5T.

53 x Top Towers (27.0l x 4.3w x 3.6h x 60T)

Configuration. Prime mover with 3x8 Dolly 3x8 Jinker

Overall length: 45.0l x 4.3w x 5.2h x 98.5T.

4.0 Site Location.



The Mount Emerald Windfarm is located approx. 390 Kilometres North-West of Townsville, and approx. 60 Kilometres South-West of Cairns.

5.0 Transport Summary.

We have based our study on the turbine components, and all imported towers entering Australia via Cairns Port.

Port to Storage (3.4 Km's): After completing the route survey, we believe the following is the most suitable option.

This route took us via Dutton Street, Kenny Street, Draper Street, Cook Street, Tingira Street.

Storage to Site (209 Km's): After completing the route survey, we believe the following is the most suitable option.

This route took us via Tingira Street, Cook Street, Bruce Highway, Palmerston Highway, Milla Milla- Malanda Road, Malanda-Atherton Road, (Atherton Bypass Via: Marks Lane, Gillies Highway, Marks Lane, Tinaroo Falls Dam Road, Kairi Road), Kennedy Highway, Hansen Road, Kippen Drive.

The following are the likely conditions for this route:

- The largest loads are likely to travel through Cairns city centre before 7.00am.
- Daytime travel only, once loads leave Cairns. Please note the following travel restrictions in place through Cairns. No travel between the hours of 7:00am and 9:00am & 3:00pm and 6:00pm, for all loads exceeding 4.0 meters in width.
- Wet Weather: Approval to travel shall be automatically suspended in the event of heavy or prolonged rain affecting the route being travelled and the movements of the vehicle and the load shall be deferred until such day and time as may be determined by a representative of the Director-General.
- Some loads will require Police escort as well as Company Pilots.

6.0 Transport approvals required.

Approvals will need to be sought from the following departments.

- Department of Transport and Main Roads QLD
- QLD Police service
- Ergon Energy
- Telstra
- Local Councils
- Queensland Rail

7.0 Port of Import.

A: BERTHS

The wind turbine equipment will be imported from various countries, and will arrive on ships into the Port of Cairns. The client may alternately source local towers. There are 2 possible berthing options available. Currently all Breakbulk is discharged onto wharfs 7 & 8. However some upgrades would be required to enter and exit the berth, especially with the tidal meter on the exit of Wharf 7.

There may be an option to discharge the ships on 4 & 5, this wharf would only need a minor amount of upgrades for access, but would need to be checked for axle loadings.

Image 1: Overview of the berths.



Image 2: Ramp to Wharf 8.



Image 3: Ramp to Wharf 7.



B: PORT STORAGE (EXTERNAL)

The reason for using the external area is that the area within the ports confines would not have enough usable space for a wind farm project of this size.

The external port storage area is located approx. 3.4 kilometres from the port, this storage area ranges from areas from 5,000 s/q to 50,000 s/q meters in size. The first of the available storage areas are currently under development, and would be available from Late 2016.

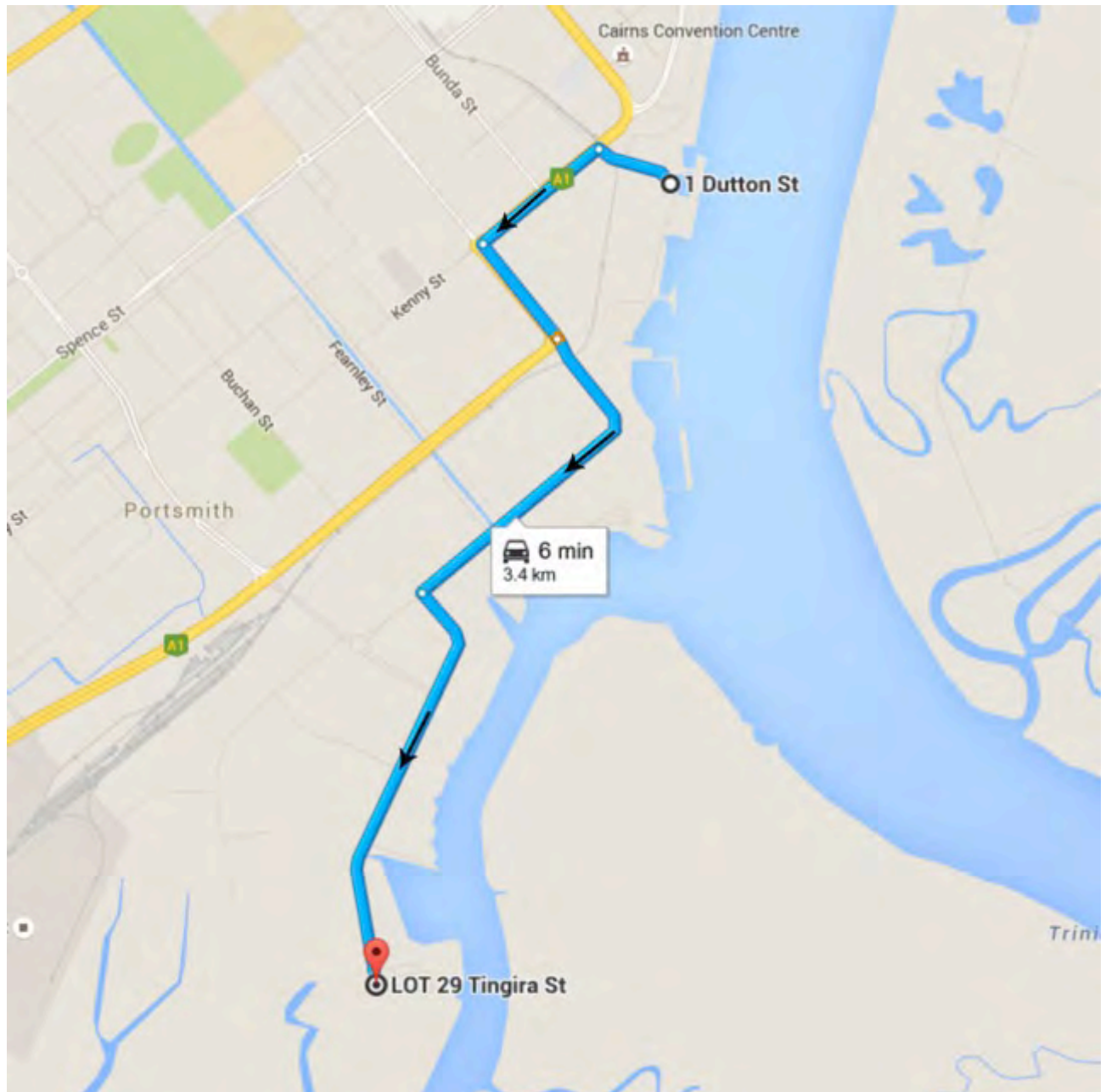
Some road upgrades would be required on the route from the port to this area. Additionally the discharge from the ship to this storage area would likely have delays between 7.00am and 9.00am, and 3.00pm till 6.00pm as this is the peak traffic period for Cairns.



Route Survey: Cairns port to storage area.

Distance of route: 3.4 Km's

Route: via Dutton Street, Kenny Street, Draper Street, Cook Street, Tingira Street.



0.2 Km's: Dutton Street onto Kenny Street at Cairns.

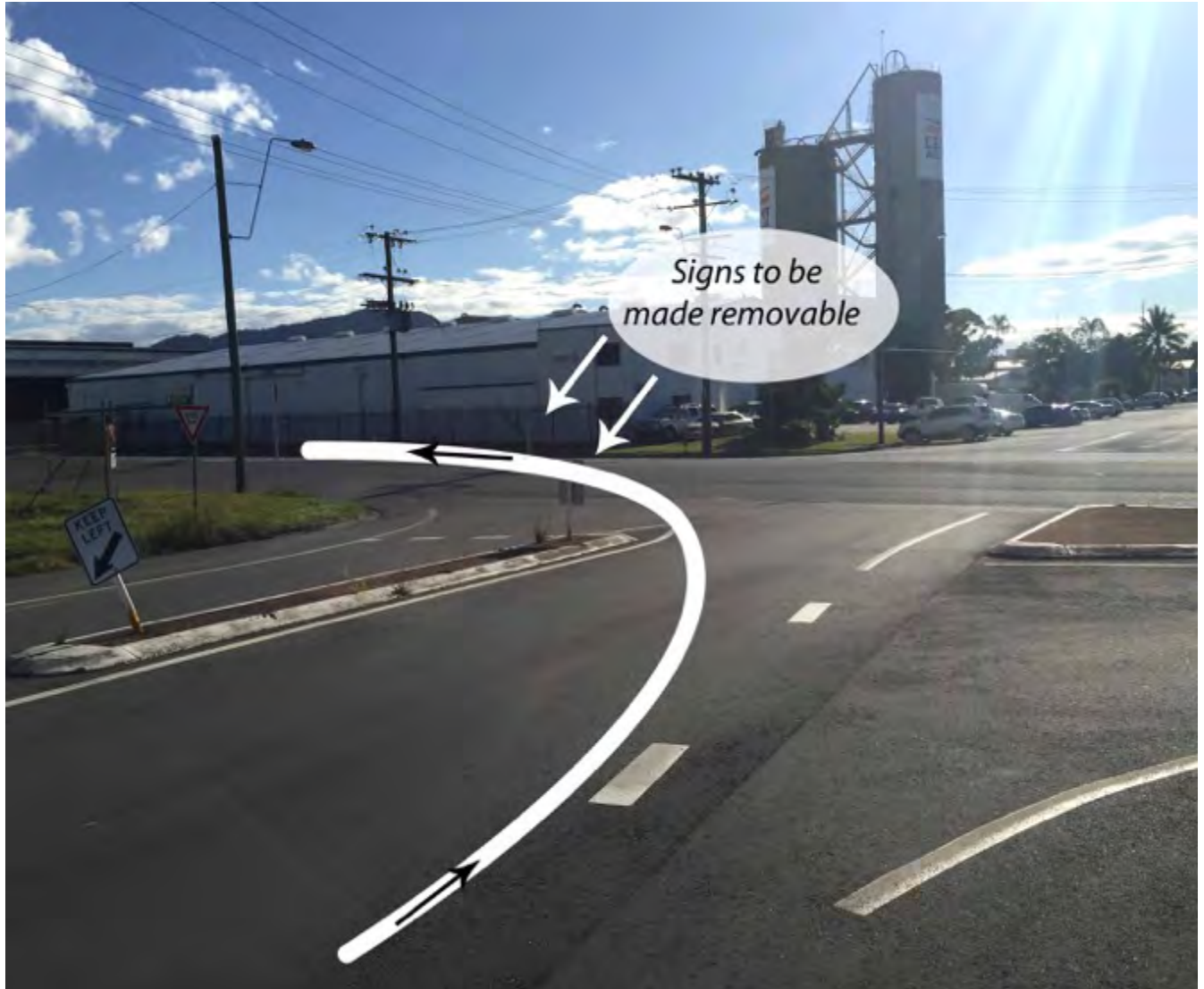
Image #1:



This is a large left hand turn. The loads would need to cross from wrong side to wrong side. Police and pilots would need to control the local traffic during this procedure.

Additionally the 2 signs on the centre median strips would need to be removed as well as relocating the rail warning signal.

Image 2:



0.6 Km's: Kenny Street onto Draper Street at Cairns.

Image #1:



Image #2:



This is a tight left hand turn at the roundabout. The loads would need to cross the vacant paddock at this corner. Cairns ports will negotiate with the owners to allow this to happen. There will be some costs associated with the upgrades.

Police and pilots would need to control the local traffic during this procedure.

1.0 Km's: Draper Street onto Cook Street at Cairns.

Image #1:



Loads to travel straight ahead through this intersection. There are no problems with this intersection.

Police and pilots would need to control the local traffic during this procedure.

1.3 Km's: Cook Street left turn in Cairns.

Image #1:



Loads to cut across the corner. There are no problems with this intersection.

Police and pilots would need to control the local traffic during this procedure.

2.1 Km's: Cook Street left turn into Tingira Street at Cairns.

Image #1:



Loads to turn left from the incorrect side to the incorrect side. There will need to be some temporary no parking zones put in place on each side of the corner.

Police and pilots would need to control the local traffic during this procedure.

3.4 Km's: Tingira Street into Storage at Cairns.

Image #1:



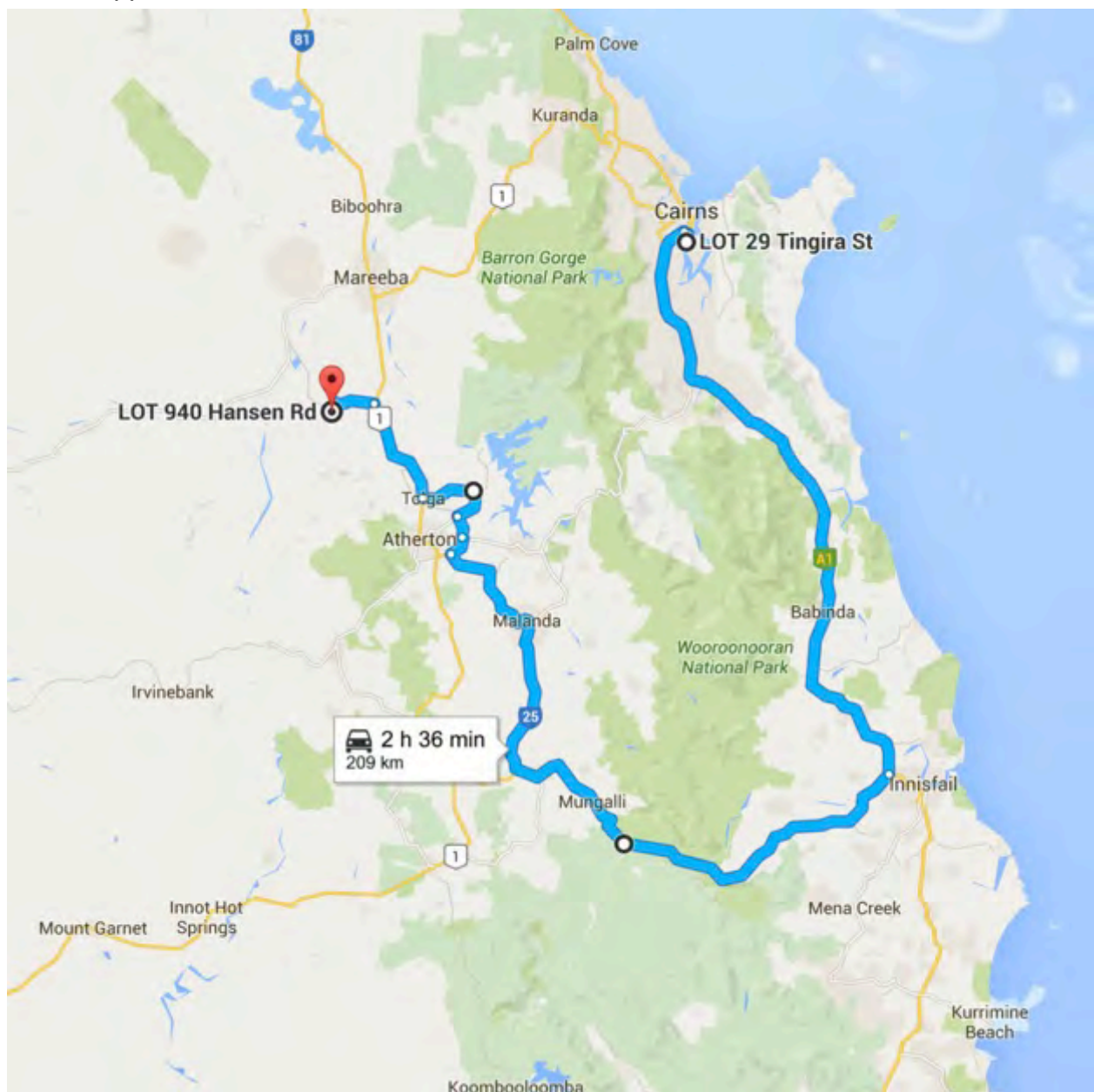
Loads to travel straight ahead at the end of Tingira Street. Some upgrades will be required to the access track.

Police and pilots would need to control the local traffic during this procedure.

8.0 Route Survey: Cairns storage area to Mount Emerald windfarm.

Distance of route: 209 Km's

Route: via Tingira Street, Cook Street, Bruce Highway, Benwell Road, Boundary Street, Woolcock Street, Bruce Highway, Palmerston Highway, Milla Milla- Malanda Road, Malanda-Atherton Road, (Atherton Bypass Via: Marks Lane, Gillies Highway, Marks Lane, Tinaroo Falls Dam Road, Kairi Road), Kennedy Highway, Hansen Road, Kippen Drive.



1.3 Km's: Tingira Street into Cook Street at Cairns.

Image #1:



Loads to turn right from the correct side to the correct side. There will need to be some temporary no parking zones put in place on each side of the corner.

Police and pilots would need to control the local traffic during this procedure.

2.3 Km's: Left turn on Cook Street at Cairns.

Image #1:



Loads to left from the incorrect side to the incorrect side. There are no problems with this section of road.

Police and pilots would need to control the local traffic during this procedure.

2.4 Km's: Cook Street onto the Bruce Highway at Cairns.

Image #1:

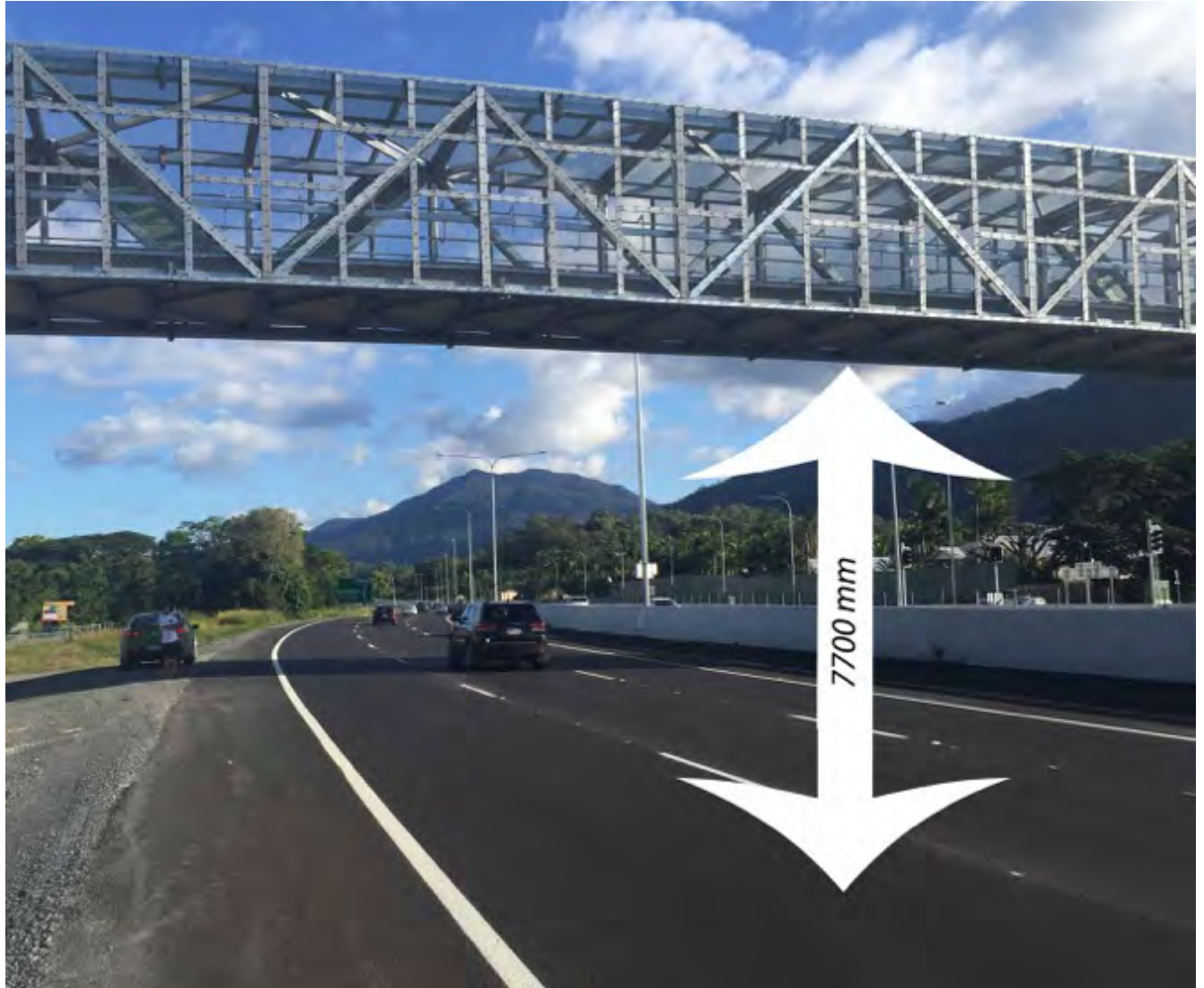


Loads to left from the incorrect side to the correct side. There will need to be some signs made removable on the centre island.

Police and pilots would need to control the local traffic during this procedure.

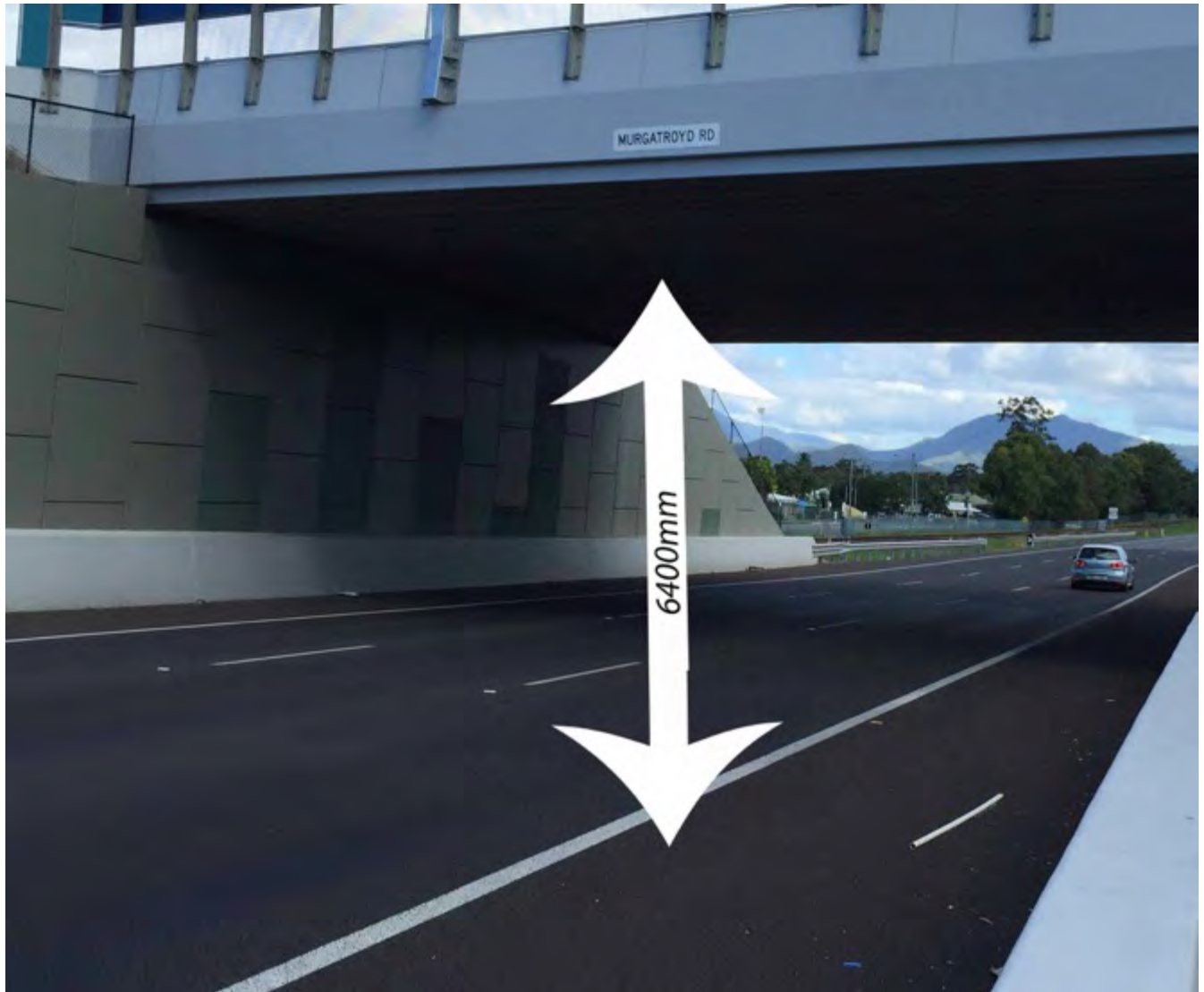
6.0 Km's: Overhead Bridges while exiting Cairns.

Bridge #1:



There are 3 bridge structures the loads will need to pass under while exiting Cairns. They are all on the Bruce Highway, and with the lowest clearance at 6.2 metres, they will not cause any problems.

Bridge # 2:

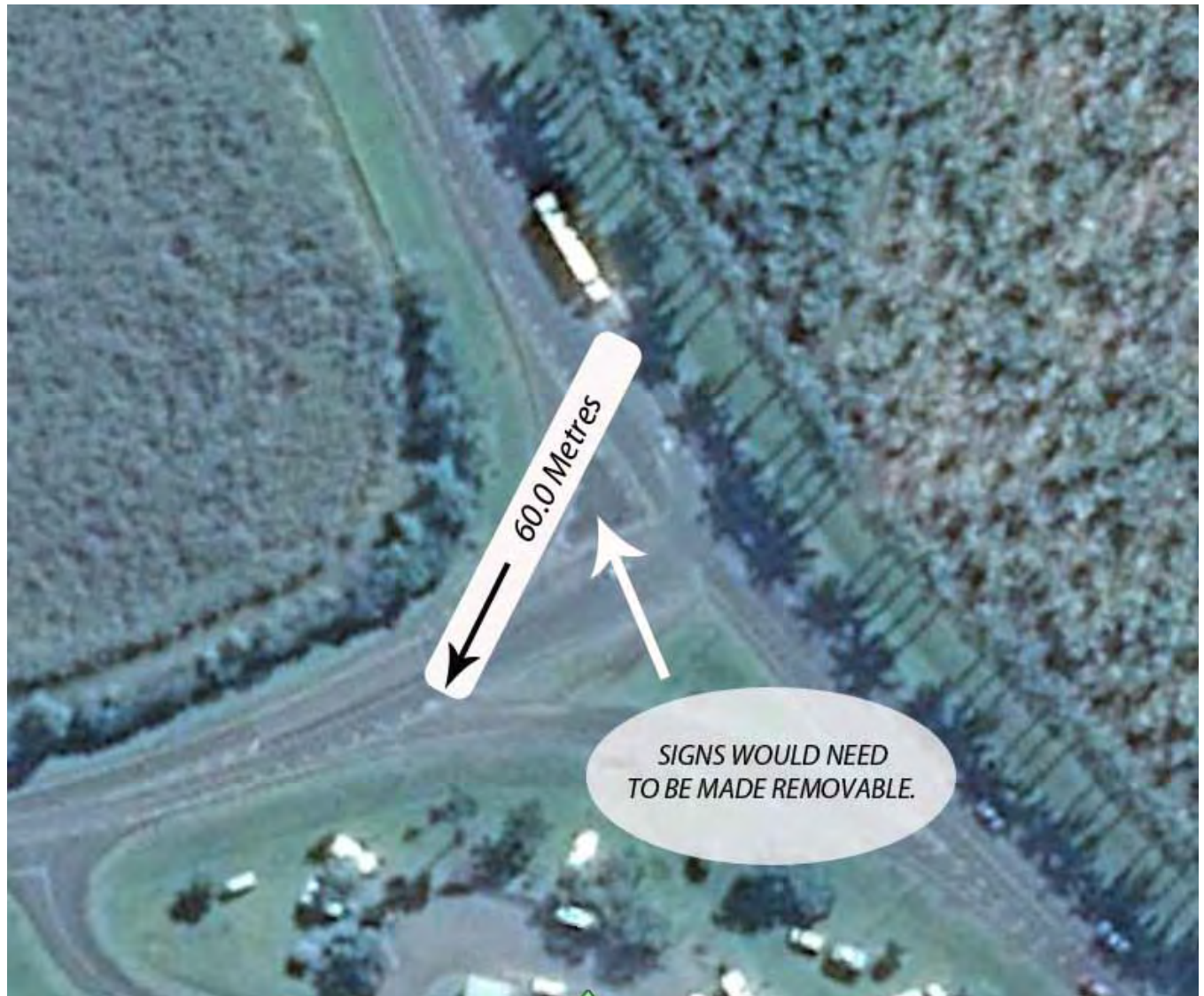


Bridge # 3:



**88.1 Km's: Bruce Highway onto Palmerston Highway at
Innisfail.**

Image 1:



This is a large right hand turn, however the loads would need to cross from correct side to wrong side. Police and pilots would need to control the local traffic during this procedure.

Additionally the 2 signs on the centre median strips would need to be removed.

Image 2:



This is a large left hand turn with adequate room.

**166.4 Km's: Palmerston Highway (Milla Milla-Atherton Road)
at Malanda.**



This is a large left hand turn with adequate room.

**166.7 Km's: Palmerston Highway (Milla Milla-Atherton Road)
at Malanda.**



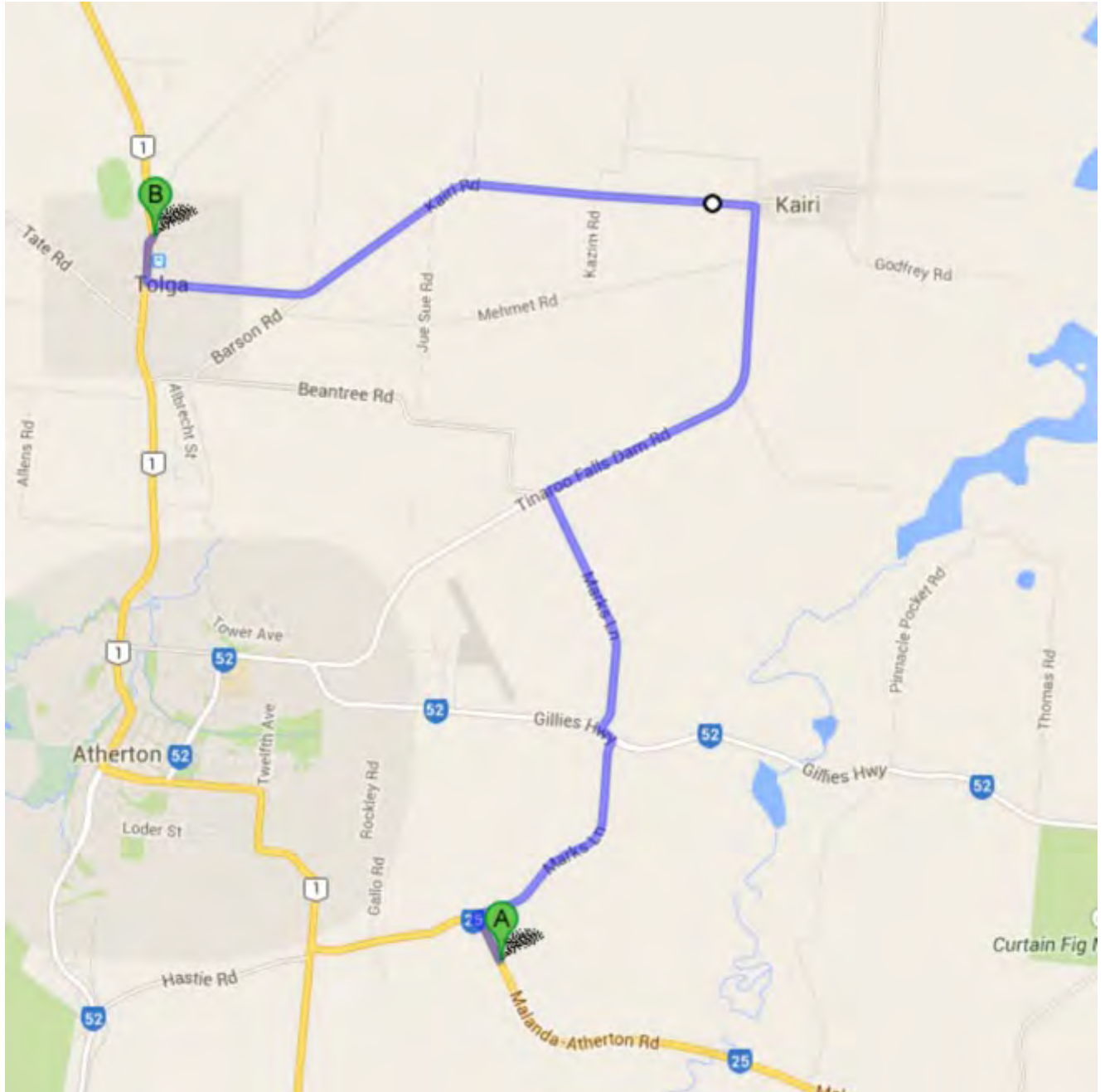
The road will have a gradual right turn into a left turn.
There is adequate room through this section of road.

169.0 Km's: Typical Bridge on the Palmerston Highway (Milla Milla-Atherton Road)



This is one of many bridge structures on route. All structures would need approvals before crossing.

181.0 Km's: Atherton Bypass.



The following route is required to by-pass Atherton.

Via: Malanda-Atherton Road, Marks Lane, Gillies Highway, Marks Lane, Tinaroo Falls Dam Road, Kairi Road, Kennedy Highway.

181.0 Km's: Malanda-Atherton Road onto Marks Lane at Atherton.

Image 1:



Image 2:



The right hand turn off Malanda-Atherton Road onto Marks Lane will require some works. Our preference would be to make the signs removable and fill added to the inside of the corner.

183.5 Km's: Marks lane onto Gillies Highway, back onto Marks lane at Atherton.

Image 1:



Image 2:



Image 3:



The left turn right turn at this intersection; will require some removable signs on the inside of each turn. Otherwise there is adequate room on these corners.

186.3 Km's: Marks Lane onto Tinaroo Falls Road at Atherton.



This is a large right hand turn with adequate room.

190.5 Km's: Tinaroo Falls Road onto Kaira Road at Kairi.

Image 1:



Image 2:



The left hand turn off Tinaroo Falls Dam Road onto Kairi will require some works. Our preference would be to make the signs removable and fill added to the inside of the corner behind the pole.

197.1 Km's: Kairi Road onto the Kennedy Highway at Tolga.



This is a large right hand turn that would require the signs to be made removable on the inside of the corner, and the blade trailers would need to mount the traffic island. Otherwise there is adequate clearance on the corner.

205.6 Km's: Kennedy Highway onto Hansen Road at Walkamin.

Image 1:



Image 2:



This is a large left hand turn. However due to the pole on the inside of the corner, the blades will require some rear overhang, approx. 10.0 metres would be adequate. There are no obstructions if this were to take place.

210.0 Km's: Hansen Road into Kippen Drive at Walkamin.



Access to the site will require upgrades. This is as far as the survey took place.

210.0 Km's: Mount Emerald.



A view of the potential wind farm site, taken from Channel Road.

9.0 Conclusion:

After undertaking this route study, we are of the opinion, that with major upgrades at the port, and minor upgrades to some corners, all loads could physically be delivered to the wind farm.

However all bridge structures would need to be assessed to confirm the axle loadings are acceptable.

A maximum loaded height of 5.4 metres should be achieved. And an article length of 60.0 metres should not be exceeded.

10.0 References:

QLD-guideline-for-excess-dimension

Rex Andrews Engineered Transportation Pty. Ltd.

Route Survey LL064 REV00.

Google Earth/Maps

Nearmaps