

**Your Reference:**

**Our Reference:** CW: RR: mw: 20-09 (FID85501, COM002-18/19, 14706-00000-000, 14704-00000-000, 14682-10000-000, 14299-50000-000, OM004568, ID1510147, ID1517148)

**Contact:** Rentia Robertson

15 September 2020

Edify Energy  
C/- RPS  
Attn: Mark Carter  
PO Box 977  
TOWNSVILLE QLD 4810

Dear Sir/Madam

**Re: Power to Amend/Repeal Instrument or a Decision – Section 24AA Acts Interpretation Act 1954**

Council advises that under Section 24AA of the Acts Interpretation Act 1954 it intends to amend Negotiated Decision Notice dated 17 December 2019 as Council has become aware that this Negotiated Decision Notice was sent with an error as Condition 62 incorrectly references Conditions 15 instead of Condition 14.

Please find enclosed the reissued Negotiated Decision Notice which is issued under Section 24AA of the Acts Interpretation Act 1954.

Should you require further assistance in relation to this matter, please do not hesitate to contact Council's Development Services section on (07) 4992 9500, quoting your application number of COM002-18/19.

Yours sincerely



Chris Welch  
**DIRECTOR COUNCIL SERVICES**

Enc

**Your reference:**

**Our reference:** CW:RR: mw: 19-12 (FID85501, COM002-18/19, 14706-00000-000, 14704-00000-000, 14682-10000-000, 14299-50000-000, OM004568, ID1510147, ID1517148)

**Contact:** [enquiries@banana.qld.gov.au](mailto:enquiries@banana.qld.gov.au)

17 December 2019

Edify Energy  
C/- RPS  
Attn: Mark Carter  
PO Box 977  
TOWNSVILLE QLD 4810

Dear Sir/Madam

**(AMENDED 15 SEPTEMBER 2020) Negotiated Decision Notice about request to change development approval**  
*(Given under section 76 of the Planning Act 2016)*

**Application Number:** COM002-18/19  
**Description:** COMBINED APPLICATION  
Material Change of Use for a Public Facility - Other  
(Solar PV Power Station (Solar Farm) and Associated  
Facility Switchyard and Electrical Transmission Line)  
Reconfiguring a Lot for Subdivision by Agreement (10  
Lease Areas)  
**Level of Assessment:** *Impact Assessable*  
**Site Address:** 480 Tomlins Road, Goovigen  
Lot 38 Tomlins Road, Dixalea  
Lot 18 Dodsons Road, Dixalea  
Lot 37 Hibbs Road, Goovigen  
5460 Dodsons Road, Ulogie  
Lot 33 Dodsons Road, Ulogie  
**Lot & Plan Details:** Lot 39 on RN395  
part of Lot 28 on RN211  
part of Lot 18 on RN271  
part of Lot 37 on RN1147  
Lot 29 on RN210  
Lot 32 on RN194  
Lot 33 on RN210

On 11 December 2019, at council's ordinary meeting (OM004568), your request for a Negotiated Decision, received by Council on 21 November was approved to the extent detailed in this Notice. This Negotiated Decision Notice replaces the Decision Notice previously issued and dated 29 October 2019.

The nature of the changes are listed below and clearly shown in the Negotiated Decision Notice and attachment 1 (as strikethrough bold text):-

- Condition 5 – Amended
- Condition 10 – Amended
- Condition 11 – Amended
- Condition 12 – Amended
- Condition 14 – Amended
- Condition 16 – Amended
- Condition 17 – Deleted
- Condition 18 – Amended
- Condition 21 – Amended
- Condition 44 – Amended
- Condition 57 – Amended
- Condition 65 – Amended
- Condition 74 – Amended

## 1. Details of the approval

The following approval is given:

	<b>Planning Regulation 2017 reference</b>	<b>Development Permit</b>	<b>Preliminary Approval</b>
Making a Material Change of Use assessable under the planning scheme	s20	<input checked="" type="checkbox"/>	
Reconfiguring a Lot	S20	<input checked="" type="checkbox"/>	

## 2. Approved Plans

The approved plans and documents for this development approval are listed in the following table:

<b>Drawing/Report Title</b>	<b>Prepared By</b>	<b>Date</b>
140339-1-01 Subdivision Proposal Plan (Revision E)	RPS	21/12/2018
140339-1-02 Project Proposal Plan (Revision F)	RPS	26/04/2019
180217A-A200 Plan (Revision O)	ATCO Structures & Logistics	20/04/2018
180217A-A300 Elevations (Revision O)	ATCO Structures & Logistics	09/04/2018
QC02-ST-TGD-DET-0001 (Revision A) Elevation	RCR Infrastructure	16/11/2017
NILSEN 60086 (Sheet 4.1) Floor Plan	ROLCON Pty Ltd	undated
NILSEN 60086 (Sheet 5.1) Elevations	ROLCON Pty Ltd	undated
NILSEN 60086 (Sheet 5.2) Elevations	ROLCON Pty Ltd	undated

Engineering Report (Revision A)	Northern Consulting Engineers	07/09/2018
Ecological Assessment Report	RPS (Version 3)	16/08/2019
Traffic Assessment Report (Revision B)	Northern Consulting Engineers	11/01/2019
Land Condition Assessment (J000283)	Range Environmental Consultants	27/09/2019

### 3. Further Development Permits

Please be advised that the following development permits are required to be obtained before the development can be carried out:

- Operational Works
- Building Works
- Plumbing & Drainage

### 4. Conflict with relevant instrument and reasons for the decision despite the conflict.

The assessment manager does not consider that the assessment manager's decision conflicts with a relevant instrument.

### 5. Submissions

There were properly made submissions about the application.

The name and address of the principal submitter for each properly made submission are as follows:

<b>Name of Principal Submitter/s</b>	<b>Address</b>
Dennis Earth Moving	Lot 2 Burnett Highway, Jambin
Tony & Bridget Bongers	PO Box 6, Jambin QLD 4702
Errol Dennis	erroldennis@outlook.com
Noel Jones	790 Mt Eugene Road, Jambin QLD 4702
Sue Wilkie	jambinhotelmotel@bigpond.com
Geoff Maynard	Mt Eugene, Jambin QLD 4702
Lachlan & Kristy Dickson	"Burravale", 550 Dodson Road, Ulogie
Cedric Creed	beefy@beagle.com.au
Greenfields Charbrays	PO Box 23, Jambin QLD 4702
Sanderson & Parks Solicitors	PO Box 1, Biloela QLD 4715
Les Marshall	lamarshall81@bigpond.com.au

## 6. Referral Agencies

The referral agency for this application was:

Name of referral agency	Advice agency or concurrence agency	Referral Basis	Address
The Chief Executive Officer of the entity	Advice		Powerlink PO Box 1193 VIRGINIA QLD 4014

## 7. Currency Period for the Approval

This development approval will lapse at the end of the period set out in section 85 of the *Planning Act 2016*.

## 8. Statement of Reasons

<b>Description of the development</b>	Combined application for Material Change of Use - Public Facility - Other (Solar PV Power Station (Solar Farm) and Associated Switchyard and Electrical Transmission Line) and Reconfiguring a Lot for Subdivision by Agreement(10 Lease Areas)
<b>Assessment Benchmarks</b>	Rural Zone Code Natural Features and Conservation Areas Overlay Code Economic Resources Overlay Code Major Utilities Overlay Code Natural Disaster Overlay Code Development Standards Code Reconfiguring a Lot Code
<b>Reasons for Decision</b>	Rural Zone Code - The development complies or has been conditioned to comply with all applicable Outcomes.  Natural Features and Conservation Areas Overlay Code - The development complies or has been conditioned to comply with all applicable Outcomes.  Economic Resources Overlay Code - The development complies or has been conditioned to comply with all applicable Outcomes.  Major Utilities Overlay Code - The development complies or has been conditioned to comply with all applicable Outcomes.  Natural Disaster Overlay Code - The development complies or has been conditioned to comply with all applicable Outcomes.

	Development Standards Code - The development complies or has been conditioned to comply with all applicable Outcomes.
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## 9. Appeal rights

The rights of an applicant to appeal to a tribunal or the Planning and Environment Court against a decision about a development application are set out in chapter 6, part 1 of the Planning Act 2016. For particular applications, there may also be a right to make an application for a declaration by a tribunal (see chapter 6, part 2 of the Planning Act 2016).

### Appeal by an applicant

An applicant for a development application may appeal to the Planning and Environment Court against the following:

- the refusal of all or part of the development application
- a provision of the development approval
- the decision to give a preliminary approval when a development permit was applied for
- a deemed refusal of the development application.

An applicant may also have a right to appeal to the Development tribunal. For more information, see schedule 1 of the Planning Act 2016.

### Appeal by a submitter

A submitter for a development application may appeal to the Planning and Environment Court against:

- any part of the development application for the development approval that required impact assessment
- a variation request.

The timeframes for starting an appeal in the Planning and Environment Court are set out in section 229 of the Planning Act 2016.

Attachment 2 is an extract from the Planning Act 2016 that sets down the applicant's appeal rights and the appeal rights of a submitter.

The Planning and Environment Court appeals database lists all the appeals lodged in the Planning and Environment Court since 15 March 2008, which the department has been notified of. It contains information about the appeal, including the appeal number, site address, local government area, and a copy of the appeal notice, including grounds for the appeal. The appeal database is an easy way for anyone to obtain information about an appeal or check if an appeal has been lodged for a specific development application or approval.

The appeal database is available at

<https://planning.dsdmip.qld.gov.au/planning/our-planning-system/dispute-resolution>.

Should you require further assistance in relation to this matter, please do not hesitate to contact Council's Development Services section on (07) 4992 9500, quoting you application number of COM002-18/19.

Yours sincerely



Chris Welch

**DIRECTOR COUNCIL SERVICES**

Enc Attachment 1 Copy of Original Decision Notice showing changes

## **Attachment 1**

### **Copy of Original Decision Notice Showing the Changes**

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**Your Reference:**

**Our Reference:** CW: RR: ak: 19-10 (FID85501, COM002-18/19, 14704-00000-000, ID1451981)  
**Contact:** Chris Welch

29 October 2019

Edify Energy C/- RPS  
Mark Carter  
PO Box 977  
TOWNSVILLE QLD 4810

Dear Sir/Madam

**(AMENDED 11 DECEMBER 2019) Decision Notice – Approval**  
*(Given under section 63 of the Planning Act 2016)*

**Application Number:** COM002-18/19

**Description:** COMBINED APPLICATION  
*Material Change of Use for a Public Facility - Other (Solar PV Power Station (Solar Farm) and Associated Facility Switchyard and Electrical Transmission Line)  
Reconfiguring a Lot for Subdivision by Agreement (10 Lease Areas)*

**Level of Assessment:** *Impact Assessable*

**Site Address:** *480 Tomlins Road, Goovigen, Lot 38 Tomlins Road, Dixalea, Lot 18 Dodsons Road, Dixalea, Lot 37 Hibbs Road, Goovigen, 5460 Dodsons Road, Ulogie, Lot 33 Dodsons Road, Ulogie*

**Lot & Plan Details:** *Lot 39 on RN395, part of Lot 28 on RN211, part of Lot 18 on RN271, part of Lot 37 on RN1147, Lot 29 on RN210, Lot 32 on RN194, Lot 33 on RN210*

On 23 October 2019, at Council's Ordinary Meeting (OM004518), the above development application was approved in full subject to conditions. The conditions of this approval are set out in Attachment 1. These conditions are clearly identified to indicate whether the assessment manager or a concurrence agency imposed them.

## 1. Details of Approval

The following approvals are given:

	Planning Regulation 2017 reference	Development Permit	Preliminary Approval
Making a Material Change of Use assessable under the planning scheme	s20	<input checked="" type="checkbox"/>	
Reconfiguring a Lot	s20	<input checked="" type="checkbox"/>	

## 2. Approved Plans

The approved plans and documents for this development approval are listed in the following table:

Drawing/Report Title	Prepared By	Date
140339-1-01 Subdivision Proposal Plan (Revision E)	RPS	21/12/2018
140339-1-02 Project Proposal Plan (Revision F)	RPS	26/04/2019
180217A-A200 Plan (Revision O)	ATCO Structures & Logistics	20/04/2018
180217A-A300 Elevations (Revision O)	ATCO Structures & Logistics	09/04/2018
QC02-ST-TGD-DET-0001 (Revision A) Elevation	RCR Infrastructure	16/11/2017
NILSEN 60086 (Sheet 4.1) Floor Plan	ROLCON Pty Ltd	undated
NILSEN 60086 (Sheet 5.1) Elevations	ROLCON Pty Ltd	undated
NILSEN 60086 (Sheet 5.2) Elevations	ROLCON Pty Ltd	undated
Engineering Report (Revision A)	Northern Consulting Engineers	07/09/2018
Ecological Assessment Report	RPS (Version 3)	16/08/2019
Traffic Assessment Report (Revision B)	Northern Consulting Engineers	11/01/2019
Land Condition Assessment (J000283)	Range Environmental Consultants	27/09/2019

## 3. Further Development Permits

Please be advised that the following development permits are required to be obtained before the development can be carried out:

- Operational Works
- Building Works
- Plumbing & Drainage
- 

#### 4. Conflict with relevant instrument and reasons for the decision despite the conflict.

The assessment manager does not consider that the assessment manager's decision conflicts with a relevant instrument.

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There were properly made submissions about the application.

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## 7. Currency Period for the Approval

This development approval will lapse at the end of the period set out in section 85 of the *Planning Act 2016*.

## 8. Statement of Reasons

<b>Description of the development</b>	Combined application for Material Change of Use - Public Facility - Other (Solar PV Power Station (Solar Farm) and Associated Switchyard and Electrical Transmission Line) and Reconfiguring a Lot for Subdivision by Agreement(10 Lease Areas)
<b>Assessment Benchmarks</b>	Rural Zone Code Natural Features and Conservation Areas Overlay Code Economic Resources Overlay Code Major Utilities Overlay Code Natural Disaster Overlay Code Development Standards Code Reconfiguring a Lot Code
<b>Reasons for Decision</b>	<p>Rural Zone Code - The development complies or has been conditioned to comply with all applicable Outcomes.</p> <p>Natural Features and Conservation Areas Overlay Code - The development complies or has been conditioned to comply with all applicable Outcomes.</p> <p>Economic Resources Overlay Code - The development complies or has been conditioned to comply with all applicable Outcomes.</p> <p>Major Utilities Overlay Code - The development complies or has been conditioned to comply with all applicable Outcomes.</p> <p>Natural Disaster Overlay Code - The development complies or has been conditioned to comply with all applicable Outcomes.</p> <p>Development Standards Code - The development complies or has been conditioned to comply with all applicable Outcomes.</p>

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- a provision of the development approval
- the decision to give a preliminary approval when a development permit was applied for
- a deemed refusal of the development application.

An applicant may also have a right to appeal to the Development tribunal. For more information, see schedule 1 of the Planning Act 2016.

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- any part of the development application for the development approval that required impact assessment
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Should you require further assistance in relation to this matter, please do not hesitate to contact Council's Development Services section on (07) 4992 9500, quoting you application number of COM002-18/19.

Yours Sincerely



Chris Welch  
**MANAGER ENVIRONMENT & PLANNING**

CC Powerlink

Enc Attachment 1 – Part A Conditions imposed by the Assessment Manager  
Attachment 1 – Part B Assessment Manager Notes  
Attachment 1 – Part C Conditions imposed by Powerlink  
Attachment 2 – Appeal Rights  
Attachment 3 – Approved Drawings  
Attachment 4 – Environmental Obligations

# COM002-18/19 Attachment 1

## *Part A - Conditions imposed by the Assessment Manager*

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### **Section 1 – Development Permit – Reconfiguring a Lot (Subdivision by Agreement – 10 lease areas)**

#### **General**

1. The development is to be completed and maintained generally in accordance with the approved plans and documents, as attached to this Decision Notice, except where modified by the conditions below:

<b>Plan/Document number</b>	<b>Plan/Document name</b>	<b>Date</b>
140339-1-01 (Revision E)	Subdivision Proposal Plan	21/12/2018

2. The leasehold period must not exceed a period of 43 years, and may be extended to provide tenure over the site for the conclusion of operations approved under Section 2 of this approval, decommissioning and rehabilitation works for a further period consistent with the approved Site Rehabilitation Plan.
3. A copy of the registered leases is to be provided to Council upon registration of the leases.  
Note: If the applicant does not provide a copy of the leases on registration, the commencement date of the term of the leases will be taken from the date the development approval became effective.
4. Complete all associated works, including any relocation or installation of services, at no cost to Council.

**Section 2 – Development Permit – Material Change of Use (Public Facility – Other (Solar PV Power Station (Solar Farm) and Associated Facility Switchyard and Electrical Transmission Line))**

**General**

1. The development is to be completed and carried out generally in accordance with the following approved plans and reports, except where modified by the conditions of this Development Approval:

<b>Plan/Document number</b>	<b>Plan/Document name</b>	<b>Date</b>
140339-1-02 (Revision F)	Project Proposal Plan	26/04/2019
180217A-A200 (Revision 0)	Plan	10/04/2018
180217A-A300 (Revision 0)	Elevations	10/04/2018
QC02-ST-TGD-DET-0001 (Revision A)	Elevation	16.11.17
NILSEN 60086 Sheet 4.1	Ground Floor Plan	Undated
NILSEN 60086 Sheet 5.1	Elevations	Undated
NILSEN 60086 Sheet 5.2	Elevations	Undated
Engineering Report prepared by Northern Consulting (Revision A)		07/09/2018
Ecological Assessment prepared by RPS (Version 3)		16/08/2018
Traffic Assessment Report prepared by Northern Consulting (Issue B)		11/01/2019
Land Condition Assessment prepared by Range Environmental Consultants		27/09/2019

2. Comply with all of the conditions of this Development Approval prior to the commencement of the use, unless otherwise stated within this Decision Notice, and maintain compliance for the duration of the approved use.
3. Exercise the approval and complete all associated works, including any relocation or installation of services, at no cost to Council.
4. Alterations to public utilities, mains and services made necessary in connection with any of the works arising from this approval including works to restore and reinstate all roads are to be completed at no cost to Council.



## Amended Plans

5. **(Amended 11 December 2019)** Submit an amended Project Proposal Plan that excludes solar array panels or other improvements from any areas identified as land degradation features in Figures 7, 8, 9 or 10 of the approved Land Condition Assessment including suitable buffers. **Council may accept solar arrays over areas which are rehabilitated prior to establishing the structures subject to satisfactory evidence being provided to Council of the rehabilitation.**
6. Final detailed layout plans of the solar farm facility are to be submitted to Council for approval prior to the commencement of the use. The plans at a minimum must show:
  - a. all building and structure locations;
  - b. substation locations;
  - c. inverter locations;
  - d. above and below ground cabling;
  - e. internal access roads;
  - f. boundary setbacks;
  - g. solar panel system type;
  - h. solar plant configuration; and
  - i. fencing associated with the use;

## Approved Use

7. The approved use of the premises is for Public Facility – Other (Solar PV Power Station (Solar Farm) and Associated Facility Switchyard and Electrical Transmission Line).
8. The approved use may operate for a maximum of 40 years from the date the facility, or part thereof, becomes operational.

## Building and other works

9. The applicant shall obtain a development permit prior to commencement of any works defined as building work under the Building Act 1975.
10. **(Amended 11 December 2019)** The maximum height of any building must not exceed 10 meters above natural ground level. This does not include any support towers for the proposed transmission line **or switchyards.**

11. **(Amended 11 December 2019)** Proposed earthworks are limited to the establishment of building pads, hardstand areas, internal roads, vehicle parking areas, **and** minor re-profiling of land beneath the solar arrays **and trenching**. A development permit is required for all Operational Works.
12. **(Amended 11 December 2019)** ~~All habitable buildings must be located a minimum of 40 metres from any electricity transmission line.~~  
**All habitable buildings must be located a minimum of**
  - a) **20m for a transmission lines up to 132 kilovolts;**
  - b) **30m for a transmission lines between 133 kilovolts and 275 kilovolts;**
  - c) **40m for a transmission lines exceeding 275 kilovolts from any electricity transmission line.**

### **Setbacks**

13. Project infrastructure is setback a minimum of 30 metres from site boundaries adjoining Lots 30 and 31 on RN210 and Lot 40 on RN396.
14. **(Amended 11 December 2019)** Screen landscaping in accordance with Condition 62 below is established to a mature height for a distance of 20 metres from the site boundaries adjoining Lots 30 and 31 on RN210 and Lot 40 on RN396 prior to installation of solar farm infrastructure on Lot 29 on RN210, Lot 32 on RN194 and Lot 39 on RN395 respectively where visible from a residence on an adjoining site **as determined by an approved landscape and visual assessment prepared in consultation with adjoining landholders.**
15. Project infrastructure is setback a minimum of 20 metres from all other site boundaries including Dodsons Road.
16. **(Amended 11 December 2019)** Project infrastructure is setback 50 metres from the top of the bank of **waterways watercourses** and 27 metres from the edge of vegetation mapped under the *Vegetation Management Act 1999*.
17. **(Deleted 11 December 2019)** ~~Except where in conflict with the advice provided by Powerlink (as attached), a 20 metre vegetated buffer is provided adjacent to all easements for electricity transmission lines.~~
18. **(Amended 11 December 2019)** All improvements are to be located outside any bushfire hazard area and associated impact buffers identified on the State's Development Assessment Mapping System **or where infrastructure is proposed in the bushfire hazard area, the applicant must prepare and submit to Council, a Bushfire Management Plan prepared by qualified professional to adequately mitigate against the risk from bushfire.**

## Road work and access

19. Prior to the commencement of construction of the solar farm, the following roads are to be upgraded:
  - a. Tomlins Road – Upgraded to Rural Minor Collector as per CMDG-Geometric Design or as agreed to by Council. Records and site inspection indicate seal widths less than 5.0m with poorly formed shoulders.
  - b. Dodsons Road – Upgraded to Rural Minor Collector as per CMDG-Geometric Design or as agreed to by Council. Records and site inspection indicate a formation width (shoulders inclusive) of 5.0m (max) and inadequate clear zones.
20. Prior to the commencement of construction of the solar farm, the intersection of Tomlins and Dodsons Road is to be upgraded as per the recommendations included in the approved Traffic Assessment Report (Issue B) prepared by Northern Consulting or as agreed to by Council.
21. **(Amended 11 December 2019)** ~~The developer is to maintain the upgraded sections of Tomlins and Dodsons Roads for the life of the development to the appropriate standard in the CMDG.~~ **upgrades required by Condition 19 are to be designed for a 20 year design life to the maximum Design Equivalent Standard Axles (DESA's during peak construction) to the appropriate standard in the CMDG. The developer will be responsible for the maintenance of storm water, pavement and seal to the design life including rehabilitation of the road should pavement fatigue or rutting occur. A pavement and road assessment shall be performed on an annual basis and submitted to council confirming the condition of the road reflects the expected condition at that stage of the design life. Prior to the end of the maintenance period should the assessment reveal a substandard condition the applicant shall be responsible for rehabilitating the roads to the expected condition.**
22. A rural access is to be provided in accordance with an Operational Works approval constructed in accordance with the requirements of the CMDG (Standard Drawing CMDG-R-040).

*Note: The dimensions listed on this standard drawing are considered the minimum required for compliance.*
23. Design and construct all internal roads and parking areas to be all weather gravel standard with suitable permanent dust suppression methods provided.
24. All vehicles accessing the site must be able to enter and exit in a forward gear.

25. Provide sufficient parking and manoeuvring, loading/unloading space on-site for all vehicles; no vehicle storage or parking is permitted on the adjoining road reserve. Car parking facilities must be designed in accordance with the Australian Standard.
26. Where an existing driveway crossover is proposed to be replaced it is to be constructed in accordance with the CMDG and have a slope not exceeding 1 in 6.
27. Any damage to the existing road surface, services or furniture as a result of construction work is to be repaired to the pre-existing condition or better condition at no cost to Council.
28. Prior to undertaking any road upgrade works identified in the conditions of this development permit, provide a bank guarantee for an amount equivalent to 10% of the value of the road upgrade works.

#### **Water and Sewerage Infrastructure**

29. Prior to the commencement of construction, a detailed report for the on-site wastewater disposal, that addresses on-site treatment and disposal for each proposed use area, is to be submitted to Council. The report is to be prepared by a suitably qualified person in accordance with the relevant codes and Australian Standards. The report is to clearly demonstrate the suitability of the lot size and treatment facilities for sustainable treatment and disposal of wastewater generated by the proposed development.
30. The minimum standard of wastewater treatment to be considered is secondary treatment incorporating disinfection. Appropriate reserve disposal areas are to be provided and maintained on the site.
31. Prior to the commencement of use, an effluent disposal/storage system, appropriate for the proposed development, is to be installed. All relevant approvals for this system, in accordance with the requirements of the *Plumbing and Drainage Act*, are to be obtained before installation.
32. The proposed effluent disposal/storage system is to be maintained so that all effluent is wholly contained within the confines of the development site and does not pond or enter any gully, watercourse, stormwater system or adjoining properties.
33. Provide a sufficient supply of potable water for all staff and visitors associated with the approved use. The water must satisfy the Australian Drinking Water Guidelines or relevant standard applicable at the time.

34. At the time of lodging a building application, documentation is required to be submitted to Council that demonstrates that a reasonable water supply for emergency purposes (including adequate storage for a minimum 5,000 Litre capacity volume) is available for the development.

### **Stormwater Quality**

35. The solar farm should not adversely interfere with the existing hydrological regime of adjoining properties or catchments
36. Stormwater Management is to be undertaken in accordance with the approved Engineering Report prepared by Northern Consulting.
37. All stormwater being discharged from the site is to meet the requirements of the CMDG and the Queensland Water Quality Guidelines 2009.
38. Stormwater runoff is to discharge to Council's stormwater drainage system or a legal point of discharge. A detailed Stormwater Management Plan, and associated engineering drawings, is to be provided to Council, as part of an Operational Works application, for approval. This plan must comply with the requirements of the CMDG and is to address all relevant recommendations made by the approved Land Condition Assessment prepared by Range Environmental Consultants.
39. All stormwater infrastructure must be designed and constructed, prior to the commencement of use, as per the requirements of the Stormwater Management Plan.
40. The stormwater drainage system serving the approved use must be designed so that the development will not make material changes to the pre-development location, duration, frequency or concentration of overland stormwater flow at the point of discharge to all downstream properties including road reserves. In the event that a material change to the pre-development stormwater flows cannot be avoided provide written evidence to Council's satisfaction of a legal right to discharge stormwater over the downstream land in the proposed method.
41. Ponding of stormwater resulting from the development must not occur on adjacent properties. Stormwater formerly flowing onto the site must not be diverted onto other properties.
42. Contaminated water must not be directly or indirectly released from the premises onto the ground or into the groundwater at the premises.
43. Releases to stormwater must not cause any visible oil slick or other visible evidence of oil or grease, nor contain visible grease, scum, litter or floating oil.

44. **(Amended 11 December 2019)** Grass cover is to be established across all areas of the development site, excluding internal roads, vehicle parking and hardstand areas **once construction is complete for the respective stage area** ~~prior to construction~~ and maintained for the duration of the use.

#### **Erosion and Sediment Control**

45. A detailed Erosion and Sediment Management Plan, and associated engineered drawings, is to be provided to Council as part of the operational works application and in accordance with the CMDG and is to address all relevant recommendations made by the approved Land Condition Assessment prepared by Range Environmental Consultants.
46. During construction the developer is to undertake sediment and erosion control management as per the approved Erosion and Sediment Management Plan.

#### **Construction Phase Environmental Management Plan**

47. The applicant must prepare a separate detailed Construction Phase Environmental Management Plan (CPEMP) for each stage of the development identifying environmental management measures to be implemented during all construction works associated with the solar farm facility. The CPEMP must address the following as a minimum:
- a. Erosion and Sediment Control
  - b. Stormwater Management / Water Quality and Surface Water Runoff (interim drainage plan during construction);
  - c. Water Management
  - d. Air Quality Management (dust suppression)
  - e. Noise and Vibration Management
  - f. Management of light spill and on-site lighting
  - g. Land Contamination (storage / use of fuel and chemicals)
  - h. Biosecurity Management (animal and plant pests)
  - i. Construction Waste Management
  - j. Flora and Fauna Impact Management
  - k. Storage and handling of fuel and other hazardous goods
  - l. Emergency Management
  - m. Environmental monitoring and reporting
  - n. Management of works near existing above ground and underground infrastructure
  - o. Hazard Management

- p. Complaints handling and Management
  - q. Statutory obligations and approvals
- 48.** The CPEMP must:
- a. Be prepared and certified by a suitably qualified person
  - b. Clearly identify design and control measures to be adopted during the construction and post construction phase
  - c. Provide recommendations based on criteria and environmental data relevant to the site and surrounding area and construction works proposed
  - d. Be prepared in accordance to the relevant standards
  - e. Contain all recommendations of the approved Land Condition Assessment prepared by Range Environmental Consultants
- 49.** The Applicant must prepare and submit the CPEMP to Council for approval within 40 working days of construction work commencing on each stage of the solar farm facility. The plan must be approved by Council before work commences.
- 50.** The applicant must implement the recommendations of the Council approved CPEMP including any recommended works, installation of monitoring equipment and management measures at all times during construction of the Solar Farm Activity.

### **Operational Environmental Management Plan**

- 51.** The applicant must prepare a detailed Operational Environmental Management Plan (OEMP) identifying environmental management measures to be implemented during operation of each stage of the solar farm facility. The OEMP must address the following as a minimum:
- a. Erosion and Sediment Control
  - b. Stormwater Management / Water Quality
  - c. Groundcover management
  - d. Water Management
  - e. Air Quality Management (dust suppression)
  - f. Noise and Vibration Management
  - g. Management of light spill and on-site lighting
  - h. Land Contamination (storage / use of fuel and chemicals)
  - i. Biosecurity Management (animal and plant pests)
  - j. Operational Waste Management
  - k. Flora and Fauna Impact Management

- l. Storage and handling of fuel and other hazardous goods
  - m. Emergency Management
  - n. Environmental monitoring and reporting
  - o. Hazard Management
  - p. Complaints handling and Management
  - q. Statutory obligations and approvals
- 52.** The OEMP must:
- a. Be prepared and certified by a suitably qualified person
  - b. Clearly identify design and control measures to be adopted during the operational phase.
  - c. Provide recommendations based on criteria and environmental data relevant to the site and surrounding area and operational works proposed.
- 53.** The Applicant must prepare and submit the OEMP to Council for approval within 40 working days of operations commencing on each stage of the solar farm facility. The plan must be approved by Council before work commences.
- 54.** The applicant must implement the recommendations of the Council approved OEMP including any recommended works, installation of monitoring equipment and management measures at all times during operation of the Solar Farm Activity

### **Amenity**

- 55.** Ensure that all reasonable and feasible avoidance and mitigation measures are employed so that noise, dust, glare, vibration and other emissions generated by the construction and operation of the approved does not cause a nuisance at any sensitive land use.
- 56.** The photovoltaic panels, any visible support structures, framing, cabling, or other equipment and infrastructure shall have a non-reflective or matte finish.
- 57.** **(Amended 11 December 2019)** In the event that panels become 'out-of-sync' (i.e. not tracking the sun such that the panels are perpendicular to the sun), the affected panels are to be repaired as soon as reasonably practicable; or removed; or adjusted to remain in a fixed stowed position (so that potential for reflection is minimised for any sensitive receptors) until the repair is completed. **This does not apply to panels being fixed to provide protection from damage associated with an imminent storm activity forecast for the area.**
- 58.** Night and outdoor lighting must be designed, constructed and operated in accordance with *Australian Standard AS4282 – Control of the obtrusive effects of outdoor lighting*.



59. Air-conditioning units (including individual compressor units), mechanical plant and equipment fitted to service the building must be shielded from view from public roads and adjoining properties. They must be concealed or screened with materials compatible and consistent with that elsewhere in the building.
60. The applicant must construct and operate the project in a manner that minimises dust generation from the site, including wind-blown and traffic-generated dust as far as practicable. The applicant must identify and implement all practicable dust mitigation measures, including cessation of relevant works, as appropriate, such that emissions of visible dust are minimised during severe weather conditions.
61. Should Council receive a dust nuisance complaint (that is not frivolous or vexatious) directly related to the operation of the development, further actions must be taken to manage the impacts

### **Landscaping**

62. **(Amended 15 September 2020)** Prior to the commencement of the installation of any infrastructure associated with the use, the applicant is to submit for approval to Council, a landscaping plan showing the vegetated buffers identified in Condition ~~15~~ 14. The landscaping plan must include:
  - a. Identification of any existing vegetation to be retained as part of site landscaping;
  - b. A list of plantings, the species to be used, containing predominantly species that are endemic to Central Queensland;
  - c. The location of plantings, spaced to achieve a dense, visually-impermeable screen;
  - d. Sections through each area of landscaping showing the mature heights of the planted native vegetation
  - e. A watering and maintenance plan during the establishment phase;
  - f. An ongoing maintenance and replanting program.
63. The vegetation buffer must be sufficiently vegetated such that when fully mature, screens views into the approved development from adjoining sensitive uses.
64. The landscaping is to be maintained in a tidy manner by the developer (i.e. watering, fertilising, mulching, weeding, and the like) at all times to the satisfaction of the Assessment Manager.
65. **(Amended 11 December 2019)** Any **existing** significant trees to be retained are to be protected during construction.

## **Fencing and signage**

66. The applicant must install safety / security fencing a minimum of 1.8 metres in height along all property boundaries to prevent unauthorised or accidental public entry. The fencing must not obscure sight lines at corners or intersections.
67. The applicant must install industry standard warning signage on all boundaries of the site, at regular intervals, warning of the safety hazards associated with the approved use.
68. Erect and maintain a single sign with a minimum area of six square metres adjacent to each access for the approved use. The sign must display as a minimum:
  - a. the name of the business operating on the premises;
  - b. the maximum onsite speed limit of 20km/h;
  - c. contact details for complaints and the site office.
69. All fencing must be completed prior to the commencement of use.

## **Waste**

70. The applicant is required to prepare a Waste Management Plan for the proposed development. The plan should include, but is not limited to, the following
  - a. A description of the development activities that may generate waste
  - b. The types and amount of waste that might be generated by the activities
  - c. how the waste will be dealt with, including a description of the types and amounts of waste that will be dealt with under each waste management practices under the waste hierarchy
  - d. procedures for identifying and implementing opportunities to minimise the amount of waste generated, promote efficiency in the use of resources, and otherwise improve the waste management practices employed
  - e. procedures for dealing with accidents, spills and other incidents that may impact waste management
  - f. how often the waste management practices will be assessed
71. Recycling and waste must use appropriately licensed facilities.
72. Waste must not be burned at the premises.

## Site rehabilitation

73. Commence rehabilitation of areas of existing land degradation identified in Figures 7, 8, 9, or 10 of the approved Land Condition Assessment as soon as practical after this approval takes effect. The areas are to be rehabilitated to a condition consistent with the soil classifications identified on Map 2 contained in Appendix A of the approved Land Condition Assessment.
74. **(Amended 11 December 2019)** Bank guarantees are to be provided to Council at the commencement of construction of each stage of development to be held against the cost of rehabilitating the site post-operation. The amount of the bank guarantee is to be agreed between the developer and Council, is to represent a reasonable estimation of costs. ~~and is to be indexed annually. The value of the bond is to be reviewed annually.~~

**Factors influencing the review of the value of the bond will include, but not be limited to:**

- a) The extent of development of the site at any given time**
- b) Indexation of any previously agreed costs**
- c) Changes to technology or legislation that may increase or decrease the cost of rehabilitation.**

**The bank guarantee is to be returned to the applicant on successful rehabilitation of the site post –operation.**

75. Twelve (12) months prior to the operations associated with the approved use ceasing on the premises the applicant must provide a Site Rehabilitation Plan (SRP) to Council detailing all planned works and actions proposed and required to be undertaken to rehabilitate the site as far as practical to the condition consistent with the soil classifications identified on Map 2 contained in Appendix A of the approved Land Condition Assessment. The SRP must contain all relevant recommendations from the approved Land Condition Assessment prepared by Range Environmental Consultants.
76. Within 6 months of ceasing electricity generation, the applicant must commence implementation of the Council approved SRP including any recommended works and remediation measures required to rehabilitate the site as far as practical to the condition the site was in prior to the approved use commencing on the premises.
77. Within 6 months of the site rehabilitation works being completed the applicant must submit a Site Conditions Report detailing the condition of the site following the recommended works stipulated in the SRP.
78. Decommissioning activities to be undertaken as part of the SRP must include, though not limited to, the following:
- a. Disconnection of the Solar Installation from the switchyard

- b. Disconnection of the PV modules and all the equipment
- c. Removal of PV modules from trackers and packaged for removal from the site
- d. Removal of all the buildings, equipment and materials recycled, wherever possible
- e. Disassembling and recycling of trackers
- f. Removal and recycling (where appropriate) of steel columns and cabling
- g. Removal of fencing in accordance to the landowners wishes
- h. Removal of gravel from internal tracks in accordance to the landowners wishes
- i. No disposal of any waste material is permitted to municipal landfill facilities.

# COM002-18/19 Attachment 1

## Part B – Assessment Manager Notes

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- A. In carrying out the activity or works associated with the development, all reasonable and practical measures are to be taken to minimise releases and the likelihood of releases of contaminants to the environment, except as otherwise provided by the conditions of this development approval.
- B. The approved development must also comply with Council's current Local Laws under the Local Government Act 2009.
- C. The applicant and or owner/s of the land and the person/s responsible for the management of the premise is/are to ensure ongoing compliance with conditions of this Development Permit including Conditions relating to the ongoing use of the premise, and the design and layout of the development.
- D. Pursuant to section 75 of the *Local Government Act 2009*, Council's written approval is required to carry out works on a road, or interfere with a road or its operation. This requirement applies to all Council-controlled roads within its local government area. The process for obtaining approval is set out in Council's *Local Law No. 1 (Administration) 2011*. Approval must be obtained prior to the commencement of the works.
- E. Please note the statements dated 7 March 2019 from Powerlink as an advice agency and attached to this Decision Notice.
- F. Please note the advice surrounding the applicants 'Environmental Obligations' contained in an attachment to the Decision Notice.
- G. Where further development is proposed it is the applicant's / developer's responsibility to ensure further approvals are sought as required by the Banana Shire Planning Scheme.

### Engineering

- H. Prior to commencing any of the following construction activities the applicant/developer will be required to obtain a development permit for operational work:
  - i. Internal and external roadworks;
  - ii. earthworks;
  - iii. Internal pathways;
  - iv. stormwater drainage ;
  - v. erosion and sediment control;
  - vi. electricity and communication layout;
  - vii. internal and external lighting; and

- viii. landscaping.
- I. Operational works designs are to be in accordance with Capricorn Municipal Development Guidelines - CMDG Design Specifications and Standard Drawings ([www.cmdg.com.au](http://www.cmdg.com.au)), unless otherwise stated in a condition of the Development Approval.

### **Cultural Heritage**

- J. This development approval does not authorise any activity that may harm Aboriginal cultural heritage. Under the Aboriginal Cultural Heritage Act 2003 you have a duty of care in relation to such heritage. Section 23(1) provides that, "A person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage".  
Council does not warrant that the approved development avoids affecting Aboriginal cultural heritage. It may therefore be prudent for you to carry out searches, consultation, or a cultural heritage assessment to ascertain the presence or otherwise of Aboriginal cultural heritage. The Act and the associated duty of care guidelines explain your obligations in more detail and should be consulted before proceeding.

### **Declared Pests/Plants**

- K. A landowner has an obligation to take reasonable steps to keep their land free of invasive plants and animals in accordance with the Biosecurity Act 2014. Consideration should be given to appropriate treating of invasive plants, where necessary, in the construction and operational phases of the proposed development to meet the obligations under this Act.
- L. Vehicle movement must be managed to prevent the spread of invasive plants. All vehicles used in weed infested areas must either be contained or cleaned to prevent the spread of invasive plant material. Numerous washdown facilities are available within the Shire to help remove weed seeds, soil and other foreign matter from vehicles and machines, and Council staff is available to conduct vehicle inspections.

### **Mosquito breeding**

- M. The site is required to be appropriately drained so that water is not allowed to accumulate or pond in a manner that may allow mosquito breeding, as required under the Public Health Regulation 2005.

### **Water & Sewerage**

- N. The applicant is responsible for ensuring Queensland Fire Services requirements are met with respect to this development which may include but

not be limited to the installation/upgrade of holding tanks or pumps as necessary to meet flow and pressure requirements.

- O. Subsequent applications will be required for Operational Works, Building and Plumbing/Drainage Works. Building works are to comply with the *Building Act 1975*, the Building Code of Australia and other relevant authorities.
- P. All new taps and plumbing fixtures on the site are to be installed and maintained with approved water saving devices in accordance with current legislative and Council requirements (AAA rating or better). The installation shall include but not be limited to approved water efficient shower heads, flow restrictors/aerators on internal taps, dual flush toilets, etc. In addition approved water efficient washing machines, dishwashers and other appliances shall be the only appliances installed on the site. Pre and post installation inspections shall be arranged with Council's Plumbing Inspector.
- Q. Hydraulic Services plans will be required to be submitted to Council for Plumbing and Drainage approval. These plans must show all drinking, non-drinking, heated, rainwater, sanitary plumbing, sanitary drainage and trade waste services.

### **Amenity**

- R. Air and light emissions must be appropriately managed to prevent environmental nuisance beyond the boundaries of the property during all stages of the development including earthworks and construction.
- S. Suitable dust suppression should be used, where required during excavation and building works, to reduce the emission of dust or other such emissions from the site.
- T. Artificial illumination should not cause a nuisance to occupants of nearby premises and any passing traffic. Security and flood lighting is to be directed away from adjacent premises to minimise the protrusion of light outside the site.

### **Water & Stormwater**

- U. It is an offence under the *Environmental Protection Act 1994* to discharge sand, silt, mud, oils, chemicals, cement or concrete, paint, thinner, degreaser, rubbish and other such contaminants to a stormwater drain, roadside gutter or a water course.
- V. During construction, stockpiles and areas of bare soil or earth that are likely to become eroded must be adequately protected – by upslope surface water diversion, downslope sediment fencing and/or temporary surface coverings.

- W.** Building and construction materials and waste, including bitumen, brick, cement, concrete and plaster, are prescribed water contaminants and as such must not be stored or disposed of in a water course, stormwater drain, roadside gutter or where they may be expected to wash into such places.
- X.** It is recommended that any oil, waste oil, paints and chemicals kept on site are stored within a bund or otherwise in a manner that will prevent spills onto land or into stormwater.
- Y.** Appropriate material must be kept on site for the containment and clean-up of spills, and any spills of oils, paints, chemicals etc must be contained and cleaned up as soon as possible.

### **Waste Management**

- Z.** It is an offence under the *Waste Reduction and Recycling Act 2011* to leave litter behind or allow litter to blow from site. All waste must be appropriately contained on site prior to removal.
- AA.** Trap Gully Landfill is the only approved waste facility within the Banana Shire for the disposal of commercial waste. No commercial waste is to be deposited at other Banana Shire landfills or transfer stations without prior written approval from Council.
- BB.** It is an offence under the *Environmental Protection Regulation 2008* to fail to comply with signage or directions at a waste facility.
- CC.** Regulated waste (including asbestos) is only to be disposed of at Trap Gully Landfill and an application form must be completed and approved prior to disposal.



# **COM002-18/19 Attachment 1**

*Part C - Conditions imposed by Powerlink*

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7 March 2019

Our Ref: DA3213

RPS Group  
PO Box 977  
TOWNSVILLE QLD 4810

c.c. Banana Shire Council  
PO Box 412  
BILOELA QLD 4715

By Email: [mark.carter@rpsgroup.com.au](mailto:mark.carter@rpsgroup.com.au)  
Attention: Mark Carter

By Email: [enquiries@banana.qld.gov.au](mailto:enquiries@banana.qld.gov.au)  
Attention: Renita Robertson Ref:PR140339-1

Dear Mr Carter

**Referral Agency Response (Advice)**

(Given under section 9.2 of the Development Assessment Rules)

Transmission Infrastructure Impacted	
<b>Transmission Corridor</b>	Callide A – Rockhampton 275kV Transmission Line and Calvale – Stanwell 275kV Transmission Line Corridor
<b>Easement ID</b>	Easement A on RN1185 Dealing 700378683 Easement B on RN1569 Dealing 700378690 Easement B on RP611008 Dealing 601542235 Easement C on RP619533 Dealing 601542237 Easement A on RP611008 Dealing 601542234 Easement B on RP619534 Dealing 601542237
Location Details	
<b>Street address</b>	480 Tomlins Road, Goovigen Lot 28 Tomlins Road, Dixalea Lot 18 Dodsons Road, Dixalea Lot 37 Hibbs Road, Goovigen 460 Dodsons Road, Ulogie Lot 33 Dodsons Road, Ulogie
<b>Real property description</b>	Lot 37 RN194, Lot 33 RN210, Lot 32 RN194, Lot 39 RN395, Lot 28 RN211, Lot 18 RN271 Lot 29 RN210
<b>Local government area</b>	Banana Shire Council
Application Details	
<b>Proposed development:</b>	Material Change of Use for a Public Facility – Other Solar PV Power Station (Solar Farm) and Associated Facility Switchyard and Electrical Transmission Line Reconfiguring a Lot for Subdivision By Agreement (10 Lease Areas)
<b>Approval sought</b>	Development Permit

We refer to the above referenced development application which has been referred to Powerlink Queensland in accordance with Section 54 of the *Planning Act 2016*.

In accordance with its jurisdiction under Schedule 10 Part 9 Division 2 of the *Planning Regulation 2016*, Powerlink Queensland is a **Referral Agency (Advice)** for the above development application.

Specifically, the application has been triggered for assessment by Powerlink Queensland because:

1. For reconfiguring a lot – all or part of the lot is subject to a transmission entity easement which is part of the transmission supply network (Table 1 1(a))

33 Harold Street, Virginia  
PO Box 1193, Virginia, Queensland 4014, Australia  
Telephone: (07) 3860 2111 Facsimile: (07) 3860 2100  
[www.powerlink.com.au](http://www.powerlink.com.au)

Powerlink Queensland is the registered business name of the  
Queensland Electricity Transmission Corporation Limited  
ABN 82 078 849 233

2. For **material change of use** – all or part of the premises are subject to a transmission entity easement which is part of the transmission supply network (Table 2 1b)

#### PLANS AND REPORTS ASSESSED

The following plans and reports have been reviewed by Powerlink Queensland and form the basis of our assessment. Any variation to these plans and reports may require amendment of our advice.

**Table 1: Plans and Reports upon which the assessment is based**

Drawing / Report Title	Prepared by	Dated	Reference No.	Version / Issue
Smokey Creek Solar Project – Subdivision Proposal Plan	RPS	21/12/2018	14039-1-01	E
Smokey Creek Solar Project – Proposed Development Plan	RPS	28/11/2018	140339-1-02	E

Powerlink Queensland, acting as a Referral Agency (Advice) under the Planning Regulation 2017 provides its response to the application as attached (**Attachment 1**).

Please treat this response as a properly made submission for the purposes of Powerlink being an eligible advice agency in accordance with the *Planning Act 2016*.

For further information please contact Michaela Tyack Property Services Advisors Team Leader, on (07) 3866 1313 or via email [property@powerlink.com.au](mailto:property@powerlink.com.au) who will be pleased to assist.

Yours sincerely

for  
 Brandon Kingwill  
**MANAGER PROPERTY**

Enquiries: Michaela Tyack

Telephone: 07 3866 1313

Enclosures: Annexure 'A'  
 Submitted Plans

## ATTACHMENT 1 – REFERRAL AGENCY (ADVICE) RESPONSE

Powerlink Queensland **supports** this application subject to the inclusion of the following conditions in the Assessment Manager's Decision Notice.

No.	Condition	Timing	Reason
1	The development must be carried out generally in accordance with the reviewed plans detailed in Table 1.	At all times.	To ensure that the development is carried out generally in accordance with the plans of development submitted with the application.
2	The statutory clearances set out in the <i>Electrical Safety Regulation 2013</i> must be maintained during construction and operation. No encroachment within the statutory clearances is permitted.	At all times.	To ensure that the purpose of the <i>Electrical Safety Act 2002</i> is achieved and electrical safety requirements are met.
3	Compliance with the terms and conditions of the easement dealing no's. shown in the heading of this letter.	At all times.	To ensure that the existing rights contained in the registered easement dealings are maintained.
4	Compliance with the generic requirements in respect to proposed works in the vicinity of Powerlink Queensland infrastructure as detailed in the enclosed Annexure "A".	At all times.	To ensure that the purpose of the <i>Electrical Safety Act 2002</i> is achieved and electrical safety requirements are met.  To ensure the integrity of the easement is maintained.

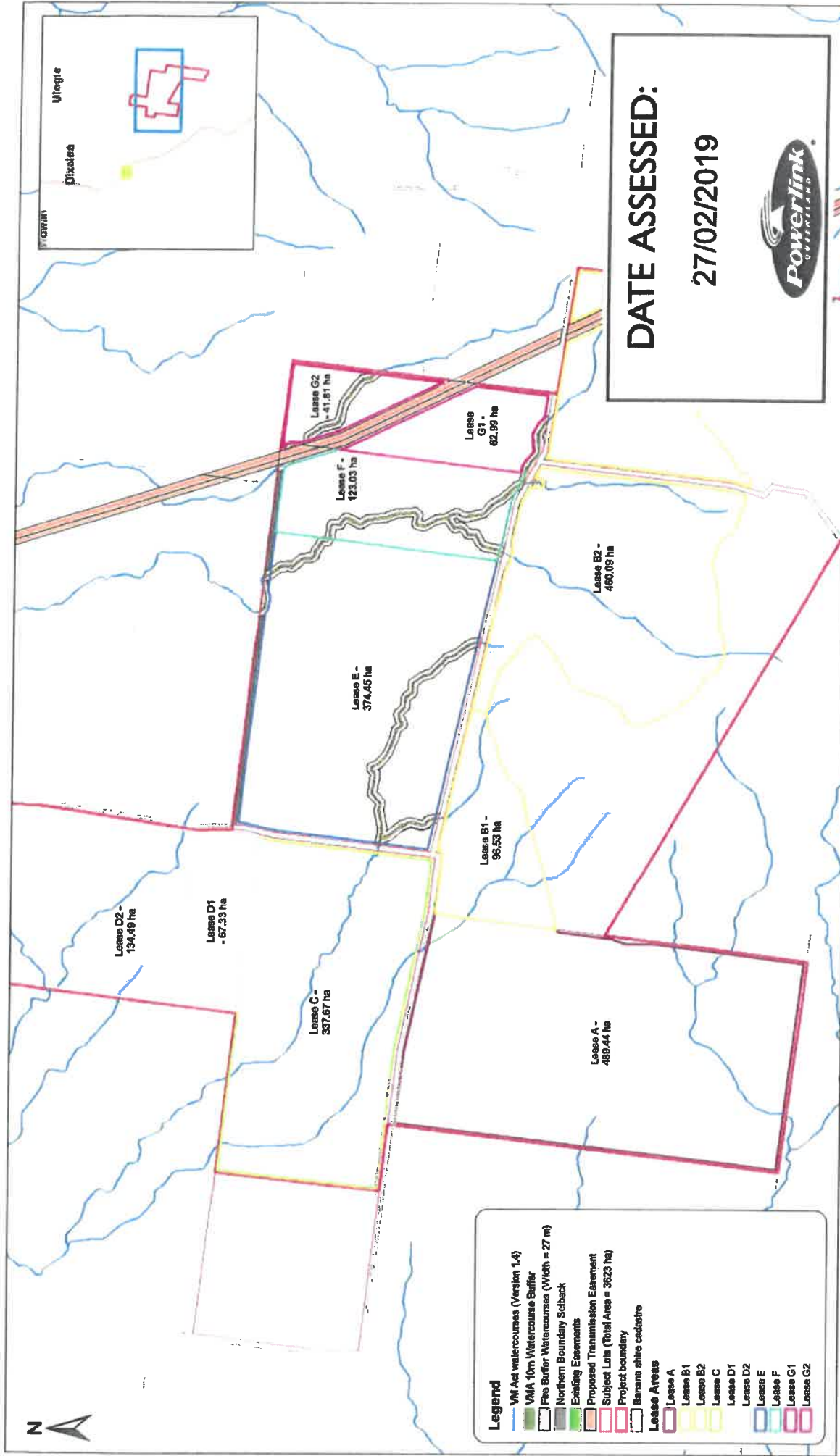
### Advice to Council and the Applicant

1. Powerlink and Edify Energy are currently negotiating network connection of the solar farm to the transmission grid. This correspondence does not constitute approval for connection which remains the subject of ongoing technical assessment and commercial negotiations. The exact location of connecting infrastructure is also part of ongoing negotiations. As a result we wish to advise council that the location of switching station and electrical transmission line is likely to change, and as such its location (as shown on the proposed plans) should not form part of the approval.
2. We draw your attention to the obligations & requirements of the Electrical Safety Act 2002 and the safety exclusion zones prescribed by the Electrical Safety Regulations 2013 based on the voltage of the transmission line.

In respect to this application the exclusion zone for untrained persons and for operating plant operated by untrained persons is **6 metres** from the 275,000-volt wires and exposed electrical parts.

Should any doubt exist in maintaining the prescribed clearance to the conductors and electrical infrastructure, then the applicant is obliged under this Act to seek advice from Powerlink Queensland.

**ATTACHMENT 2 – ASSESSED PLANS**



- Legend**
- VM Act watercourses (Version 1.4)
  - VMA 10m Watercourse Buffer
  - Pre Buffer Watercourse (Width = 27 m)
  - Northern Boundary Subback
  - Existing Easements
  - Proposed Transmission Easement
  - Subject Lots (Total Area = 3623 ha)
  - Project boundary
  - Barons shire cadastre
- Lease Areas**
- Lease A
  - Lease B1
  - Lease B2
  - Lease C
  - Lease D1
  - Lease D2
  - Lease E
  - Lease F
  - Lease G1
  - Lease G2

**RPS**  
 RPS Australia East Pty Ltd  
 ACN 140 282 762  
 ABN 44 140 282 76  
 Level 5, Central Plaza  
 370 Flinders Street  
 (PO Box 977)  
 Townsville QLD 4810  
 T +61 7 4724 4244  
 W /rpsgroup.com.au

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Plan Ref	Rev	Sheet
140338-1-01	E	A3

**PROJECT**  
**SMOKY CREEK SOLAR PROJECT**

**SUBDIVISION PROPOSAL PLAN**

Reference Scale: 1:28,000

0 1,000 2,000 3,000 4,000 Meters

**DATE ASSESSED:**  
 27/02/2019

**Powerlink**  
 QUEENSLAND

Source: Department of Natural Resources & Mines - Cadastral data including exact Townships Local Government Area © State of Queensland (Department of Natural Resources and Mines) 2014.  
 Department management watercourse and drainage feature map (1:100 000 and 1:250 000) - version 1.4 © State of Queensland (Department of Natural Resources and Mines) 2016.  
 Wetland production area - high ecological significance version © State of Queensland (Department of Environment and Heritage Protection) 2016.  
 Vegetation management - essential habitat map - version 4.346 State of Queensland (Department of Natural Resources and Mines) 2016.

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission.  
 Please verify the accuracy of all information prior to use.  
 Coordinate System: GDA 1984 MGA Zone 58  
 Projection: Transverse Mercator  
 Datum: GDA 1984

Document Name: 140338-1-01RevE\_SubdivisionProposalPlan  
 Date: 21/12/2018  
 Author: AF  
 Project Manager: MC



**ATTACHMENT 3 – ANNEXURE A**



**ANNEXURE A – GENERIC REQUIREMENTS**

The conditions contained in this Annexure have been compiled to assist persons (the applicant) intending to undertake work within the vicinity of high-voltage electrical installations and infrastructure owned or operated by Powerlink. The conditions are supplementary to the provisions of the Electrical Safety Act 2002, Electrical Safety Regulation 2013 and the Terms and Conditions of Registered Easements and other forms of Occupational Agreements hereinafter collectively referred to as the "Easement". Where any inconsistency exists between this Annexure and the Easement, the Easement shall take precedence.

**1. POWERLINK INFRASTRUCTURE**

You may not do any act or thing which jeopardises the foundations, ground anchorages, supports, towers or poles, including (without limitation) inundate or place, excavate or remove any soil, sand or gravel within a distance of twenty (20) metres surrounding the base of any tower, pole, foundation, ground anchorage or support.

**2. STRUCTURES**

No structures should be placed within twenty (20) metres of any part of a tower or structure foundation or within 5m of the conductor shadow area. Any structures on the easement require prior written consent from Powerlink.

**3. EXCLUSION ZONES**

Exclusion zones for operating plant are defined in Schedule 2 of the Electrical Safety Regulation 2013 for Untrained Persons. All Powerlink infrastructure should be regarded as "electrically live" and therefore potentially dangerous at all times.

In particular your attention is drawn to Schedule 2 of the Electrical Safety Regulation 2013 which defines exclusion zones for untrained persons in charge of operating plant or equipment in the vicinity of electrical facilities. If any doubt exists in meeting the prescribed clearance distances from the conductors, the applicant is obliged under this Act to seek advice from Powerlink.

**4. ACCESS AND EGRESS**

Powerlink shall at all times retain the right to unobstructed access to and egress from its infrastructure. Typically, access shall be by 4WD vehicle.

**5. APPROVALS (ADDITIONAL)**

Powerlink's consent to the proposal does not relieve the applicant from obtaining statutory, landowner or shire/local authority approvals.

**6. MACHINERY**

All mechanical equipment proposed for use within the easement must not infringe the exclusion zones prescribed in Schedule 2 of the Electrical Safety Regulation 2013. All operators of machinery, plant or equipment within the easement must be made aware of the presence of live high-voltage overhead wires. It is recommended that all persons entering the Easement be advised of the presence of the conductors as part of on site workplace safety inductions. The use of warning signs is also recommended.

**7. EASEMENTS**

All terms and conditions of the easement are to be observed. Note that the easement takes precedence over all subsequent registered easement documents. Copies of the easement together with the plan of the Easement can be purchased from the Department of Environment & Resource Management.

**8. EXPENDITURE AND COST RECOVERY**

Should Powerlink incur costs as a result of the applicant's proposal, all costs shall be recovered from the applicant.

Where Powerlink expects such costs to be in excess of \$10 000.00, advanced payments may be requested.

**9. EXPLOSIVES**

Blasting within the vicinity (500 metres) of Powerlink infrastructure must comply with AS 2187. Proposed blasting within 100 metres of Powerlink infrastructure must be referred to Powerlink for a detailed assessment.

**10. BURNING OFF OR THE LIGHTING OF FIRES**

We strongly recommend that fires not be lit or permitted to burn within the transmission line corridor and in the vicinity of any electrical infrastructure placed on the land. Due to safety risks Powerlink's written approval should be sought.

**11. GROUND LEVEL VARIATIONS****Overhead Conductors**

Changes in ground level must not reduce statutory ground to conductor clearance distances as prescribed by the Electrical Safety Act 2002 and the Electrical Safety Regulation 2013.

**Underground Cables**

Any change to the ground level above installed underground cable is not permitted without express written agreement of Powerlink.

**12. VEGETATION**

Vegetation planted within an easement must not exceed 3.5 metres in height when fully matured. Powerlink reserves the right to remove vegetation to ensure the safe operation of the transmission line and, where necessary, to maintain access to infrastructure.

**13. INDEMNITY**

Any use of the Easement by the applicant in a way which is not permitted under the easement and which is not strictly in accordance with Powerlink's prior written approval is an unauthorised use. Powerlink is not liable for personal injury or death or for property loss or damage resulting from unauthorised use. If other parties make damage claims against Powerlink as a result of unauthorised use then Powerlink reserves the right to recover those damages from the applicant.

#### 14. INTERFERENCE

The applicant's attention is drawn to s.230 of the Electricity Act 1994 (the "Act"), which provides that a person must not wilfully, and unlawfully interfere with an electricity entity's works. "Works" are defined in s.12 (1) of the Act. The maximum penalty for breach of s.230 of the Act is a fine equal to 40 penalty units or up to 6 months imprisonment.

#### 15. REMEDIAL ACTION

Should remedial action be necessary by Powerlink as a result of the proposal, the applicant will be liable for all costs incurred.

#### 16. OWNERS USE OF LAND

The owner may use the easement land for any lawful purpose consistent with the terms of the registered easement; the conditions contained herein, the Electrical Safety Act 2002 and the Electrical Safety Regulation 2013.

#### 17. ELECTRIC AND MAGNETIC FIELDS

Electric and Magnetic Fields (EMF) occur everywhere electricity is used (e.g. in homes and offices) as well as where electricity is transported (electricity networks).

Powerlink recognises that there is community interest about Electric and Magnetic Fields. We rely on expert advice on this matter from recognised health authorities in Australia and around the world. In Australia, the Federal Government agency charged with responsibility for regulation of EMFs is the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). ARPANSA's *Fact Sheet – Magnetic and Electric Fields from Power Lines*, concludes:

*"On balance, the scientific evidence does not indicate that exposure to 50Hz EMF's found around the home, the office or near powerlines is a hazard to human health."*

Whilst there is no scientifically proven causal link between EMF and human health, Powerlink nevertheless follows an approach of "prudent avoidance" in the design and siting of new powerlines. This includes seeking to locate new powerline easements away from houses, schools and other buildings, where it is practical to do so and the added cost is modest.

The level of EMF decreases rapidly with distance from the source. EMF readings at the edge of a typical Powerlink easement are generally similar to those encountered by people in their daily activities at home or at work. And in the case of most Powerlink lines, at about 100 metres from the line, the EMF level is so small that it cannot be measured.

Powerlink is a member of the ENA's EMF Committee that monitors and compiles up-to-date information about EMF on behalf of all electricity network businesses in Australia. This includes subscribing to an international monitoring service that keeps the industry informed about any new developments regarding EMF such as new research studies, literature and research reviews, publications, and conferences.

We encourage community members with an interest in EMF to visit ARPANSA's website: [www.arpansa.gov.au](http://www.arpansa.gov.au) Information on EMF is also available on the ENA's website: [www.ena.asn.au](http://www.ena.asn.au)

# Attachment 2

## Planning Act 2016 Extract on Appeal Rights

---

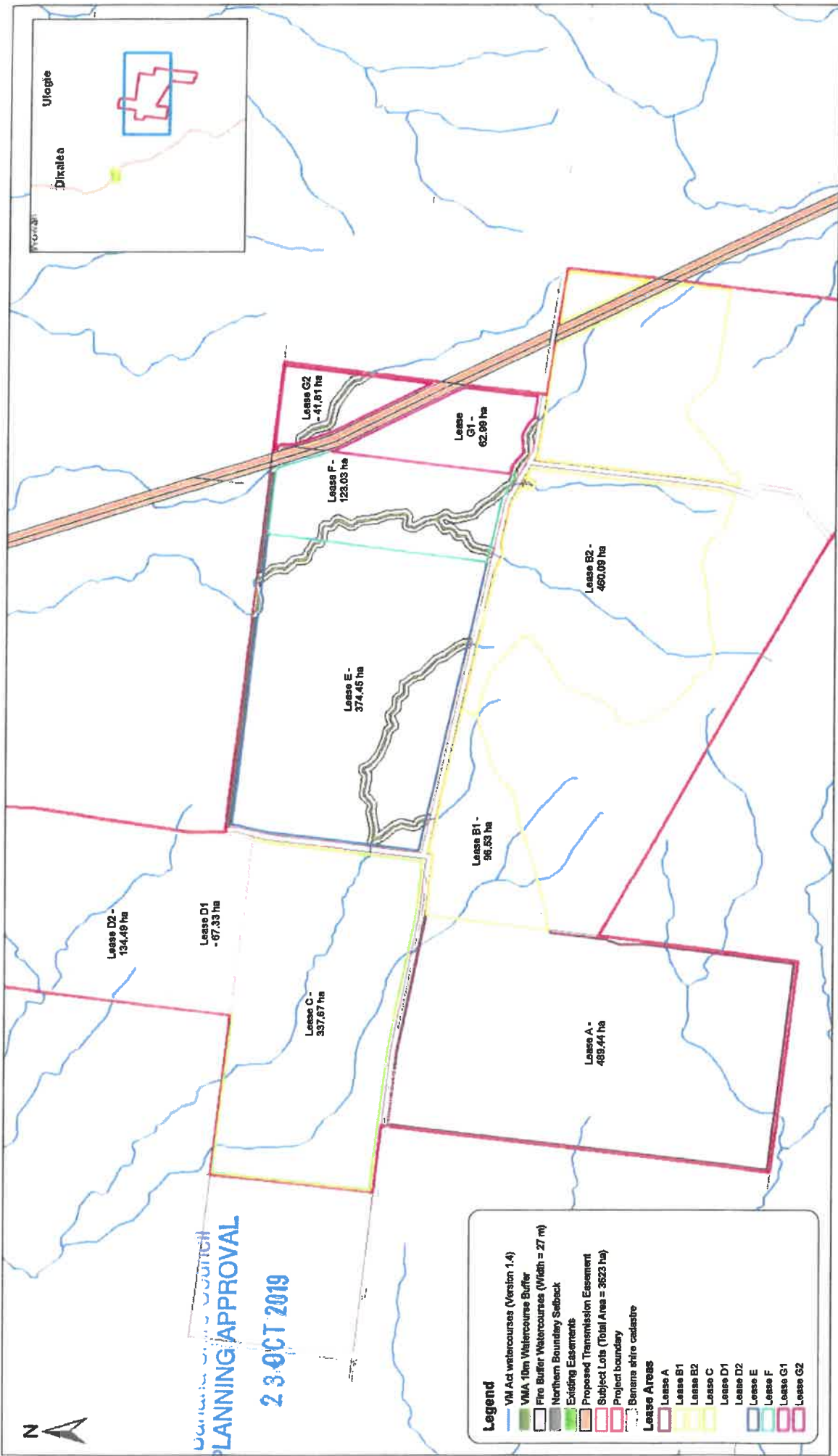
### Part 1 Appeal rights

#### 229 Appeals to tribunal or P&E Court

- (1) Schedule 1 states—
  - (a) matters that may be appealed to—
    - (i) either a tribunal or the P&E Court; or
    - (ii) only a tribunal; or
    - (iii) only the P&E Court; and
  - (b) the person—
    - (i) who may appeal a matter (the appellant); and
    - (ii) who is a respondent in an appeal of the matter; and
    - (iii) who is a co-respondent in an appeal of the matter; and
    - (iv) who may elect to be a co-respondent in an appeal of the matter.
- (2) An appellant may start an appeal within the appeal period.
- (3) The appeal period is—
  - (a) For an appeal by a building advisory agency—10 business days after a decision notice for the decision is given to the agency; or
  - (b) For an appeal against a deemed refusal—at any time after the deemed refusal happens; or
  - (c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or
  - (d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or
  - (e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or
  - (f) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person. Note— See the P&E Court Act for the court's power to extend the appeal period.
- (4) Each respondent and co-respondent for an appeal may be heard in the appeal.
- (5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.
- (6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—
  - (a) the adopted charge itself; or
  - (b) for a decision about an offset or refund—
    - (i) the establishment cost of trunk infrastructure identified in a LGIP; or
    - (ii) The cost of infrastructure decided using the method included in the local government's charges resolution.

**Attachment 3**  
**Approved Drawings**

---

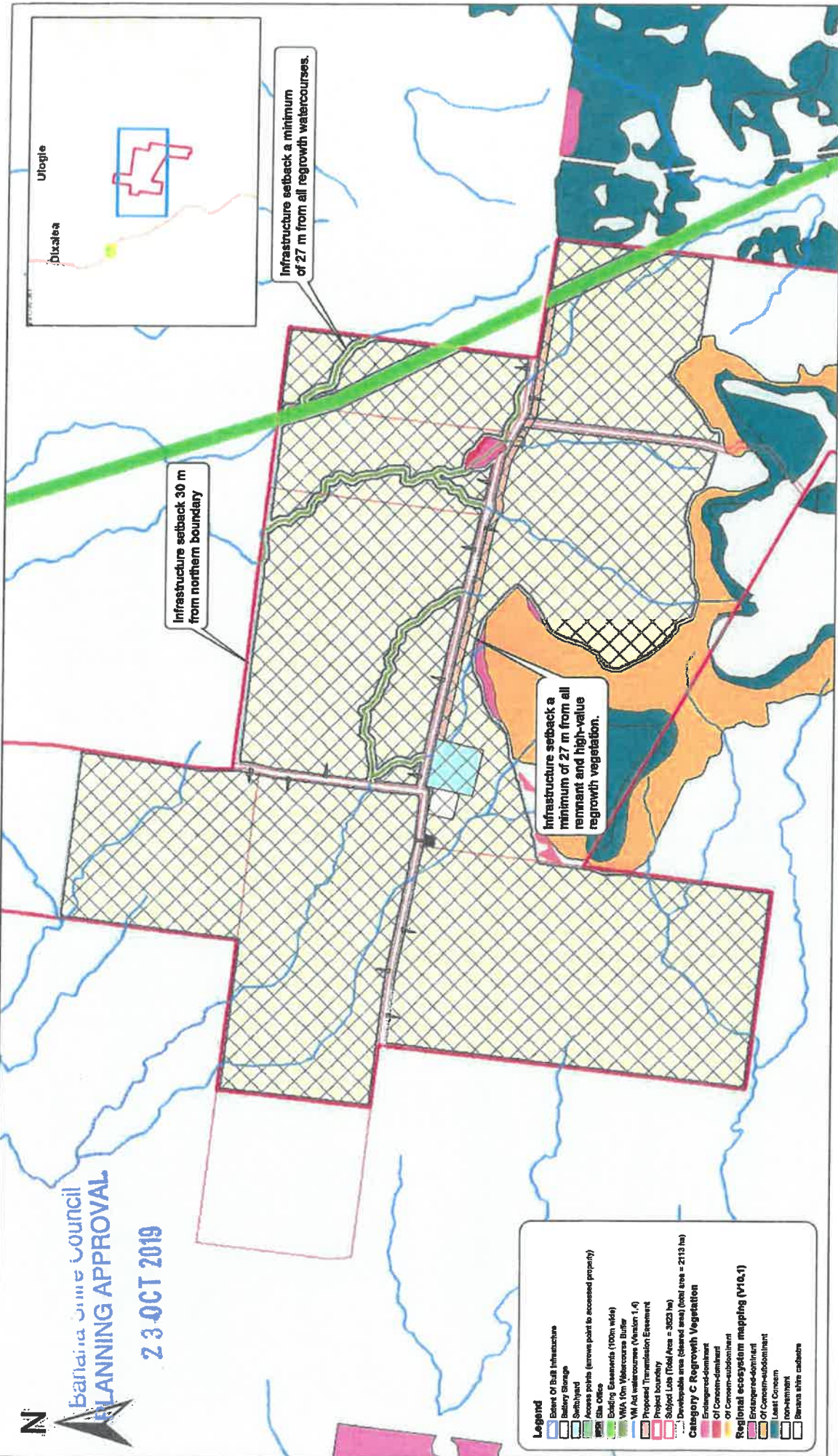


<p><b>PROJECT</b></p> <p><b>SMOKY CREEK SOLAR PROJECT</b></p> <p><b>SUBDIVISION PROPOSAL PLAN</b></p>		<p>Source: Department of Natural Resources &amp; Mines - Coloured Aerial Imagery dated Townsville Local Government Area © State of Queensland (Department of Natural Resources and Mines) 2014. Vegetation management resources and strategic feature map (1:100,000 and 1:250,000) - version 1.4 © State of Queensland (Department of Natural Resources and Mines) 2016. Vegetation management - essential habitat map - version 4.3 © State of Queensland (Department of Environment and Heritage Protection) 2015. Vegetation management - essential habitat map - version 4.3 © State of Queensland (Department of Natural Resources and Mines) 2019</p> <p>Disclaimer: While all reasonable care has been taken to ensure the information contained in this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Coordinates System: GDA 1984 MGA Zone 88 Projection: Transverse Mercator Datum: GDA 1984</p>
<p>Plan Ref <b>140339-1-01</b></p>	<p>Rev <b>E</b></p>	<p>Sheet <b>A3</b></p>
<p>Document Name: 140339-1-01 Rev E_SubdivisionProposalPlan</p>		<p>Project Manager: MC</p>
<p>Date: 21/12/2018</p>		<p>Author: AF</p>



Ballina Shire Council  
PLANNING APPROVAL

23 OCT 2019



**Legend**

- Extent Of Built Infrastructure
- Battery Storage
- Subsidiary
- Access paths (arrows point to accessed property)
- RPS Site Office
- Building Essences (100m wide)
- VMA 10m Watercourse Buffer
- VMA 40m Watercourse (Version 1.4)
- Proposed Transmission Easement
- Project boundary
- Subject Lots (Total Area = 3022 ha)
- Developable area (cleared area) (total area = 2113 ha)
- Category C Regrowth Vegetation
- Endangered-dominant
- Of Concern-dominant
- Of Concern-subdominant
- Regional ecosystem mapping (V16.1)
- Endangered-dominant
- Of Concern-dominant
- Of Concern-subdominant
- Least Concern
- non-herm
- Barriers other easements

**RPS**

RPS Australia East Pty Ltd  
ACN 140 282 762  
ABN 44 140 282 76

Level 5, Central Plaza  
370 Flinders Street  
(PO Box 977)  
Townsville QLD 4810  
T +61 7 4724 4244  
W rpsgroup.com.au

Plan Ref: **140339-1-02** Rev: **E** Sheet: **A3**

**PROJECT**

**SMOKY CREEK SOLAR PROJECT**

**PROPOSED DEVELOPMENT PLAN**

0 1,100 2,200 3,300 4,400 Meters

Reference Scale: 1:30,000

Source: Department of Natural Resources & Mines - Corralia data supplied under Townsville Local Government Area  
© State of Queensland (Department of Natural Resources and Mines) 2014.  
Vegetation management watercourses and drainage feature map (1:100 000 and 1:250 000 - version 1.4 © State of Queensland (Department of Natural Resources and Mines) 2014.  
Water and Catchment Management (Department of Natural Resources and Mines) 2015.  
Water and Catchment Management (Department of Natural Resources and Mines) 2015.  
Vegetation management - essential habitat map - version 4.3-60 State of Queensland (Department of Natural Resources and Mines) 2015

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission.  
Please verify the accuracy of all information prior to use.  
Coordinate System: GDA 1994 MGA Zone 58  
Projection: Transverse Mercator  
Datum: GDA 1994

Document Name: 140339-1-02RevE\_ProjectProposalPlan  
Date: 28/11/2018  
Author: AF  
Project Manager: MC









23-OCT-2019

**WIND RATING C2.5**

NAILING & ANCHORING ACCORDING TO MANUFACTURERS SPECIFICATIONS.  
ALL FIXINGS, TIE DOWNS & BRACING IN ACCORDANCE WITH THE BUILDING CODE OF AUSTRALIA & AS 1684.3-2006  
RESIDENTIAL TIMBER-FRAMED CONSTRUCTION.

HAMILTON SOLAR FARM PTY LTD

Development Approval  
Decision Notice No  
50289




**Timber Wall Framing Table**

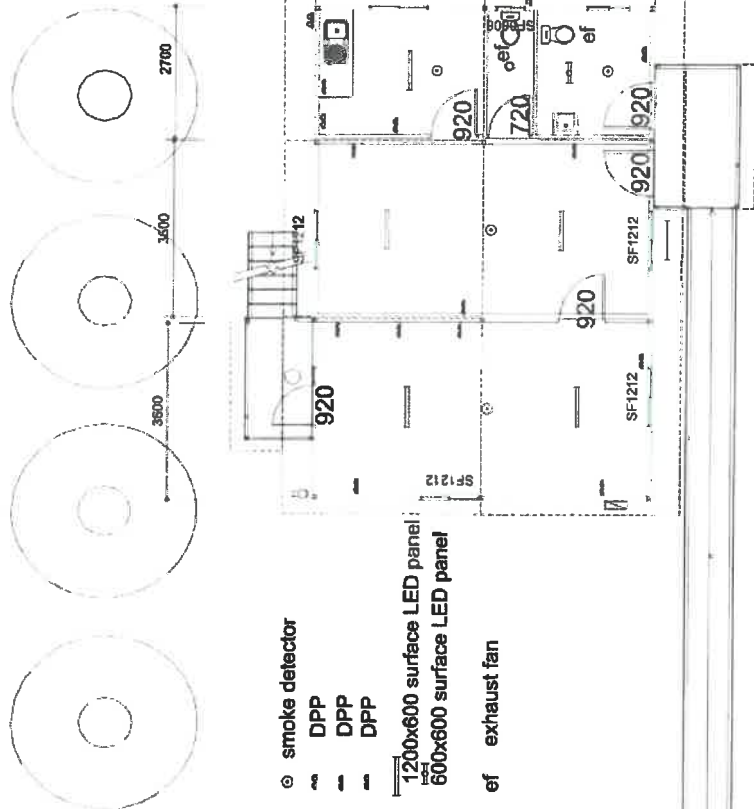
Max. Floor Width	Max. Common Stud	Common Stud	Top Plate	Bottom Plate
3600	1900 x 35MGP10 At 450 c/c	1900 x 35MGP12 At 200 c/c	1900 x 35 MGP12	1900 x 35 MGP10
3600	1900 x 35MGP10 At 450 c/c	1900 x 35MGP12 At 200 c/c	1900 x 35 MGP12	1900 x 35 MGP10
4000	1900 x 35MGP10 At 450 c/c	1900 x 35MGP12 At 200 c/c	1900 x 35 MGP12	1900 x 35 MGP10

NOTE: PROVIDE DOUBLE TOP PLATE WHEN STUDS DON'T ALIGN WITH TRUSS LOCATIONS 2000 x 35 MGP10

**Timber Lintel Sizes & Jamb Studs**

Span	Lintel Size	Jamb Stud	Sill Timbers
600	2500 x 35MGP10 1900 x 35MGP12	1900 x 35MGP10 1900 x 45MGP12	1900 x 35 MGP12
900	2500 x 35MGP10 1900 x 35MGP12	1900 x 35MGP10 1900 x 45MGP12	1900 x 35 MGP12
1200	2500 x 35MGP10 1900 x 35MGP12	1900 x 35MGP10 1900 x 45MGP12	1900 x 35 MGP12
1500	2500 x 35MGP10 1900 x 35MGP12	1900 x 35MGP10 1900 x 45MGP12	1900 x 35 MGP12
1800	2500 x 35MGP10 1900 x 35MGP12	1900 x 35MGP10 1900 x 45MGP12	1900 x 35 MGP12
2400	2740 x 35MGP12 2000 x 45MGP12	2000 x 45MGP12 2000 x 35 MGP15	1900 x 35 MGP12

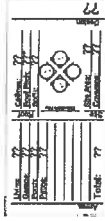
refer to engineering by manufacturer for warehouse details-  
EZI BUILT steel homes & sheds.  
Quote ref. 12062



GROUND FLOOR PLAN  
Scale - 1:100

GENERAL NOTES

No.	REVISION/ISSUE	DATE



ALL DIMENSIONS ARE THE CENTERLINE UNLESS OTHERWISE STATED.  
THESE PLANS ARE TO BE APPROVED IN ACCORDANCE WITH THE BUILDING CODE OF AUSTRALIA & AS 1684.3-2006  
CONSTRUCTION TO BE IN ACCORDANCE WITH THE BUILDING CODE OF AUSTRALIA & AS 1684.3-2006  
TO THE EXTENT OF THE REQUIREMENTS.

ROL CON PTY LTD,  
332 BAYSWATER ROAD,  
GARBUETT, 4814  
Mobile 0411 646 472  
Email [don@rolshomes.com.au](mailto:don@rolshomes.com.au)

PROJECT:  
SOLAR COLLINSVILLE  
COLLINSVILLE

CURR:  
SOLAR FARMS

DRAWING:  
NILSEN 60086

SCALE: 1:100 DATE: 09/09/20

DRAWN BY: DAJR

CHECKED BY: 4.1

APPROVED BY:

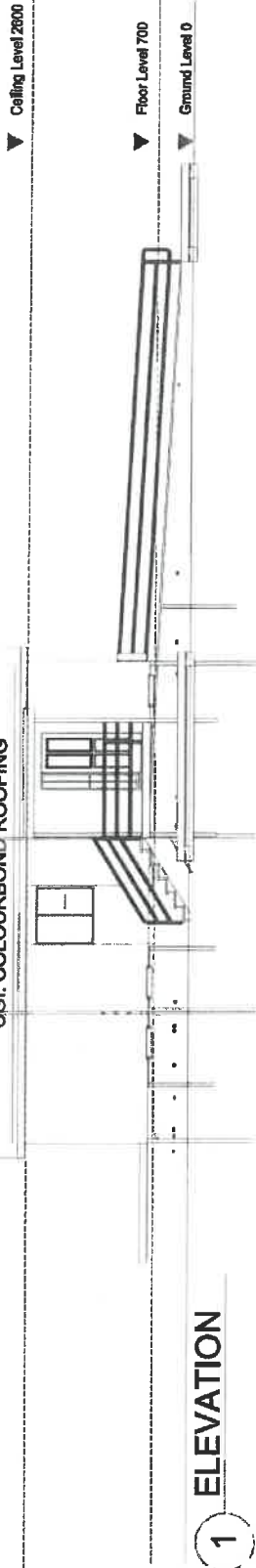
**WIND RATING C2.5**

NAILING & ANCHORING ACCORDING TO MANUFACTURERS SPECIFICATIONS.

ALL FININGS, TIE DOWNS & BRACING IN ACCORDANCE WITH THE BUILDING CODE OF AUSTRALIA & AS 1884.2-2009. RESIDENTIAL TIMBER-FRAMED CONSTRUCTION.

MODULE 3. MODULE 2. MODULE 1.

CGI COLOURBOND ROOFING



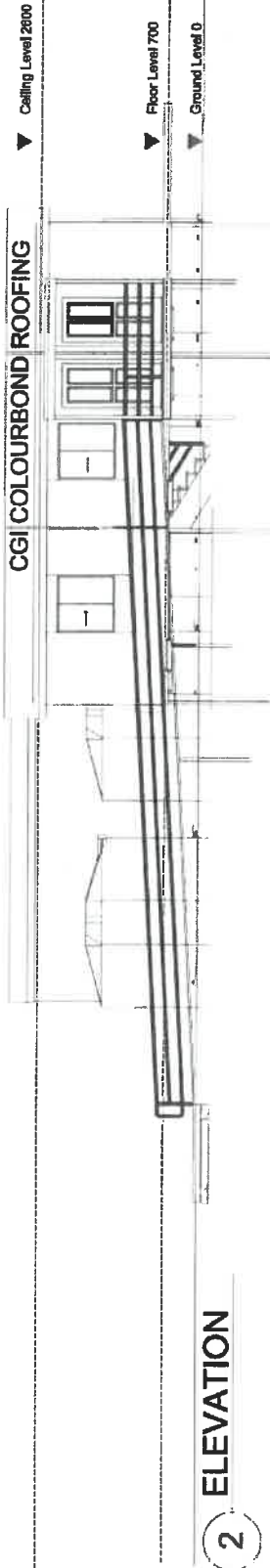
1 ELEVATION



Development Approval  
Decision Notice No  
50289



CGI COLOURBOND ROOFING



2 ELEVATION

Banana Shire Council  
**PLANNING APPROVAL**

**23 OCT 2019**

ELEVATIONS  
Scale - 1:100

GENERAL NOTES

NO.	REVISION/ISSUE	DATE

NO.	DATE	BY	DESCRIPTION

ALL DIMENSIONS ARE TO FACE UNLESS STATED OTHERWISE. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE DIMENSIONS TO THE BUILDING.

**ROLCON PTY LTD.**  
332 BAYSWATER ROAD,  
GARBUDD, 4814  
Mobile 0411 846 472  
Email don@rolconhomes.com.au

**SOLAR COLLINSVILLE**  
COLLINSVILLE

**SOLAR FARMS**

DRAWING: **NILSEN 60086**

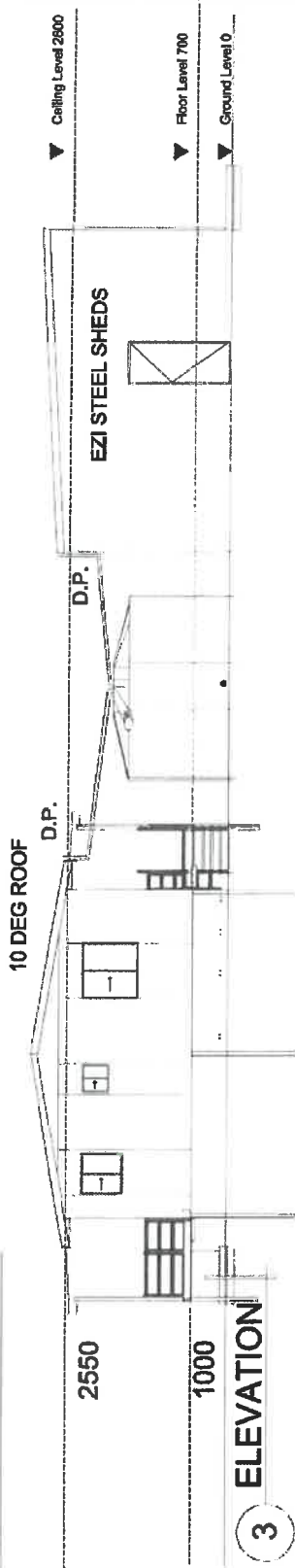
SCALE: 1:100 DATE: 09/09/2019

SHEET: 5.1

DRAWN BY: DAJR  
CHECKED BY:  
APPROVED BY:

**WIND RATING C2.5**  
 NAILING & ANCHORING ACCORDING  
 TO MANUFACTURERS SPECIFICATIONS.

ALL FIXINGS, TIE DOWNS & BRACING  
 IN ACCORDANCE WITH THE BUILDING  
 CODE OF AUSTRALIA & AS 1684.3-2006  
 RESIDENTIAL TIMBER-FRAMED CONSTRUCTION.



**3 ELEVATION**



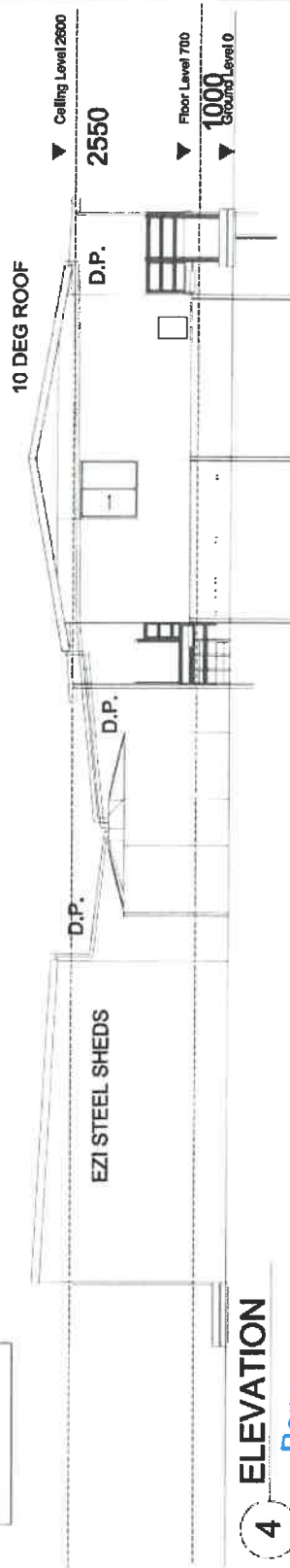
**Development Approval**

Decision Notice No

**50289**

**Devcert**

Development Approval for Building Work  
 is granted under the Building Act 1973,  
 subject to conditions of Decision Notice.



**4 ELEVATION**

**Banarua Shire Council  
 PLANNING APPROVAL**

**23 OCT 2019**

**ELEVATIONS**  
 Scale - 1:100

GENERAL NOTES

**ROLCON P. L.**

No.	REVISION/NOTE	DATE

DATE: 13/09/17	BY: [Signature]
SCALE: 1:100	DATE: 13/09/17
PROJECT: 50289	CLIENT: SOLAR FARMS

ALL DIMENSIONS ARE THE PROPERTY OF THE DRAWER AND  
 THEY ARE NOT TO BE REPRODUCED IN WHOLE OR IN PART  
 WITHOUT THE WRITTEN CONSENT OF THE DRAWER.  
 COMMENTS TO THE DRAWER SHOULD BE MADE BY RETURN  
 TO THE OFFICE.

**ROLCON PTY LTD.**  
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 GARBUTT, 4814  
 Mobile 0411 846 472  
 Email don@rolconhomes.com.au

**SOLAR COLLINSVILLE**  
 COLLINSVILLE

**SOLAR FARMS**

DRAWING: **NILSEN 60086**  
 SCALE: 1:100 DATE: 20/10/2019

DRAWN BY: DAIR  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]  
 SHEET: 5.2



Banana Shire Council  
**PLANNING APPROVAL**

**23 OCT 2019**


## ENGINEERING REPORT

**SMOKY CREEK SOLAR FARM  
TOMLINS ROAD, BANANA SHIRE**

**FOR  
EDIFY ENERGY**

REF: P25007  
REVISION A

Phone: 07 4725 5550  
Fax: 07 4725 5850  
Email: [mail@nceng.com.au](mailto:mail@nceng.com.au)  
50 Punari Street Currajong Qld 4812  
Milton Messer & Associates Pty Ltd  
ACN 100 817 356 ABN 34 100 817 356

REVISION	AUTHOR	APPROVED FOR ISSUE			ISSUED TO:	REASON
		NAME	SIGNATURE	DATE		
A	Dale Armbrust	Andrew Wallace		07/09/2018	RPS Group	For Local Authority Approval

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2.0	SITE WORKS – EARTHWORKS .....	2
3.0	TRAFFIC.....	2
4.0	FLOODING .....	3
5.0	STORMWATER DRAINAGE .....	3
5.1	Stormwater runoff and mitigation assessment .....	3
5.2	Waterway barrier works for creek crossings .....	3
6.0	CONCLUSION.....	4

## APPENDICIES

### APPENDIX A

**Proposal Plan  
(RPS)**

### APPENDIX B

**Site Plan  
(NCE)**

### APPENDIX C

**1% AEP Flood Map  
(Banana Shire Council)**

### APPENDIX D

**DAFF  
Code for self-assessable development  
Minor waterway barrier works  
Part 4: bed level crossings**



## 1.0 INTRODUCTION

Northern Consulting Engineers (NCE), in association with RPS Group (RPS), have been engaged to prepare an engineering report to support development applications for the proposed Smoky Creek Solar Farm (SCSF) located approximately 75km south of Rockhampton and 40km north of Biloela, east of the Burnett Highway and accessed via Tomlins Road. The 450MWac solar farm is proposed on land described as:

- Lot 35 on RN 395;
- Lot 28 on RN 211;
- Lot 18 on RN271; and
- Lot 37 on RN 1147.

The total area of the subject lots comes to 3,623 ha, with the developable (cleared area) being 2,113 ha and the area of built infrastructure (20m offset from the developable area) being 1,993 ha.

This report is based on the following layout plan provided to NCE and available as appendix to this report;

- Smoky Creek Solar Project, Proposed Development Plan, 140339-1-02 RevD (RPS), Appendix A.

## 2.0 SITE WORKS – EARTHWORKS

1 second (~30m) digital elevation model (DEM) data was sourced for the site via Geoscience Australia and is based on national elevation data products derived from the Shuttle Radar Topography Mission (SRTM) data. This coarse data shows that the terrain within the project boundary varies significantly, with levels ranging from 150m to 300m AHD. The majority of the project site falls to the north, with areas also draining to the east and west. The site plan contained in Appendix B of this report shows elevations across the site based on the SRTM data.

Clearing and minor levelling / profiling of natural surface inconsistencies is expected to occur to enable installation of the plant and cabling and the introduction of access corridors for ongoing operation and maintenance tasks to be performed.

Any stripping of natural vegetation and thus an increase in the risk of erosion and sediment transportation will be addressed at detailed design stage can be expected to include standard industry measures defined within IECA publications 'Best practice Erosion and Sediment Control'.

## 3.0 TRAFFIC

A desktop safety assessment undertaken by NCE concluded that the proposed solar farm can be safely constructed and operated with the following upgrades:

- The current access intersection Burnett Highway and Tomlins Road (SCRN) is appropriate for the current and expected traffic volumes and composition.
- Tomlins Road, whilst providing a 5.5m wide sealed surface and 0.5-1.0m wide shoulders, is expected to be adequate to service the construction and operational phase of the project.
- It is highly recommended that continual monitoring of the road surface and pavement profile be undertaken during the construction phase to identify any failures early. A properly prepared action plan for the maintenance and repair of the roadway should form part of any documentation utilised for the development.

- Dodson's Road is currently considered to be inadequate for the increased construction traffic. It is recommended that the road formation be improved / widened to accommodate passing single articulated vehicles typically utilised during the construction phase being a class (9) six axle articulated semi-trailer.

Please refer to NCE's Traffic Assessment report for full details of this assessment.

#### 4.0 FLOODING

A draft 1% AEP flood map has been provided by the Banana Shire Council, and shows the site as generally free from regional-scale flooding, with the exception of small ponded areas within farm dams. This mapping is contained in Appendix C of this report.

It should be noted that this data appears unsuitable for confirming the extent and severity of localised flooding within the project site, and it is recommended that a comprehensive two-dimensional flood assessment be carried out at the detailed design phase to verify 1% AEP flood levels across the site and to confirm the ultimate drainage strategy for the fully developed site.

#### 5.0 STORMWATER DRAINAGE

##### 5.1 Stormwater runoff and mitigation assessment

Pre and post-development stormwater runoff characteristics for the site are expected to be similar. Reference is made to Lauren M Cook and Richard H McCuen's 'Hydrologic Response of Solar Farms' document, which discusses the impacts of solar panels on stormwater runoff. Future detailed stormwater assessments for the development will include consideration of this journal, and any required mitigation measures will be designed accordingly. Whilst there will be a significant number of PV panels erected as part of the facility, the impervious area at ground level will remain the same. Each of the panels would be supported via a singular post bored or pierced into the ground, minimising the area impacted for infiltration and surface storage.

This journal advises that well maintained grass coverage between and under the panels alleviates the need for any mitigation works or additional soil erosion and sediment control that may otherwise be required to protect downstream waterways.

##### 5.2 Waterway barrier works for creek crossings

All minor crossings of existing creeks will be carried out in accordance with the DAFF Code for self-assessable development – Minor waterway barrier works. A number of waterways are present on the site (refer to the Site Plan contained in Appendix B of this report), and the waterways that may be affected are low impact (green, depicted in Figures 9 and 10 of the code) and moderate impact (amber, depicted in Figures 7 and 8 of the code). Crossing works will be carried out with consideration for minimising works and impacts in any waterway. All requirements of the code can be complied with. Refer to Appendix D for a copy of the code.

## 6.0 CONCLUSION

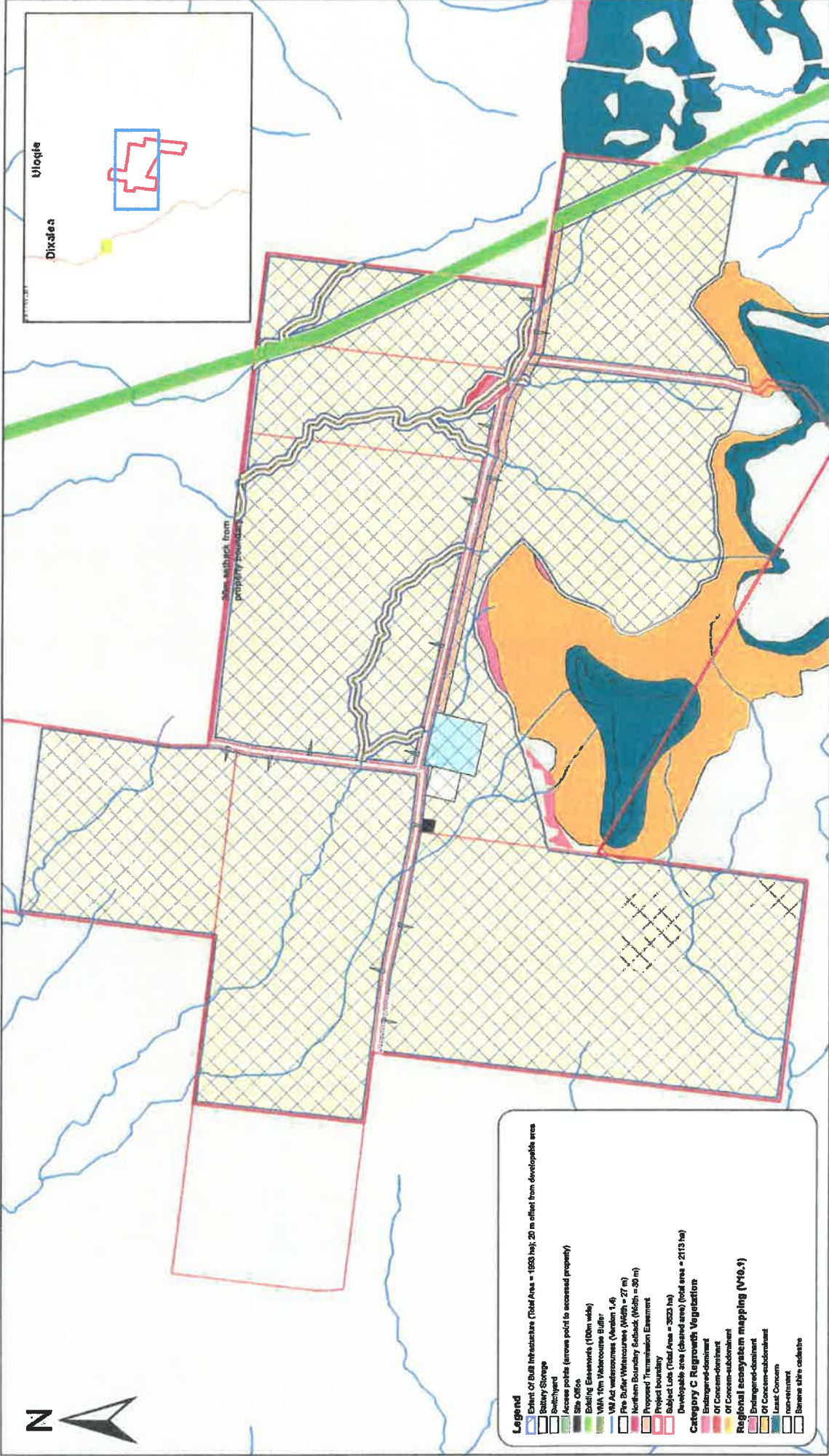
The proposed site for the Smoky Creek Solar Farm is considered suitable from a civil engineering perspective.

In summary, the following engineering solutions are available to ensure a suitable level of service for each utility can be provided at the site:

- ✓ Minor site earthworks can be undertaken in a safe manner to protect the surrounding environment.
- ✓ Stormwater run-off characteristics are not expected to change significantly due to the development, provided grass coverage is maintained under and between the panels.
- ✓ Regional flooding is not expected to adversely impact the site during a 1% AEP storm event where development is proposed. The effects of local flooding need to be assessed via a site specific assessment.

# APPENDIX A

## Proposal Plan (RPS)



- Legend**
- Extent Of Bulk Infrastructure (Total Area = 1933 ha), 20 m offset from developable area
  - Battery Storage
  - Sub-tyard
  - Access point (arrows point to accessed property)
  - Site Office
  - Building Easements (10m wide)
  - VMA 10m Watercourse Buffer
  - VMA 4m Watercourse (Version 1.4)
  - Five Buffer Watercourse (Width = 27 m)
  - Northern Boundary Setback (Width = 30 m)
  - Proposed Transmission Easement
  - Project boundary
  - Subject Lots (Total Area = 3022 ha)
  - Developable area (cleared area) (total area = 2713 ha)
  - Category C Regrowth Vegetation
  - Endangered-dominant
  - Of Concern-dominant
  - Of Concern-subdominant
  - Regional ecosystem mapping (V10.1)
  - Endangered-dominant
  - Of Concern-dominant
  - Least Concern
  - non-tenement
  - Banana sibs occlusa

**RPS**

RPS Australia East Pty Ltd  
 ACN 140 282 762  
 ABN 44 140 282 76

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 370 Flinders Street  
 (PO Box 977)  
 Townsville QLD 4810  
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 W rpsgroup.com.au

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Plan Ref: 1403339-1-02 Rev: D Sheet: A3

**PROJECT**

# SMOKY CREEK SOLAR PROJECT

## PROPOSED DEVELOPMENT PLAN

0 1,000 2,000 3,000 4,000 Meters

Reference Scale: 1:26,933

Source: Department of Natural Resources & Mines - Cadastral data broughtly correct Townsville Local Government Area & State of Queensland (Department of Natural Resources and Mines) 2014.  
 Queensland State of Queensland (Department of Natural Resources and Mines) 2015. (1:100 000 and 1:250 000) - version 1.4 © State of Queensland (Department of Natural Resources and Mines) 2015.  
 Wetland protection area - high ecological significance wetland © State of Queensland (Department of Environment and Heritage Protection) 2015  
 Wetland protection area - research habitat map - version 4.5 © State of Queensland (Department of Natural Resources and Mines) 2015

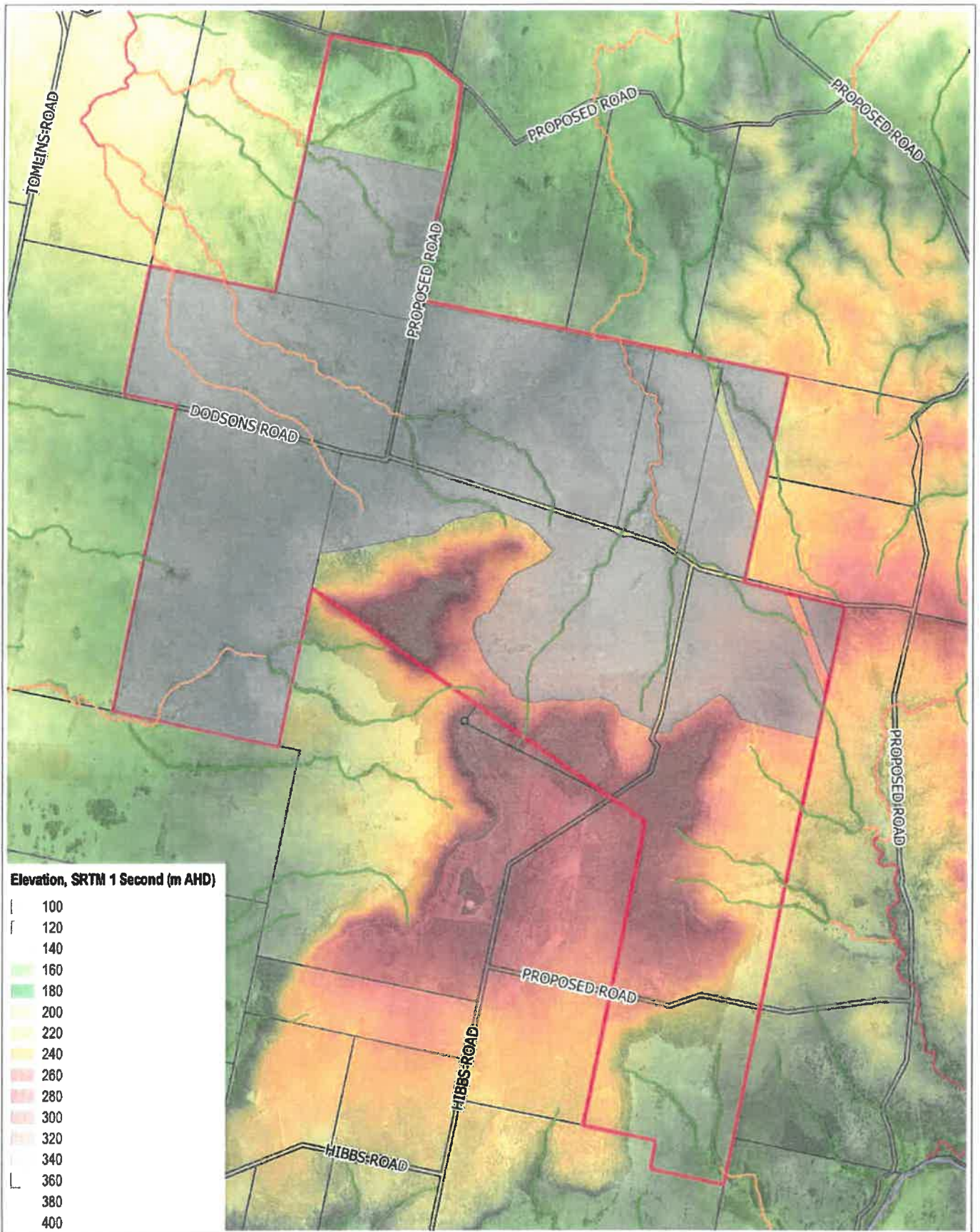
Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, the user should verify the information portrayed in this form prior to reliance on it.  
 Coordinate System: GDA 1984 MGA Zone 58  
 Datum: GDA 1984

Document Name: 1403339-1-02RevD\_ProjectPropoalPlan  
 Date: 10/08/2018 Author: AF Project Manager: MC

# APPENDIX B

## Site Plan (NCE)





**NORTHERN CONSULTING engineers**

Civil & Structural Engineers  
 50 Panara Street, Cumnahong 4812  
 Phone: (07) 4725 5550 Fax: (07) 4725 6660  
 Email: mail@nconing.com.au  
 18/2000 Moggill & Associates Pty. Ltd.  
 ACN 100 817 326

In Association With:

**EDIFY ENERGY**

0 400 800 1200 1600 m

1:35,000

**Legend**

- Low Impact Waterways
- Moderate Impact Waterways
- High Impact Waterways
- Developable Area
- Project Boundary
- Property Boundary

**SMOKY CREEK SOLAR FARM**

**Site Plan**

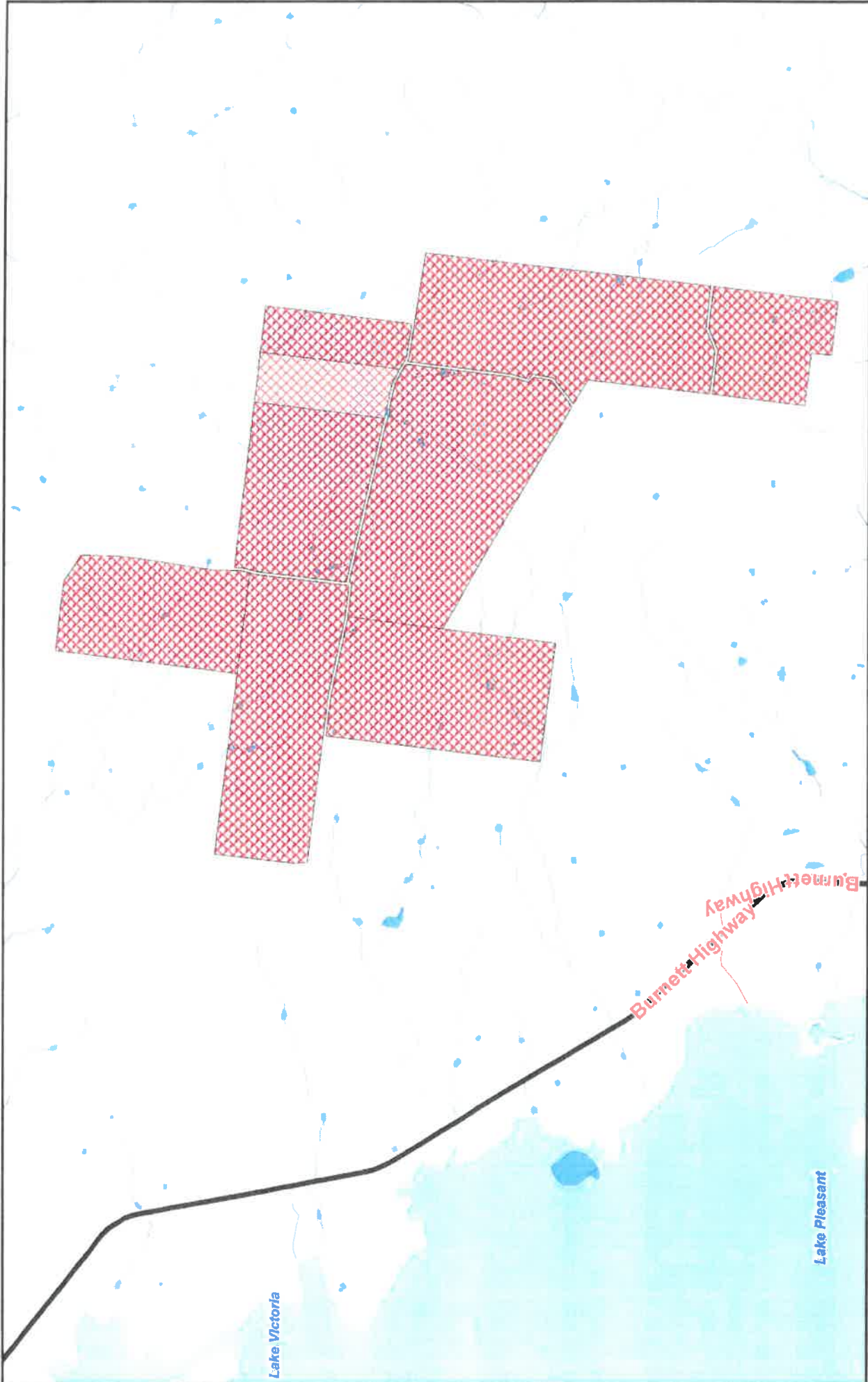
Date: 07/09/2018	Size	Map
Revision A	<b>A3</b>	<b>A1</b>
HCE Ref RPS0007		

Disclaimer:  
 All information noted on this plan is INDICATIVE only. Therefore any reference and/or dissemination of the data not solely related to the documents purpose shall be at the user's risk. HCE shall become responsible or liability for any errors, faults, omissions or amendments in the information.



## APPENDIX C

### 1% AEP Flood Map (Banana Shire Council)





This publication has been produced by Burns & Mcdonnell in reliance on selected data provided by or on behalf of the Department of Natural Resources and Mines (DNRM) (Department of Natural Resources and Mines) (2018).  
 Burns & Mcdonnell and The State of Queensland (Department of Natural Resources and Mines) (2018), in relation to the data (including accuracy, reliability, completeness or suitability) and access to liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data.

  
  
 Kilometres  
 Scale 1 : 87,553 (A4 Original Size)  
 Transverse Mercator projection, GDA94, MGA Zone 50

# Smoky Ck draft flood map

## APPENDIX D

### DAFF

Code for self-assessable development  
Minor waterway barrier works  
Part 4: bed level crossings

# **Code for self-assessable development**

Minor waterway barrier works  
Part 4: bed level crossings

Code number: WWBW01 April 2013

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## Version history

Version	Date	Comment
1	September 2010	Combined minor permanent waterway barrier works self-assessable codes (SAC).
2	October 2011	<p><u>Key revisions:</u>            Bed level crossings now a stand alone 'part 4'            5.2.5 (v) (minimum rock diameter decreased to 50mm)            Figures</p>
3	January 2013	<p>This version accompanies the GIS layer <i>Queensland waterways for waterway barrier works</i></p> <p><u>Key revisions:</u>            2 (incorporation and interpretation of waterway zones)            3 (definitions of waterway, channel width, works and maintenance)            5.1.2 (allowable disturbance footprint, habitat restoration requirements)            5.17 (now 5.1.28) (wording on signage)            5.2.1, 5.3.1, 5.4.1, 5.5.1 (allowable duration for works)</p> <p><u>Deletions:</u>            Scour protection downstream length limit            Upstream scour protection specifications</p> <p><u>Additions:</u>            5.1.1 (sites must be open for inspection)            6.1.31 (replacement of existing crossings)            5.2 (construction on purple and red waterways)            5.3 (construction on amber waterways)            5.4 (construction on green waterways)            5.5 (maintenance works)            Figures            Appendix 1            Appendix 2            Appendix 3</p>
4	April 2013	<p><u>Key revision:</u>            Maintenance works under the SAC are allowable in tidal (grey) zones</p> <p><u>Additions:</u>            2.4 (maintenance works in grey zones)            5.1.9 (exception for emergency maintenance works)            5.5.1 (duration for maintenance works in grey zones)</p>

# 1 Introduction

- 1.1 Most Australian native fish move along waterways as part of their life cycle. Fish movement along both small and large freshwater and estuarine waterways is vital for all native fish species including important recreational and commercial fishing species. Waterway barriers that slow or prevent fish movement have the potential to impact both on commercial and recreational fisheries production and the health, distribution and populations of native fish.
- 1.2 This code is prepared under the *Sustainable Planning Act 2009 (SPA)* and *Fisheries Act 1994*. Under the SPA, the construction or raising of temporary or permanent waterway barriers and the disturbance of marine plants are classed as development. The work is operational work<sup>1</sup> and for the purposes listed in the code, the SPA provides that the work covered by the code is self-assessable development.
- 1.3 Under the Sustainable Planning Regulation 2009 (SPR) and the Fisheries Regulation 2008, this code is an applicable code for operational work made self-assessable under the SPA<sup>2</sup>.
- 1.4 Self-assessable development must comply with an applicable code. The developer<sup>3</sup> is responsible for ensuring the proposed development will comply with this code before proceeding.
- 1.5 Codes are reviewed periodically and may be amended so the most current version should be used. These are available from the website at [www.fisheries.qld.gov.au](http://www.fisheries.qld.gov.au) or call 13 25 23.
- 1.6 Where the development proposal cannot meet the requirements of the relevant code, an application for a development approval must be lodged.
- 1.7 This self-assessable code is a technical guide to assist individuals and organisations in undertaking minor waterway barrier works that meet legislative and policy requirements under the Fisheries Act<sup>4</sup>.
- 1.8 To assist in the interpretation of this self-assessable code, a glossary is provided in section 7.

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<sup>1</sup> See section 22(2) of the Fisheries Act and SPA, section 10.

<sup>2</sup> See SPR, schedule 3, part 2, table 4, item 2(a) and Fisheries Regulation 2008, sections 704 and 706.

<sup>3</sup> For this code, the developer is the party undertaking the waterway barrier works.

<sup>4</sup> Refer to Fisheries Queensland policy *Waterway Barrier Works Development Approvals FHMOP 008*.

## 2 Development relevant to this code

- 2.1 This code is relevant to assessing operational work against the Fisheries Act, that is the construction or raising of permanent<sup>5</sup> waterway barriers and their maintenance.
- 2.2 This code applies if the waterway barrier works are the construction of a new or replacement of an existing bed level crossing on a low (green), moderate (amber), high (red) impact waterway or on an assessable (purple) waterway as marked on the spatial data layer *Queensland Waterways for Waterway Barrier Works* (see Figure 1 and Appendix 1).
- 2.3 This code does not apply if the new or replacement works are within a tidal (grey) zone as marked on the data layer *Queensland Waterways for Waterway Barrier Works*, unless an alternative determination has been made by an appropriate Fisheries Queensland officer<sup>6</sup>.
- 2.4 This code applies if the waterway barrier works are the maintenance of an existing bed level crossing on a low (green), moderate (amber), high (red) impact waterway or on an assessable (purple) waterway or within a tidal (grey) zone, as marked on the spatial data layer *Queensland Waterways for Waterway Barrier Works*.
- 2.5 This code does not apply to the construction of new waterway barrier works within the boundaries of declared Fish Habitat Areas<sup>7</sup> or Wild River Areas<sup>8</sup>.

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<sup>5</sup> Permanent waterway barriers are barriers that are in place for longer than twelve calendar months. For temporary works see Fisheries Queensland code for self-assessable development WWBW02 *Temporary waterway barrier works* or contact Fisheries Queensland for further information (See section 6 for details)

<sup>6</sup> Contact your regional Fisheries Queensland centre (see section 6) for an alternative determination

<sup>7</sup> See section 615 & Schedule 3 of the *Fisheries Regulation 2008*.

<sup>8</sup> See the *Sustainable Planning Regulation 2009, schedule 3, Part 2, Table 4, item 2*.



- 1a. The works are the construction, replacement or maintenance of a bed level crossing(s)... **Go to 2**
- 1b. The works are not the construction, replacement or maintenance of a bed level crossing(s)... **Code does not apply**
- 2a. The site of the works are on a coloured waterway or zone on the GIS layer *Queensland Waterways for Waterway Barrier Works*... **Go to 3**
- 2b. The site of the works are not on a coloured waterway or zone on the GIS layer *Queensland Waterways for Waterway Barrier Works*... **No waterway barrier works code or approval required.**
- 3a. The works meet the requirements of sections 1, 2, 3, 4 and 5.1 of this code... **Go to 4**
- 3b. The works do not meet the requirements of sections 1, 2, 3, 4 and 5.1 of this code... **Development approval required**
- 4a. The site is in the grey zone on the GIS layer... **Go to 5**
- 4b. The site is not in the grey zone on the GIS layer... **Go to 8**
- 5a. The works are the maintenance of a bed level crossing ... **Go to 6**
- 5b. The works are *not* the maintenance of a bed level crossing... **Go to 7**
- 6a. The works will comply with the standards under section 5.5 of this code.... **Proceed under section 5.5 of this code**
- 6b. The works will not comply with standards under section 5.5 of this code... **Development approval required**
- 7a. I have an alternative determination from a Fisheries Queensland officer... **Go to 14**
- 7b. I do not have an alternative determination from a Fisheries Queensland officer... **Development approval required**
- 8a. The site is on a waterway marked as a purple or red waterway on the GIS layer... **Go to 9**
- 8b. The site is not on a waterway marked as a purple or red waterway on the GIS layer... **Go to 10**
- 9a. The works will comply with standards under section 5.2 of this code... **Proceed under section 5.2 or 5.5 of this code**
- 9b. The works will not comply with standards under section 5.2 of this code... **Development approval required**
- 10a. The site is on a waterway marked as an amber waterway on the GIS layer... **Go to 11**
- 10b. The site is not on a waterway marked as an amber waterway on the GIS layer... **Go to 12**
- 11a. The works will comply with standards under section 5.3 of this code... **Proceed under section 5.3 of this code**
- 11b. The works will not comply with standards under section 5.3 of this code... **Development approval required**
- 12a. The site is on a waterway marked as a green waterway on the GIS layer... **Go to 13**
- 12b. The site is not on a waterway marked as a green waterway on the GIS layer... **Go to 2**
- 13a. The works will comply with standards under section 5.4 of this code... **Proceed under section 5.4 of this code**
- 13b. The works will not comply with standards under section 5.4 of this code... **Development approval required**
- 14a. The site of works has been determined to be equivalent to a purple or red waterway by a Fisheries Queensland officer... **Go to 8**
- 14b. The site of works has been determined to be equivalent to an amber waterway by a Fisheries Queensland officer... **Go to 10**
- 14c. The site of works has been determined to be equivalent to a green waterway by a Fisheries Queensland officer... **Go to 12**

**Figure 1** Decision matrix for use with the data layer *Queensland Waterways for Waterway Barrier Works*

### 3 Meaning of terms

For the purposes of applying this code and determining whether development is self-assessable, the following meanings of terms apply.

- Waterways<sup>9</sup> include<sup>10</sup>:
  - rivers
  - creeks
  - streams
  - a watercourse or inlet of the sea
  - those marked on the data layer *Queensland Waterways for Waterway Barrier Works* (see Appendix 1)
  - regardless of whether they are tidal, freshwater, dry, static or flowing (ephemeral or perennial) waters.
- Waterway barrier means a crossing that is built at (or up to 300 mm above) bed level (bed level crossing) and is located on a marked waterway (Appendix 1).
- Bed level means the lowest point of the natural stream bed (pre-construction), within the footprint of the proposed crossing.
- Works includes the construction, raising, replacement, reinstatement and maintenance of a structure if the works limit (or have the potential to limit) fish access and movement along a waterway.
- Maintenance referred to in this code is limited to works described under section 5.5 of this code.

3.2 Other terms used are defined in the glossary of this code.

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<sup>9</sup> See the Fisheries Act, section 4, schedule dictionary

<sup>10</sup> For further clarification see *Waterway barrier works development approvals*, Fisheries Queensland Fish Habitat Management Operational Policy FHMOP 008.

## 4 Compliance with this code

- 4.1 If development proceeds but is not compliant with this code and its standards, or makes insufficient use of the data layer *Queensland Waterways for Waterway Barrier Works*<sup>11</sup>, the developer may be prosecuted under provisions of SPA or the Fisheries Act<sup>12</sup>.
- 4.2 Other approvals may be required for the development from local governments or other state agencies or under other state legislation. Contact the relevant local government, or the Department of State Development, Infrastructure and Planning for further information (see Section 6 for contact details).

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<sup>11</sup> See Disclaimer in Appendix 1.

<sup>12</sup> See Fisheries Act, subdivision 6, section 122, section 123 and the SPA, section 574.

## 5 Code standards

### 5.1 All work covered under this self-assessable code

All work carried out under this code must meet the following requirements.

#### General

- 5.1.1 Sites where development is occurring under this code are required to be open for inspection by Fisheries Queensland staff for monitoring compliance with this code during business hours:
- after Fisheries Queensland has received the pre-works advice sheet
  - during works
  - up to 10 business days after Fisheries Queensland has received the post-works advice sheet.
- 5.1.2 Where the works result in two crossings at the same site<sup>13</sup>, for example at a road realignment or upgrade, the original crossing and its associated components are to be completely removed from the waterway within four weeks of the completion of the works<sup>14</sup>.
- 5.1.3 Replacement, modification and maintenance works undertaken under this code are only carried out on existing lawful structures<sup>15</sup>.

#### Acid sulfate soil (ASS)

- 5.1.4 In areas of acid sulfate soils (ASS) or potential acid sulfate soils (PASS):
- all material used in the works must be ASS free and PASS free
  - all work affected by ASS or PASS is to be managed in accordance with *Queensland Acid Sulfate Soil Technical Manual Soil Management Guidelines*.<sup>16</sup>

#### Disturbance to bed and banks

- 5.1.5 During construction, disturbance to the instream bed and bank sediment of the waterway, beyond the barrier footprint, is to be minimised as much as practical.
- 5.1.6 If it is necessary to remove vegetation (marine, aquatic or riparian) for the development, the vegetation is to be cut no lower than ground level and the

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<sup>13</sup> This code does not apply to intentional duplications.

<sup>14</sup> Requirements under the *Queensland Heritage Act 1992* and any other relevant state or local legislation are the responsibility of the developer.

<sup>15</sup> See glossary for definition of a lawful structure.

<sup>16</sup> These guidelines are available from [www.dnrm.qld.gov.au](http://www.dnrm.qld.gov.au)

roots are to be left in the ground to aid in stabilisation. If deep excavation is required during construction the roots may only be removed within the construction footprint area under this code.

5.1.7 During the works specified under this code any removal, destruction or damage to marine plants must be carried out:

- according to the relevant Fisheries self assessable code<sup>17</sup>
- or according to the conditions of a development approval obtained under the Fisheries Act for the proposed marine plant disturbance.

5.1.8 For any part of the waterway bed or banks adjacent to the works that has been altered by the waterway barrier works, the site should be restored and/or rehabilitated, so that as a minimum:

- The profiles of the bed and banks are re-instated to natural stream profiles and stability within five business days of completion of works.
- The waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency.
- Vegetation and cover is rapidly re-established so that the native plant community at the site can recover or be enhanced e.g. by using native species.

### Timing of works

5.1.9 Work must not commence during times of elevated flows<sup>18</sup>.

5.1.10 Excavation work in un-bunded tidal areas is to be scheduled to occur within two hours either side of low tide.

5.1.11 In tidal areas, flow at the site must not be impeded<sup>19</sup> beyond 21 days.

### Water quality

5.1.12 Impacts on water quality are to be minimised by undertaking works to the standards set out in the Best Practice Erosion and Sediment Control guidelines 2008<sup>20</sup>.

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<sup>17</sup> See Fisheries Queensland codes for self-assessable development at [www.fisheries.qld.gov.au](http://www.fisheries.qld.gov.au) or contact Fisheries Queensland for further information (see section 6 for details).

<sup>18</sup> Except for emergency maintenance works

<sup>19</sup> Tidal flushing must be restored after 21 days.

<sup>20</sup> Best Practice Erosion and Sediment Control, 2008, International Erosion Control Association, Australasia.

## Temporary works

5.1.13 If temporary structures, such as bunds or sidetracks are required for construction, refer to the Fisheries Queensland code for self-assessable development WWBW02 Temporary waterway barrier works or contact Fisheries Queensland for further information (see section 6 for details).

## Fish kills

5.1.14 Provisions must be made to minimise the risk of fish kills arising from the works e.g. through entrapment of fish upstream or between works<sup>21</sup>.

5.1.15 In the event of fish that have been trapped by the works becoming distressed<sup>22</sup> the Fish Salvage Guidelines prepared by Fisheries Queensland must be implemented immediately<sup>23</sup>.

5.1.16 Fish kills must be reported to the Department of Environment and Heritage Protection on 1300 130 372.

## Notification

5.1.17 All works in this code require both pre-works and post-works notification<sup>24</sup>.

5.1.18 All applicable sections of the pre-works and post-works advice sheet must be completed in full.

5.1.19 A map of the location of the works and site photographs (see Appendix 3) are to be included with the pre-works and post-works advice sheets.

5.1.20 Separate notification is required for associated works at the same site under other Fisheries Queensland self-assessable codes.

5.1.21 At least five but no more than 20 business days before work commences, the pre-works advice sheet must be completed in full and submitted to the manager (Planning and Assessment) of the relevant regional fisheries centre (see section 6 for contact details).

5.1.22 For entities undertaking a Program of Works, a single pre-works notification can be made for the Program by including an attachment outlining:

- the numbers and types of waterway barrier works
- the location of each barrier site (attach a map(s) and if possible, a GPS mark in decimal degrees for each site)

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<sup>21</sup> Provisions based on best practice environmental management approaches are relevant

<sup>22</sup> Distressed fish may gasp at the water surface, exhibit rapid breathing, be rolling, lethargic etc.

<sup>23</sup> Fish salvage guidelines lists required permits to undertake fish salvage activities. These guidelines are available at [www.fisheries.qld.gov.au](http://www.fisheries.qld.gov.au) or on 13 25 23.

<sup>24</sup> For notification of emergency works also see 5.1.23

- estimated commencement and duration of each of the waterway barrier works
- likely associated marine plant disturbance where relevant.

5.1.23 Entities<sup>25</sup> undertaking emergency<sup>26</sup> bed level crossing maintenance works shall notify as for 5.1.15, soon as practicable after commencing the works.

5.1.24 Within 15 business days of the completion of works (including emergency maintenance works), the post-works advice sheet is to be completed in full and submitted to the manager (Planning and Assessment) of the relevant regional fisheries centre.

5.1.25 For entities undertaking a program of works (including emergency maintenance works), a single post-works notification can be made for the program by including an attachment outlining:

- the date each works was completed
- confirmation of the location of each barrier site (attach a map(s) and if possible, a GPS mark in decimal degrees, for each site).

## Signage

5.1.26 At all times, while works are proceeding, at least one sign is to be erected at a public road or waterway closest to the works site that enables the highest level of public visibility.

5.1.27 Each sign must have minimum dimensions of 500 mm by 500 mm.

5.1.28 The following words are to be legibly included on the sign—Operational works conducted under Fisheries Queensland self-assessable code. Call 13 25 23.

5.1.29 Signs must be removed within 48 hours of completion of works under this code.

5.1.30 Signage requirements under this code do not apply for:

- emergency maintenance works
- bed level crossing works being undertaken on a designated main road, by or on behalf of the Queensland Department of Transport and Main Roads.

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<sup>25</sup> See Glossary for definition of an entity

<sup>26</sup> See Glossary for definition of emergency maintenance works

## Replacement of existing crossing

5.1.31 Replacement of an existing crossing must be treated as the construction of a new crossing, thus carried out in accordance with the relevant sections 5.2, 5.3 or 5.4 of this code.

## Bed level crossing dimensions and design

5.1.32 In all bed level crossing constructions:

- The bed level crossing must be no greater than 15 metres wide in an upstream/downstream direction (not including stream bed scour protection).
- New bed level crossings must be aligned perpendicular (within 10°) to the water flow.
- Where the bed level crossing is to be constructed from rocks, use clean rocks (minimal fine material) that are an equivalent or larger size than the natural bed material at the site, and at least 50 mm diameter.
- The surface is to be left rough and not to be over compacted (e.g. track-rolled finish or rougher).

## Stream bed scour protection (see Figure 2)

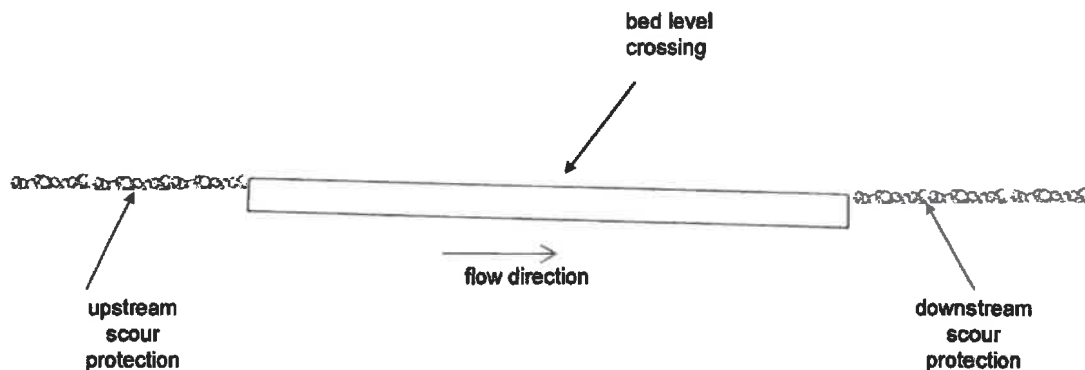
5.1.33 Where scour protection is incorporated:

- Scour protection must abut the surface edge of the crossing at the same level (this is to ensure that there is no drop in elevation at the join)<sup>27</sup>.
- The stream bed must abut the scour protection at the same level (this is to ensure that there is no drop in elevation at the join).
- The scour protection is installed at a gradient no steeper than 1 in 20 (for downstream scour protection) or the natural channel gradient, whichever is steeper.
- Scour protection must incorporate a low flow channel.
- Use clean rocks (minimal fine material), at least 100 mm diameter.
- Ensure the rock armouring is not over compacted but left proud and uneven (track-rolled finish or rougher).

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<sup>27</sup> If the crossing is set below bed level then the surface of the scour protection must also be below bed level





**Figure 2 Scour protection levels**

## Post-construction bed level crossing upkeep

5.1.34 All crossings constructed or replaced under this code must be inspected at least annually and reinstated to original design specifications if required, in order to maintain fish passage<sup>28</sup>.

5.1.35 For the life of the crossing, relative elevation levels of the crossing invert and stream bed scour protection and the stream bed must be retained so that there are no drops in elevation at their respective joins.

## 5.2 Construction of new or the replacement of existing bed level waterway crossings on assessable (purple) and high impact (red) waterways

### Duration

5.2.1 Works must commence and finish within a maximum time of 180 calendar days and instream sediment and silt control measures associated with the works must be removed within this period.

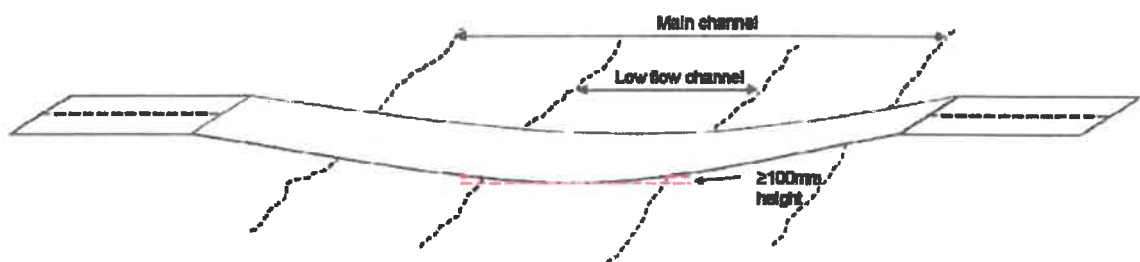
5.2.2 Bed level crossing configurations must also meet one of the following options:

- Option one (Figures 3 and 4)
  - The lowest point of the bed level crossing must be installed at the level of the lowest point of the natural stream bed (pre-construction), within the footprint of the proposed crossing.

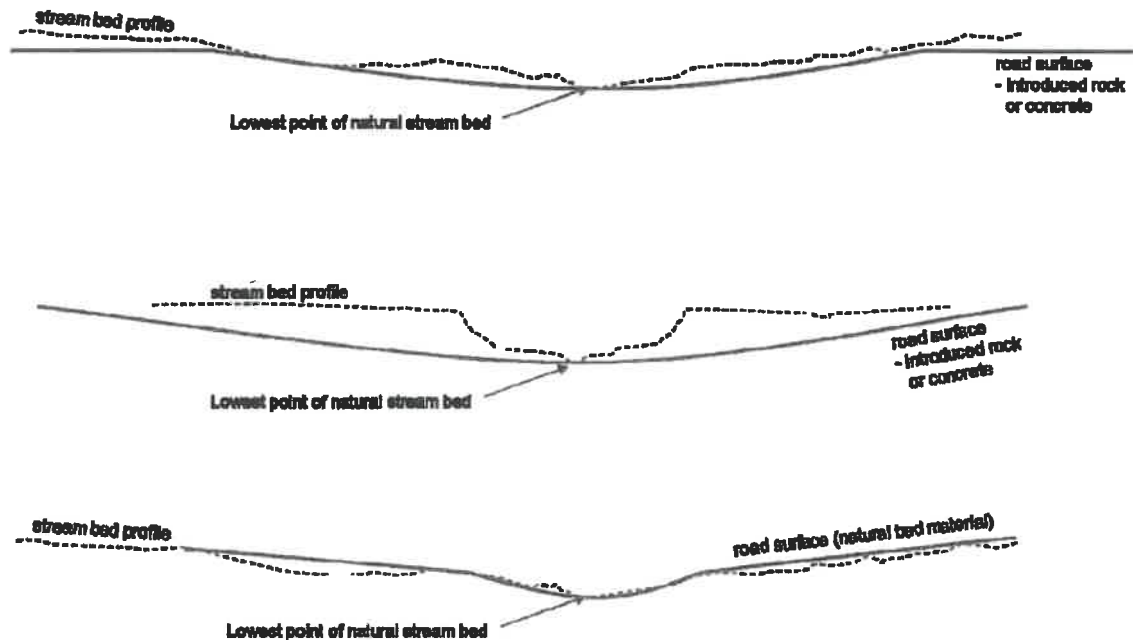
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<sup>28</sup> Removal of marine plants for maintenance purposes should be carried out under the relevant Fisheries self assessable code. Contact Fisheries Queensland for further information (see section 6 for details).

- There must be a height difference of at least 100 mm from the lowest point of the crossing to the edges of the low flow section of the crossing (see Figure 3).
- If the crossing is constructed from concrete or introduced rock then the level of the remainder of the crossing must be no higher than the lowest point of the natural stream bed outside of the low flow channel.
- If the crossing is constructed from the natural bed material the level of the remainder of the crossing must be no higher than the highest point of the natural stream bed outside the low flow channel.



**Figure 3** Option one—minimum height difference across the crossing

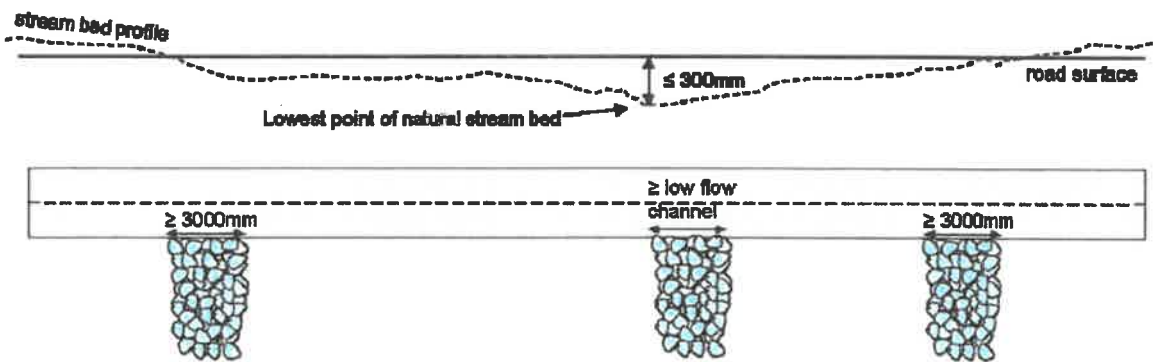


**Figure 4** Option one—possible crossing alignments

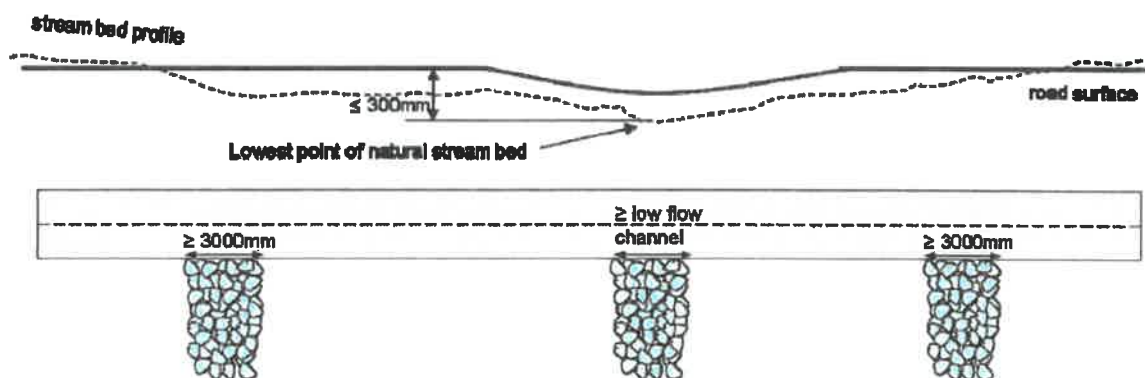
- Option two (Figures 5 and 6)
  - The deck height (pavement surface) of the bed level crossing can be built up to a maximum of 300 mm above the lowest point of the natural

stream bed (pre-construction), within the footprint of the proposed crossing.

- Adjacent to each bank, construct a rock chute at a slope no greater than 1 in 30 slope (3.3% grade).
- Adjacent to the low flow section of the crossing or aligned with the low flow channel of the waterway, construct a rock chute at a slope no greater than 1 in 30 slope (3.3% grade).
- The width of each bankside rock chute is a minimum of 3 m or 100% of the main channel width.
- The width of the low flow rock chute is a minimum of 100% of the low flow channel width.
- Where concrete is the construction material for the crossing, then the surface of the crossing must be roughened for the width of each rock chute, e.g. using a rough broom finish, exposed aggregate etc.



**Figure 5** Purple and red option two (no low flow section incorporated)—cross section and plan view



**Figure 6** Purple and red option two (low flow section incorporated)—cross section and plan view

## 5.3 Construction of new or the replacement of existing bed level waterway crossings on moderate impact (amber) waterways

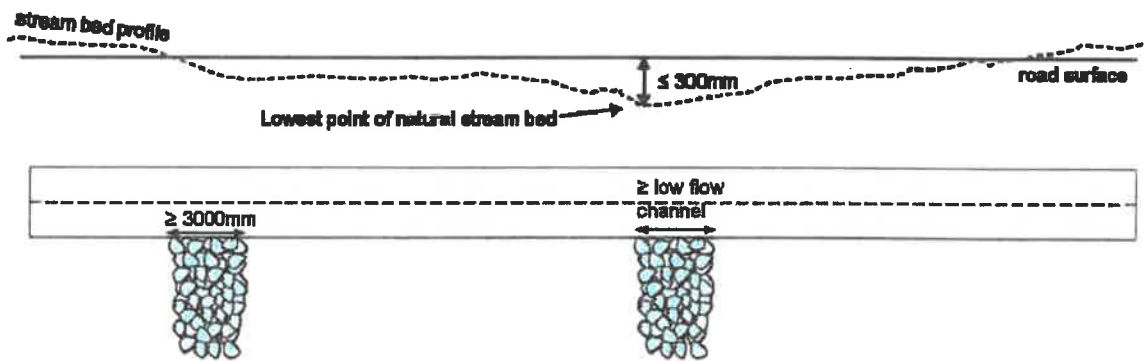
### Duration

5.3.1 Works must commence and finish within a maximum time of 360 calendar days and instream sediment and silt control measures associated with the works must be removed within this period.

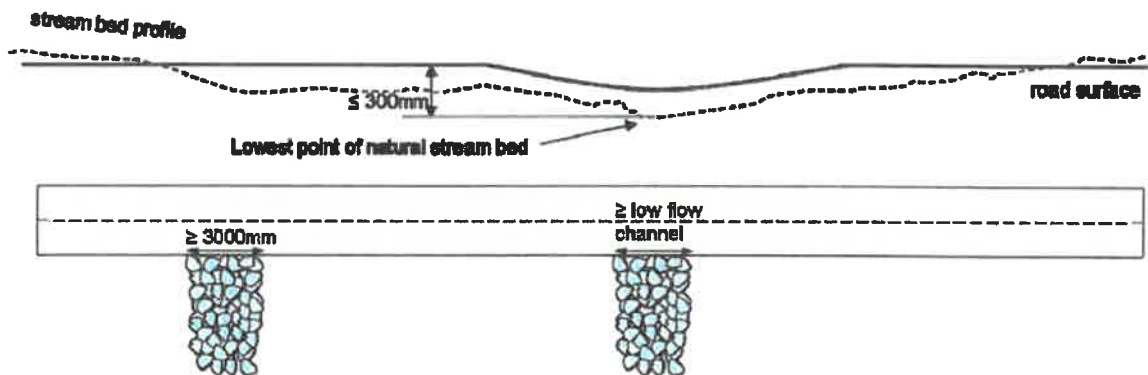
5.3.2 Bed level crossing configurations must also meet one of the following options:

- Option one (Figures 3 and 4)
  - The lowest point of the bed level crossing must be installed at the level of the lowest point of the natural stream bed (pre-construction), within the footprint of the proposed crossing.
  - There must be a height difference of at least 100 mm from the lowest point of the crossing to the edges of the low flow section of the crossing (see Figure 3).
  - If the crossing is constructed from concrete or introduced rock, the level of the remainder of the crossing must be no higher than the lowest point of the natural stream bed outside of the low flow channel.
  - If the crossing is constructed from the natural bed material, the level of the remainder of the crossing must be no higher than the highest point of the natural stream bed outside the low flow channel.
  
- Option two (Figure 7 and 8)
  - The deck height (pavement surface) of the bed level crossing can be up to a maximum of 300 mm above the level of the lowest point of the natural stream bed (pre-construction), within the footprint of the proposed crossing.
  - Adjacent to one bank, construct a rock chute from the downstream bed level to the road surface level, at a slope no greater than 1 in 30 slope (3.3% grade).
  - Adjacent to the low flow section of the crossing or aligned with the low flow channel of the waterway, construct a rock chute at a slope no greater than 1 in 30 slope (3.3% grade).
  - The width of the bankside rock chute is a minimum of 3 m or 100% of the main channel width.
  - The width of the low flow rock chute is a minimum of 100% of the low flow channel width.

- Where concrete is the construction material for the crossing then the surface of the crossing must be roughened for the width of the rock chute, e.g. using a rough broom finish, exposed aggregate etc.



**Figure 7** Amber option two (no low flow section incorporated)—cross section and plan view



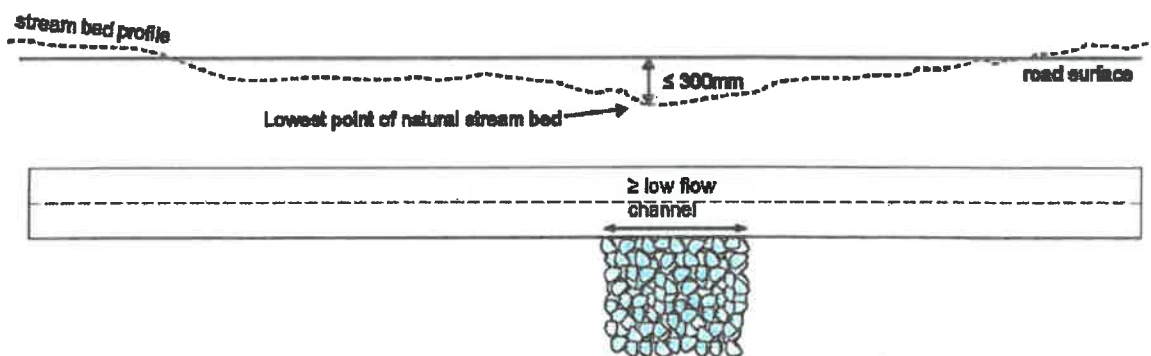
**Figure 8** Amber option two (low flow section incorporated)—cross section and plan view

## 5.4 Construction of new or the replacement of existing bed level waterway crossings on low impact (green) waterways

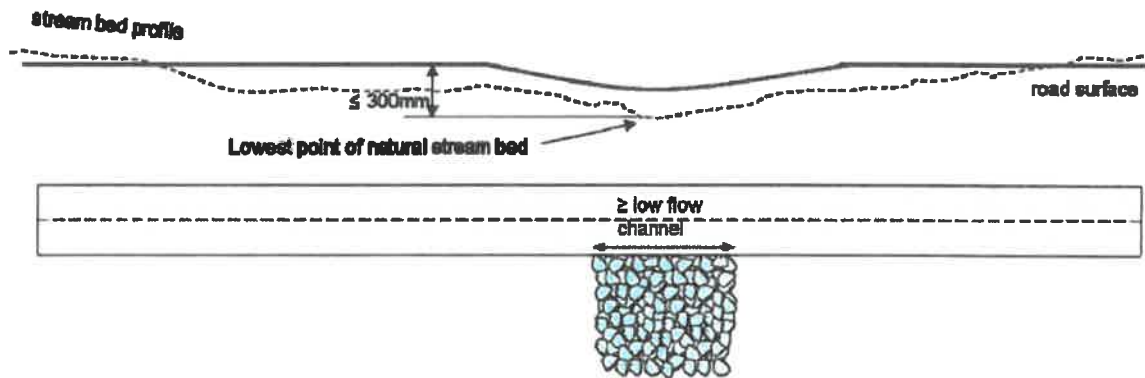
### Duration

- 5.4.1 Works must commence and finish within a maximum time of 360 calendar days and instream sediment and silt control measures associated with the works must be removed within this period.
- 5.4.2 Bed level crossing configurations must also meet one of the following options:
- Option one (Figure 3 and 4)
    - The lowest point of the bed level crossing must be installed at the level of the lowest point of the natural stream bed (pre-construction), within the footprint of the proposed crossing.

- There must be a height difference of at least 100 mm from the lowest point of the crossing to the edges of the low flow section of the crossing (see Figure 3).
  - If the crossing is constructed from concrete or introduced rock, the level of the remainder of the crossing must be no higher than the lowest point of the natural stream bed outside of the low flow channel.
  - If the crossing is constructed from the natural bed material, the level of the remainder of the crossing must be no higher than the highest point of the natural stream bed outside the low flow channel.
- Option two (Figure 9 and 10)
    - The deck height (pavement surface) of the bed level crossing can be up to a maximum of 300 mm above the level of the lowest point of the natural stream bed (pre-construction), within the footprint of the proposed crossing.
    - Adjacent to the low flow section of the crossing or aligned with the low flow channel of the waterway, construct a rock chute at a slope no greater than 1 in 30 slope (3.3% grade).
    - The width of the low flow rock chute is a minimum of 100% of the low flow channel width.
    - Where concrete is the construction material for the crossing then the surface of the crossing must be roughened for the width of the rock chute, eg using a rough broom finish, exposed aggregate etc.



**Figure 9 Green option two (no low flow section incorporated)—cross section and plan view**



**Figure 10 Green option two (low flow section incorporated)— cross section and plan view**

## 5.5 Maintenance works

### Duration

5.5.1 Maintenance works must commence and finish, and instream sediment and silt control measures associated with the works must be removed, within the following periods:

- on grey zone (tidal) waterways, 180 calendar days
- on purple and red waterways, 180 calendar days
- on amber and green waterways, 360 calendar days.

The below maintenance activities are permissible under this code<sup>29</sup>.

### Stream bed scour protection maintenance works

5.5.2 Scour protection maintenance works must be as per 5.1.33.

### Emergency maintenance works

5.5.3 Where emergency (bed level crossing) maintenance works are being carried out, these should be as for 5.2, 5.3 and 5.4 of this code.

5.5.4 Relevant requirements under 5.1 must also be implemented.

<sup>29</sup> For clarification on what activities are not considered to be maintenance, see *Waterway barrier works development approvals*, Fisheries Queensland Fish Habitat Management Operational Policy FHMOP 008.

## 6 Contacts and further information

To assist in interpreting and applying this code, additional information is available on the Fisheries Queensland website, or by contacting the relevant regional centre.

Current versions of all Queensland legislation, including those referred to in the document, can be found at the [Office of the Queensland Parliamentary Counsel website](#).

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### Fisheries Queensland

Website: [www.fisheries.qld.gov.au](http://www.fisheries.qld.gov.au)

Customer service centre: 13 25 23 or (07) 3404 6999

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### Regional centre contacts

If you are north of and including the Gladstone Regional Council area, contact:

Northern Fisheries Facility – Cairns  
Department of Agriculture, Fisheries and Forestry  
Manager (Planning and Assessment)  
PO Box 5396, Cairns Qld 4870  
Email: [idasnfc@daff.qld.gov.au](mailto:idasnfc@daff.qld.gov.au)  
Telephone: (07) 4057 3700

If you are south of the Gladstone Regional Council area, contact:

Maroochy Research Facility – Nambour  
Department of Agriculture, Fisheries and Forestry  
Manager (Planning and Assessment)  
PO Box 5083 SCMC, Nambour Qld 4560  
Email: [idassfc@daff.qld.gov.au](mailto:idassfc@daff.qld.gov.au)  
Telephone: (07) 5453 5860

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### Department of State Development, Infrastructure and Planning (DSDIP)

#### DSDIP

PO Box 15009

Brisbane City East

Queensland 4002

Telephone: 13 74 68 or (07) 3227 8548

Facsimile: (07) 3224 4683

Email: [info@dsdip.qld.gov.au](mailto:info@dsdip.qld.gov.au)

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For information on the SPA refer to the planning and development section of [www.dsdip.qld.gov.au](http://www.dsdip.qld.gov.au)

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## 7 Glossary

<b>Acid Sulfate Soils (ASS)</b>	<p>Acid sulfate soils are soils that contain iron sulfides. When exposed to air these sulfides oxidise to produce sulfuric acid, which has negative consequences for animals, plants and humans. Acid sulfate soils are mainly found on coastal lowland areas below five metres Australian Height Datum (AHD).</p> <p>Acid sulfate soils indicators include:</p> <ul style="list-style-type: none"><li>• acid scalds</li><li>• stunted and dead vegetation</li><li>• jarosite</li><li>• clear blue-green water</li><li>• iron staining, rust-red scum and oily-looking bacterial scum</li><li>• damaged infrastructure such as eaten away cement structures</li><li>• domination of acid tolerant aquatic plant species such as water lilies, rushes and sedges</li><li>• pH field tests are also a useful indicator.</li></ul> <p>For additional information see the Identifying acid sulfate soils factsheet available at <a href="http://www.dnrm.qld.gov.au">www.dnrm.qld.gov.au</a></p>
<b>Barrier</b>	<p>For the purposes of this code a waterway barrier is a crossing that is built at (or up to 300mm above) bed level and is located on a marked waterway (Appendix 1).</p> <p>A waterway barrier limits fish access and movement along a waterway.</p> <p>Crossings can act as barriers through increased water velocity and turbulence, shallow water depth, lack of resting and hiding areas, steps and drops in elevation across the gradient, constriction of channel, debris blockage etc.</p>
<b>Barrier material</b>	<p>Material that is used to construct or raise the barrier.</p>
<b>Bed level</b>	<p>Bed level is considered to be the lowest point of the natural stream bed (pre-construction) within the footprint of the proposed crossing.</p>
<b>Bed level crossing</b>	<p>Known by various names including ford, causeway, splash level road crossing etc. Does not include low flow pipes or culverts. Can be constructed with any compressed or hardened material e.g. rocks, gravel or concrete.</p>
<b>Deck height</b>	<p>The height of the road/pavement surface above the streambed at the point where a measurement is taken.</p>
<b>Developer</b>	<p>The person or organisation responsible for undertaking the bed level crossing works.</p>

<b>Development</b>	<p>As defined in the <i>Sustainable Planning Act 2009</i>, section 7.</p> <p>Includes building work, material change of use and operational work. Operational work includes the construction or raising of waterway barrier works.</p>
<b>Emergency maintenance works</b>	<p>Emergency maintenance works means the necessary works undertaken on a bed level waterway crossing to re-open a road or track that is no longer safely functional due to the sudden unforeseen failure or destruction of the crossing as a direct result of:</p> <ul style="list-style-type: none"> <li>• flooding, fire or earthquake</li> <li>• accidental vehicle impact.</li> </ul> <p>(The definition of emergency works does not include: failure due to wear and tear; increased traffic; obsolescence; inadequate design or materials; or construction practices).</p>
<b>Entity</b>	<p>For the purpose of this code, the following are considered entities under section 5.1.24, 5.1.25, 5.1.26:</p> <ol style="list-style-type: none"> <li>1. A local government under the <i>Local Government Act 1993</i> (Qld).</li> <li>2. A local government owned corporation under the <i>Local Government Act 1993</i> (Qld).</li> <li>3. A government department declared under the <i>Public Service Act 1996</i> (Qld).</li> <li>4. The Queensland Electricity Transmission Corporation Limited (ACN 078 849 233), trading as Powerlink.</li> <li>5. Ergon Energy Pty Ltd (ABN 66 078 875 902).</li> <li>6. Energex Limited (ABN 40 078 849 055).</li> <li>7. Queensland Rail (ABN 47 564 947 264).</li> <li>8. Northern SEQ Distributor-Retailer Authority (trading as Unitywater— ABN 89 791 717 472).</li> <li>9. Central SEQ Distributor-Retailer Authority (trading as Queensland Urban Utilities— ABN 86 673 835011).</li> <li>10. Southern SEQ Distributor-Retailer Authority (trading as Allconnex Water— ABN 80 769 308 350).</li> </ol>
<b>Footprint of works</b>	<p>The works footprint includes the base of the structure, apron works, scour protection works. It does not include approach roads and access tracks.</p>
<b>Freshwater</b>	<p>Waters that are upstream of tidal influence.</p>
<b>Lawful structure</b>	<p>A structure that was constructed in compliance with all the requirements, under an Act, relating to a structure of that type at the time of construction. See <i>Sustainable Planning Regulation 2009</i>, schedule 3, part 2.</p>

<b>Low flow</b>	For perennial waterways, low flows are base flow volumes or levels. For ephemeral waterways, low flows at commence to flow levels up to the level or volume of a one in one year flow event.
<b>Main channel</b>	<p>This is the active component of the flow channel characterised by a distinct change in appearance or structure at the upper limit of the channel such as undercutting; changes in vegetation density; sudden changes in bank slope; boundary levels for water marks, mosses or lichens; changes in sediment particle size. Approximate Q values of Q1 – 2 or AEP equivalent.</p> <p>Where the main channel width is variable, use an average width for the site.</p> <p>See Appendix 3 for examples.</p>
<b>Maintenance</b>	<p>For the purpose of this code, maintenance is limited to works described under section 5.5 of the code.</p> <p>Removal of marine plants should be carried out under the relevant Fisheries self assessable code.</p>
<b>Marine plants</b>	As defined under the <i>Fisheries Act 1994</i> , section 8. Includes but is not limited to mangroves, seagrass, saltcouch, algae and samphire (succulent) vegetation and adjacent plants such as Melaleuca and Casuarina. See also FHMOP001.
<b>PASS</b>	<p>Potential acid sulfate soils.</p> <p>PASS are waterlogged soils where the water prevents the air from reacting with the iron sulfides.</p> <p>If the water is drained from PASS soils, sulfuric acid is produced.</p> <p>PASS free refers to soils that are <u>not</u> potential acid sulfate soils.</p>
<b>Permanent waterway barrier works</b>	For the purposes of this code, permanent waterway barrier works are waterway barrier works that are (or will be) in place for a period longer than twelve months.
<b>Rock chute</b>	A rock chute is a section of stream bed or channel that has been armoured with rock, generally for erosion protection. In this context the rock chute is constructed within a waterway, on the downstream side and adjacent to a bank, culvert or low flow section of a crossing, in order to provide a level of fish passage at the crossing prior to drownout.
<b>Scour protection</b>	Stream bed structures upstream and downstream of waterway barrier works installed to prevent or remediate destabilisation and removal of substrate by the action of water flows on the waterway bed, adjacent to the hard structures of the works.
<b>Tidal</b>	Tidal waters are waters that are tidal or subjected to tidal influence.
<b>Waterway bed gradient</b>	The waterway bed gradient is the slope, rise or fall of the waterway. This is usually dependent on the location along the waterway.

## 8 Pre- and post-works advice sheet WWBW01

Complete all sections and mail or email to the manager (Planning and Assessment) of the relevant regional fisheries centre (see section 6 for contact details).

Note:

1. All applicable fields must be completed on this form. Incomplete forms will not be registered and works will not be lawful.
2. Both pre- and post-works notification are required. Post-works notification must include a copy of the completed pre-works notification.
3. Approvals may be required from other agencies prior to commencing work.

### **PART 1. PRE-WORKS ADVICE**

*Mail / email at least five business days but not more than 20 business days before works commence*

**1. Date work to commence:**

**2. Estimated duration (no. days):**

**3. Details of person undertaking works and organisation**

*This person may be contacted by Fisheries Queensland for monitoring purposes*

Name:

Organisation:

Address:

Email:

Phone (h):

(w):

(mob):

Facsimile:

**4. Location** Attach map and site photographs (see Appendix 3 for instructions) to the pre-works advice (this) sheet

Latitudinal and longitudinal extent for area (decimal degrees i.e. ddd.ddddd):

\_\_\_\_.\_\_\_\_.\_\_\_\_S \_\_\_\_\_.\_\_\_\_.\_\_\_\_E; \_\_\_\_\_.\_\_\_\_.\_\_\_\_S \_\_\_\_\_.\_\_\_\_.\_\_\_\_E

\_\_\_\_.\_\_\_\_.\_\_\_\_S \_\_\_\_\_.\_\_\_\_.\_\_\_\_E; \_\_\_\_\_.\_\_\_\_.\_\_\_\_S \_\_\_\_\_.\_\_\_\_.\_\_\_\_E

Datum system: GDA94  WGS84

UBD map and reference, if applicable, (e.g. Map 177, J11):

Street address:

Suburb:

Lot on plan:

Nearest town:

Local government area:

Name of waterway:

*(Site photographs must be attached – see Appendix 3)*

#### **5. Works details**

Work type and purpose, specify private or public purpose:

Brief description of works proposed:

Type and size of structure (length, height, width, construction material, construction methods etc):

#### **6. Marine plant disturbance**

Will the works disturb marine plants? Yes  No  Go to 7

Will the marine plant disturbance be carried out under a marine plant self assessable code? Yes  No

If yes, specify which marine plant self assessable code(s)

If no, provide details of the relevant development approval for the marine plant disturbance

## 7. Declaration

In completing the notification form, I confirm that the following have been undertaken

1. The self-assessable code WWBW01 (Part 4) January 2013 has been read
2. The self-assessable code WWBW01 (Part 4) January 2013 has been understood
3. The proposed works comply with the self-assessable code WWBW01 (Part 4) January 2013
4. Photographs of the site have been attached

Person (name in full):

Signature:

Date:

## 8. Notification details

*Please provide the name of the Regional Fisheries Facility you have notified.*

Regional Fisheries Facility advised:

Date:

### OFFICE USE ONLY

Date of entry:

DLS Authority Number:

**Please keep a copy of this form for your records**

Note:

1. No acknowledgement/receipt will be given by DAFF.
2. Compliance with the code is the responsibility of the submitter.

**PART 2. POST-WORKS ADVICE**

*Complete and mail / email with a completed copy of the pre-works advice sheet within 15 business days of completion of works*

**1. Work completion**

Date works completed:

Signature:

Attach photographs of completed works at site (see Appendix 3)

**2. Notification details**

*Please provide the name of the Regional Fisheries Facility you have notified.*

Regional Fisheries Facility advised:

Date:

**OFFICE USE ONLY**

Date of entry:

DLS Authority Number:

**Please keep a copy of this form for your records**

Notes:

1. No acknowledgement/receipt will be given by DAFF.
2. Compliance with the code is the responsibility of the submitter.

# Appendix 1

## *Queensland Waterways for Waterway Barrier Works spatial data layer*

### **Disclaimer for the spatial data layer**

While every care is taken to ensure the accuracy of the spatial data layer, all data custodians and/or the State of Queensland makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs to which the user might incur as a result of the data being inaccurate or incomplete in any way and for any reason.

While the best available data has been used in generating the layer *Queensland Waterways for Waterway Barrier Works*, waterways are dynamic systems and in a constant state of change which may not be reflected in the data. The information portrayed is therefore subject to revision.

Where the fitness of the data layer in representing the site on the ground is in question, the burden for ensuring that the appropriate procedures are employed at the site rests solely with the user. Therefore the data layer should not be the only source for determining the relation of a site to a waterway. Insufficient site-waterway determinations for barrier works by the user may be prosecuted under provisions of the *Sustainable Planning Act 2009* and the *Fisheries Act 1994*. Any apparent discrepancy should first be checked with the Department of Agriculture, Fisheries and Forestry.

### **Availability**

The most current version of the data layer *Queensland Waterways for Waterway Barrier Works* can be downloaded from the [Queensland Government Information Service](#) website.

### **User guide**

For further information on how to make adequate waterway determinations refer to the *Guide for the determination of waterways using the spatial data layer Queensland Waterways for Waterway Barrier Works* available from the [Fisheries Queensland Website](#).



## Appendix 2

### Main channel

The main channel of a given waterway is the active component of the flow channel. The extent of the main channel is also referred to as bankfull level.

The majority of creeks and rivers display geomorphologic features indicative of the main (active) channel. This may include more than one active channel for a given waterway, especially in low gradient waterways with sand and gravel sediments. A small number of waterways may not display indicators for the main channel, such as those incised in bedrock.

Many features can be used to help identify the limits of the main channel (bankfull level) and significant work has been done on this in the United States of America (USA). Elements of the studies conducted in the eastern USA can provide useful information for determining main channels in Queensland. Videos detailing their determination of bankfull level (main channel extent) can be viewed online at <http://www.stream.fs.fed.us/publications/videos.html>.

The furthest extent of the main channel can be characterised by a distinct change in the appearance of the bank at a certain level, including:

- undercutting
- changes in vegetation density
- sudden changes in bank slope
- boundary levels for water marks
- mosses or lichens
- changes in sediment particle size
- and the height of a point bar on the inside of a meander bend.

These features may be used to identify the main channel of the waterway.

The determination of the main channel should be made in an area of the waterway that is relatively stable and not severely altered by localised scouring and erosion. Where the main channel width is variable at a given site, an average width for the site may be used for determining dimensions of the waterway.

Overseas studies have found that the dominant active channel forming flow (bankfull discharge) occurs at an average recurrence interval between 1 and 2 years.<sup>30 31</sup> This modest flow forms and maintains the main channel of a given waterway, with larger

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<sup>30</sup> Dunne, T. and L.B. Leopold. 1978. Water in Environmental Planning. W.H. Freeman&Co. New York. 818 pp.

<sup>31</sup> Q1 - Q2 or annual exceedence probability (AEP) equivalent

flow events potentially altering its course and flow path<sup>32</sup>. Knowledge of the bankfull flow levels can help in identifying the main channel.

The following photos are examples of waterways throughout Queensland and show the main and low flow channels. The titles refer to the colour coding used in the *Queensland Waterways for Waterway Barrier Works* data layer. In some waterways the low flow and main channels may be difficult to differentiate such as the waterhole sections of wallum and low slope western waterways.

**Main channel**



**Low flow channel**



**Image 1 Purple—Leichardt River (Coolullah Station)**

---

<sup>32</sup> Water and Rivers Commission, 2000. *Stream Channel Processes: Fluvial Geomorphology*. Waters and Rivers Commission River Restoration Report No. RR6



**Image 2 Purple—Bottle Creek (Rosedale)**



**Image 3 Purple—Elizabeth Creek (Burketown)**



**Image 4** Purple—Gilliat River (Julia Creek)



**Image 5** Purple—Splitters Creek (Bundaberg). Note, the blue line indicates the cease to flow level for this waterhole.



**Image 6** Purple—Thomson River (Stonehenge). Note, the blue line indicates the cease to flow level for this waterhole.



**Image 7** Red—Un-named Tributary (Rosedale)



**Image 8 Red—Splitters creek (Bundaberg)**



**Image 9 Orange—Un-named Tributary (Baffle Creek)**



**Image 10 Orange—Magowra Creek (Normanton)**



**Image 11 Orange—Un-named tributary (Condamine)**



**Image 12 Green—Butha Creek (Great Sandy Straits)**



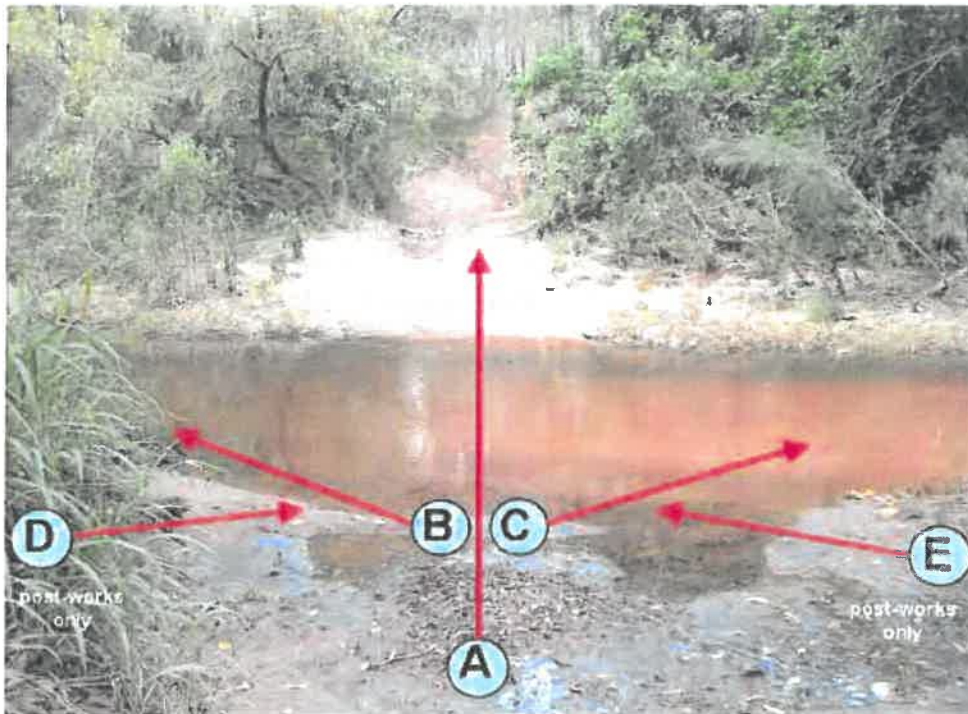
**Image 13 Green—Un-named Tributary (Deepwater National Park)**



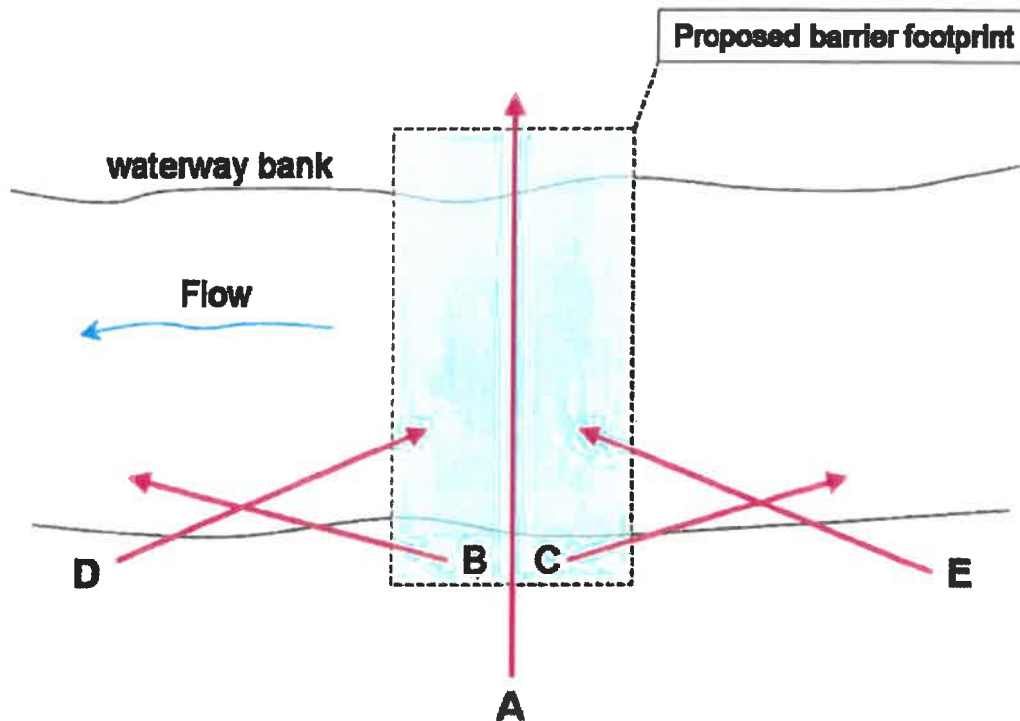
## Appendix 3

### Site photograph instructions

Figures 1 and 2 depict where the photographs need to be taken at a given waterway for pre- and post-works notification.



**Figure 11** The location and direction of pre- and post-works photos at a site of proposed barrier works



**Figure 12** Generalised plan view of a site showing the location of photos to be taken for pre- and post-works notification

### Pre-works notification photos

A minimum of three pre-works photographs need to be taken of the waterway at the site of proposed works.

- Photo A—looking across the waterway at the proposed site of works.
- Photo B—looking downstream of the proposed site of works.
- Photo C—Looking upstream of the proposed site of works.



**Photo A**      **Looking across the waterway**



**Photo B**      **Looking downstream**



**Photo C      Looking Upstream**

#### **Post-works notification photos**

A minimum of five post-works photographs need to be taken of the waterway after the works are completed. This includes the same photo locations for the pre-works notification and two additional photos looking at the completed barrier works from an upstream and downstream position.

- Photo A—looking across the waterway at the completed works.
- Photo B—looking downstream of the completed site of works.
- Photo C—looking upstream of the completed site of works.
- Photo D—looking at the completed barrier works from a downstream position.
- Photo E—looking at the completed barrier works from an upstream position.



**Photo A** Looking across the waterway



**Photo B** Looking downstream (after waterway barrier works)



**Photo C** Looking upstream (after waterway barrier works)



**Photo D** Looking at the completed waterway barrier works from a downstream position



**Photo E**      **Looking at the completed waterway barrier works from an upstream position**



**Department of Agriculture, Fisheries and Forestry**

**13 25 23**

[www.fisheries.qld.gov.au](http://www.fisheries.qld.gov.au)









Banana Shire Council  
PLANNING APPROVAL

23 OCT 2019

# Smokey Creek Solar PV Farm

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## Ecological Assessment

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RPS

## Document status

Version	Purpose of document	Approved by	Reviewed by	Review date
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2.	Draft Report for Client Review	LL	AF	30-JUL-2018
3.	Final Report for Issue including Client Amendments	AF	AW	16-AUG-2018

## Approval for issue

Name	Signature	Date
Laurence Liessmann		16-AUG-2018

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# 1 Introduction

**Edify Energy Pty Ltd (Edify)** propose to construct and operate a solar farm on property located on Hibbs Road, off the Burnett Highway, approximately 15 km south-east of Dixalea (Figure 1). The project will be constructed over seven properties; Lot 39 on RN395; Lot 28 on RN211; Lot 18 on RN271; Lot 37 on RN1147; Lot 29 on RN210; Lot 32 on RN194; Lot 33 on RN210. The project will consist of:

- Solar photovoltaic panels;
- Sub-station;
- New overhead powerline;
- Transmission infrastructure;
- Site buildings and storage areas;
- Laydown and construction compound; and
- Access tracks

**RPS Australia East Pty Ltd (RPS)** has been engaged by Edify to undertake an ecological assessment for the project. The purpose of the investigation is to inform the statutory planning process, provide information for input into the design process and identify any potential ecological constraints relating to the development of the proposed PHES.

## 1.1 Objectives

The objective of the ecological assessment was to identify potential environmental constraints relating to development of the proposed PHES. These matters include threatened species and ecological communities listed as Matters of National Environmental Significance (MNES) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), listed threatened species pursuant to the *Nature Conservation Act 1992* (NC Act) and Matters of State Environmental Significance (MSES) under Queensland legislation.

The specific objectives of this study were to:

- Review relevant background information and data related to ecological constraints in a local and regional context;
- Describe the ecological values of the survey area, with consideration to relevant statutory requirements; and
- Detail any potential ecological constraints and opportunities of the proposed development.

## 1.2 Scope of works

The scope of the study included the following:

- Prepare a detailed desktop assessment of background information and legislative/policy documents relevant to the project;
- Undertake a brief site inspection; and
- Prepare a report detailing, methodology and results of the assessment.

### 1.3 Project area description

The project area occupies an area of approximately 2,113 ha on part of Lot 39 on RN395; Lot 28 on RN211; Lot 18 on RN271; Lot 37 on RN1147; Lot 29 on RN210; Lot 32 on RN194; Lot 33 on RN210, Dixalea (Figure 1) located within the Banana Shire Local Government Area. The total area of the allotments on which the development is proposed is approximately 3,623 ha. An aerial photograph of the site and surrounds is provided in Figure 2.

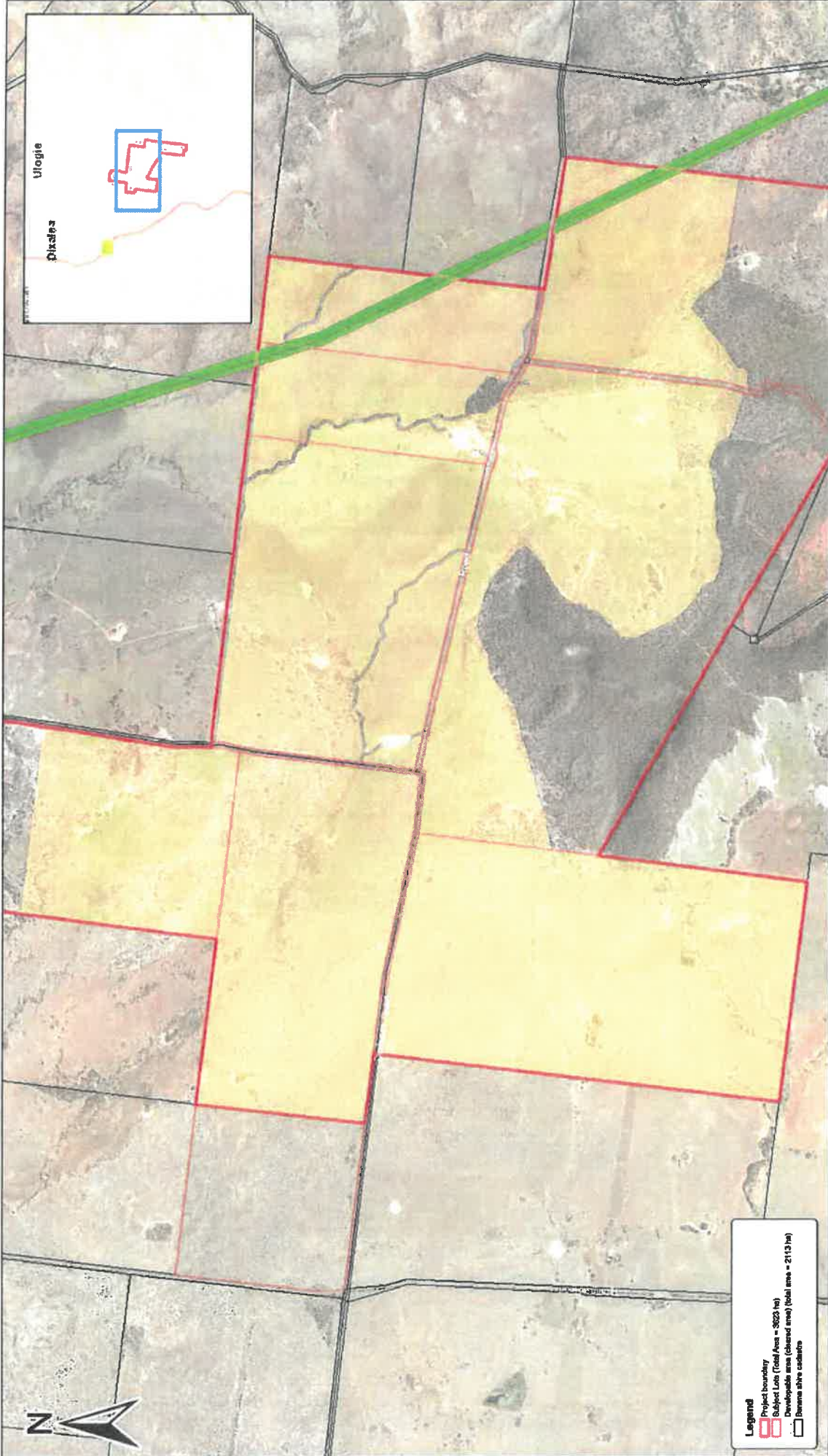
The project area is predominantly within the Callide Creek Downs sub-region of the Brigalow Belt South bioregion (BBSB) and a small section occurs in the Mount Morgan Ranges sub-region.

The project area is characterised by flat to undulating plains of stony brown clay loam that evidently supported brigalow and semi-evergreen vine thicket prior to clearing. The land management history of the project area includes clearing for pasture improvement and cattle grazing to the extent that the project area now contains only isolated trees and small, highly fragmented stands. Few areas of remnant vegetation have been retained on low-lying areas of the property. Habitat for native species is now highly modified being fragmented and heavily impacted by cattle grazing.

The elevation of the project area ranges from between 200 m AHD and 230 m AHD and is characterised by undulating plains with associated slopes and crests.

A high voltage transmission line passes immediately adjacent to the project area through lot 33RN210 and 37RN1147 in a north-west/south-east direction.





**Legend**

- Project boundary
- Subject Lots (Total Area = 3823 ha)
- Developable area (cleared area) (total area = 2113 ha)
- Shown as a cadastral

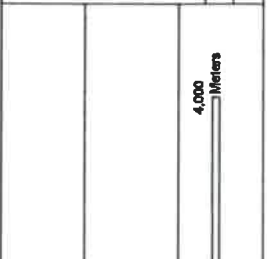
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Plan Ref	Rev	Sheet	
140339-1-01	A	A3	

**PROJECT**  
**SMOKY CREEK SOLAR PROJECT**

**FIGURE 1: SITE LOCATION PLAN**

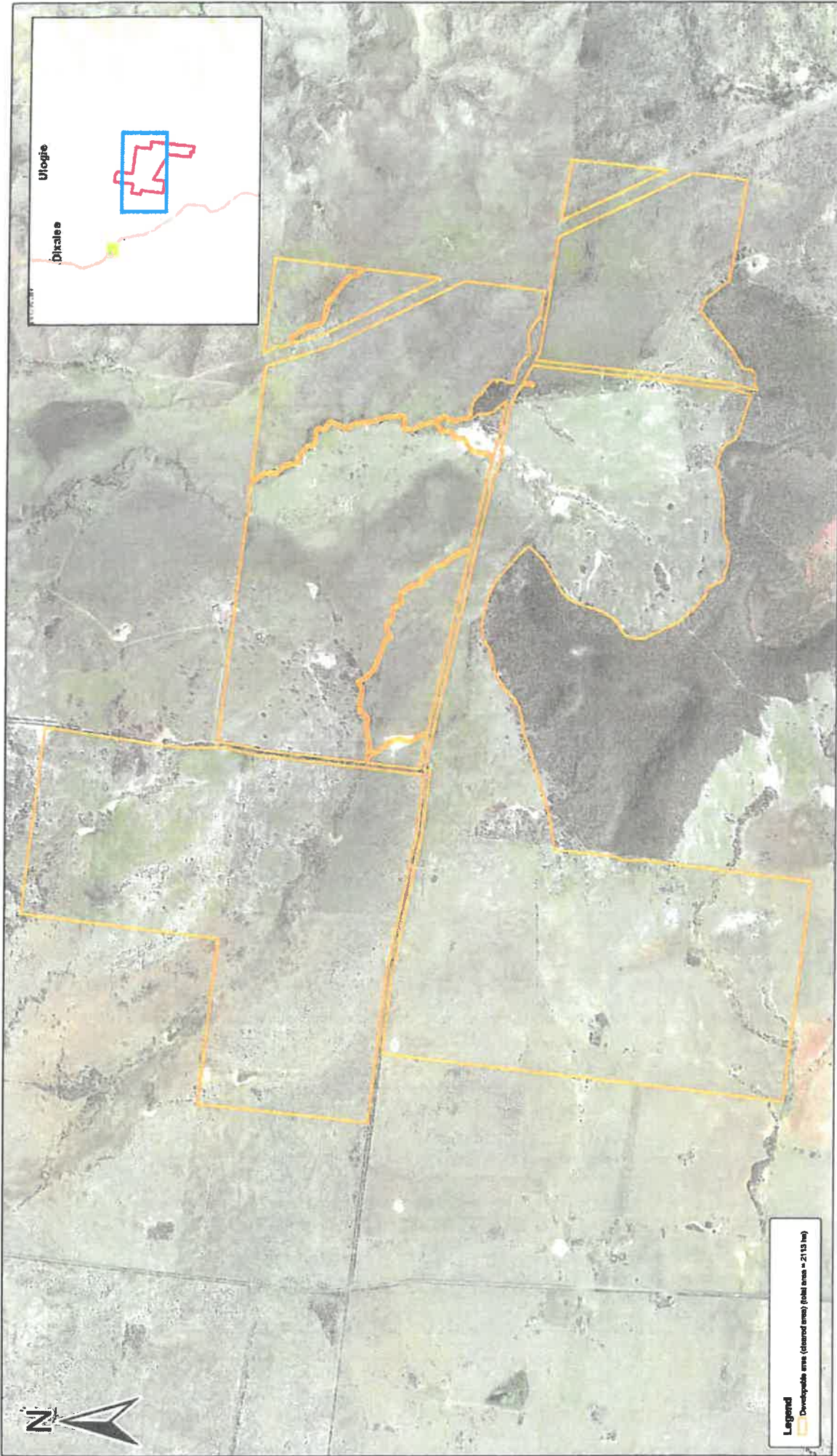


Source: Department of Natural Resources & Mines - Cadastral Data, Electricity network, Townsville Local Government Area  
 Queensland Government, Queensland Department of Natural Resources and Mining (1:100,000 and 1:250,000) - version 1.46 State of Queensland (Department of Natural Resources and Mining) 2016,  
 Wetland protection area - high ecological significance wetland @ State of Queensland (Department of Environment and Heritage Protection) 2016  
 Wetland protection area - substantial habitat rmp - version 4.540 State of Queensland (Department of Natural Resources and Mining) 2016

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Coordinate System: GDA 1984 MGA Zone 56  
 Projection: Transverse Mercator  
 Datum: GDA 1984

Document Name: 140339-3-01RevB\_SiteLocationPlan  
 Date: 16/08/2018  
 Author: AF  
 Project Manager: MC



**Legend**  
 Developable area (cleared area) (total area = 2113 ha)

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**PROJECT**  
**SMOKY CREEK SOLAR PROJECT**

**FIGURE 1: AERIAL IMAGERY OF PROJECT AREA**

0 1,000 2,000 3,000 4,000 Meters  
 Reference Scale: 1:26,833

Source: Department of Natural Resources & Mines - Geobase data (originty) about Townsville Local Government Area  
 © State of Queensland (Department of Natural Resources and Mines) 2014.  
 Vegetation management resources and change feature map (1:100 000 and 1:250 000) - version 1.4 © State of Queensland (Department of Natural Resources and Mines) 2014.  
 Wetland protection area - high ecological significance version © State of Queensland (Department of Environment and Heritage Protection) 2015  
 Vegetation management - essential habitat map - version 4.5 © State of Queensland (Department of Natural Resources and Mines) 2010

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is as up to date and accurate, no guarantee is given that the information portrayed is free from error or omission.  
 Please verify the accuracy of all information prior to use.

Coordinate System: GDA 1984 MGA Zone 58  
 Projection: Transverse Mercator  
 Datum: GDA 1984

Document Name: 140339-3-02RevB_AerialImagery	Author: AF	Project Manager: MC
Date: 16/08/2018		

## 1.4 Statutory considerations

The following legislation, policy, guidelines and guidance documents provided in **Table 1** are relevant to identifying the impacts and constraints relevant to the site and provide guidance in the assessment of the ecological values of the site.

**Table 1 Relevant environmental statutory considerations**

Legislative act	Brief description
<b>Commonwealth Legislation</b>	
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	<p>The <i>Environment Protection and Biodiversity Conservation (EPBC) Act 1999</i> provides a mechanism for assessing the environmental impact of activities and development where "Matters of National Environmental Significance" (MNES) may be significantly affected. The Act identifies eight matters of MNES, which require consideration and analysis, including:</p> <ul style="list-style-type: none"> <li>• Ramsar wetland of international importance;</li> <li>• World Heritage properties;</li> <li>• National Heritage places;</li> <li>• Commonwealth Marine areas;</li> <li>• Great Barrier Reef Marine Park;</li> <li>• Nationally threatened species and ecological communities;</li> <li>• Nationally listed migratory species; and</li> <li>• Nuclear actions (including uranium mining).</li> </ul> <p>Where a project or action is believed to potentially cause a significant impact on a matter of MNES, it is to be referred to the Australian Government Department of Environment (DoE) for assessment as to whether the action is a 'controlled action' requiring Commonwealth approval for the proposed action. The EPBC Act processes also allow voluntary referral of a Project to seek confirmation that a Project will not have significant impacts on matters of MNES. Where an action requires Commonwealth approval, a formal assessment process is undertaken in accordance with provisions of relevant legislation.</p>
<b>State Legislation</b>	
<i>Nature Conservation Act 1999</i>	<p>The <i>Nature Conservation Act 1992 (NCA)</i> aims to conserve nature through strategies such as dedicating and declaring protected areas for those parts of Queensland with outstanding biological diversity, natural features and wilderness values. The Act provides for the protection of near threatened, vulnerable and endangered animals and plants.</p> <p><i>Nature Conservation (Wildlife) Regulation 2006.</i></p> <p>In support of the purpose and the provisions of the NCA, the <i>Nature Conservation (Wildlife) Regulation 2006</i> lists all flora and fauna species which are considered to be 'extinct in the wild', 'endangered', 'Vulnerable', 'Near Threatened' and 'Least Concern' wildlife.</p>
<i>Vegetation Management Act 1999</i>	<p>The VM Act is the planning initiative underlying regional management of vegetation in Queensland, including clearing of vegetation types, termed Regional Ecosystems (REs).</p> <ul style="list-style-type: none"> <li>• The RE classification is a hierarchical system formed by a three-part code with the primary subdivision being bioregion, followed by land zone, and then vegetation. The biogeographic region or bioregion is the primary level of classification for biodiversity values in Queensland describing where the RE is found on a state-wide basis. Land Zones are geological and geomorphic categories that describe the major geologies and landforms of Queensland. The system is based primarily on geology, with geologic age considered an important determinant;</li> </ul>

## Legislative act

## Brief description

- The status of REs is based on their pre-clearing and remnant extent, and is gazetted under the Act and listed in the RE Description Database (REDD) maintained by the Queensland Department of Environment and Heritage Protection (DEHP); and
- The Act aims to conserve remnant endangered and of concern REs, prevent land degradation and further loss of biodiversity, manage the environmental impacts of clearing vegetation and reduce the emissions of greenhouse gases. The VMA status of an RE is described in line with the following:
  - Endangered. A RE that is prescribed under the regulation and has either of the following attributes:
    - Less than 10% of its pre-clearing extent remaining; or
    - From 10% to 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000ha.
  - Of concern. An RE that is prescribed under the regulation and has either of the following attributes:
    - From 10% to 30% of its pre-clearing extent remaining; or
    - More than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha; or
  - Least concern. A RE that is prescribed under the regulation and has more than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is more than 10,000ha; or
  - The biodiversity status of a RE is classified by DEHP based on the condition of remnant vegetation. A RE will have a vegetation management status and/or a biodiversity status of endangered, of concern or least concern; or
  - Essential Habitat.

The VMA also has provision for the regulation of essential habitat for species of state significance. Essential habitat (mapped by DEHP) is vegetation in which a listed species has been known to occur. Clearing or disturbance to areas of essential habitat will require compensatory habitat measures to be developed. For the project development area, core habitat has been used to describe the combination of critical or essential habitat for both national or state listed significant species.

*Water Act 2000*

The *Water Act 2000 (Water Act)* provides for the sustainable management of water and other resources, a regulatory framework for water sewerage services, and the establishment and operation of water authorities. The Water Act governs the construction, control and management of works with respect to water conservation and protection, irrigation, drainage, water supply, flood control and prevention.

The Water Act regulates the destruction/ disturbance of freshwater riverine vegetation in the bed and banks of Department of Natural Resources and Mines (DNRM) watercourses. Section 266 of the Water Act identifies that:

A person may apply to the chief executive for a permit to do any or all of the following activities:

- Destroy vegetation in a watercourse, lake or spring;
- Excavate in a watercourse, lake or spring; and
- Place fill in a watercourse, lake or spring.

Destruction of vegetation in accordance with the Water Act is "...the removing, clearing, killing, cutting down, felling, ringbarking, digging up, pushing over, pulling over or poisoning of the vegetation". In accordance with the Water Act, watercourses are determined as watercourses by the DNRM through topographical mapping, aerial imagery and a possible onsite assessment.

Legislative act	Brief description
<b>Queensland Fisheries Act 1994</b>	<p>The <i>Fisheries Act 1994</i> (Fisheries Act) provides for the use, conservation and enhancement of the community's fisheries resources and fish habitat by providing for, amongst other things, the protection of fish habitats.</p> <p>The Fisheries Act has been integrated into the <i>Sustainable Planning Act 2009</i> (SP Act) so that development permits under the SP Act are required for certain operational works that are assessable development under the SP Act.</p> <p>Operational works that are assessable development under the SP Act include waterway barrier works and works in a declared fish habitat.</p>
<b>Environmental Offsets Act 2014</b>	<p>On 1 July 2014, a new environmental offsets framework was introduced in Queensland. The new framework streamlines environmental offsets by providing an outcome-based approach to offsets, removing the complexities and duplication associated with the former offsets framework and aligning offsets across all three levels of government.</p> <p>The new framework includes:</p> <ul style="list-style-type: none"> <li>● <i>Environmental Offsets Act 2014</i> which coordinates the delivery of environmental offsets across jurisdictions is the overarching legislation for offsets in Queensland;</li> <li>● <i>Environmental Offsets Regulation 2014</i> which provides details of the prescribed activities regulated under existing legislation and prescribed environmental matters to which the Act applies; and</li> <li>● Queensland Environmental Offsets Policy which provides a single, consistent, whole-of-government policy for the assessment of offset proposals provided by authority holders to satisfy offset conditions.</li> </ul> <p>The new policy provides greater flexibility in relation to how offsets can be delivered including:</p> <ul style="list-style-type: none"> <li>● Financial settlement calculated using the Financial Settlement Offset Calculator;</li> <li>● Land-based offsets; and</li> <li>● Offsets delivered as actions in a Direct Benefit Management Plan.</li> <li>● Or a combination of these approaches.</li> </ul> <p>Where offset conditions specify, staged offsets can also be delivered.</p> <p>The policy also introduces a more strategic approach to offset delivery through the introduction of Strategic Offset Investment Corridors and Direct Benefit Management Plans (DBMP). This more strategic approach is intended to lead to greater benefits for the environment and will provide more opportunities for landholders to receive income in return for voluntarily agreeing to manage their land, or part of their land, as an offset.</p>

## 2 Methods

### 2.1 Desktop assessment

The desktop assessment involved a review of relevant environmental documents, databases, scientific journals, books, technical reports, maps and legislation (Commonwealth, State and Local) to identify the ecological values that potentially occur within and surrounding the project area.

This review included an assessment of the following information:

- Aerial Photograph Interpretation (API) to determine the broad categorisation of vegetation within and surrounding the site and to review the extent of historical clearing and land use, and any other significant environmental features such as watercourses and wetlands (Google Earth 2016);
- Regulated vegetation management map: The most recent version of the DNRM Regulated Vegetation Management mapping (2015) including regional ecosystems (Version 10.1), essential habitat mapping (Version 7.04) (Figure 3)
- Referable Wetlands mapping. The referable wetlands mapping produced by the DEHP was reviewed to provide an indication of the occurrence and location of any wetland management areas (comprising significant wetlands and a 100 m wetland buffer area) in relation to the landforms of the site;
- DEHP Protected Plants Flora Survey Trigger Map (Appendix A);
- Wildlife Online database of flora and fauna. This database holds records of plants and animals that have either been sighted or collected within a given radius of the site (a search parameter was prescribed limiting the search area to a 15km radius around an approximate central point of the site (-24.0564, 150.4114). Records held in this database are maintained by DEHP (Appendix B);
- Atlas of Living Australia species records review (AoLA, 2016);
- Protected matters database of Matters of NES. This database applies a range of bio-models to predict the presence of species of flora and fauna and other matters of NES within a given radius of the site (a search parameter was prescribed limiting the search area to a 15km radius around an approximate central point of the study area (-24.0564, 150.4114), as cited under the Commonwealth's EPBC Act (Appendix C).

### 2.2 Site inspection

A site inspection of the project area was undertaken by **Simon Danelson** (Principal Ecologist), on 23 June 2018. A ground traverse of the proposed clearing footprint was undertaken, including an examination of onsite vegetation communities and general fauna habitat values.

The habitat assessment focused on identifying the broad habitat features typically associated with threatened species considered to potentially occur onsite.

## 3 Results

### 3.1 Flora

#### 3.1.1 Regional ecosystems

Regulated vegetation mapping in Queensland divides vegetation into three broad categories: remnant, non-remnant and high value regrowth vegetation. The map shows areas that are assessable and non-assessable under the provisions of the *Vegetation Management Act 1999* (VMA). Table 2 outlines the definitions of each of these categories.

**Table 2 Description of vegetation classifications**

Vegetation classification	Definition
Remnant Vegetation (Category A)	Areas subject to compliance notices, offsets and voluntary declarations.
Remnant Vegetation (Category B)	Remnant vegetation is vegetation which has never been cleared or vegetation which has been cleared but has regrown to meet the following: <ul style="list-style-type: none"> <li>• 50% of the original undisturbed canopy cover;</li> <li>• 70% of the original undisturbed canopy height; and</li> <li>• Composed of the same floristic species that would exist if the vegetation community were undisturbed.</li> </ul>
Reef Regrowth watercourse vegetation (Category R)	Native woody vegetation on freehold land, Indigenous land or leasehold land granted for agriculture or grazing purposes, located within 50 metres of a watercourse in the Burdekin, Mackay, Whitsunday and Wet Tropics Great Barrier Reef catchments (if there is no native vegetation within 50 metres of a regrowth watercourse, the code does not apply).
High Value Regrowth Vegetation (Category C)	Category C regrowth vegetation is an area on leasehold land granted for agricultural or grazing purposes that has regrowth vegetation (not remnant vegetation), that is either a least concern, of concern or endangered regional ecosystem, and has not been cleared since 31st December 1989.
Non-remnant Vegetation (Category X)	Non-remnant vegetation is vegetation which has been cleared and has not yet regrown to the meet the definition of remnant vegetation.

Remnant vegetation communities in Queensland (Category A and Category B) are classified as Regional Ecosystems (RE) for the administration of the VMA (Table 2). Sattler and Williams (1999) describe regional ecosystems as:

*"Communities of vegetation that are consistently associated with a particular combination of geology, land form and soil in a bioregion"*

The RE (Version 10.1) mapping of the site shows the entire project area as containing non-remnant vegetation.





### 3.1.2 Threatened ecological communities

Listed threatened ecological communities are matters of national environmental significance (MNES) under the EPBC Act. Currently there are three categories for listing threatened ecological communities (TECs) under the EPBC Act: critically endangered, endangered and vulnerable.

An ecological community is a naturally occurring group of native plants, animals and other organisms that interact within a unique habitat. The structure, composition and distribution of ecological communities are influenced by many environmental factors including landscape position, altitude, climate and water availability. Threatened ecological communities that are protected under the EPBC Act include woodlands, grasslands, shrub lands, forests, wetlands, marine, ground springs and cave communities (Department of Environment, 2016).

In accordance with the EPBC Act, a person must not take an action that has, will have, or is likely to have, a significant impact on a listed threatened ecological community, without approval from the Minister for the Department of Environment.

A desktop search of the Protected Matters Database (PMD) of MNES was undertaken to identify any TEC's with the potential to occur in the project area using a 15 km radius of a central coordinate (-24.0564, 150.4114). The search returned the following TEC's:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) (Endangered);
- Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (Endangered);
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (Endangered); and
- Weeping Myall Woodlands (Endangered).

For the TEC's identified through the desktop assessment and assessed in Appendix D, no TEC's were identified within the project area during the site investigation.

Elements of the brigalow and semi-evergreen vine thicket TEC are present as remnant vegetation in the southern extent of lot 32 on RN210, which has been excised from the project area.

Within the project area, watercourses which traverse lot 29 and 32 on RN210 and lot 33 on RN588 and the watercourse on the boundary of project area in Lot 39 on RN395, comprise regrowth vegetation containing elements of brigalow TEC.

### 3.1.3 On-ground vegetation communities

The field survey determined that the vegetation communities within the project area are consistent with the non-remnant status of RE mapping Version 8.0 (RE mapping). A brief description of the on-ground communities is provided in below.

#### 3.1.3.1 Lot 28 on RN211 and lot 18 on RN271

These parcels are comprised of gently undulating plains of stony brown clay loams in the southern two thirds sloping upwards to undulating plains and rises in the northern third. Although a small section in the northern extent of lot 18 on RN271 is mapped as containing remnant vegetation, but the entire project area is non-remnant.

Vegetation in these parcels primarily consisted of isolated trees and patches of trees including species such as brigalow (*Acacia harpophylla*), Dawson's gum (*Eucalyptus cambageana*), mountain coolabah (*Eucalyptus orgadophila*), coolabah (*Eucalyptus coolabah*) and the Queensland bottle tree (*Brachychiton*

## RPS

*rupestris*) (Plate 1). In places, a shrubby layer has been retained, and is dominated by species typically found in brigalow communities, such as *Geijera parviflora*, *Diospyros humilis*, *Carissa ovata*, *Psydrax spp.* *Alectryon diversifolius*. The pre-clearing RE was likely 11.9.1 (*Acacia harpophylla* – *Eucalyptus cambageana* woodland to open forest) over much of the undulating plain, where remnants of this community have been retained along the adjacent road corridors. Certain creek lines also contained some brigalow remnants.

The northern section of lot 18 on RN271 consists of low rocky rises with a low woodland dominated by rosewood (*Acacia rhodoxylon*) and *Acacia blakei* in places (Plate 2). Most of the community has been recently cleared, where the pre-clearing RE is likely to be RE 11.10.3 (*Acacia catenulata* or *A. shirleyi* open forest). A creek draining the land to the west supported a fringing brigalow community, which we consider to be non-remnant.

Along the northern boundary of lot 18 on RN271, shrubby open forest dominated by narrow-leaved ironbark (*Eucalyptus crebra*) was present on a rise (Plate 3) with gum-topped box shrubby open forest to the east on the adjoining flats. This vegetation has been incorrectly mapped as the heterogenous polygon 11.10.1/11.9.13 (*Corymbia citriodora* woodland / *Eucalyptus moluccana* or *E. microcarpa* open forest). The correct RE is a heterogenous polygon of RE 11.10.7/11.9.13 (*Eucalyptus crebra* woodland / *Eucalyptus moluccana* or *E. microcarpa* open forest).



**Plate 1** Cleared pasture land with isolated trees and patches of trees was dominant in the project area

RPS



**Plate 2** Rosewood (*Acacia rhodoxylon*) low woodland on low rises in the northern area



**Plate 3** Shrubby open forest dominated by narrow-leaved ironbark (*Eucalyptus crebra*) which is mapped as remnant along the northern boundary.

### 3.1.3.2 Lot 29 and 33 on RN210 and lot 32 on RN194

These parcels are comprised of gently undulating plains in the centre and undulating to rolling rises in the west and east. The soil is a stony brown clay loam. Most of this land has been cleared for pasture improvement and contains the below vegetation communities:

- An area of approximately 50 ha in the western area of lot 29 on RN210, was comprised of retained woodland trees, primarily narrow-leaved ironbark (*E. crebra*), Queensland bottle tree and Dawson's gum (Plate 4).
- A vegetated creek line in lot 32 on RN194, consists of mature trees characteristic of the pre-clearing RE 11.3.1 (*Acacia harpophylla* and/or *Casuarina cristata* open forest), Dawson's gum, Queensland bottle tree and belah (*Casuarina cristata*) with a shrubby element (Plate 5 and Plate 6). This vegetation community is thin and altered, and is correctly mapped as non-remnant, although it still retains some habitat value. The community fringes a creek bank which appears to be highly dispersive and the vegetation appears to stabilise the bank.
- An area of remnant vegetation is mapped outside the project area in the southern extent of lot 32 on RN194. The community comprises the endangered heterogenous polygon 11.9.1/11.9.4 (*Acacia harpophylla* – *Eucalyptus cambageana* woodland to open forest / semi-evergreen vine thicket or *Acacia harpophylla* with a semi-evergreen vine thicket understorey) and the of concern RE 11.11.16 (*Corymbia leichhardtii*, *C. clarksoniana* tall open woodland). This community is more accurately described as RE 11.9.1 (*Acacia harpophylla* – *Eucalyptus cambageana* woodland to open forest) (Plate 7).



**Plate 4 Retained Dawson's gums in the western extent of 29 on RN210**

RPS



**Plate 5** The majority of this section is cleared open pasture land



**Plate 6** Retained brigalow and Dawson's gum along a creek line in lot 32 on RN210

## RPS



**Plate 7 Brigalow vegetation mapped as remnant outside the project area in lot 32 on RN210**

### 3.1.3.3 Lot 39 on RN395 and Lot 37 on RN1147

These parcels are comprised of gently undulating to undulating plains of stony brown clay loam. The area contains isolated trees generally comprising brigalow, Dawson's gum, Queensland bottle tree, mountain coolibah and narrow-leaved ironbark, with occasional small stands of trees. Where stands have been retained, they are generally heavily utilised by cattle and do not contain native ground covers or a characteristic shrub layer. These parcels skirt a low range of remnant vegetation which appears to be composed of a narrow-leaved ironbark and/or mountain coolibah woodland to low woodland and a rosewood low woodland.

The pre-clearing RE of these parcels was likely 11.9.1 (*Acacia harpophylla* – *Eucalyptus cambageana* woodland to open forest) with patches of RE 11.10.3 (*Acacia catenulata* or *A. shirleyi* open forest) and 11.7.2 (*Acacia* spp. woodland) along the flanks of the low range to its east. A creek system in the south of this land is fringed by low brigalow woodland community (pre-clearing RE likely to be 11.3.1) but is considered too narrow and open to be classified as remnant.

The pre-clearing RE of the northern section of Lot 37 on RN1147 (along the southern boundary of lot 29 and 33 on RN2110 and lot 32 on RN194), is likely to have been brigalow (RE11.9.1) and in some places semi-evergreen vine thicket (RE 11.9.4). Scattered trees and occasional stands of brigalow occur, however as noted above, these areas are heavily utilised by cattle and provide minimal habitat value. Many of these areas have been recently re-cleared and were not accessible at the time of the survey. All areas are correctly mapped as non-remnant vegetation.

RPS



**Plate 8** Cleared brigalow vegetation along the eastern boundary of the western portion, near the apron slope of the low range.



**Plate 9** Cleared brigalow vegetation along the eastern boundary of western section

## RPS



Plate 10 Cleared brigalow vegetation occupying the proposed location of the switchyard

### 3.1.4 Threatened flora

Desktop searches for threatened flora and fauna species potentially occurring within the locality were undertaken using the Wildlife Online database (Appendix B) and the Protected Matters database of Matters of NES (Appendix C) using a 20 km radius of the site.

An assessment of the likelihood of occurrence for each species has been provided based on their known ecological requirements and the current environmental conditions and habitat values of the site (Appendix E). Of the species assessed, two are considered to possibly occur within the project area. The species and their conservation status under the EPBC Act and NC Act is shown in Table 3.

No threatened or near threatened plants were identified during the initial site investigation.

Table 3 Conservation significant flora that have the potential to occur on site

Species name	Common name	NC Act status	EPBC Act status
<i>Solanum dissectum</i>	-	Endangered	Endangered
<i>Solanum johnsonianum</i>	-	Endangered	Endangered

#### 3.1.4.1 *Solanum dissectum* and *Solanum johnsonianum*

*Solanum dissectum* is found in the Biloela-Banana-Baralaba area. It occurs on heavy cracking soils, often in association with brigalow (*Acacia harpophylla*), or *Eucalyptus thozetiana* (Bean 2004). Similarly, *Solanum johnsonianum* is found to the north of the Theodore – Biloela area. Occurs on heavy cracking clay soils in brigalow, often after fire or disturbance, such as clearance (Bean 2004). Both species have also been previously recorded within 10 km of the project area.

Overall, the habitat quality for both species of *Solanum* spp. is considered low due to the extensive broadscale clearing and historical cattle grazing. Marginal habitat for the species was present in the regrowth brigalow that fringed some watercourses and the associated extensive cracking clay loam plains. However, it



should be noted that the soil in the project area is not classified as heavy cracking clay and consists of a clay loam.

## 3.2 Fauna

### 3.2.1 Threatened fauna

Desktop searches for threatened flora and fauna species potentially occurring within the locality were undertaken using the Wildlife Online database (Appendix B) and the Protected Matters database of Matters of NES (Appendix C).

An assessment of the likelihood of occurrence of each fauna species has been provided based on their known ecological requirements and the current environmental conditions and habitat values of the site (Appendix F). Of the species assessed, two are considered to possibly occur within the project area. The species and their conservation status under the EPBC Act and NC Act is shown in Table 4.

The small number of threatened species records is probably due to a lack of local survey effort rather and should be used as an indicative measure of threatened species presence/absence in the local context.

**Table 4 Threatened fauna that have the potential to occur on site**

Species name	Common name	NC Act status	EPBC Act status
<i>Geophaps scripta scripta</i>	Squatter pigeon	Vulnerable	Vulnerable
<i>Denisoniam maculata</i>	Ornamental snake		Vulnerable

#### 3.2.1.1 Squatter pigeon

The squatter pigeon (southern subspecies) mainly inhabits grassy woodlands and open forests dominated by eucalyptus. It has also been recorded in sown grasslands with scattered remnant trees, disturbed sites in scrub and acacia. The species displays a preference for open areas with a short grass cover and is regularly found adjacent to tracks and areas with short grass (DoEE 2018a).

Species movement is not well understood but individuals and populations are believed to be resident or locally dispersive in response to changing resource availability (i.e. water, seed). The species is reliant on a permanent water source which might include rivers, creeks, waterholes, farm dams and water troughs and there is likely to be significant contraction toward important water resources during the dry season (DoEE 2018a).

Squatter pigeon populations north of the Carnarvon Ranges in southern Queensland are not considered to be important populations under the EPBC Act. The species remains common in heavily-grazed country north of the Tropic of Capricorn, where there is believed to be a continuous interbreeding sub-population (Squatter Pigeon Workshop 2011). The contraction of the species range in a northward direction has isolated the following sub-populations which are considered important populations:

- Populations occurring in the Condamine River catchment and Darling Downs of southern Queensland;
- The populations known to occur in the Warwick-Inglewood-Texas region of southern Queensland; and
- Any populations potentially occurring in NSW.

Potential habitat consisting of a generally short, well grazed grassy understorey of native and introduced grasses and permanent water resources (i.e. farm dams) occurs in the project area.

The squatter pigeon was not recorded during the site inspection and database searches (i.e. AoLA and wildlife online) have not been previously recorded the species within 25 km of the project area. In addition, any populations within the local area would not be considered an important population under the EPBC act due to the sites location, which is north of the Camarvon Ranges.

### 3.2.1.2 Ornamental snake

Ornamental snake is believed to be endemic to the Brigalow Belt North and parts of the Brigalow Belt South biogeographic regions in central-eastern Queensland. The species prefers woodlands and open forests containing moist habitats, especially gilgai mounds and depressions, but also lake margins and wetlands (DoEE 2018b).

The species is most commonly recorded in vegetation dominated by brigalow (*Acacia harpophylla*), gidgee (*Acacia cambagei*), blackwood (*Acacia argyrodendron*) or coolibah (*Eucalyptus coolabah*) including the following RE's:

- 11.4.3 – Open forest dominated by Brigalow and/or Belah clay soils not associated with current alluvium;
- 11.4.6 – Gidgee woodland clay soils not associated with current alluvium;
- 11.4.8 – Woodland to open forest dominated by Dawson Gum (*Eucalyptus cambageana*) and Brigalow or, sometimes in the north of the species range, Blackwood/Black Gidgee; and
- 11.4.9 – Open forest, occasionally woodland, dominated by Brigalow on clay soils not associated with current alluvium.

The species has also been recorded in the following RE's (Agnew 2010 pers. comm, cited in DotEE 2016):

- 11.3.3 – Coolibah woodland adjacent to large areas, treeless, ephemeral wetland on alluvium (river and creek flats); and
- 11.5.16 – Brigalow and/or Belah open-forest in depressions in Cainozoic old loamy and sandy plains. Associated with gilgai with one-metre local relief and 5-6 m in diameter.

Microhabitat features preferred by the species include deep cracks formed in vertisols with shrink-swell properties and gilgai formations (Wilson & Taylor 2012). The importance of these microhabitats is only partially understood, although cracks in deep clays provide refuge for many animals during dry periods, including prey species such as burrowing frogs (*Cyclorana* spp.). Timber, bark, rocks and dense tussock grasses also offer refuge sites for cryptic reptiles.

The project area does not contain any pre-clearing RE's which have been associated with the species. Marginal habitat occurs as regrowth brigalow fringed watercourses and the associated cracking clay loam plains. We note however, that soils in the project area are not deep cracking clays. Despite being dry, cracks in the clay were not evident or common and the soil appeared to be more a clay loam.

Overall, the habitat quality for ornamental snake was very low as the species is known to be sensitive to activities such as cattle grazing which has a long history in the project area. Impacts that were observed include stunted vegetation regrowth from browsing animals, soil compaction, a general lack of microhabitat complexity (i.e. fallen timber, coarse woody debris and ground litter) and damage to surface soils from activities such as discing and ripping.

### 3.2.2 Marine and migratory species

Marine and migratory species are listed under schedules of the EPBC Act, where any significant impact on migratory species is regarded as a 'controlled action'.

An assessment of the likelihood of occurrence for each migratory fauna species has been provided based on the known ecological requirements of each species and the current environmental conditions and habitat values of the site (Appendix G). Of the species assessed, none are considered to have the potential to occur within the project area, due to the lack of suitable habitat or the site location not being located inside of the species distributional range.

No listed migratory fauna was observed on site during the reconnaissance field survey and all species are considered unlikely to occur in significant numbers. Consequently, the likelihood of a significant impact is very low.

### 3.2.3 Habitat assessment and existing impacts

The project area has been heavily modified from the natural state, with broadscale clearing evident in the project area. The following impacts were observed generally:

- No evidence of fire was observed, and the timing, area and intensity of fire at the site and its relevance to threatened species and fauna is unknown. Based on the observations made, fire does not appear to substantially contribute to the ecology of the site;
- No significant populations of feral animals were observed; however, it is presumed that cane toads, feral cats and wild dogs are likely to occur;
- Although a complete census of flora was not undertaken at the site, the general impression of the site was a low native plant richness and cover, especially compared to remnant communities adjacent to the project area;
- Microhabitat features in proximity to the tower site include exposed rock outcrops and a termite mound.
- Tree hollows, coarse woody debris (including hollow logs), organic litter, rocky outcrops and decorticated bark were uncommon.

### 3.2.4 Watercourses

#### 3.2.4.1 VM Act watercourses – regulated and regrowth vegetation

The VM Act watercourse mapping identifies watercourses that support regulated vegetation under the VM Act. As the entire project area is located within a non-remnant area, the action will not impact on regulated vegetation associated with a water course (Figure 4).

Category R regrowth vegetation is associated with several watercourses which traverse the project area, namely, a stream order one watercourse on Lot 29 on RN210, a stream order one and two on Lot 32 on RN194 and a stream order one located in Lot 33 on RN210. All category R regrowth vegetation and associated protection area (i.e. stream order 1 or 2 – 10 m) have been excised from the overall project area.

#### 3.2.4.2 Queensland waterways for waterway barrier works

The spatial data layer Queensland Waterways for Waterway Barrier Works shows the extent of the *Fisheries Act 1994* interest in barrier works on waterways, where the streams are colour-coded according to their level of risk of impact.

In total, 12 watercourses intersect the project area, 9 are classified as low risk and 3 as moderate risk (Figure 5).

### 3.2.4.3 Water Act watercourses

The purpose of the *Water Act 2000* is to provide for the sustainable management of water and other resources. Various activities are regulated under the Water Act and incorporated into the DA approval system via the *Queensland Planning Act 2016*.

To trigger the Water Act however, the watercourse needs to meet the definition of a watercourse under the Act. The Watercourse identification map (Water Act), shows watercourses that are classified under the Act and therefore require an RPP.

Watercourses within the project area are not identified on the Watercourse identification map, with the closest defined watercourse being Don River, approximately 3.8 km to the north.

## 3.2.5 Wetlands

### 3.2.5.1 Referrable wetlands

The map of referable wetlands identifies the location of wetland protection areas (WPA) in Great Barrier Reef (GBR) catchments which apply to State Development Assessment Provisions (SDAP) State code 9: Great Barrier Reef Wetland Protection Areas.

The map of referable wetlands also identifies wetlands of high ecological significance (HES) and general ecological significance (GES). HES wetlands are defined in the *Environmental Protection Regulation 2008* and are 'matters of state environmental significance' (MSES) under the Planning and Environmental Offsets legislation.

A review of the spatial database did not identify any WPA's or HES wetlands near the project area. The closest WPA is located approximately 6 km to the west of the project area, associated with Callide Creek (Figure 6).

### 3.2.5.2 Ramsar Wetlands

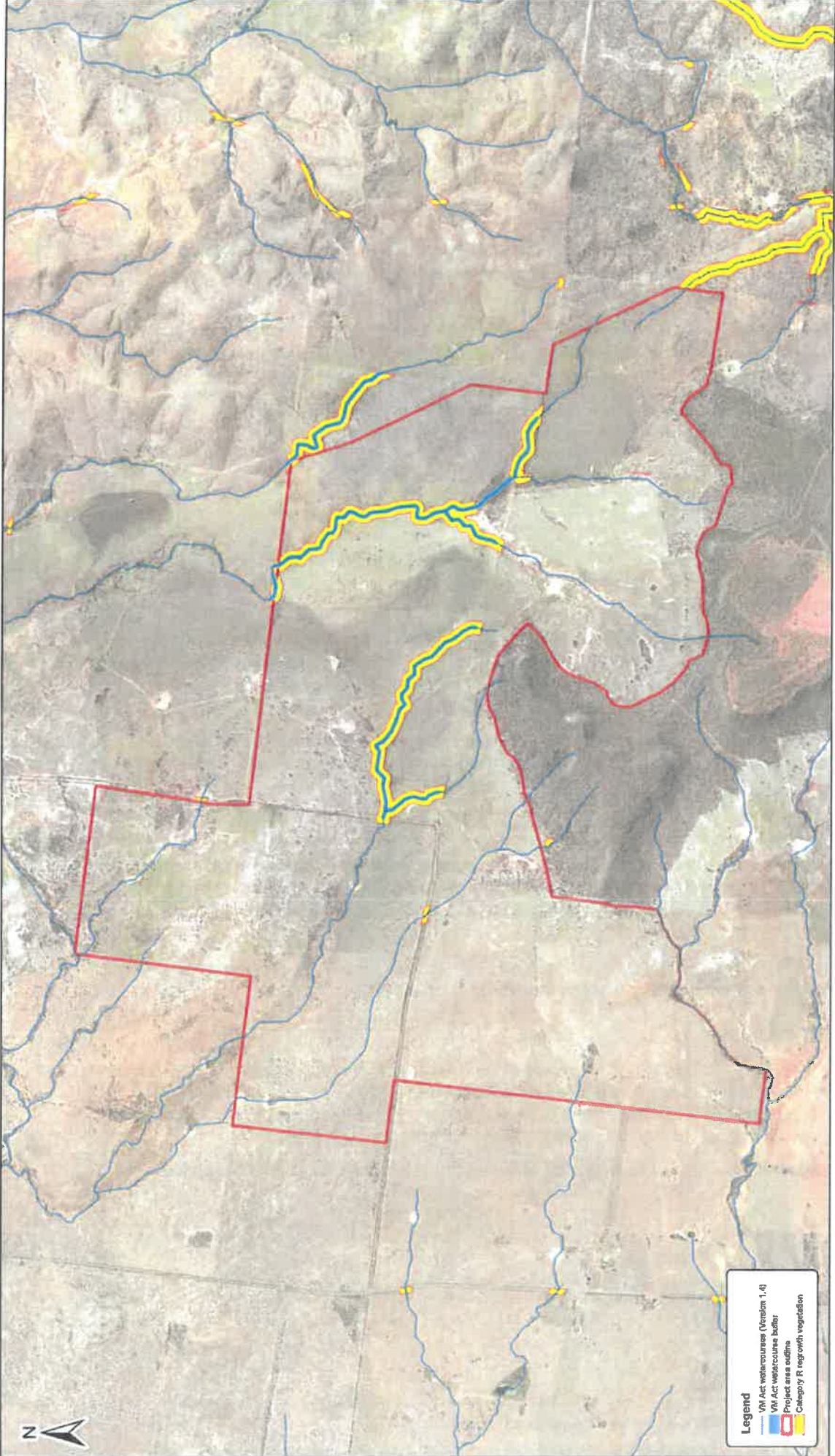
The Ramsar Convention (The convention on Wetlands of International Importance) is an international treaty for the conservation and sustainable utilisation of wetlands to which Australia is a signatory. The Ramsar List of Wetlands of International Importance now includes 1,950 sites (known as Ramsar Sites). Ramsar sites are MNES's pursuant to the EPBC Act.

A desktop search of Ramsar Wetlands did not identify any internationally important wetlands in the proximity of the project area or in the immediate downstream receiving environment.

### 3.2.5.3 HEV wetlands and watercourses

Watercourses and wetlands located in high ecological value waters (HEV's) are defined in the *Environmental Protection (Water) Policy 2009*, schedule 1 and are classified as MSES. The HEV waters spatial layer produced by the Department of Environment and Science (DES) shows the location of all wetlands and watercourses in high ecological value (HEV) waters in Queensland.

A review of the spatial layer confirmed that no HEV watercourses or wetlands occur near the project area.



**Legend**

- VM Act watercourse (Version 1.4)
- VM Act watercourse buffer
- Project area outline
- Category 1 vegetation

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**PROJECT**

## SMOKEY CREEK SOLAR PROJECT

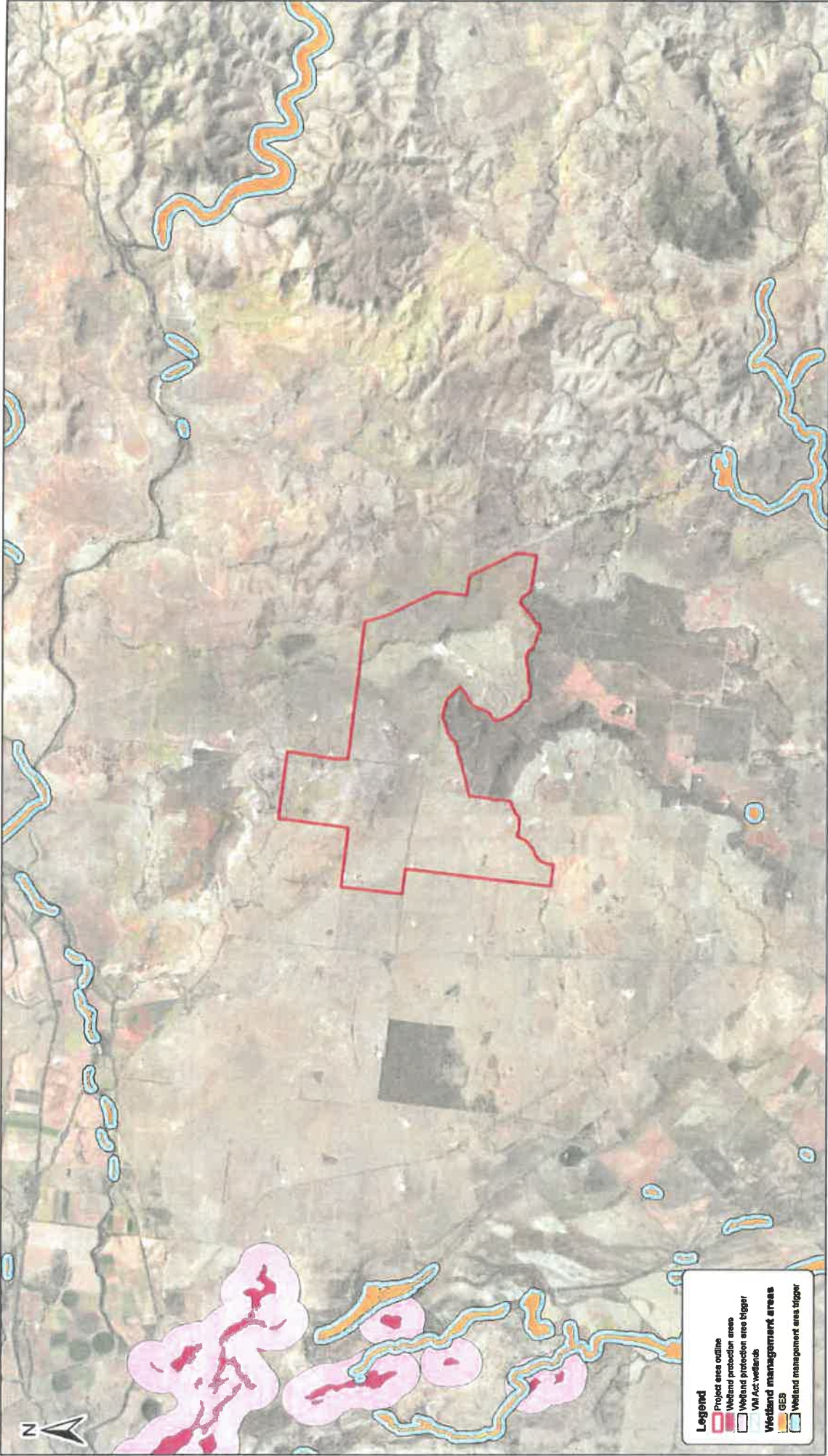
### FIGURE 4: VM ACT WATERCOURSE MAP

Reference Scale: 1:30,000


Source: Department of Natural Resources & Mines - Cadastral data (highlighted extent Entire Local Government Area)  
 Queensland Department of Natural Resources and Water Supply (1:100,000 and 1:200,000) - version 1.4 © State of Queensland (Department of Natural Resources and Mines) 2016.  
 Wetland program area - high ecological significance wetland © State of Queensland (Department of Environment and Natural Resources) - essential habitat map - version 4.349 State of Queensland (Department of Natural Resources and Mines) 2016  
 Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information contained in this map is correct or complete.  
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 Projection: Transverse Mercator  
 Datum: GDA 1984

Document Name: 140339-3-04Reva_VMActWatercourses	Project Manager: LL
Date: 6/07/2018	Author: AF





**Legend**  
 Project area outline  
 Wetland protection areas  
 Wetland protection area bigger  
 Wetland management areas  
 Wetland management area bigger

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	Plan Ref <b>140339-3-06</b>	Rev <b>A</b>	Sheet <b>A3</b>	Project <b>SMOKEY CREEK SOLAR PROJECT</b>  <b>FIGURE 6: WETLAND MAPPING</b>
Source: Department of Natural Resources & Mines - Cadastral data (copyrighted without Barrow Local Government Area © State of Queensland Department of Natural Resources and Mines) 2014. Wetland protection area - high ecological significance wetland © State of Queensland (Department of Environment and Heritage Protection) 2015 Wetland management area - essential habitat map - version 4.3.08 State of Queensland (Department of Natural Resources and Mines) 2016 Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, we do not guarantee its accuracy. The information portrayed is free from error or omission. Please verify the accuracy of all information prior to use. Coordinate System: GDA 1984 MGA Zone 56 Datum: GDA 1984				
Document Name: <b>140339-3-06Reva_WetlandMapping</b>		Date: <b>6/07/2018</b>		
Author: <b>AF</b>		Project Manager: <b>LL</b>		
Reference Scale: 1:75,000 0 2,800 5,600 8,400 11,200 Meters				

## 4 Potential impacts of development

### 4.1 Habitat loss

Habitat loss is the removal of an area of suitable habitat that cannot be reinstated. Microhabitat features such as tree hollows, large logs, leaf litter, and rock and boulder piles are particularly significant for their value as denning, breeding and nesting sites. The removal of these features from the landscape can substantially reduce the carrying capacity for native species and prevent future recolonization of the resource.

Taking into consideration the historical broadscale clearing that has occurred within the project area and retention of regrowth watercourses, habitat loss due to the action is negligible.

### 4.2 Fragmentation

Habitat fragmentation is the division of large contiguous habitat into smaller disjunct habitats. Species populations in fragmented landscapes are more exposed to harsh environmental factors, natural disasters and reduced genetic exchange and diversity (Hanski & Gaggiotti, 2004) which can culminate in species population decline, biodiversity loss and altered community structure and ecosystem function (Didham 2010).

The impacts of habitat fragmentation can be quantified using various methods and depend on factors including the remaining habitat area, shape and isolation, plus species-specific factors such as mobility. Irrespective of the measurement used, the retention of vegetated corridors connecting habitat areas that provide for the safe movement of animals between existing bush remnants and protected areas is critical.

Aerial imagery of the project area and surrounds shows the project area and surrounding regions have been extensively cleared. Therefore, the removal of the sparse vegetation layer and the retention of regrowth watercourses, connectivity within the local area is not expected to be impacted further.

### 4.3 Edge effects

Vegetation clearing in the landscape creates edges between the vegetation and the cleared area. Along edges, an ecotone is created with different environmental conditions which may be unsuitable for resident biota. Species remaining in the ecotone are therefore exposed to altered biotic processes of predation, competition and parasitism due to microclimatic changes from altered solar radiation, wind speed and soil moisture in the interior habitat.

Depending on their environmental niche or envelope, flora and fauna are differentially impacted by edge effects. Generalist species with a broad climatic niche are favoured over specialist interior species which have an obligate requirement for certain microclimatic conditions. These include a range of pest animal and weed species which are disproportionately favoured in disturbed areas.

It is noted that the impact of edge effect is somewhat related to the existing species composition and the abruptness of the change in community. For example, open woodland species are generally less likely to be impacted by edge effects.

Environmental conditions in the project area are currently subject to edge effects from previous broadscale clearing undertaken. Increased edge effects are unlikely to increase substantially because of the project.



#### 4.4 Fauna injury and mortality

Fauna injury and mortality during development can occur via several avenues. Machinery used to fell and clear trees can crush animals, especially when shelter and nesting sites are destroyed. Operational traffic related injury and mortality in the form of road accidents might also occur. These impacts are more likely to impact less mobile and nocturnal species which are highly susceptible due to their inability to migrate to safe habitats.

It is recommended that all clearing is undertaken using best practice using the following minimum standards:

- Restrict the area of disturbed habitat to the proposed footprint and where possible retain significant habitat features such as hollow logs;
- Limit onsite speed limits to 20 km/hr reduce the risk of traffic related injury and mortality;
- Vegetation clearing should be undertaken in a manner that reduces potential injuries and mortalities to fauna; and
- Engage a Department of Environment and Science (DES) approved spotter/catcher or ecologist to identify habitat trees that may be occupied by fauna and implement a staged approach to clearing where habitat trees are gently disturbed to warn resident fauna of the impending clearing.

#### 4.5 Invasive plants and animals

Although the impact of weeds is not significant in the project area, introduced grasses and exotic weeds occur. Future clearing activities and disturbance to the site has the potential to facilitate the proliferation and expansion of existing weeds and introduce additional species.

Weeds typically produce a large quantity of seeds, facilitating their proliferation, and rapid establishment in disturbed areas via vectors including wind, water, vehicles and machinery, and people, birds and other animals. Weed incursion impacts on vegetation function and floristic composition can impede or prevent natural regeneration, additionally weeds can have a pronounced effect on fire ecology.

Clearing activities often result in the incursion of weeds to adjacent vegetation. The dispersal of weeds from both internal and external sources can be avoided by implementing control measures during the construction and operational phases including but not limited to the following:

- Ensure that all vehicles are cleaned (i.e. free of contaminants) prior to entering and on exiting the subject site;
- Dispose of weeds and weed-affected material off-site in an approved refuse site;
- Employ rigorous weed management of disturbed areas following clearing until suitable ground cover can be established; and
- Mulch cleared vegetation and place in a layer over cleared surfaces to minimise erosion.

#### 4.6 Noise, light and vibration

There will potentially be dust and noise impacts to fauna which will be generated during construction. As night works are not expected during construction, light spill into retained habitat areas is unlikely to impact on nocturnal fauna during construction.

#### 4.7 Erosion and sediment

In relation to sedimentation, these impacts relate to erosion of the disturbed site, and sediment being transported via runoff to the local surface drainage network. Essential activities during the construction

phase include clearing of vegetation, extraction and stockpiling. These activities, by their nature, will disturb the soil surface reducing cover.

Although multiple sources of sedimentation are likely to have a cumulative effect, appropriate management strategies are likely to minimise and contain the impact to an acceptable level. It is recommended that an erosion and sediment control plan is developed to control impacts on the receiving environment. Erosion and sediment control that should be implemented during the construction phase, include but are not limited to the following:

- Maximise the retention of vegetation along adjacent streams and watercourse;
- Mulch cleared vegetation and place in a layer over cleared surfaces to minimise erosion; and
- Develop and implement an erosion and sediment control plan.

#### 4.8 Water and soil contamination

Potential contamination may occur from accidental spills of fuel or oil from operation equipment. The potential contamination of surface water and groundwater is minimal if appropriate control measures are implemented. Control measures should include but not limited to staff trained in the use of spill kits, diesel storage is in self-bunded units and all major services are undertaken off site.

## 5 Legislative constraints and requirements

### 5.1 State legislation

#### 5.1.1 Matters of state environmental significance

Matters of state environmental significance (MSES) are referenced in the Schedule 2 of the *Environmental Offset Regulation 2014* (EO Act) and include certain environmental values that are protected under Queensland legislation. A preliminary assessment of each of MSES with respect to the project site is included below in Table 5.

An environmental offset condition may be imposed under various State assessment frameworks for prescribed activities under the EO Act, if the activity will, or is likely to have a significant residual impact (SRI) on a prescribed environmental matter that is a MSES. An offset condition may be imposed where an activity will, or is likely to have a Significant Residual Impact (SRI) on a MSES. A SRI is defined under the EO Act, section 8 as:

*“an adverse impact, whether direct or indirect, of a prescribed activity on all or part of a prescribed environmental matter that:*

*a) remains, or will or is likely to remain, (whether temporarily or permanently) despite on-site avoidance and mitigation measures for the prescribed activity; and*

*b) is, or will or is likely to be, significant.”*

Where an MSES is triggered, the ‘Significant Residual Impact Guideline – For matters of state environmental significance and prescribed activities assessable under the *Planning Act 2016* (DSDIP 2014) is used to determine the significance of the impact.

A summary assessment of MSES triggers in relation to the project is provided in Table 5, below. In the current location, the project is not expected to trigger any MSES.

**Table 5 Matters of state environmental significance assessment**

Matter of state environmental significance	Trigger
<b>Regulated Vegetation</b>	
1. The prescribed regional ecosystems that are endangered regional ecosystems comprise a matter of State environmental significance.	No Category B areas on the regulated vegetation management map that are 'endangered' regional ecosystems in the Project Area.
2. The prescribed regional ecosystems that are of concern regional ecosystems comprise a matter of State environmental significance.	There are no Category B areas on the regulated vegetation management map that are 'of concern' regional ecosystems in the Project Area.
3. A prescribed regional ecosystem is a matter of State environmental significance if it is—	No areas shown as a wetland on the vegetation management wetlands map in the project area.
a. a regional ecosystem that intersects with an area shown as a wetland on the vegetation management wetlands map (to the extent of the intersection); or	No essential habitat on the essential habitat map for an animal that is endangered wildlife or vulnerable wildlife or a plant that is endangered wildlife or vulnerable wildlife intersects the project area.
b. an area of essential habitat on the essential habitat map for an animal that is endangered	No prescribed regional ecosystems are located within the project area.

**Matter of state environmental significance**

**Trigger**

wildlife or vulnerable wildlife or a plant that is endangered wildlife or vulnerable wildlife.

4. A prescribed regional ecosystem is a matter of State environmental significance to the extent the ecosystem is located within a defined distance from the defining banks of a relevant watercourse.

**Connectivity Areas**

1. This section applies to a prescribed regional ecosystem—
  - a. to the extent the ecosystem contains remnant vegetation; and
  - b. if the ecosystem contains an area of land that is required for ecosystem functioning (a connectivity area).
2. The prescribed regional ecosystem is a matter of State environmental significance if the administering agency is satisfied, having had regard to criteria in the environmental offsets policy about connectivity areas, that—
  - a. the connectivity area is of sufficient size or configured in a way that maintains ecosystem functioning; and
  - b. the prescribed regional ecosystem will remain despite a threatening process within the meaning of the *Nature Conservation Act 1992*.

The proposed clearing area does not contain prescribed regional ecosystems which could potentially be required for ecosystem functioning.

As the project area entirely consists of non-remnant vegetation and the existing regrowth watercourses will be excised, there will be no impact on connectivity function.

**Wetlands and Watercourses**

1. Each of the following matters is a matter of State environmental significance—
  - a. a wetland;
    - i. in a wetland protection area; or
    - ii. of high ecological significance (HES) shown on the Map of Referable Wetlands;
  - b. a wetland or watercourse in high ecological value waters.

No wetland protection area on the Map of Referable Wetlands occur near the project area.

No HES wetlands on the Map of Referable Wetlands occur near the project area.

No HEV wetlands or watercourses shown on the Environmental Protection Policy (Water) scheduled data – surface water mapping occurs near the project area.

**Designated Precinct In a Strategic Environmental Area**

A designated precinct in a strategic environmental area is a matter of State environmental significance.

The project area does not intersect or contain a strategic environmental area.

The proposed action therefore does not trigger the MSES – Designated Precinct in a Strategic Environmental Area.

**Protected Wildlife Habitat**

1. An area that is shown as a high-risk area on the flora survey trigger map and that contains plants that are endangered wildlife or vulnerable wildlife is a matter of State environmental significance.
2. An area that is not shown as a high-risk area on the flora survey trigger map, to the extent the area contains plants that are endangered wildlife

No high-risk areas shown on the flora survey trigger map occur near the project area.

Brigalow fringed watercourses that potentially support plants that are endangered wildlife or vulnerable wildlife will be excised from the project area.

The site is not located on Map of Assessable Development Area Koala Habitat Values' that applies under the South-East

Matter of state environmental significance	Trigger
<p>or vulnerable wildlife, is a matter of State environmental significance.</p> <p>3. A non-juvenile koala habitat tree located in an area shown as bushland habitat, high value rehabilitation habitat or medium value rehabilitation habitat on the map called 'Map of Assessable Development Area Koala Habitat Values' that applies under the South-East Queensland Koala Conservation State Planning Regulatory Provisions is a matter of State environmental significance.</p> <p>4. A habitat for an animal that is endangered wildlife or vulnerable wildlife, or a special least concern animal is a matter of State environmental significance.</p>	<p>Queensland Koala Conservation State Planning Regulatory Provisions.</p> <p>The project area does not contain habitat for an animal that is endangered wildlife or vulnerable wildlife, or a special least concern animal.</p>
<p><b>Protected Areas</b></p> <p>A protected area is a matter of State environmental significance.</p>	<p>No protected areas under the NC Act are present on the site. The proposed action therefore does not trigger the MSES – Protected Areas.</p>
<p><b>Highly Protected Zones of State Marine Parks</b></p> <p>A highly protected area of a relevant Queensland marine park is a matter of State environmental significance.</p>	<p>No marine parks or land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone occur near the Project Area.</p> <p>The proposed action therefore does not trigger the MSES – Highly Protected Zones of State Marine Parks.</p>
<p><b>Fish Habitat Areas</b></p> <p>An area declared under the <i>Fisheries Act 1994</i> to be a fish habitat area is a matter of State environmental significance.</p>	<p>No declared fish habitat areas intersect the site. The proposed action therefore does not trigger the MSES – Fish Habitat Areas.</p>
<p><b>Waterway Providing for Fish Passage</b></p> <p>Any part of a waterway providing for passage of fish is a matter of State environmental significance only if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway.</p>	<p>12 barrier waterways intersect the project area, 9 are classified as low risk and 3 as moderate risk.</p>
<p><b>Marine Plants</b></p> <p>A marine plant within the meaning of the <i>Fisheries Act 1994</i> is a matter of State environmental significance.</p>	<p>Marine plants with the meaning of the <i>Fisheries Act 1994</i> do not occur in the Project Area.</p> <p>The proposed action therefore does not trigger the MSES – Marine Plants.</p>
<p><b>Legally Secured Offset Areas</b></p> <p>A legally secured offset area is a matter of State environmental significance.</p>	<p>No legally secured offset areas intersect the Project Area. The proposed action therefore does not trigger the MSES – Legally Secured Offset Areas.</p>

## 5.2 Federal legislation

### 5.2.1 *Environment Protection and Biodiversity Conservation Act*

Under the EPBC Act, an action requires approval from Federal Environment Minister if the action has, will have, or is likely to have a significant impact on any Matter of National Environmental Significance (MNES) including listed threatened flora and fauna, migratory fauna and threatened ecological communities. Approval is obtained via a referral to the Australian Government Department of the Environment and Energy for a decision.

Significant impacts include those that degrade important habitats for listed species or disrupt the lifecycle of ecologically significant populations of listed species.

The Matters of National Environmental Significance – Significant Impact Guidelines (SIG) contain significant impact criteria which are used for the assessment of impacts on MNES. Separate criteria are applied for critically endangered and endangered species, vulnerable species and migratory species under the SIG.

For critically endangered or endangered species, an action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere with the recovery of the species.

For vulnerable species the same criteria apply, only the focus is for 'important populations' of the species or community. An important population is defined in the guidelines as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range.

For migratory species, an action is likely to have a significant impact if there is a real chance or possibility that the action will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or

## RPS

- **Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.**

**Important habitat for a migratory species is defined in the EPBC Act as:**

- **Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;**
- **Habitat that is of critical importance to the species at certain life-cycle stages;**
- **Habitat utilised by a migratory species which is at the limit of the species range; and**
- **Habitat within an area where the species is declining.**

**The desktop assessment and field reconnaissance investigation did not identify any potential habitat for endangered and vulnerable flora and fauna, as well as migratory species that could potentially be impacted by the proposed action. Therefore, the proposed action is unlikely to impact on a MNES.**

**It should be noted that only through formal referral and determination under the EPBC Act can legal certainty be provided, and it is the obligation of the applicant to decide whether a referral is necessary, based on the extent of the projects impacts.**

## 6 Summary and recommendations

For ease of reference, findings of this investigation are summarised in Table 6 below.

**Table 6 Summary of findings**

<p><b>Significant flora</b></p>	<p>The desktop assessment and field investigation identify potential habitat for the following NC Act and EPBC Act listed plant species:</p> <ul style="list-style-type: none"> <li>• <i>Solanum dissectum</i> (EPBC Act – endangered; NC Act – endangered);</li> <li>• <i>Solanum johnsonianum</i> (EPBC Act – endangered; NC Act – endangered).</li> </ul> <p>Overall, the habitat quality for both species of <i>Solanum</i> spp. is considered low due to the extensive broadscale clearing and historical cattle grazing. Marginal habitat for the species was present in the regrowth brigalow that fringed some watercourses and the associated extensive cracking clay loam plains. However, it should be noted that the soil in the project area is not classified as heavy cracking clay and consists of a clay loam.</p> <p>Potential habitat along brigalow-fringed watercourses should be excised from the project area. If development occurs within the regrowth brigalow associated with the watercourses, a flora survey is recommended to identify and confirm the presence of any EPBC Act or NC Act listed species that may occur. In the absence of a standardised Federal guideline under the EPBC Act, we recommended that the survey is undertaken in accordance with the <i>Flora Survey Guidelines - Protected Plants: Nature Conservation Act 1992</i>.</p>
<p><b>Threatened ecological communities</b></p>	<p>No TEC's were returned in the MNES Protected Matter Search or considered likely to occur during the field assessment of the site.</p>
<p><b>Remnant and regrowth vegetation</b></p>	<p>The desktop assessment and field investigation determined that the project area consists entirely of non-remnant vegetation.</p> <p>Category R regrowth vegetation is associated with several watercourses which traverse the project area, namely, a stream order one watercourse on Lot 29 on RN210, a stream order one and two on Lot 32 on RN194 and a stream order one located in Lot 33 on RN210. Notwithstanding, all category R regrowth vegetation and associated protection area (i.e. stream order 1 or 2 – 10 m) have been excised from the overall project area.</p>
<p><b>Significant fauna</b></p>	<p>The desktop assessment and field investigation identified potential habitat for the following NC Act and EPBC Act listed animals:</p> <ul style="list-style-type: none"> <li>• Squatter pigeon (<i>Geophaps scripta scripta</i>) - Vulnerable (EPBC Act), Vulnerable (NC Act); and</li> <li>• Ornamental snake (<i>Denisoniam maculata</i>) – Vulnerable (EPBC Act).</li> </ul> <p>Although potential habitat occurs within the project area, the squatter pigeon was not recorded during the site inspection and database searches (i.e. AoLA and wildlife online) have not been previously recorded the species within 25 km of the project area. In addition, any populations within the local area would not be considered important due to the sites proximity, which is north of the Carnarvon Ranges.</p> <p>The project area does not contain any pre-clearing RE's which have been previously been associated with the ornamental snakes. Marginal habitat for the species was present as regrowth brigalow along watercourses and the associated cracking clay loam plains. We note these soils are not classified as deeply cracking. Although the site dry during the survey, cracks were not evident or common and the soil was more consistent with a clay loam.</p> <p>Overall, the habitat quality for ornamental snake was very low as the species is known to be sensitive to activities such as cattle grazing which has a long history in the project area. Impacts that were observed include stunted vegetation regrowth from browsing animals, soil compaction, a general lack of microhabitat complexity (i.e. fallen timber,</p>





<p><b>Aquatic ecosystems and wetlands</b></p>	<p>coarse woody debris and ground litter) and damage to surface soils from activities such as discing and ripping.</p> <p>It should be noted that only through formal referral and determination under the EPBC Act, can legal certainty be provided for EPBC Act listed species, and it is the obligation of the applicant to decide whether a referral is necessary, based on the extent of the projects impacts.</p> <ul style="list-style-type: none"> <li>• In relation to the Watercourse identification map (Water Act), watercourses within the project area are not identified on the Watercourse identification map, with the closest defined watercourse being Don River, approximately 3.8 km to the north.</li> <li>• No WPA's or HES wetlands were identified within or adjacent to the project area. The closest WPA is located approximately 6 km to the west of the project area, associated with Callide Creek.</li> <li>• No significant wetlands listed under State or Commonwealth legislation occur within or immediately adjacent to the project area.</li> </ul>
<p><b>Matters of state environmental significance</b></p>	<ul style="list-style-type: none"> <li>• No MSES are likely to be triggered or impacted by the project.</li> </ul>
<p><b>Matters of national environmental significance</b></p>	<ul style="list-style-type: none"> <li>• MNES are unlikely to be significantly impacted because of the project. It should be noted that only through formal referral and determination under the EPBC Act, can legal certainty be provided for EPBC Act listed species, and it is the obligation of the applicant to decide whether a referral is necessary, based on the extent of the projects impacts.</li> </ul>

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Banana Shire Council  
PLANNING APPROVAL

23 OCT 2019



## TRAFFIC ASSESSMENT REPORT

**SMOKY CREEK SOLAR FARM**

**FOR**  
**Edify Energy**

JOB NO.	RP50317
REVISION	B.
COUNCIL REF:	Not Applicable

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## 1.0 EXECUTIVE SUMMARY

The objective of this report is to assess at a high level the access requirements for a proposed farm located at Smoky Creek, QLD.

The site more specifically referred to as part of Lot 39 on RN395, Lot 28 on RN211, Lot 18 on RN271 and part of Lot 37 on RN1147 will host a large-scale solar photovoltaic (PV) generation facility and associated infrastructure. The project will occupy an area of approximately 2113 ha over the site and generate circa 450MW.

Utilising recent traffic count data obtained from The Department of Transport and Main Roads (TMR), and utilising standard traffic generation data provided by the proponent for this type of facility a traffic impact assessment concluded that current State Controlled Road Networks (SCRN) are suitable sized to accommodate increased traffic demands.

Adoption of an 8-month construction period is considered to be optimistic. Development generated traffic (Construction) has been determined on the basis of the power generation of the facility and therefore is relatively static. Should the construction period be extended (which is considered likely in comparison with other developments of a similar nature under construction at present), the intensity of traffic entering and exiting the site will simply reduce proportionally. Therefore the 8-month period is considered to be worse case, and reflects the maximum traffic volumes entering and exiting the site during the build.

Given the remote location of the site, it is considered probable that the labour force will be ferried to and from the site via mini buses (15 seat) capacity. Labour force trip generation has been analysed using this assumption.

An assessment of the potential traffic movements and composition of design vehicles shows that site access can be safely obtained through the existing State Controlled Road Network (SCRN) Channelised Right Turn and Basic Left Turn (CHR / BAL) intersection along the Burnett Highway (Biloela – Mt Morgan) at approximately Chainage 38.890 km, into the Local government road network.

Tomlins Road currently offers a 5.5m wide sealed road profile with 0.5-1.0m shoulders (6.5 to 7.5m carriageway), which is considered satisfactory in relation to accommodating the predicted construction and operational traffic volumes and composition.

From 'Google Earth' imagery, Dodsons Road appears to offer an unsealed pioneered/gravel formation 5.0 - 5.5m wide two way / one - one and a half lanes. Further investigation will be required to confirm the exact roadway formation width; however, it is recommended that Dodsons Road be upgraded to the minimum standard listed below should the current formation not meet the standard suggested:

Description	Two Lane / Two Way
Traffic Lane	2 x 3.0m
Shoulder	2 x 0.5m
Carriageway	7.0m
Pavement (Unsealed)	150mm - Type 2.3

A desktop safety assessment concluded that the proposed intersection:

- The current access intersection location (SCRN) is appropriate from a safety perspective,
- Tomlins Road, whilst providing a 5.5m wide sealed surface and 0.5-1.0m wide shoulders is expected to be adequate to service the construction and operational phases of the project.
- If further investigation reveals Dodson's Road formation is less than the minimum standard for a (2 way / 2 lane) unsealed gravel roadway, it is recommended that an upgrade be considered to adequately addresses the movement of the design vehicle (Class 9)
- The Access route proposed is orientated so as not to incur adverse impacts from dawn and dust sun light impacts
- Advanced warning signs alerting the general public to frequent turning vehicles during the construction period are recommended to be installed for the construction period alone.

## 2.0 DEVELOPMENT CONTEXT

### 2.1 Background

Edify Energy proposes to develop a large-scale solar photovoltaic (PV) generation facility, and associated infrastructure on the above-mentioned lots.

Northern Consulting Engineers have been engaged to prepare a brief high-level traffic impact assessment report for the increase in traffic volumes during the construction phase of the development.

### 2.2 Site details

The site more specifically referred to as part of Lot 39 on RN395, Lot 28 on RN211, Lot 18 on RN271 and part of Lot 37 on RN1147 will host a large-scale solar photovoltaic (PV) generation facility and associated infrastructure. The project will occupy an area of approximately 2113 ha over the site and produce in the order of 500MW.

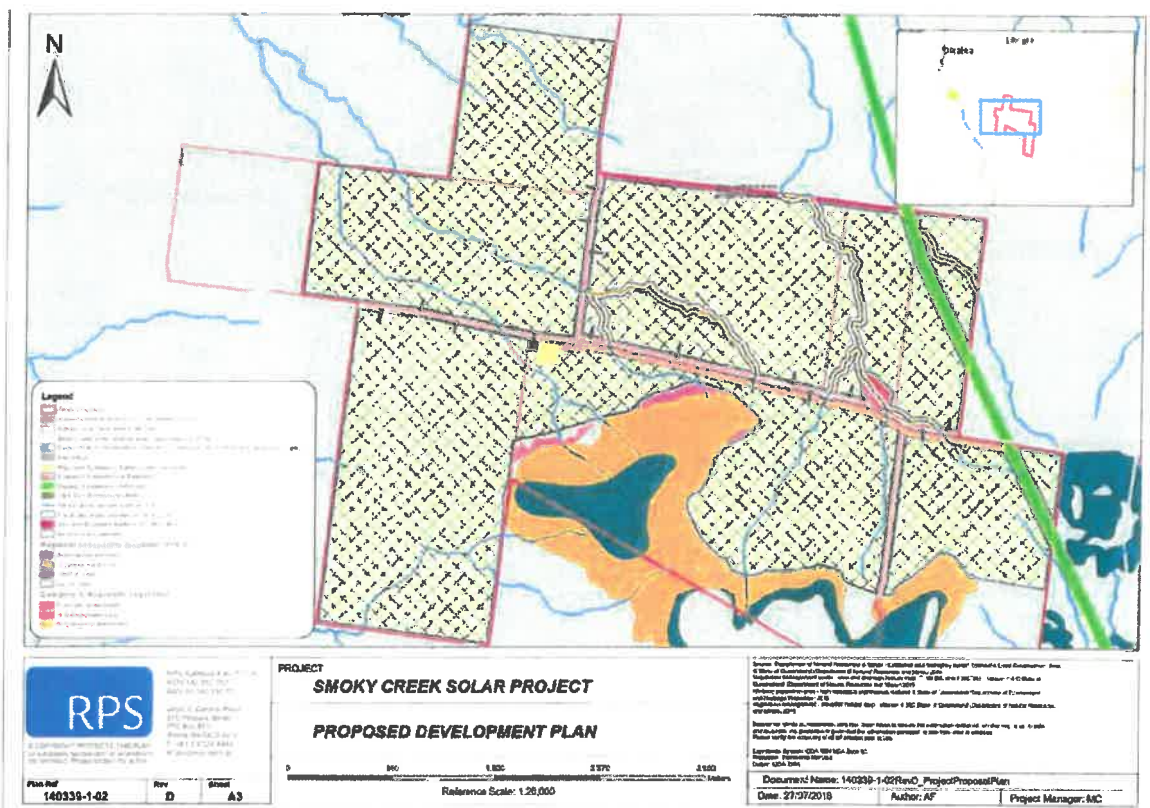


Figure 2-1 – Proposed Solar Farm Location

2.3 Current Site Access

The site is currently accessed via the Burnett Highway / Tomlins Road and Dodsons Road.

2.4 Road Network Description

Dawson Highway (TMR designation 46A)

Burnett Highway (TMR designation 41E)

Tomlins Road (Banana Shire Council)

Dodson's Road (Banana Shire Council)



Figure 2-2 - Part copy - Transport and Main Roads - Central Queensland Region Road Map

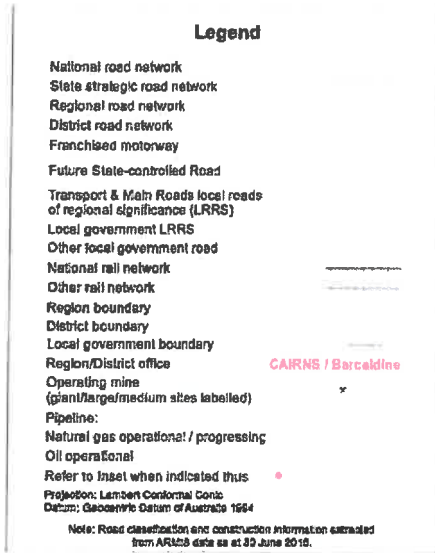


Figure 2-3 – Transport and Main Roads – Central Queensland Region Road Map (Legend)

### 2.5 Existing Traffic Volumes

Current traffic volume data for the Burnett Highway (41E) were obtained through the Rockhampton office of the Department of Transport and Main Roads (TMR).

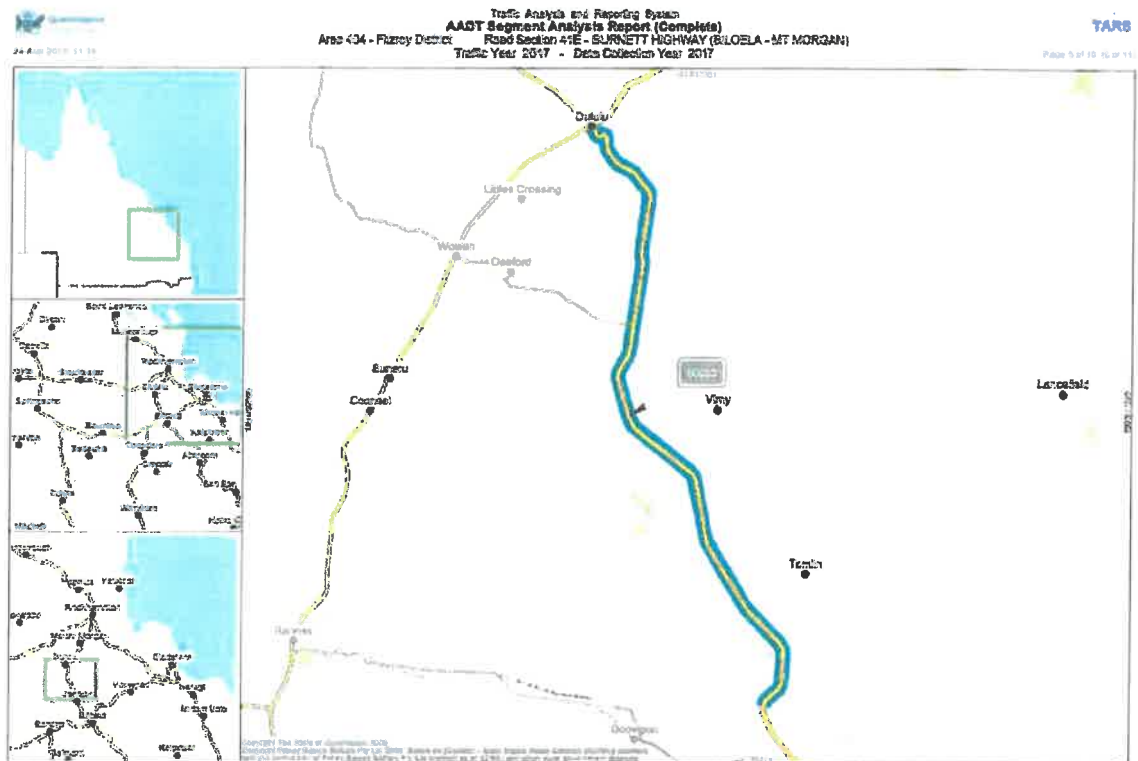


Figure 2-4 – TARS Data – Road Section 41E (Burnett Highway)



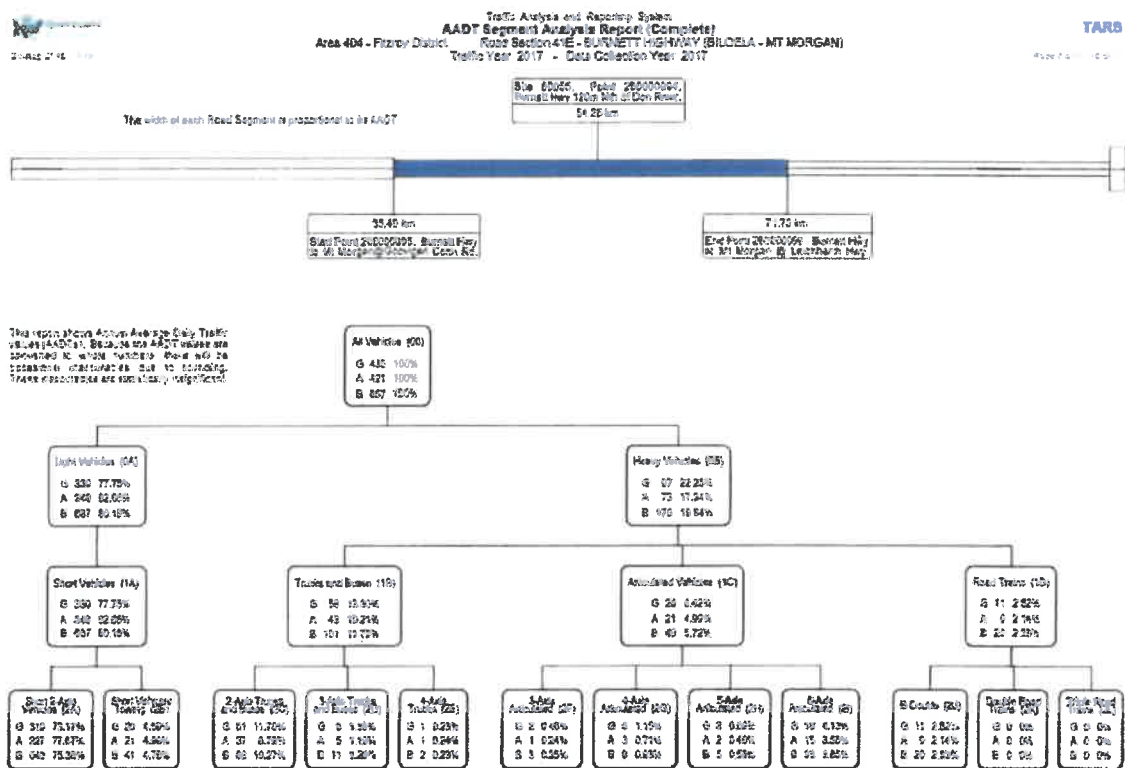


Figure 2-5 – TARS Data – Road Section 41E (Burnett Highway)

All Traffic Analysis and Reporting System (TARS) data relied upon have been included within Appendix A.

## 2.6 Traffic Growth Trends and Anticipated Traffic Breakdown

Based on the advice provided by Edify Energy, the construction phase of the project is anticipated to last 8 months commencing late 2019 / early 2020. Information regarding the anticipated vehicle movements during the 8 months construction phase have also been provided by Edify Energy and relied upon by NCE.

Adoption of the 8-month construction period is considered to be optimistic. Development generated traffic (Construction) has been determined on the basis of the power generation of the facility and therefore is relatively static. Should the construction period be extended (which is considered likely in comparison with other developments of a similar nature under construction at present), the intensity of traffic entering and exiting the site will simply reduce proportionally. Therefore the 8-month period is considered to be worse case, and reflects the maximum traffic volumes entering and exiting the site during the build.

Given the remote location of the site, it is considered probable that the labour force will be ferried to and from the site via mini buses (15 seat) capacity. Labour force trip generation has been analysed using this assumption.

Northern Consulting Engineers (NCE) have run the traffic warrants for the proposed development, at the time of construction and at the 10-year horizon being the operational phase.

Edify Energy expect fill material required to create sub-station platforms, building pads for operation and maintenance facilities, hard stands and carparking will be sourced on site.

Whilst the TARS data indicates that the current peak traffic volumes are approximately 8% to 12% of the Average Annual Daily Traffic (AADT) during the daily peak, NCE have assessed the peak volumes at 16%.

Table 2-1 Background traffic Growth (Construction year)

Description of entity		Road 41E
<b>Linear Growth Equation <math>A = rt+P</math></b>		
Year - Traffic Survey Data Collected		2017
Year - Commencement of Use		2019
Year - Projected Design Horizon		2019
Projected Growth Rate (percentage)		0.00%
AADT (G) [Traffic Flow in Gazettal Direction]		436
AADT (A) [Traffic Flow Against Gazettal Direction]		421
AADT (B) [Traffic Flow Both Directions]		857
(G)	Future value including growth rate	436.0
(A)	Future value including growth rate	421.0
(B)	Future value including growth rate	857.0
P	Initial value	(G), (A) or (B) above
r	Annual growth rate (decimal)	0.00%

Description of entity		Road 41E
<b>Continous Compound Growth Equation <math>A = P .e^{rt}</math></b>		
Year - Traffic Survey Data Collected		2017
Year - Commencement of Use		2019
Year - Projected Design Horizon		2019
Projected Growth Rate (percentage)		0.00%
AADT (G) [Traffic Flow in Gazettal Direction]		436
AADT (A) [Traffic Flow Against Gazettal Direction]		421
AADT (B) [Traffic Flow Both Directions]		857
(G)	Future value including growth rate	436.0
(A)	Future value including growth rate	421.0
(B)	Future value including growth rate	857.0
P	Initial value	(G), (A) or (B) above
r	Annual growth rate (decimal)	0.0000
e	Continous Growth	exp
t	Number of year projected.	2.0

Table 2-2 Background traffic Growth (Design Horizon)

Description of entity		Road 41E
<b>Linear Growth Equation <math>A = rt+P</math></b>		
Year - Traffic Survey Data Collected		2017
Year - Commencement of Use		2019
Year - Projected Design Horizon		2029
Projected Growth Rate (percentage)		0.00%
AADT (G) [Traffic Flow in Gazettal Direction]		436
AADT (A) [Traffic Flow Against Gazettal Direction]		421
AADT (B) [Traffic Flow Both Directions]		857
(G)	Future value including growth rate	436.0
(A)	Future value including growth rate	421.0
(B)	Future value including growth rate	857.0
P	Initial value	(G), (A) or (B) above
r	Annual growth rate (decimal)	0.00%

Description of entity		Road 41E
<b>Continuos Compound Growth Equation <math>A = P \cdot e^{rt}</math></b>		
Year - Traffic Survey Data Collected		2017
Year - Commencement of Use		2019
Year - Projected Design Horizon		2029
Projected Growth Rate (percentage)		0.00%
AADT (G) [Traffic Flow in Gazettal Direction]		436
AADT (A) [Traffic Flow Against Gazettal Direction]		421
AADT (B) [Traffic Flow Both Directions]		857
(G)	Future value including growth rate	436.0
(A)	Future value including growth rate	421.0
(B)	Future value including growth rate	857.0
P	Initial value	(G), (A) or (B) above
r	Annual growth rate (decimal)	0.0000
e	Continous Growth	exp
t	Number of year projected.	12.0

Table 2-3 Construction Traffic Movements

Transport Component	CONSTRUCTION MONTH								TOTAL	
	1	2	3	4	5	6	7	8		
PV Panels		463	463	463	463	463	463			2778
Power Conversion Units			63	63	63	63				250
Supports and fixings		834	834	834	834					3334
Switchgear				2						2
Power Transformer				2						2
Balance of system	83	83	83	83	83	83	83	83		667
Construction Labour Traffic (Light)	750	750	750	750	750	750	750	750		6000
Gravel roads (Internal)	372	372	372	372	372	372				2231
<b>TOTAL</b>		<b>1205</b>	<b>2502</b>	<b>2564</b>	<b>2568</b>	<b>2564</b>	<b>1731</b>	<b>1296</b>	<b>833</b>	<b>15264</b>
Assumed working days per month		<b>26</b>								
Daily Movements	46	96	99	99	99	67	50	32	Max	99
Assumed working hours per day		<b>8</b>								
Peak Movements per hour	17	23	23	23	23	19	17	15	Max	23

Table 2-4 Operational Traffic Movements

Operations and Maintenance Traffic Movements	Trip / MWp / Wk	Trips per week	Trips per year		
			Year 1	Year 2	Year N
Electricians	0.075	38	1950	1463	975
Water Trucks	0.3	3	150	150	150
Labour for Module Cleaning	0.9	9	450	450	450
Labour for General Maintenance	0.52	5	260	325	390
<b>Total Annual Movements</b>			<b>2810</b>	<b>2388</b>	<b>1965</b>
<b>Average Weekly Movements</b>			<b>54</b>	<b>46</b>	<b>38</b>
<b>Average Daily movement</b>			<b>8</b>	<b>7</b>	<b>5</b>

## 2.7 Current Speed Environment / Speed Surveys

The regulated speed environment for the Burnett Highway is 100km/h. Based on the information obtained from TMR.

## 2.8 Existing / Proposed Parking Provision

On-site parking provision will be provided for all workers and visitors during the construction and operational phases of the solar farm.

### 3.0 DEVELOPMENT PROPOSAL

#### 3.1 Proposed Uses and Scale

The proposed solar farm development area is approximately 2113 ha.

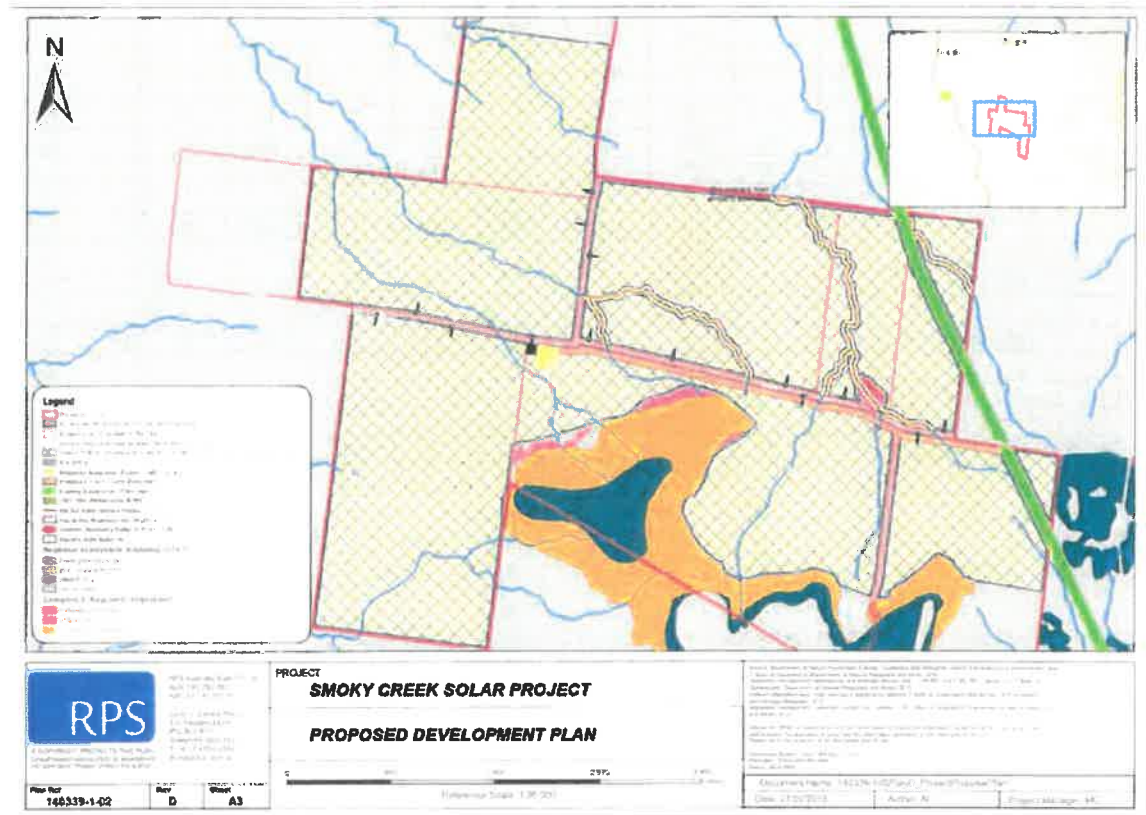


Figure 3-1 – Proposed Development Envelope

#### 3.2 Operating hours and peaks

The facility is expected to operate 24 hours per day, including public holidays. Power generation will occur during daylight hours, with maintenance works being undertaken as and when required. During the construction phase of the development, workers are anticipated to be accommodated on site Monday – Saturday. Construction activities are expected to be undertaken between the hours of 6am and 4pm, however some construction activities may occur outside these hours where the works cannot be interrupted (eg. Large concrete pours).

#### 3.3 Number of Employees / Visitors

The proposed facility is anticipated to operate with 5 employees permanently based on site.

#### 3.4 Site Layout

Preliminary layout plans of the facility are provided below.

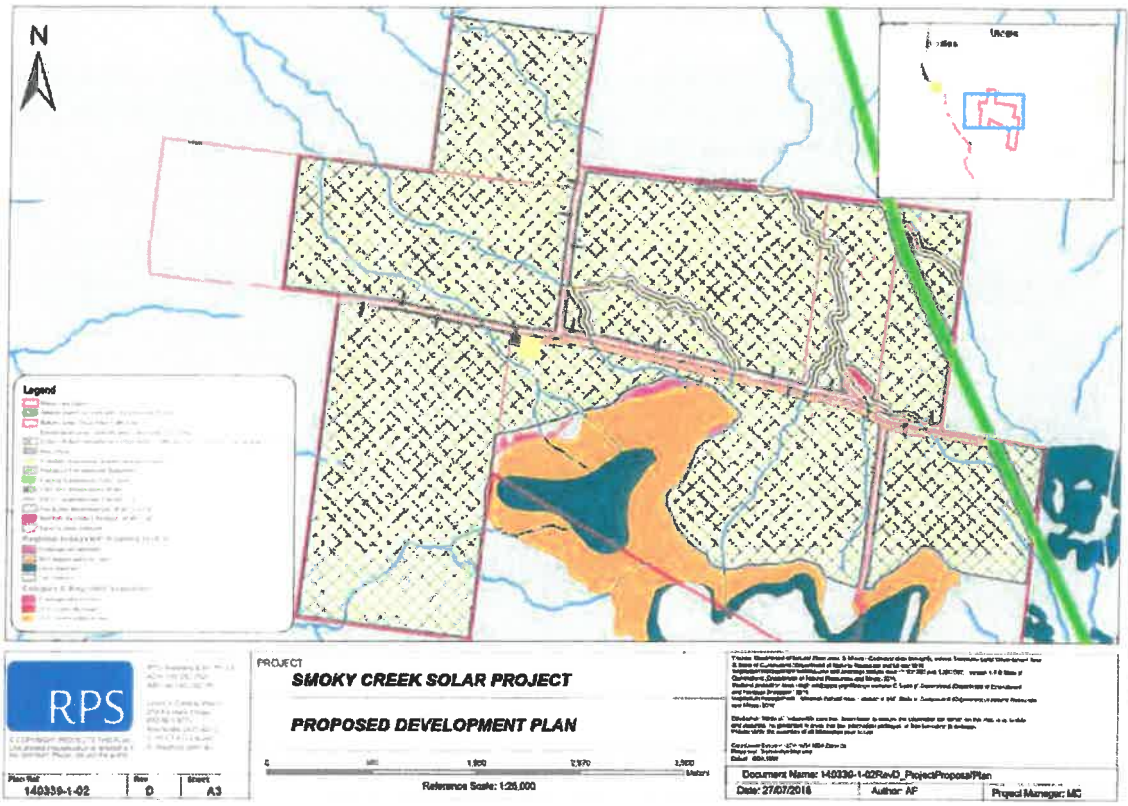


Figure 3-2 – Proposed Development Envelope

### 3.5 Access Form and Location

The following basic assumptions have been utilised during this preliminary access assessment.

- Current speed limit for Burnett Highway is 100km/h
- TMR traffic count data for 2017 has been adopted as the back-ground traffic and growth factors.
- Peak hourly traffic has been determined as follows:
  - Background traffic growth adopted calculated from Burnett Highway TARS data and 10 year predicted growth factor of 0.0%,
  - Development generated traffic 100/0, 0/100 [In/Out] Split applied in both directions.
  - Daily development labour traffic assessed as arriving within the peak hour (shift change)
  - Daily development delivery (HV) traffic averaged over the work day.
- Trip distribution: Given the volatility in the condition of the regional road network, a worst-case scenario has been developed for development generated traffic originating in both direction north and south.
- Construction traffic analysed for 2019,
- Operational Traffic analysed for 2029.

### 3.6 Austroads Intersection Configuration Warrants (Construction Traffic 2019)

Northern Consulting Engineers have prepared traffic volumes associated with the construction phase turn manoeuvres at the existing (SCRN) intersection. The results of these investigations are presented within the attached appendices with an example figure below:

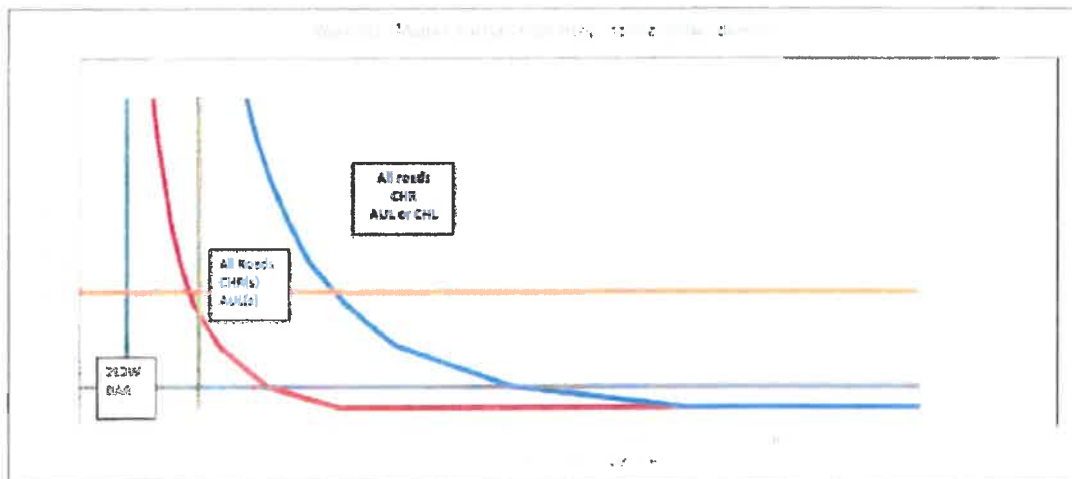
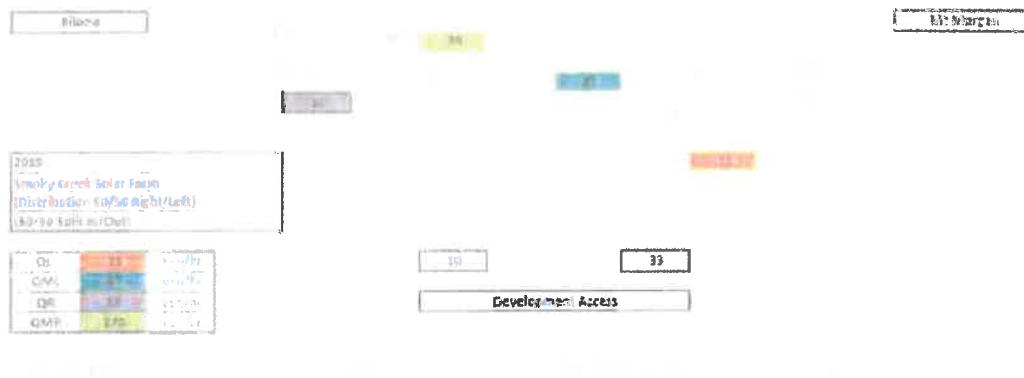


Figure 3-3 – Trip Distribution, Traffic Volume Calc and Intersection Warrant [Typical]

### 3.7 Intersection Form

As evidenced within the appendices, design traffic within the Burnett Highway combined with the predicted development generated traffic can be accommodated safely within the existing CHR / AUL intersection between the Burnett Highway and Tomlins Road.

Given the number of semi-trailers expected to utilise the Tomlins Road / Dodsons Road intersection during the construction phase the adoption of a configuration that is sympathetic to this vehicle type is recommended.

Given the low traffic volumes within Tomlins and Dodson's Roads and the fact that construction traffic will be aware of the location of the intersection and will generally access the site during daylight hours the adoption of an CHR(s) / AUL(s) intersection at Tomlins / Dodson's Road is recommended.



Estimate Document:  
#GRD04-17  
#SRD04-17

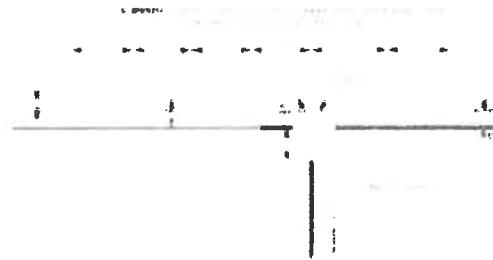
**Right Turn Treatments (Rural/Urban)**

Operating Posted Speed:	100 km/h	Storage Length (SL):	35 m
Design Speed (V):	110 km/h	Roadway Widthing (R):	1.5 m
Through Lane Width (TW):	3.5 m	Circle Rate:	2.5 m/s
Turning Lane Width (WL):	3.5 m	Stop Limit (SL):	

**BAR Treatment**

A	C	X
34	7	10-15m

Straight (Type 2 B 2 road used)



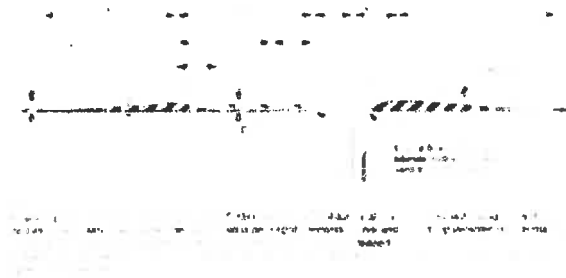
**CHR(S) Treatment**

A	B	C	E	R	T	X
50	120	65	55	300	30	10-12m



**CHR Treatment**

A	B	D	R	T	X
110	220	180	20%	35	10-12m



12/02/17, RP50007 Right Turn Treatments - Rev. 0.0.0

Figure 3-4 – Northern Consulting Engineers – Intersection configuration calculation spreadsheet

Reference Documents  
AGRD04-17  
AGRD06A-17

**Left Turn Treatments (Rural)**

Operating/Posted Speed	100 km/h	Turning Lane Width (W <sub>T</sub> )	8.5 m
Design Speed (V)	120 km/h	Roadway Widening (F)	3.5 m
Through Lane Width (W)	9.5 m	Decel rate	2.5 m/s <sup>2</sup>
		Stopping condition/Turning Speed	20 m/s

**BAI Treatment**

A	C	P
54	5	35

Stratford



**AU(5) Treatment**

D	T	L
55	35	72



Notes:  
1. For design speed, Roadway Widening (F) of 3.5m, turning lane width (W<sub>T</sub>) of 8.5m, and deceleration rate of 2.5 m/s<sup>2</sup>.  
2. Through Lane Width (W) of 9.5m, Design Speed (V) of 120 km/h, and Stopping condition/Turning Speed of 20 m/s.  
3. Roadway Widening (F) of 3.5m, Turning Lane Width (W<sub>T</sub>) of 8.5m, and Deceleration rate of 2.5 m/s<sup>2</sup>.

**AU(1) Treatment**

D	T	L
56	35	72

Calculated deceleration length (D=44)  
Minimum Storage Length (S=60)



Notes:  
1. For working out details of non-left turn geometries, use vehicle turning path software or parameters.

LR0222\_S&I700 Right Left Turn Treatments - Revised

Figure 3-5 – Northern Consulting Engineers – Intersection configuration calculation spreadsheet

#### 4.0 SAFETY ASSESSMENT

##### 4.1 *Desk top Preliminary Design Safety Audit*

Northern Consulting Engineers have undertaken a desktop preliminary design stage safety audit of the proposed access intersection.

The key outcomes from the audit are listed below:

- The existing intersection at Burnett Highway and Tomlins Road is considered safe for existing and proposed traffic loads for both construction phase and operational phase.
- The proposed upgrade to Tomlins / Dodson's Road intersection is expected to provide a suitable and safe intersection for the existing and proposed traffic loads for both construction phase and operational phase.
- If further investigation reveals Dodson's Road formation is less than the minimum standard for a (2 way / 2 lane) unsealed gravel roadway, it is recommended that an upgrade be considered to adequately address the movement of the design vehicle (Class 9)
- The Access route proposed is orientated so as not to incur adverse impacts from dawn and dust sun light impacts
- Advanced warning signs indicating the frequent truck turning movements are expected during the construction phase are recommended to be installed along the route from the Burnett Highway through to the site.

A full copy of the Preliminary Design Stage Safety Audit is contained within the Appendices.

## 5.0 CONCLUSION

In conclusion, the anticipated increase in traffic volume during the construction of the proposed solar farm can be accommodated within the existing road networks with upgrades.

An upgraded intersection configured in accordance with Figures 7.6 and 8.2 - Rural property access (BAL/BAR) specifically design for articulated vehicles (see Figures 2-24 and 2-25) Austroads "Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, 2017", is recommended to be installed at the intersection of Tomlins Road and Dodson's Road.

A pre-construction dilapidation report should be prepared and utilised as a bench mark to compare the performance of the pavement surfacing and pavement profile during and following the construction phase to ensure a safe and usable road profile is available for the development and the greater community.

A properly prepared action plan for the maintenance and repair of Tomlins Road and Dodson's Road should form any documentation utilised as part of the development.

From 'Google Earth' imagery, Dodsons Road appears to offer an unsealed pioneered/gravel formation 5.0 - 5.5m wide two way / one - one and a half lanes. Further investigation will be required to confirm the exact roadway formation width; however, it is recommended that Dodsons Road be upgraded to the minimum standard listed below should the current formation not meet the standard suggested:

Description	Two Lane / Two Way
Traffic Lane	2 x 3.0m
Shoulder	2 x 0.5m
Carriageway	7.0m
Pavement (unsealed)	150mm - Type 2.3

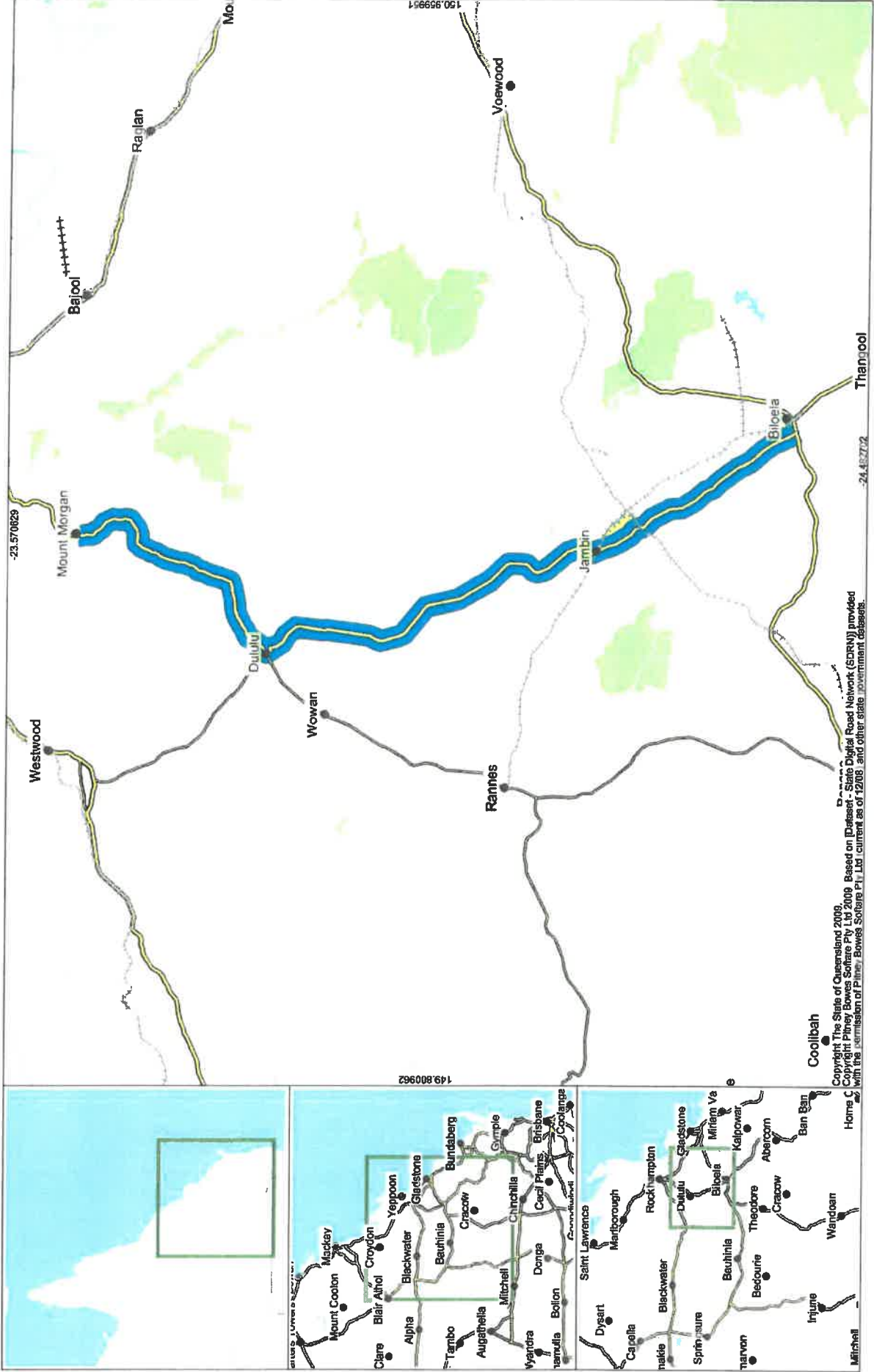
A desktop safety assessment concluded that the proposed solar farm can be safety constructed and operated with the following upgrades:

- The existing intersection at Burnett Highway and Tomlins Road is considered safe for existing and proposed traffic loads for both construction phase and operational phase.
- The proposed upgrade to Tomlins / Dodson's Road intersection is expected to provide a suitable and safe intersection for the existing and proposed traffic loads for both construction phase and operational phase.
- If further investigation reveals Dodson's Road formation is less than the minimum standard for a (2 way / 2 lane) unsealed gravel roadway, it is recommended that an upgrade be considered to adequately addresses the movement of the design vehicle (Class 9)
- The Access route proposed is orientated so as not to incur adverse impacts from dawn and dust sun light impacts
- Advanced warning signs indicating the frequent truck turning movements are expected during the construction phase are recommended to be installed along the route from the Burnett Highway through to the site.

## APPENDIX A

### Department of Transport and Main Roads Traffic Analysis and Report System (TARS) Data Sheets

Traffic Analysis and Reporting System  
**AADT Segment Analysis Report (Complete)**  
Road Section 41E - BURNETT HIGHWAY (BILOELA - MT MORGAN)  
Traffic Year 2017



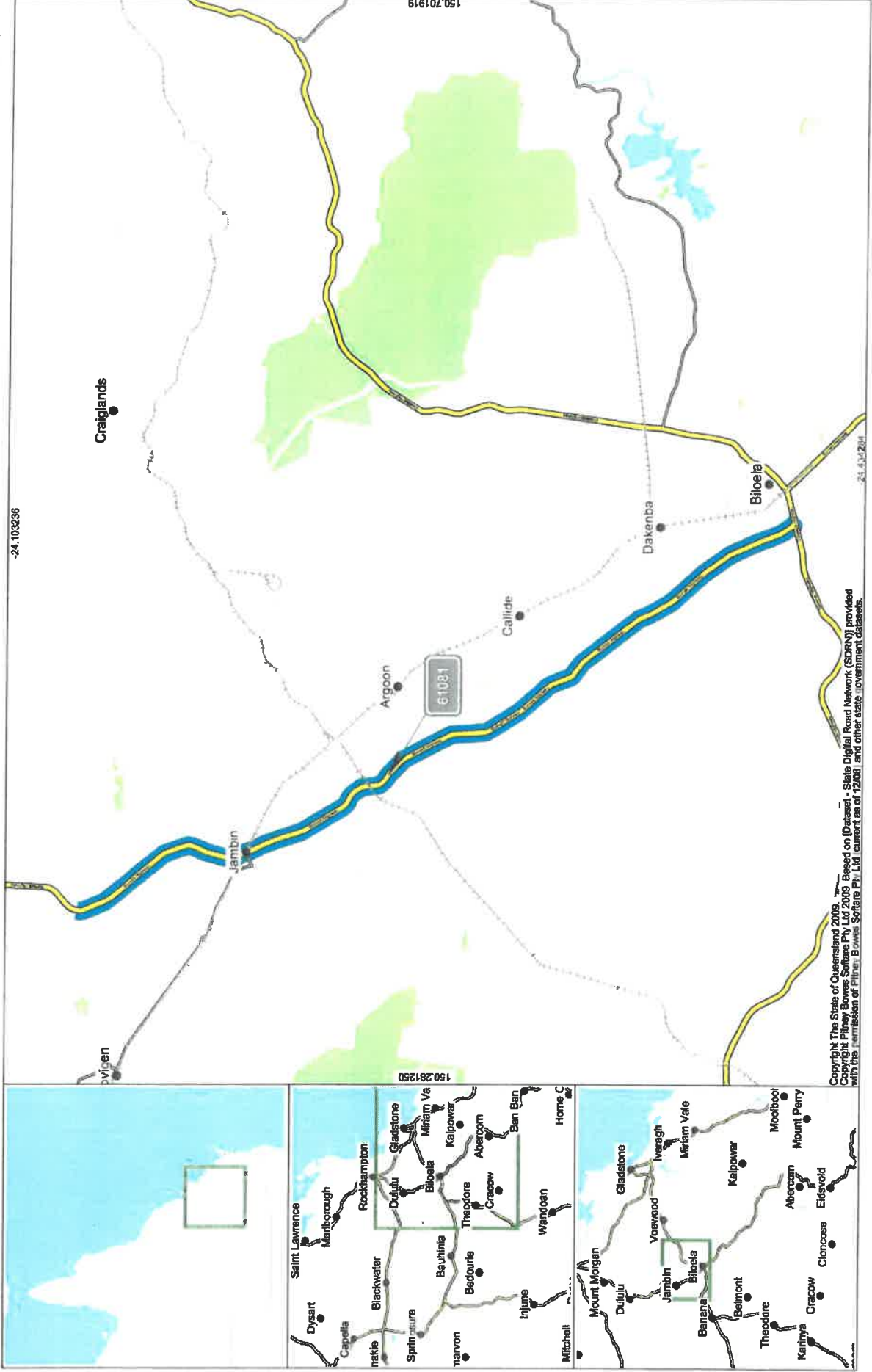
**Road Segments Summary - All Vehicles**

Region	Segment Start Tdlist	Segment End Tdlist	Site	Site Tdlist	Description	AADT			VKT (Millions)			Data Year	
						G	A	B	G	A	B	Year	Page
404	0.000 km	35.401 km	61081	20.310 km	Burnett Hwy 1km South Callide Creek	557	535	1,092	7,19720	6,91293	14,11013	2017	2
404	35.401 km	71.730 km	60055	54.260 km	Burnett Hwy 120m N of Don River	436	421	857	5,78140	5,58250	11,36989	2017	3
404	71.730 km	101.344 km	60056	98.945 km	Burnett Hwy 20m Nth Hamilton Ck	389	395	784	4,20474	4,28960	8,47434	2017	4
404	101.344 km	102.775 km	61082	102.725 km	Burnett Hwy 50 Metres Sth of Gordon St	1,178	1,197	2,375	0,61529	0,62521	1,24050	2017	5
<b>Totals</b>						<b>17,79863</b>	<b>17,99024</b>	<b>35,18886</b>					

**Road Segments Summary - Heavy Vehicles only**

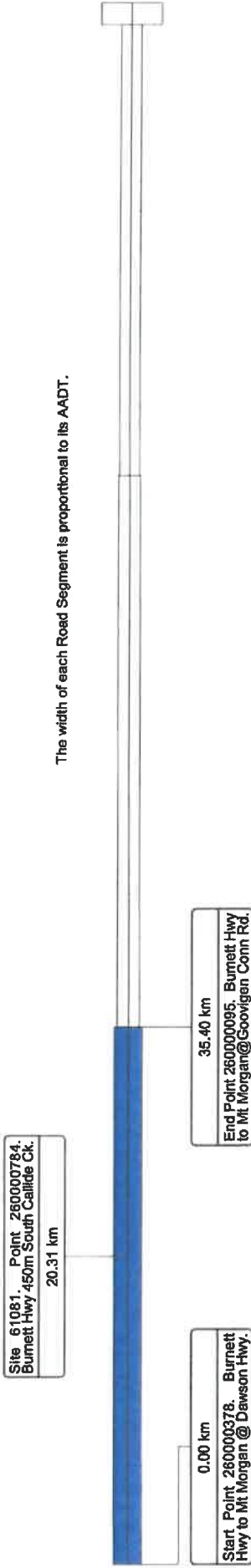
VKT totals are calculated only if traffic class data is available for all sites.

Region	Segment Start Tdlist	Segment End Tdlist	Site	Site Tdlist	Description	HV AADT			HV VKT (Millions)			Data Year			
						G	A	B	G	A	B	Year	Page		
404	0.000 km	35.401 km	61081	20.310 km	Burnett Hwy 1km South Callide Creek	113	103	19,25%	218	19,78%	1,46011	1,33090	2,79101	2017	2
404	35.401 km	71.730 km	60055	54.260 km	Burnett Hwy 120m N of Don River	97	73	17,34%	170	19,84%	1,28623	0,96789	2,25421	2017	3
404	71.730 km	101.344 km	60056	98.945 km	Burnett Hwy 20m Nth Hamilton Ck	28	36	9,11%	65	8,29%	0,31346	0,38913	0,70259	2017	4
404	101.344 km	102.775 km	61082	102.725 km	Burnett Hwy 50 Metres Sth of Gordon St	145	102	8,52%	247	10,40%	0,07574	0,05328	0,12901	2017	5
<b>Totals</b>						<b>3,13554</b>	<b>2,74129</b>	<b>5,87683</b>							



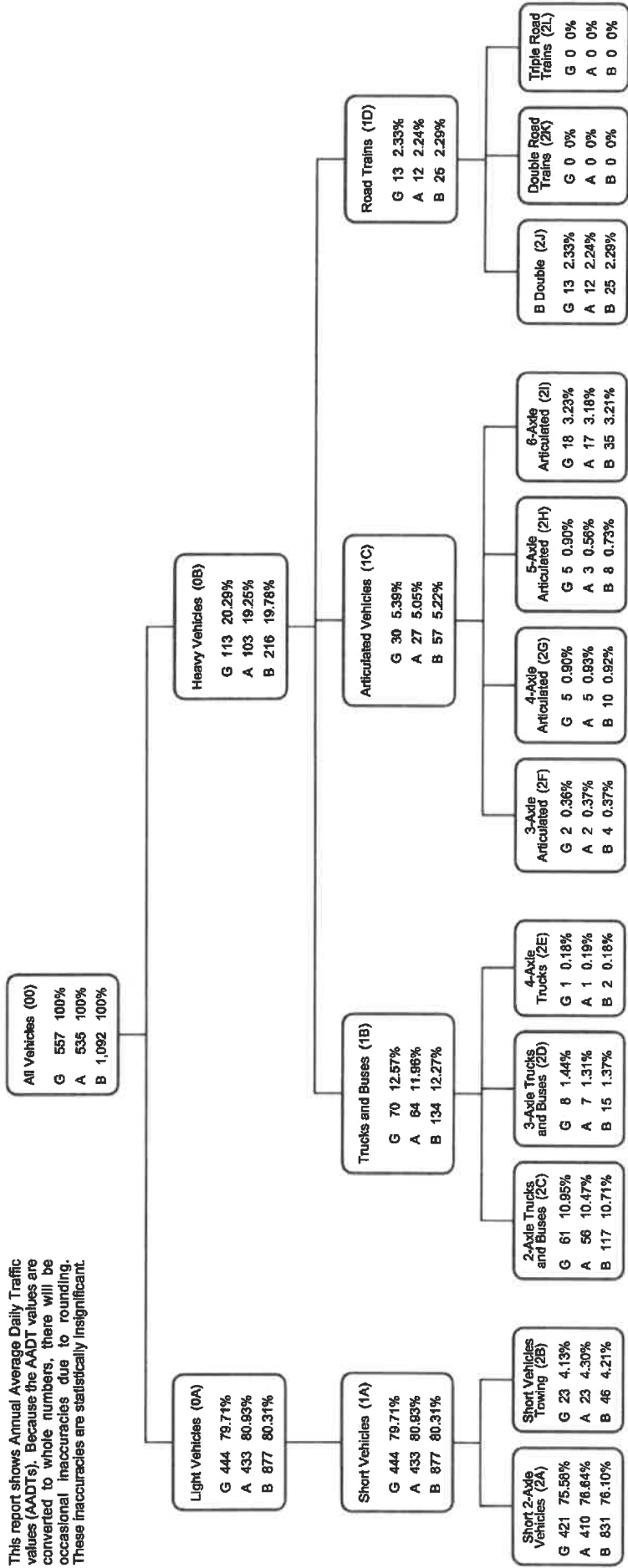
Copyright The State of Queensland 2018.  
 Copyright Pitney Bowes Software Pty Ltd 2003. Based on (Data) - State Digital Road Network (SDRN) provided with the permission of Pitney Bowes Software Pty Ltd current as of 12/06 and other state government datasets.



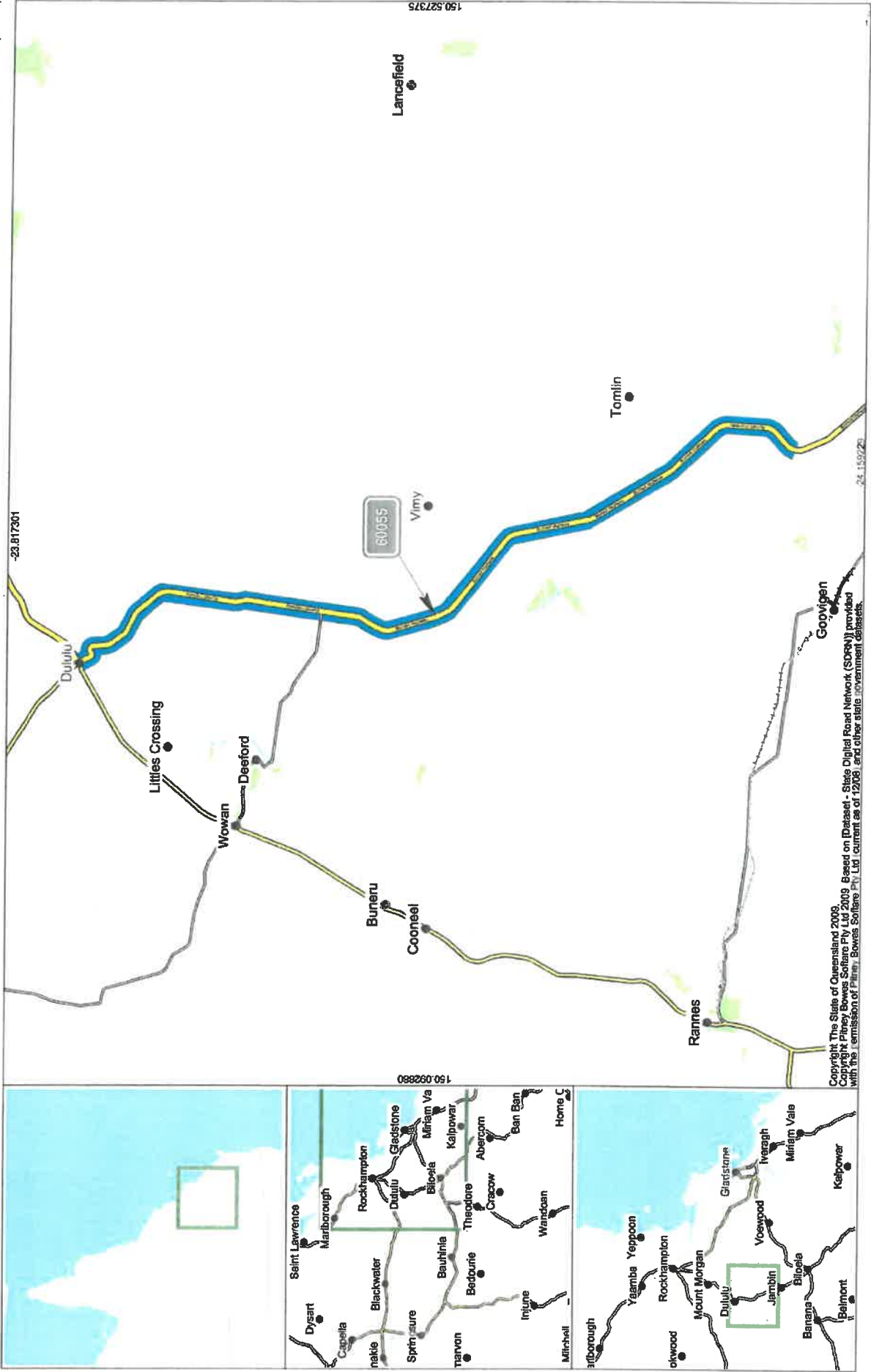


The width of each Road Segment is proportional to its AADT.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

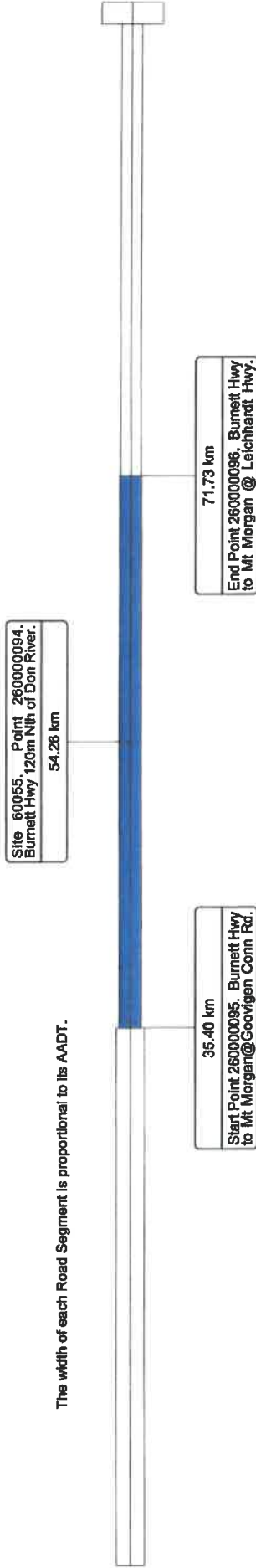


TARS  
Traffic Analysis and Reporting System  
AADT Segment Analysis Report (Complete)  
Road Section 41E - BURNETT HIGHWAY (BILOELA - MT MORGAN)  
Traffic Year 2017 - Data Collection Year 2017

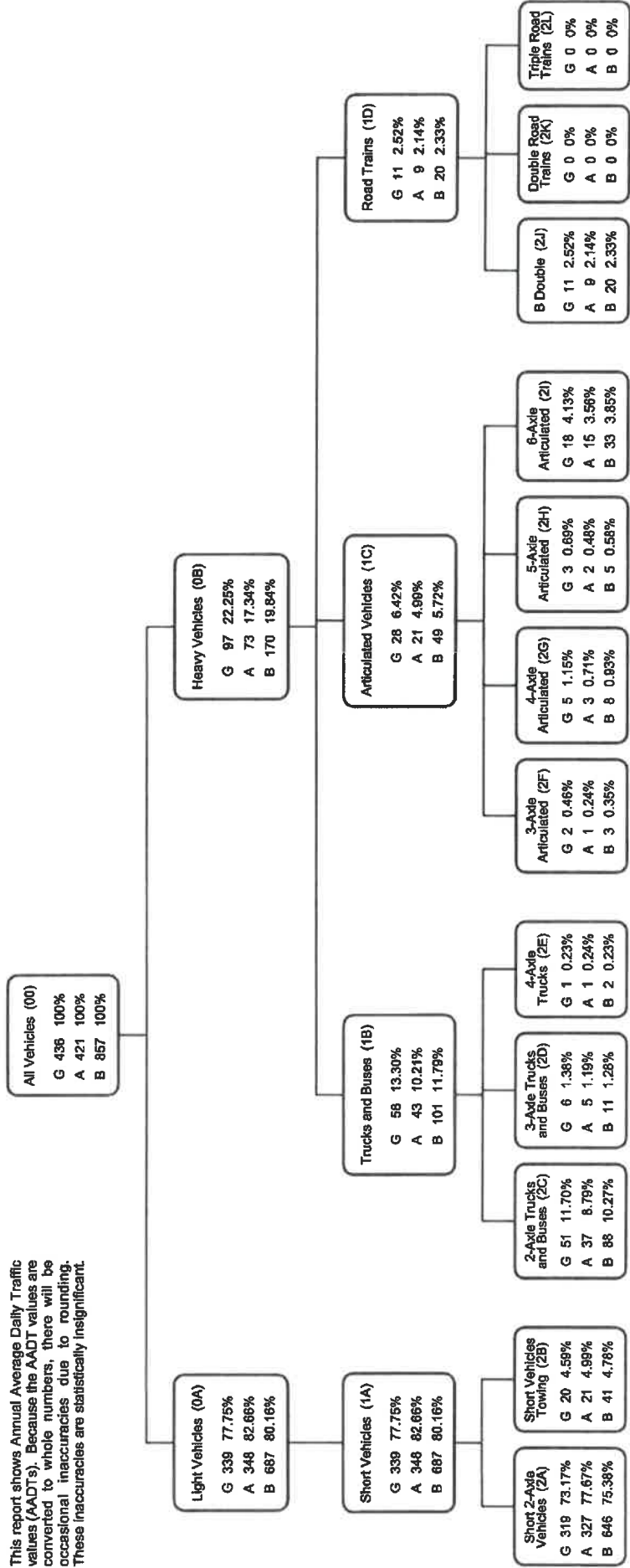


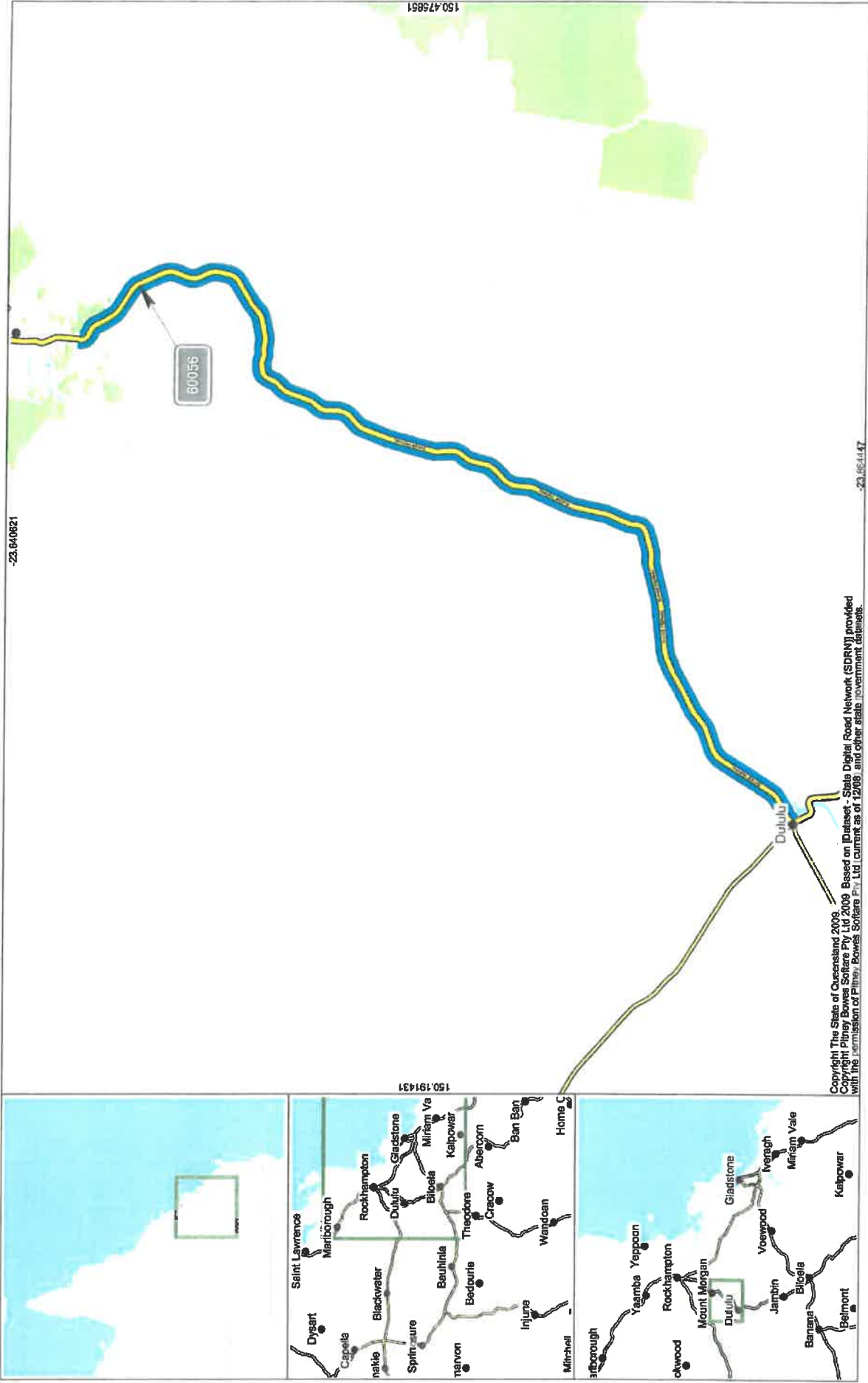
Copyright The State of Queensland 2009. Based on Dataset - State Digital Road Network (SDRN) provided with the permission of Pinner, Bowers Software Pty Ltd current as of 12/08 and other state government datasets.

TARS  
 Traffic Analysis and Reporting System  
**AADT Segment Analysis Report (Complete)**  
 Area 404 - Fitzroy District  
 Road Section 41E - BURNETT HIGHWAY (BILOELA - MT MORGAN)  
 Traffic Year 2017 - Data Collection Year 2017



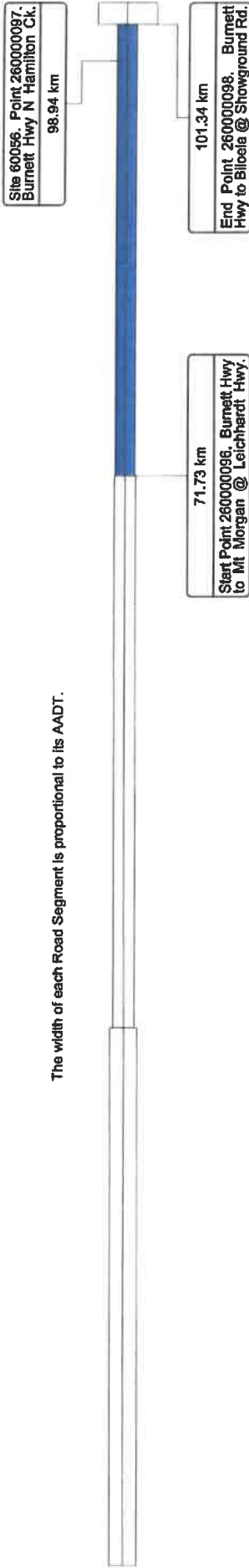
This report shows Annual Average Daily Traffic values (AADT's). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.





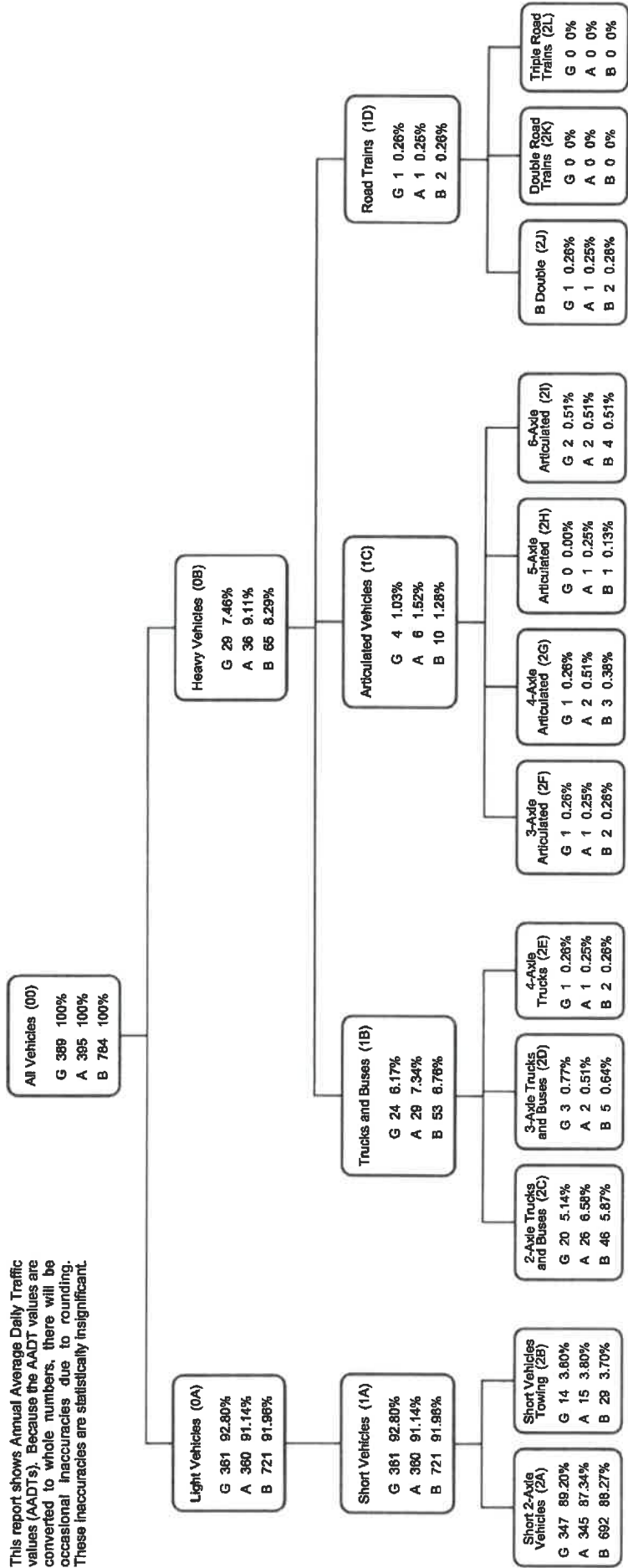
Copyright The State of Queensland 2009. Based on [Dataset - State Digital Road Network (SDRN)] provided with the permission of Pliney, Bowes Software Pty Ltd, current as of 12/08, and other state government datasets.

Traffic Analysis and Reporting System  
**AADT Segment Analysis Report (Complete)**  
 Area 404 - Fitzroy District Road Section 41E - BURNETT HIGHWAY (BILOELA - MT MORGAN)  
 Traffic Year 2017 - Data Collection Year 2017

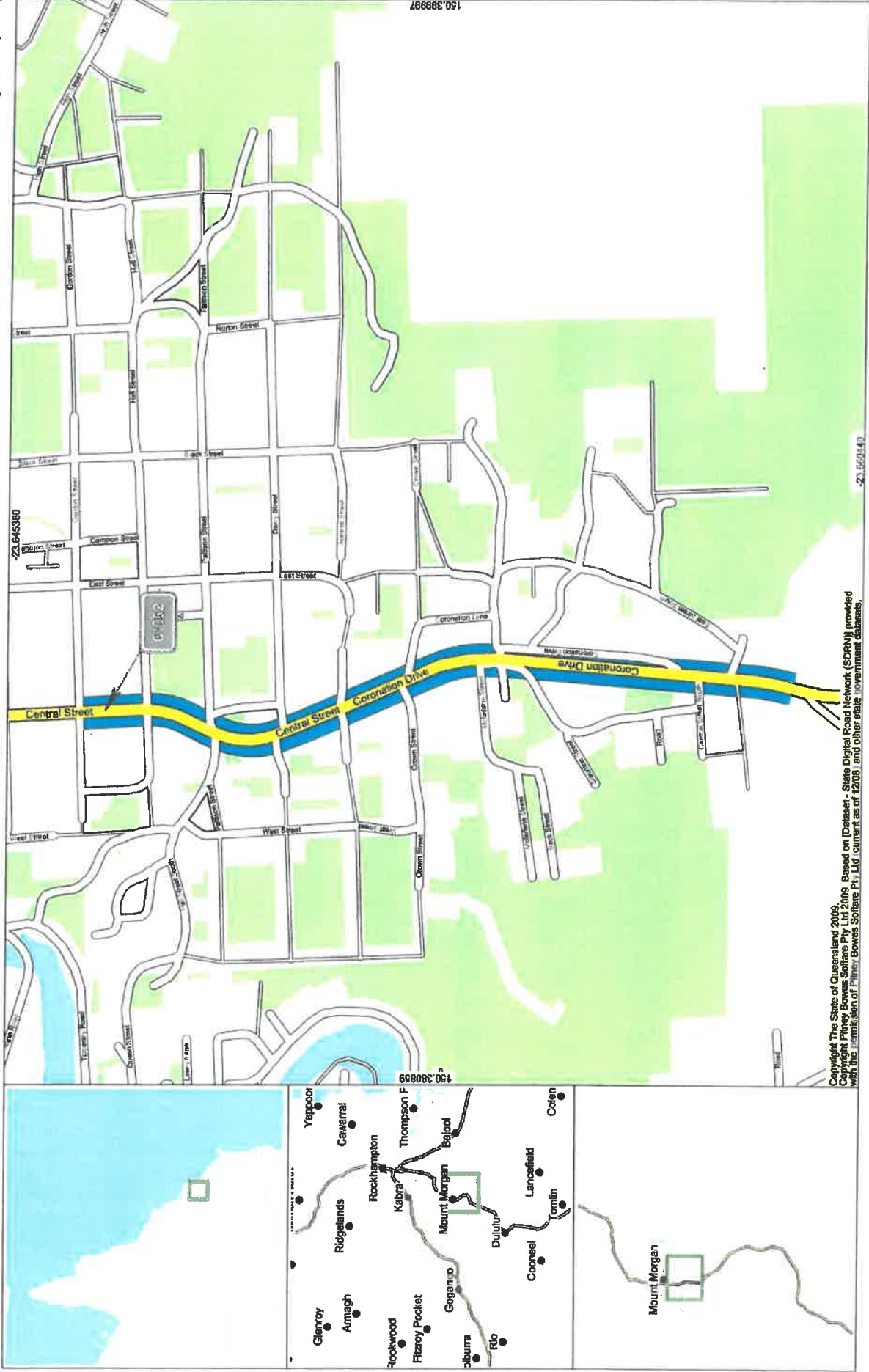


The width of each Road Segment is proportional to its AADT.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.



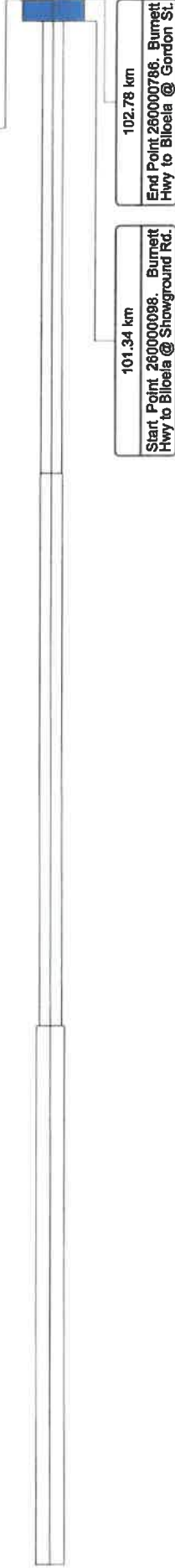
Traffic Analysis and Reporting System  
**AADT Segment Analysis Report (Complete)**  
 Road Section 41E - BURNETT HIGHWAY (BILOELA - MT MORGAN)  
 Traffic Year 2017 - Data Collection Year 2017



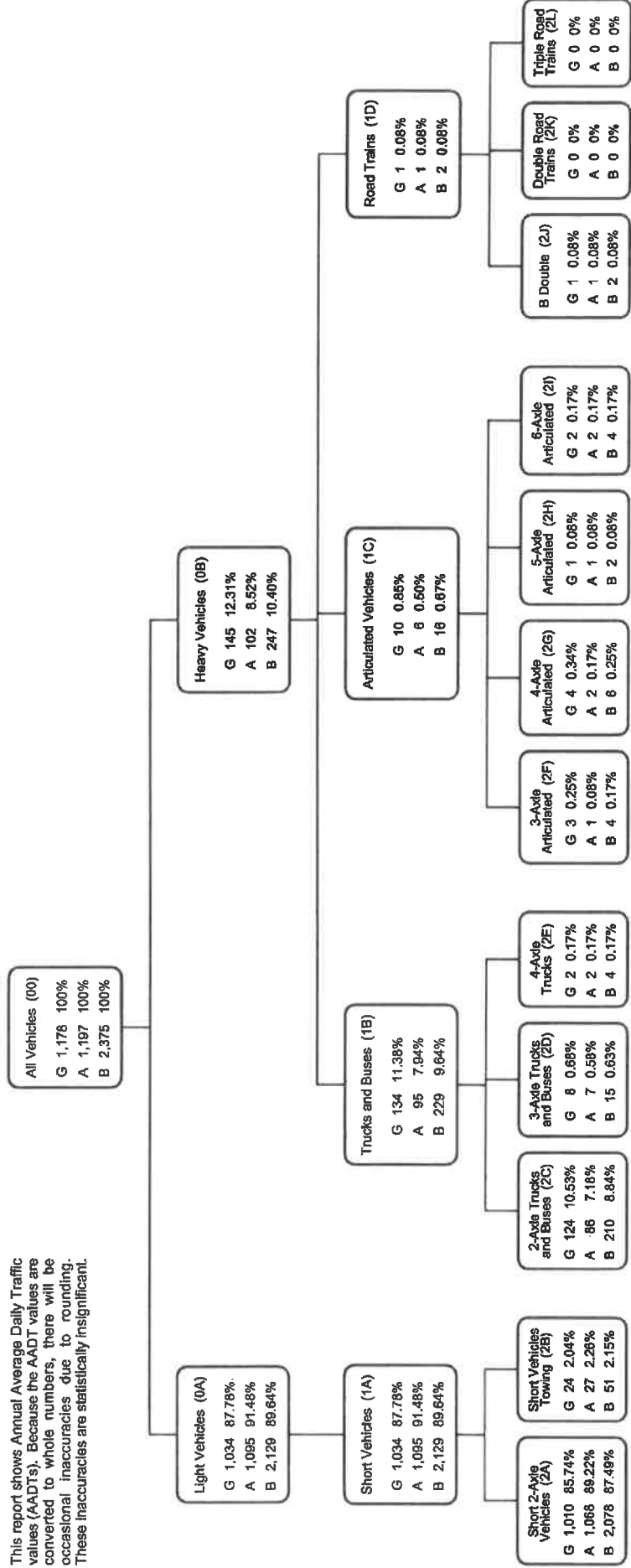
Copyright The State of Queensland 2009.  
 Copyright Pliney Bowes Software Pty Ltd 2009. Based on [Dataset - State Digital Road Network (SDRN)] provided with the permission of Pliney Bowes Software Pty Ltd current as of 12/09/ and other state government datasets.

Site 61082, Point 260000785, Burnett Hwy 50 Metres South of Gordon St.  
102.72 km

The width of each Road Segment is proportional to its AADT



This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.



### AADT Segment Report

Provides AADT Segment details for a Road Section together with the traffic flow data collected at the related Site. Traffic data is reported by the start and end Through Distance of the AADT Segments on each section of road. The road segments are represented diagrammatically with AADT data including:

- AADT by direction of traffic flow
- VKT Vehicle Kilometres Travelled
- %VC Percentage Vehicle Class as per the Austroads vehicle classification scheme

### Annual Average Daily Traffic (AADT)

Annual Average Daily Traffic (AADT) is the number of vehicles passing a point on a road in a 24 hour period, averaged over a calendar year.

### AADT Segment

Is a subdivision of a Road Section. The boundaries of an AADT Segment are its Start Point and End Point (or Start and End Through Distance (TDist)) within the Road Section. These distances are measured in kilometres from the beginning of the Road Section in Gazettal Direction. AADT Segments are determined by the traffic volume, collected at a count Site, located within the limits of each AADT Segment.

### Annual Segment Growth (when displayed)

A percentage that represents the increase or decrease in AADT for the AADT Segment, using an exponential fit, calculated over a 1, 5 or 10 year period.

### Area

For administration purposes the Department of Transport and Main Roads has divided Queensland into 12 Districts. The Area field in TSDM reports displays the District Name and Number.

District Name	District
Central West District	401
Darling Downs District	402
Far North District	403
Fitzroy District	404
Mackay/Whitsunday District	405
Metropolitan District	406
North Coast District	407
North West District	409
Northern District	408
South Coast District	410
South West District	411
Wide Bay/Burnett District	412

### Data Year

The most recent year the traffic data was collected for this AADT Segment.

### Gazettal Direction

The Gazettal Direction is the direction of the traffic flow. It can be easily recognised by referring to the name of the road eg. Road Section: 10A Brisbane - Gympie denotes that the gazettal direction is from Brisbane to Gympie.

- G Traffic flowing in Gazettal Direction
- A Traffic flowing against Gazettal Direction
- B The combined traffic flow in both Directions

### Road Section

Is the Gazettal road from which the traffic data is collected. Each Road Section is given a code, allocated sequentially in Gazettal Direction. Larger roads are broken down into sections and identified by an ID code with a suffix for easier data collection and reporting (eg. 10A, 10B, 10C). Road Sections are then broken into AADT Segments which are determined by traffic volume.

### Site

The physical location of a traffic counting device. Sites are located at a specified Through Distance along a Road Section.

### Site TDist

The Through Distance in gazettal direction from the start of the Road Section at which the site is located.

### Site Description

The description of the physical location of the traffic counting device.

### Start and End Point

The unique identifier for the Through Distance along a Road Section.

### Through Distance

The distance, in kilometres, from the beginning of the Road Section in Gazettal Direction.

### Traffic Class

Is the 12 Austroads vehicle categories or classes into which vehicles are placed or binned. Traffic classes are formed in a hierarchical format.

#### Volume or All Vehicles

00 = 0A + 0B

#### Light Vehicles

0A = 1A

1A = 2A + 2B

#### Heavy Vehicles

0B = 1B + 1C + 1D

1B = 2C + 2D + 2E

1C = 2F + 2G + 2H + 2I

1D = 2J + 2K + 2L

The following classes are the categories for which data can be captured:

#### Volume

00 All vehicles.

#### 2-Bin

0A Light vehicles

0B Heavy vehicles

#### 4-Bin

1A Short vehicles

1B Truck or bus

1C Articulated vehicles

1D Road train

#### 12-Bin

2A Short 2 axle vehicles

2B Short vehicles towing

2C 2 axle truck or bus

2D 3 axle truck or bus

2E 4 axle truck

2F 3 axle articulated vehicle

2G 4 axle articulated vehicle

2H 5 axle articulated vehicle

2I 6 axle articulated vehicle

2J B double

2K Double road train

2L Triple road train

### Vehicle Kilometres Travelled (VKT)

Daily VKT is a measure of the traffic demand. It is calculated by the length of an AADT Segment in kilometres multiplied by its AADT. The yearly VKT is the daily VKT multiplied by 365 days.

#### AADT Segment Summary - All Vehicles

The Total VKT can be used to gauge the demand on an entire Road Section.

#### AADT Segment Summary - Heavy Vehicles only

A blank field indicates that vehicle classification data was not collected for this AADT Segment.

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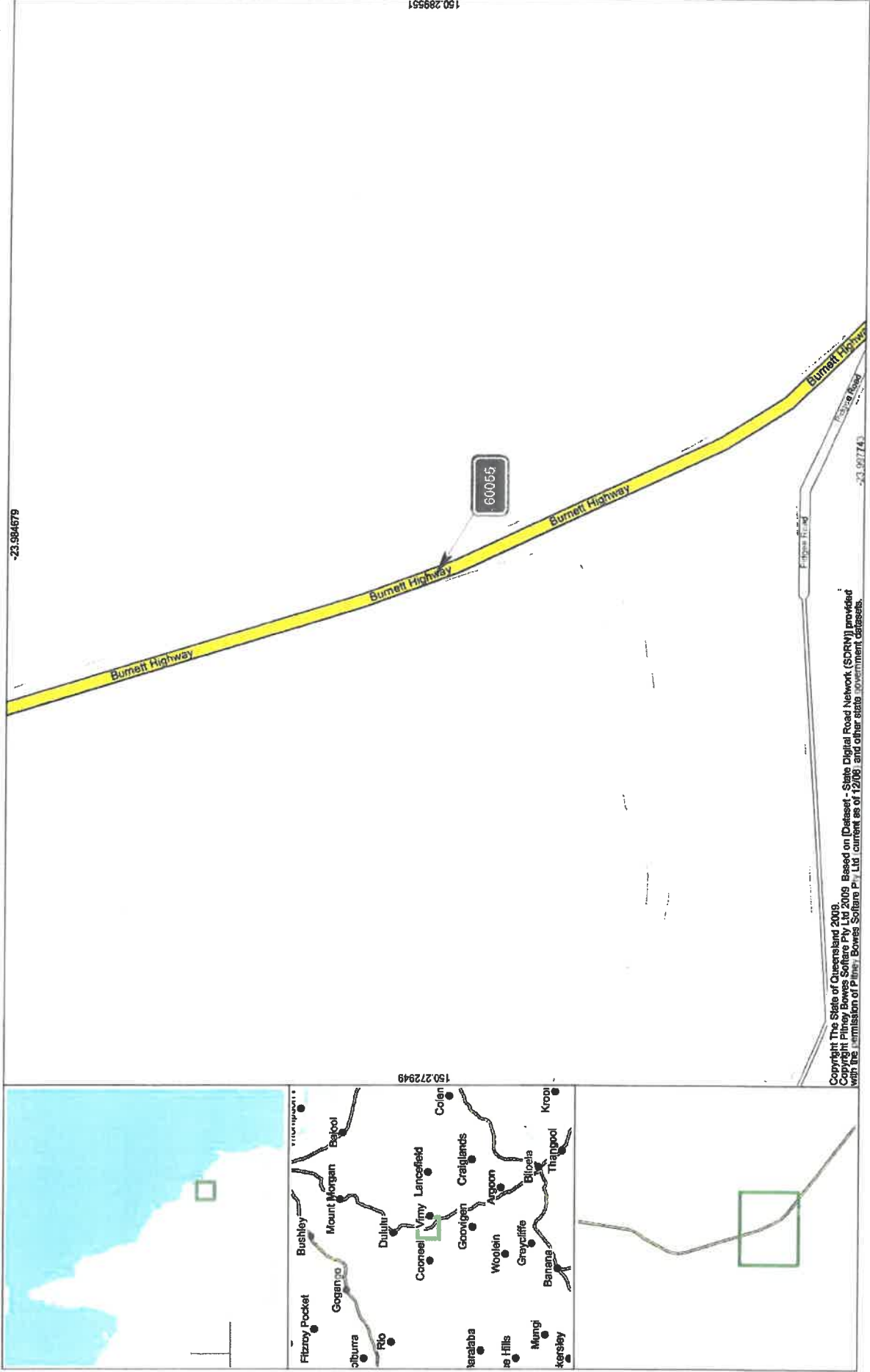
**Crash Types**  
 Crash Dates  -   
 Owner   
 DCA Code   
 Group   
 Fatalities =   
 Severity   
 Nature

Alignment:   
  
 Feature   
 Traffic Ctrl   
 Speed Limit   
 Contrib Circ.   
 Unit Type   
 Risk Factor

Area LGA  SLA  Police Division

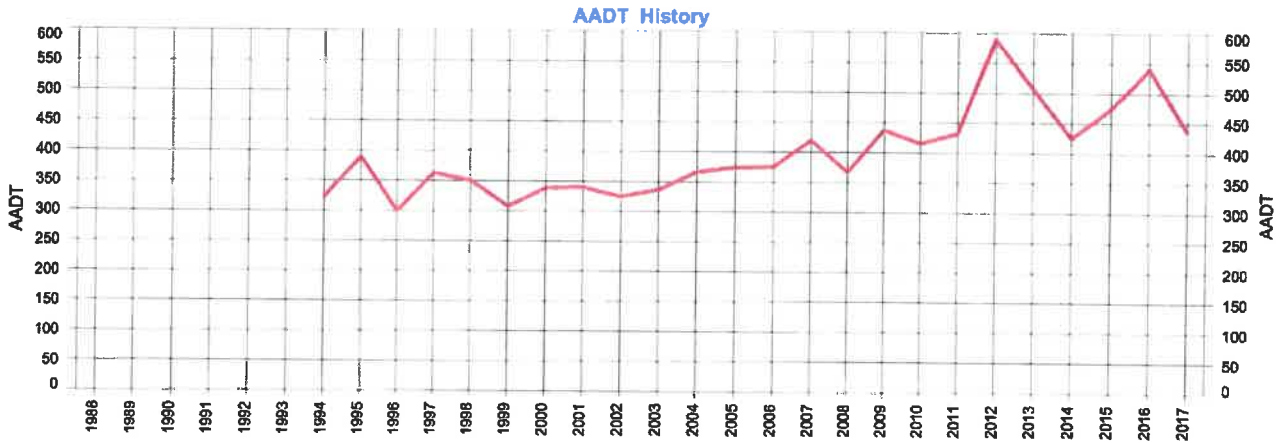
**Road Sections**  
 All Road Sections  Include Crashes on  Thru road Mid-block  Thru roads at Intersections  Intersecting roads at Intersections  
 Road Section   
 Cway  RPC  11  Dist  End  Tdist  
 Start  End  Fatal  Hosp. Medical  Minor  PDO  Total

**Intersections**  
 All Intersections

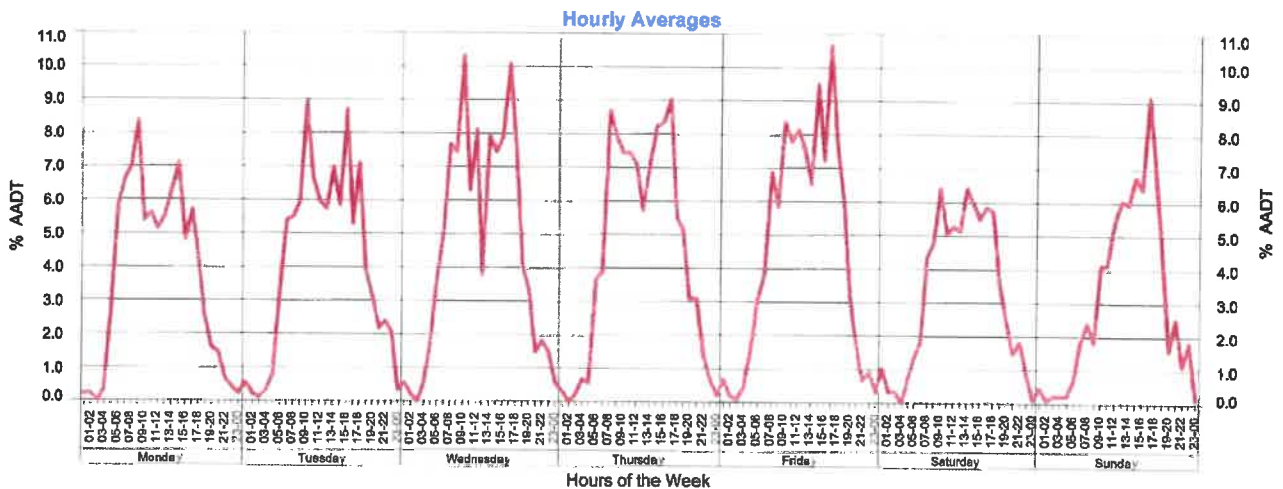


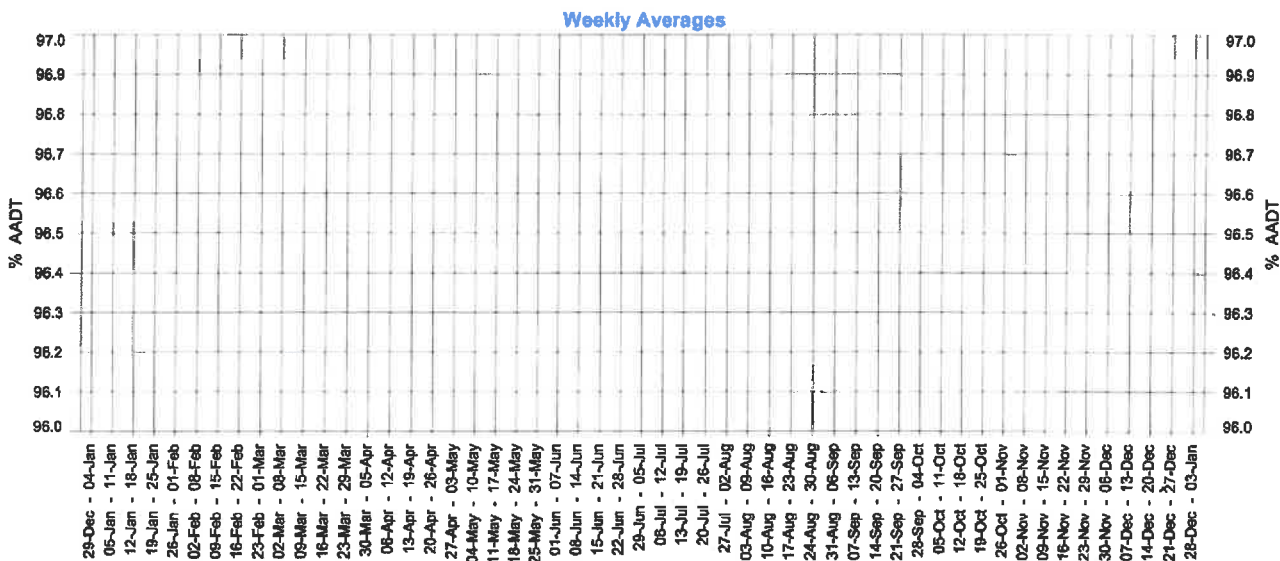
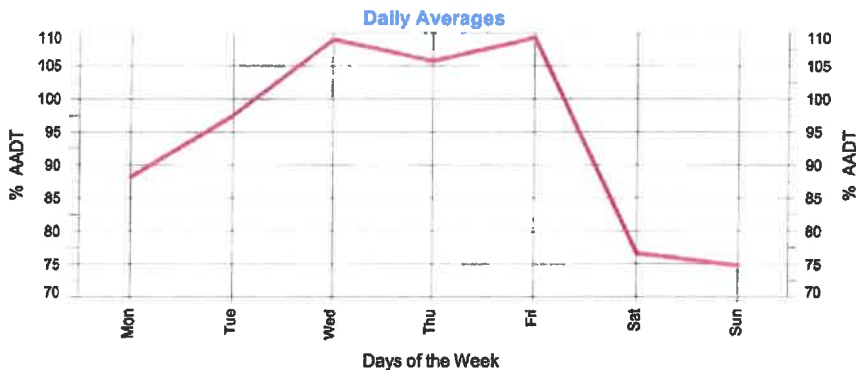
Area 404 - Fitzroy District  
Road Section 41E - BURNETT HIGHWAY (BILOELA - MT MORGAN)  
Site 60066 - Burnett Hwy 120m N of Don River  
Thru Dist 54.26  
Type C - Coverage  
Stream T1 - Thru traffic in Lane 1 -in gazettal dlm

Year 2017  
AADT 436  
Avg Week Day 440  
Avg Weekend Day 327  
Growth last Year -19.41%  
Growth last 5 Yrs -4.29%  
Growth last 10 Yrs -0.03%



Year	AADT	1-Year Growth	5-Year Growth	10-Year Growth	Year	AADT	1-Year Growth	5-Year Growth	10-Year Growth
2017	436	-19.41%	-4.29%	-0.03%	2002	325	-4.41%	-1.49%	
2016	541	14.14%	2.94%	3.83%	2001	340	0.59%	0.89%	
2015	474	11.53%	0.65%	2.12%	2000	338	9.74%	-0.74%	
2014	425	-16.17%	-1.66%	0.96%	1999	308	-12.25%	-2.74%	
2013	507	-13.92%	5.57%	4.16%	1998	351	-3.31%		
2012	589	36.34%	10.49%	7.04%	1997	363	21.40%		
2011	432	4.10%	2.44%	2.72%	1996	299	-23.14%		
2010	415	-5.03%	1.99%	2.40%	1995	389	20.81%		
2009	437	19.07%	4.12%	3.62%	1994	322			
2008	367	-12.62%	0.40%	1.09%	1993				
2007	420	12.00%	5.48%	2.97%	1992				
2006	375	0.27%	2.66%	1.71%	1991				
2005	374	2.19%	2.85%	1.31%	1990				
2004	366	8.93%	3.19%	1.15%	1989				
2003	336	3.38%	0.22%		1988				





2017 Calendar

January							February							March							April						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
30	31					1			1	2	3	4	5			1	2	3	4	5						1	2
2	3	4	5	6	7	8	6	7	8	9	10	11	12	6	7	8	9	10	11	12	3	4	5	6	7	8	9
9	10	11	12	13	14	15	13	14	15	16	17	18	19	13	14	15	16	17	18	19	10	11	12	13	14	15	16
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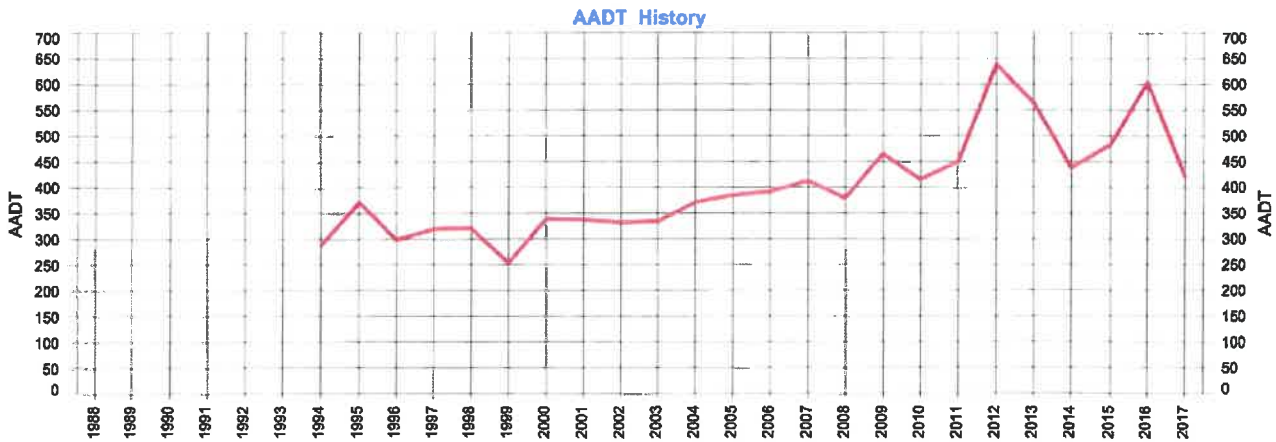
May							June							July							August						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
1	2	3	4	5	6	7				1	2	3	4	31					1	2			1	2	3	4	5
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22	23	24	25	26	27	28	19	20	21	22	23	24	25	17	18	19	20	21	22	23	21	22	23	24	25	26	27
29	30	31					26	27	28	29	30			24	25	26	27	28	29	30	28	29	30	31			

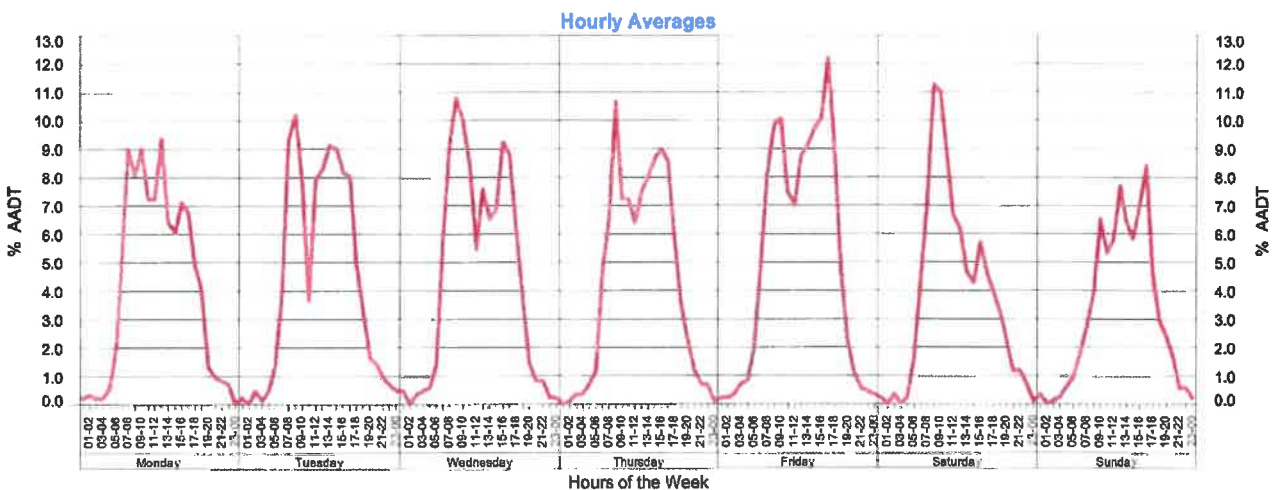
September							October							November							December						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
							30	31					1														
4	5	6	7	8	9	10	2	3	4	5	6	7	8	6	7	8	9	10	11	12	4	5	6	7	8	9	10
11	12	13	14	15	16	17	9	10	11	12	13	14	15	13	14	15	16	17	18	19	11	12	13	14	15	16	17
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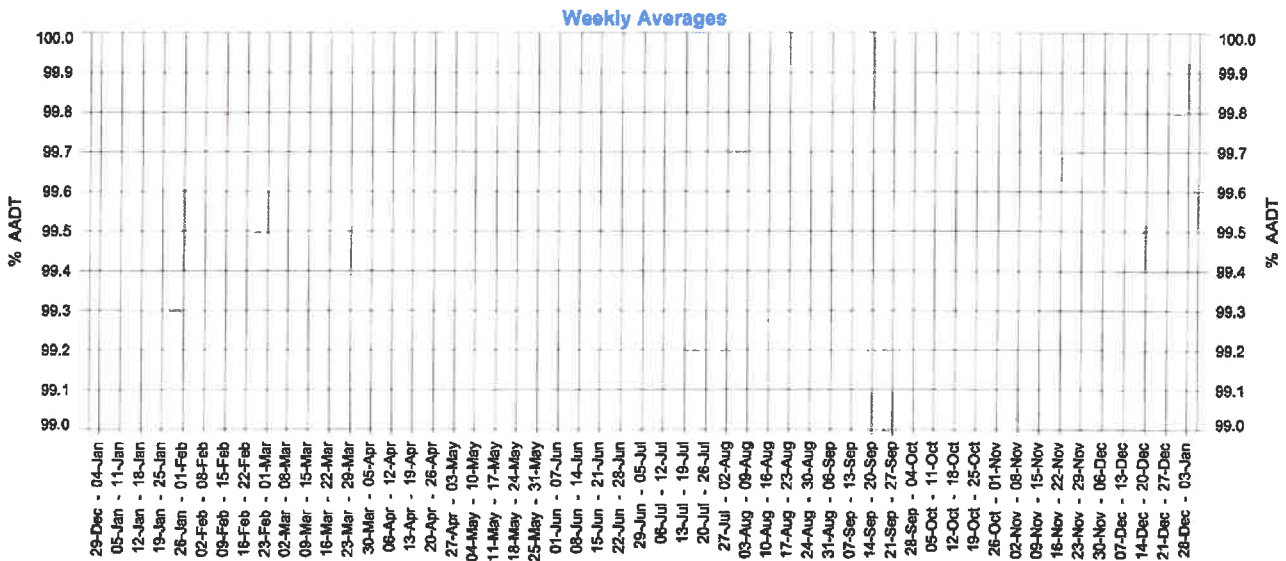
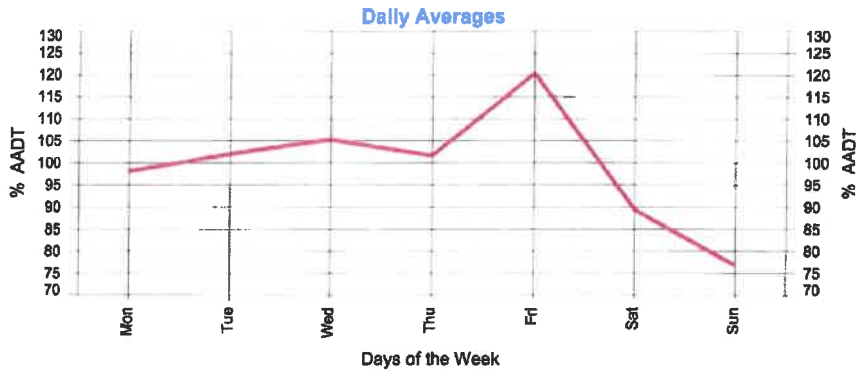
Days on which traffic data was collected.

Area	404 - Fitzroy District	Year	2017	Growth last Year	-30.30%
Road Section	41E - BURNETT HIGHWAY (BILOELA - MT MORGAN)	AADT	421	Growth last 5 Yrs	-7.03%
Site	60055 - Burnett Hwy 120m N of Don River	Avg Week Day	442	Growth last 10 Yrs	-1.03%
Thru Dist	54.26	Avg Weekend Day	349		
Type	C - Coverage				
Stream	T2 - Thru traffic in Lane 2 -against gazetted				



Year	AADT	1-Year Growth	5-Year Growth	10-Year Growth	Year	AADT	1-Year Growth	5-Year Growth	10-Year Growth
2017	421	-30.30%	-7.03%	-1.03%	2002	332	-1.78%	1.93%	
2016	604	25.05%	4.30%	4.75%	2001	338	-0.29%	2.85%	
2015	483	10.27%	-0.02%	1.92%	2000	338	33.46%	1.13%	
2014	438	-22.34%	-2.11%	1.00%	1999	254	-21.12%	-5.88%	
2013	564	-11.74%	7.56%	5.46%	1998	322	0.62%		
2012	639	42.00%	12.42%	8.00%	1997	320	7.02%		
2011	450	8.43%	2.88%	3.12%	1996	299	-19.41%		
2010	415	-10.75%	1.25%	2.24%	1995	371	28.82%		
2009	465	22.69%	5.30%	4.95%	1994	288			
2008	379	-8.23%	0.92%	2.16%	1993				
2007	413	5.36%	4.54%	3.62%	1992				
2006	392	1.82%	3.71%	3.17%	1991				
2005	385	3.77%	3.55%	2.57%	1990				
2004	371	10.75%	5.34%	2.37%	1989				
2003	335	0.90%	2.32%		1988				





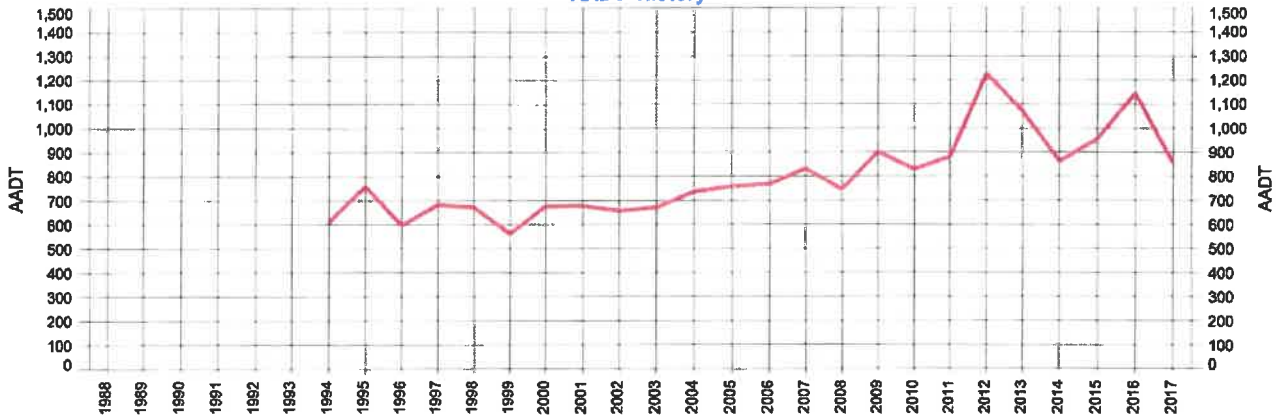
### 2017 Calendar

January							February							March							April									
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S			
30	31					1	6	7	8	9	10	11	12	6	7	8	9	10	11	12	3	4	5	6	7	8	9			
2	3	4	5	6	7	8	13	14	15	16	17	18	19	13	14	15	16	17	18	19	10	11	12	13	14	15	16			
9	10	11	12	13	14	15	20	21	22	23	24	25	26	20	21	22	23	24	25	26	17	18	19	20	21	22	23			
16	17	18	19	20	21	22	27	28						27	28	29	30	31			24	25	26	27	28	29	30			
23	24	25	26	27	28	29																								
May							June							July							August									
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S			
1	2	3	4	5	6	7	1	2	3	4				31					1	2	1	2	3	4	5	6				
8	9	10	11	12	13	14	5	6	7	8	9	10	11	3	4	5	6	7	8	9	7	8	9	10	11	12	13			
15	16	17	18	19	20	21	12	13	14	15	16	17	18	10	11	12	13	14	15	16	14	15	16	17	18	19	20			
22	23	24	25	26	27	28	19	20	21	22	23	24	25	17	18	19	20	21	22	23	21	22	23	24	25	26	27			
29	30	31					26	27	28	29	30			24	25	26	27	28	29	30	28	29	30	31						
September							October							November							December									
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S			
				1	2	3	30	31					1						1	2	3	4	5					1	2	3
4	5	6	7	8	9	10	2	3	4	5	6	7	8	6	7	8	9	10	11	12	4	5	6	7	8	9	10			
11	12	13	14	15	16	17	9	10	11	12	13	14	15	13	14	15	16	17	18	19	11	12	13	14	15	16	17			
18	19	20	21	22	23	24	16	17	18	19	20	21	22	20	21	22	23	24	25	26	18	19	20	21	22	23	24			
25	26	27	28	29	30		23	24	25	26	27	28	29	27	28	29	30				25	26	27	28	29	30	31			

■ Days on which traffic data was collected.

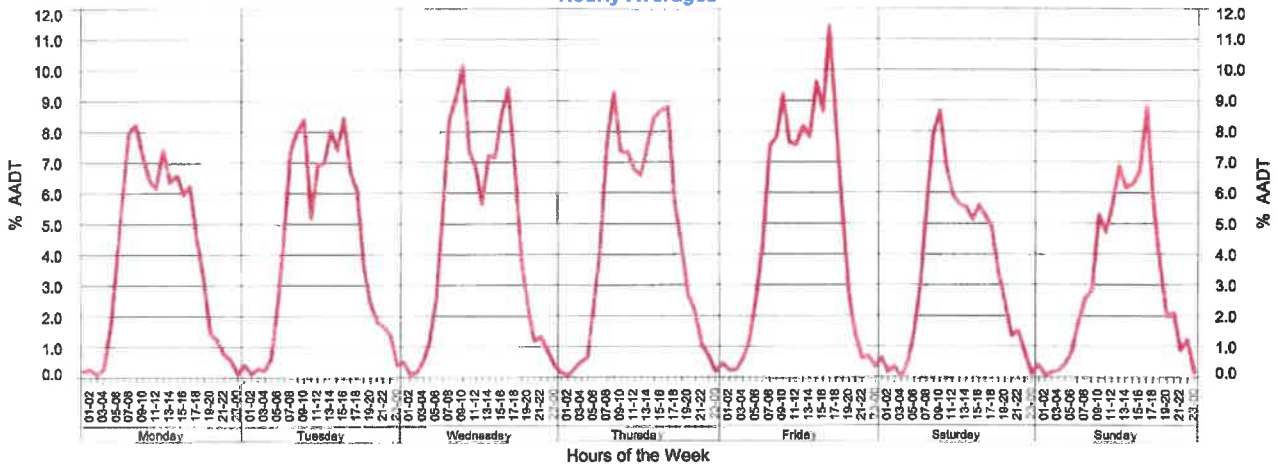
Area	404 - Fitzroy District	Year	2017	Growth last Year	-25.15%
Road Section	41E - BURNETT HIGHWAY (BILOELA - MT MORGAN)	AADT	857	Growth last 5 Yrs	-5.69%
Site	60055 - Burnett Hwy 120m N of Don River	Avg Week Day	882	Growth last 10 Yrs	-0.53%
Thru Dist	54.26	Avg Weekend Day	677		
Type	C - Coverage				
Stream	TB - Bi-directional traffic flow				

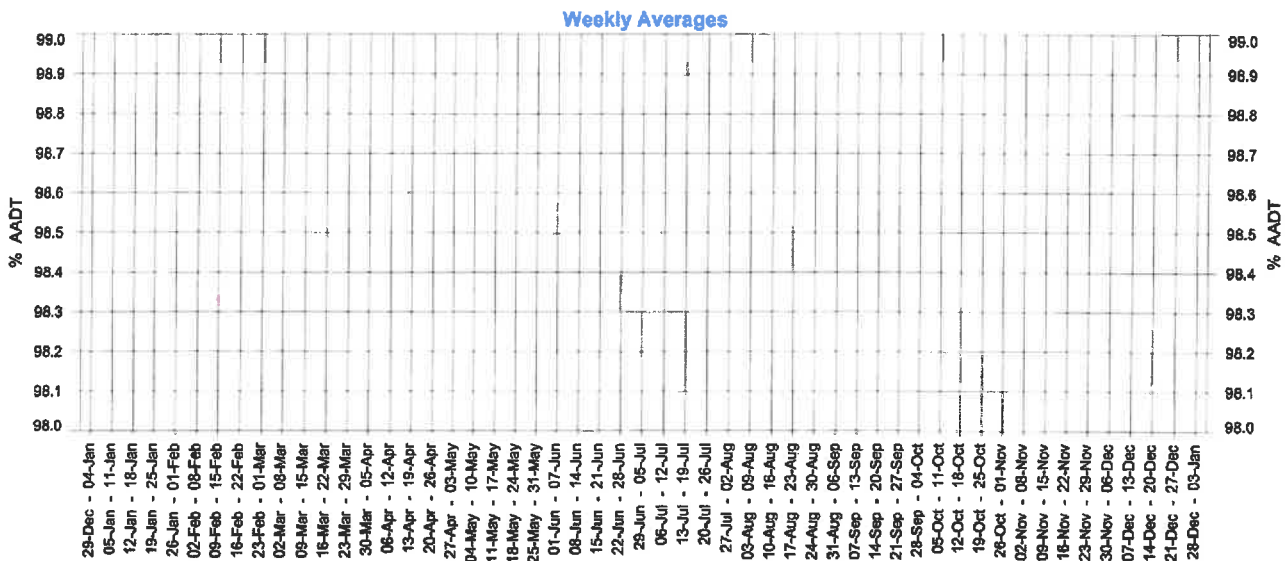
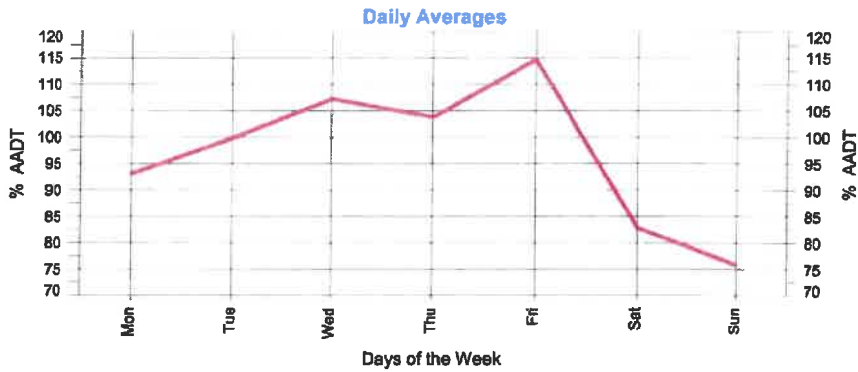
AADT History



Year	AADT	1-Year Growth	5-Year Growth	10-Year Growth	Year	AADT	1-Year Growth	5-Year Growth	10-Year Growth
2017	857	-25.15%	-5.69%	-0.53%	2002	657	-3.10%	0.16%	
2016	1,145	19.64%	3.65%	4.21%	2001	678	0.15%	1.83%	
2015	957	10.89%	0.31%	2.02%	2000	677	20.46%	0.16%	
2014	863	-19.42%	-1.89%	0.98%	1999	562	-16.49%	-4.22%	
2013	1,071	-12.79%	6.59%	4.83%	1998	673	-1.46%		
2012	1,228	39.23%	11.47%	7.53%	1997	683	14.21%		
2011	882	6.27%	2.66%	2.92%	1996	598	-21.32%		
2010	830	-7.98%	1.62%	2.32%	1995	760	24.59%		
2009	902	20.91%	4.72%	4.28%	1994	610			
2008	746	-10.44%	0.66%	1.81%	1993				
2007	833	8.60%	5.01%	3.28%	1992				
2006	767	1.05%	3.19%	2.43%	1991				
2005	759	2.99%	3.20%	1.93%	1990				
2004	737	9.84%	4.21%	1.74%	1989				
2003	671	2.13%	1.22%		1988				

Hourly Averages





### 2017 Calendar

January							February							March							April						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
30	31					1			1	2	3	4	5			1	2	3	4	5						1	2
2	3	4	5	6	7	8	6	7	8	9	10	11	12	6	7	8	9	10	11	12	3	4	5	6	7	8	9
9	10	11	12	13	14	15	13	14	15	16	17	18	19	13	14	15	16	17	18	19	10	11	12	13	14	15	16
16	17	18	19	20	21	22	20	21	22	23	24	25	26	20	21	22	23	24	25	26	17	18	19	20	21	22	23
23	24	25	26	27	28	29	27	28						27	28	29	30	31			24	25	26	27	28	29	30
May							June							July							August						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
1	2	3	4	5	6	7	1	2	3	4				31					1	2	1	2	3	4	5	6	
8	9	10	11	12	13	14	5	6	7	8	9	10	11	3	4	5	6	7	8	9	7	8	9	10	11	12	13
15	16	17	18	19	20	21	12	13	14	15	16	17	18	10	11	12	13	14	15	16	14	15	16	17	18	19	20
22	23	24	25	26	27	28	19	20	21	22	23	24	25	17	18	19	20	21	22	23	21	22	23	24	25	26	27
29	30	31					26	27	28	29	30			24	25	26	27	28	29	30	28	29	30	31			
September							October							November							December						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
				1	2	3	30	31					1			1	2	3	4	5					1	2	3
4	5	6	7	8	9	10	2	3	4	5	6	7	8	6	7	8	9	10	11	12	4	5	6	7	8	9	10
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18	19	20	21	22	23	24	16	17	18	19	20	21	22	20	21	22	23	24	25	26	18	19	20	21	22	23	24
25	26	27	28	29	30		23	24	25	26	27	28	29	27	28	29	30				25	26	27	28	29	30	31

Days on which traffic data was collected.



**Annual Volume Report**

Displays AADT history with hourly, daily and weekly patterns by Stream in addition to annual data for AADT figures with 1 year, 5 year and 10 year growth rates.

**Annual Average Daily Traffic (AADT)**

Annual Average Daily Traffic (AADT) is the number of vehicles passing a point on a road in a 24 hour period, averaged over a calendar year.

**AADT History**

Displays the years when traffic data was collected at this count site.

**Area**

For administration purposes the Department of Transport and Main Roads has divided Queensland into 12 Districts. The Area field in TSDM reports displays the District Name and Number.

District Name	District
Central West District	401
Darling Downs District	402
Far North District	403
Fitzroy District	404
Mackay/Whitsunday District	405
Metropolitan District	406
North Coast District	407
North West District	408
Northern District	409
South Coast District	410
South West District	411
Wide Bay/Burnett District	412

**Avg Week Day**

Average daily traffic volume during the week days, Monday to Friday.

**Avg Weekend Day**

Average daily traffic volume during the weekend.

**Calendar**

Days on which traffic data was collected are highlighted in green.

**Gazettal Direction**

Is the direction of the traffic flow. It can be easily recognised by referring to the name of the road eg. Road Section: 10A Brisbane - Gympie denotes that the gazettal direction is from Brisbane to Gympie.

**Growth Percentage**

Represents the increase or decrease in AADT, using a exponential fit over the previous 1, 5 or 10 year period.

**Hour, Day & Week Averages**

The amount of traffic on the road network varies depending on the time of day, the day of the week and the week of the year. The ebb and flow of the volume of traffic travelling through a site over a period of time forms a pattern. The Hour, Day and Week Averages are used in the calculation of AADT.

**Road Section**

Is the Gazetted road from which the traffic data is collected. Each Road Section is given a code, allocated sequentially in Gazettal Direction. Larger roads are broken down into sections and identified by an ID code with a suffix for easier data collection and reporting (eg. 10A, 10B, 10C). Road Sections are then broken into AADT Segments which are determined by traffic volume.

**Site**

The physical location of a traffic counting device. Sites are located at a specified Through Distance along a Road Section.

**Stream or Site Stream**

The lane number in which the vehicles are travelling.

TB	Traffic flow in both directions
TG	Traffic flow in gazettal direction
TA	Traffic flow against gazettal direction
T1, T3, T5, T7...	Traffic flow in gazettal direction at lane level
T2, T4, T6, T8...	Traffic flow against gazettal direction at lane level

**Thru Dist or TDist**

The distance from the beginning of the Road Section, in kilometres.

**Type**

There are two types of traffic counting sites, Permanent and Coverage. Permanent means the traffic counting device is in place 24/7. Coverage means the traffic counting device is in place for a specified period of time.

**Year**

Current year or years chosen. A separate report will be produced for each year selected.

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Crash Types

Crash Dates

Owner

Alignment:

DCA Code

Group

Feature

Traffic Ctrl

Speed Limit

Fatalities

Contrib Circ.

Severity

Unit Type

Nature

Risk Factor

Area LGA  SLA  Police Division

Road Sections

All Road Sections  Include Crashes on  Thru road   Thru roads at Intersections  Intersecting roads at Intersections

Road Section	Cway	RPC	Dist	RPC	End	Dist	Start	End	Fatal	Hosp. Medical	Minor	PDO	Total
41E BILOELA - MT MORGAN	<input type="text" value="1"/>	<input type="text" value="0.000"/>	<input type="text" value="11"/>	<input type="text" value="0.000"/>	<input type="text" value="102.775"/>	<input type="text" value="0.000"/>	<input type="text" value="27"/>	<input type="text" value="21"/>	<input type="text" value="2"/>	<input type="text" value="2"/>	<input type="text" value="4"/>	<input type="text" value="56"/>	

Intersections

All Intersections

Road Section 41E Biloela - Mt Morgan  Wway  Tdist  0.000 -  102.775

Road Section 26A Westwood - Taroom

Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
2010055017	05-JUN-2010	Sat	10	101	N	Hosp	0	10	Car, Station	Utility, Panel	51	1	3	0.000	25.680	Burnett Hwy	Leichhardt Hwy
2010102817	15-NOV-2010	Mon	08	101	S	Treat	0	10	Special Purp	Truck	51	1	3	0.000	25.680	Burnett Hwy	Leichhardt Hwy

Road Section 41E Biloela - Mt Morgan

Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20151091859	06-AUG-2015	Thu	12	703	E	Treat	0	99	Car, Station			1	1	1.017	1.017	Burnett Hwy	
2010054416	03-JUN-2010	Thu	15	301	S	Treat	0	99	Car, Station	Car, Station		1	1	3.613	3.613	Burnett Hwy	
2017005304	10-JAN-2017	Tue	04	703	E	Hosp	0	99	Utility, Panel			1	1	6.431	6.431	Burnett Hwy	
209000425091	05-JUN-2009	Fri	04	703	N	Treat	0	99	Car, Station			1	2	2.246	10.768	Burnett Hwy	
2014137710	06-OCT-2014	Mon	10	703	N	Treat	0	99	Car, Station			1	2	3.640	12.160	Burnett Hwy	
2090026106	05-APR-2009	Sun	09	704	S	Prop	0	99	Car, Station			1	2	7.370	15.890	Burnett Hwy	
2013104684	20-AUG-2013	Fri	11	805	S	Hosp	0	99	Truck			1	2	8.579	17.099	Burnett Hwy	
20161407569	28-JUL-2016	Thu	13	804	S	Hosp	0	20	Truck			1	2	11.231	19.751	Burnett Hwy	
20130094976	22-JAN-2013	Tue	17	703	N	Hosp	0	99	Car, Station			1	2	11.336	19.856	Burnett Hwy	
2012066812	12-JUL-2012	Thu	13	804	S	Hosp	0	99	Utility, Panel			1	2	12.097	20.617	Burnett Hwy	
2090032072	27-APR-2009	Mon	15	803	S	Hosp	0	10	Car, Station			1	3	1.590	22.350	Burnett Hwy	Mccanns Rd
20140515758	17-APR-2014	Thu	13	805	S	Hosp	0	11	Truck			1	4	0.020	27.240	Biloela - Duaringa Rd	Burnett Hwy
2013033123	20-MAR-2013	Wed	05	801	N	Treat	0	99	Utility, Panel			1	4	2.440	29.660	Burnett Hwy	
2011007973	29-JAN-2011	Sat	06	201	S	Hosp	0	99	Car, Station	Truck		1	4	2.446	29.666	Burnett Hwy	
2090072981	18-SEP-2009	Fri	19	804	N	Prop	0	99	Utility, Panel			1	4	2.490	29.680	Burnett Hwy	
2017056293	29-MAR-2017	Wed	07	408	S	Hosp	0	20	Utility, Panel	Car, Station		1	4	2.504	29.724	Burnett Hwy	Jambin Threeways R
2090016307	01-MAR-2009	Sun	14	803	N	Treat	0	99	Car, Station			1	4	2.860	29.880	Burnett Hwy	
2018061487	03-MAY-2015	Sun	20	703	N	Hosp	0	99	Car, Station			1	4	4.030	31.250	Burnett Hwy	
2012032969	05-APR-2012	Thu	20	609	S	Treat	0	99	Car, Station	Animal - Stock		1	4	5.681	32.901	Burnett Hwy	

Road Section 41E Biloela - Mt Morgan

Cway

Tdist

0.000

102.775

Road Section 41E Biloela - Mt Morgan

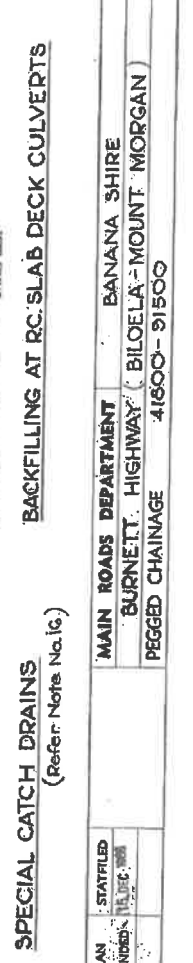
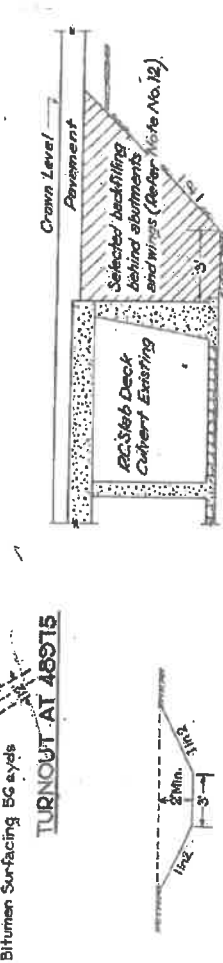
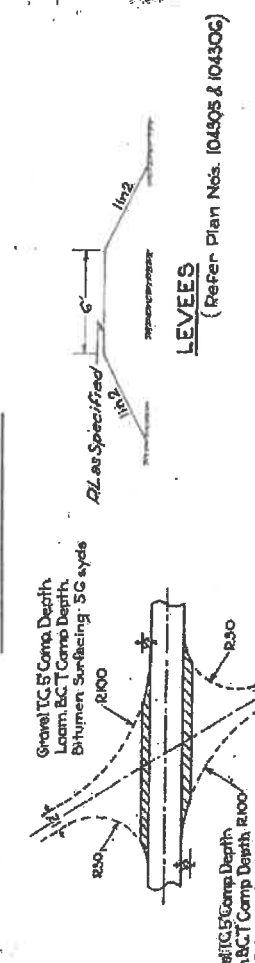
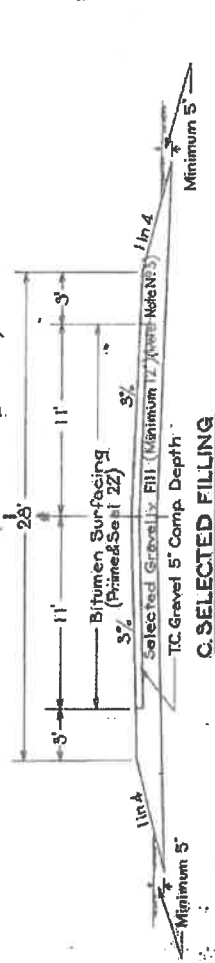
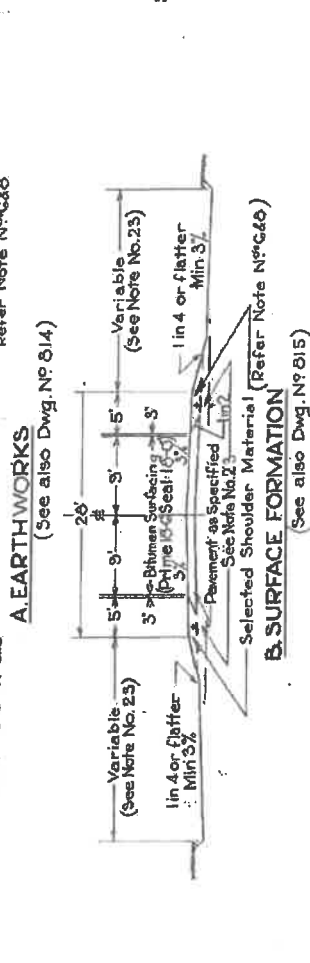
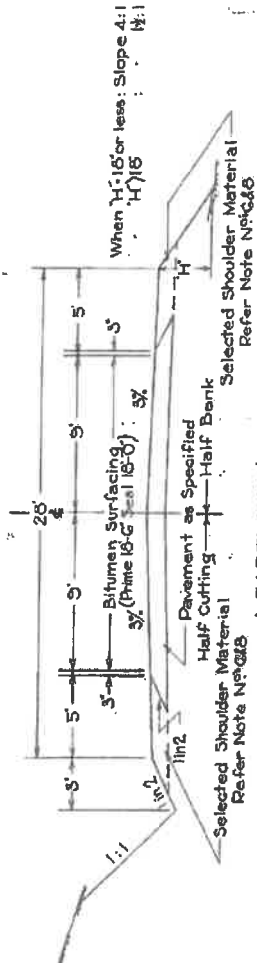
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900677568	31-AUG-2009	Mon	18	703	S	Treat	0	20	Car, Station V			1	4	7.689	34.909	Burnett Hwy	
20900189930	10-MAR-2009	Tue	04	703	S	Treat	0	99	Utility, Panel			1	4	9.572	36.792	Burnett Hwy	
20150585564	27-APR-2015	Mon	09	703	N	Hosp	0	99	Utility, Panel			1	4	10.580	37.800	Burnett Hwy	
20800545432	29-AUG-2008	Fri	17	704	S	Hosp	0	99	Car, Station V			1	4	18.001	45.221	Burnett Hwy	
20120427426	04-MAY-2012	Fri	18	802	S	Treat	0	99	Car, Station V			1	4	18.521	45.741	Burnett Hwy	
20900061276	23-JAN-2009	Fri	17	703	N	Prop	0	99	Car, Station V			1	4	20.501	47.721	Burnett Hwy	
20110503819	09-JUN-2011	Thu	15		N	Prop	0	99	Truck			1	4	24.810	52.030	Burnett Hwy	Invalid Street From P
20170592233	03-APR-2017	Mon	12	704	N	Hosp	0	20	Car, Station V			1	5	2.199	56.199	Burnett Hwy	
20110348281	20-APR-2011	Wed	18	201	S	Inj	0	99	Car, Station V	Car, Station V		1	5	3.243	57.243	Burnett Hwy	
20110651492	26-JUL-2011	Tue	23		S	Prop	0	99	Car, Station V			1	5	4.870	58.870	Invalid Street From P	Invalid Street From P
20900204817	16-MAR-2009	Mon	10	102	E	Prop	0	10	Articulated V	Car, Station V	1673	1	5	5.479	59.479	Burnett Hwy	Dixalea-Deeford Rd
20800694985	30-OCT-2008	Thu	09	704	S	Hosp	0	20	Car, Station V			1	6	0.015	63.175	Burnett Hwy	
20900084427	01-FEB-2009	Sun	12	704	S	Hosp	0	20	Car, Station V			1	6	3.959	67.119	Burnett Hwy	
20110628707	19-JUL-2011	Tue	18		S	Prop	0	99	Car, Station V			1	6	6.730	69.890	Burnett Hwy	Invalid Street From P
20110415530	12-MAY-2011	Thu	13	803	N	Hosp	0	99	Articulated V			1	6	6.732	69.892	Burnett Hwy	
20171865159	24-OCT-2017	Tue	07	805	N	Hosp	0	99	Articulated V			1	6	6.746	69.906	Burnett Hwy	
20160094822	16-JAN-2016	Sat	04	804	N	Fatal	1	99	Utility, Panel			1	6	7.520	70.680	Burnett Hwy	
20900709478	11-SEP-2009	Fri	16	801	N	Hosp	0	99	Motor Cycle			1	6	7.761	70.921	Burnett Hwy	
20100299851	09-MAR-2010	Tue	13	101	W	Hosp	0	11	Car, Station V	Car, Station V	***	1	6	8.303	71.463	Burnett Hwy	Dee St
20900996441	19-DEC-2009	Sat	02	700	N	Hosp	0	99	Car, Station V			1	6	8.476	71.636	Burnett Hwy	
20100118849	07-JAN-2010	Thu	06	101	W	Treat	0	10	Utility, Panel	Truck	51	1	7	0.000	71.730	Burnett Hwy	Leichhardt Hwy
20110826570	17-SEP-2011	Sat	11	104	W	Treat	0	10	Utility, Panel	Car, Station V	51	1	7	0.000	71.730	Burnett Hwy	Leichhardt Hwy
20121115790	03-NOV-2012	Sat	12	101	S	Treat	0	10	Car, Station V	Car, Station V	51	1	7	0.000	71.730	Burnett Hwy	Leichhardt Hwy

Road Section		41E Biloela - Mt Morgan		Cway		Tdist		0.000		102.775							
Road Section		41E Biloela - Mt Morgan															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20141051041	06-AUG-2014	Wed	17	704	W	Hosp	0	99	Car, Station			1	7	1.230	72.960	Burnett Hwy	
20100641790	07-JUL-2010	Wed	14	804	S	Hosp	0	99	Car, Station			1	7	5.335	77.065	Burnett Hwy	
20900311549	24-APR-2009	Fri	06	301	E	Hosp	0	99	Utility, Panel	Car, Station		1	8	2.370	80.930	Burnett Hwy	
20120138386	10-FEB-2012	Fri	13	800	S	Hosp	0	99	Car, Station			1	8	3.432	81.992	Burnett Hwy	
20150085187	17-JAN-2015	Sat	16	805	S	Treat	0	99	Car, Station			1	9	3.595	87.160	Burnett Hwy	
20151832949	11-DEC-2015	Fri	14	201	S	Fatal	1	99	Motor Cycle	Utility, Panel		1	9	7.580	91.145	Burnett Hwy	
20110165363	25-FEB-2011	Fri	12	800	S	Treat	0	99	Car, Station			1	10	0.955	92.410	Burnett Hwy	
20120197410	27-FEB-2012	Mon	11	803	S	Treat	0	99	Car, Station			1	10	3.463	94.888	Burnett Hwy	
20100621932	30-JUN-2010	Wed	09	804	E	Inj	0	99	Car, Station			1	10	5.765	97.190	Burnett Hwy	
20100648316	09-JUL-2010	Fri	04	804	S	Treat	0	99	Utility, Panel			1	10	5.767	97.192	Burnett Hwy	
20130435669	12-APR-2013	Fri	17	803	S	Treat	0	99	Car, Station			1	10	6.475	97.900	Burnett Hwy	
20160759029	02-MAY-2016	Mon	11	408	E	Hosp	0	11	Car, Station	Truck		1	10	7.756	99.181	Burnett Hwy	Murray St
20180149053	23-JAN-2018	Tue	14	803	N	Treat	0	20	Articulated Vi			1	10	9.657	101.082	Burnett Hwy	
20120493090	23-MAY-2012	Wed	15	003	S	Hosp	0	11	Car, Station	Pedestrian	1914	1	10	11.112	102.537	Burnett Hwy	Pattison St
20900224278	23-MAR-2009	Mon	08	001	N	Treat	0	99	Pedestrian	Car, Station		1	10	11.330	102.755	Burnett Hwy	



41500L, 45100R, 50200L,  
5600R, 54500L, 56100R,  
61500L, 62800L, 63000R,  
64600R, 76500L, 80500R,  
89400L, 86600R.

W42  
30 x 30



- CONCRETE**  
The pavement - shoulder, drainage, slope, and base courses shall be constructed in accordance with the specifications and details shown on the drawings. The concrete shall be of the quality specified on the drawings. The concrete shall be of the quality specified on the drawings. The concrete shall be of the quality specified on the drawings.
- REINFORCEMENT**  
The reinforcement shall be of the quality specified on the drawings. The reinforcement shall be of the quality specified on the drawings. The reinforcement shall be of the quality specified on the drawings.
- PAVEMENT**  
The pavement shall be of the quality specified on the drawings. The pavement shall be of the quality specified on the drawings. The pavement shall be of the quality specified on the drawings.
- SHOULDER**  
The shoulder shall be of the quality specified on the drawings. The shoulder shall be of the quality specified on the drawings. The shoulder shall be of the quality specified on the drawings.
- BASE COURSE**  
The base course shall be of the quality specified on the drawings. The base course shall be of the quality specified on the drawings. The base course shall be of the quality specified on the drawings.
- GRAVEL**  
The gravel shall be of the quality specified on the drawings. The gravel shall be of the quality specified on the drawings. The gravel shall be of the quality specified on the drawings.
- LOAM**  
The loam shall be of the quality specified on the drawings. The loam shall be of the quality specified on the drawings. The loam shall be of the quality specified on the drawings.
- BITUMEN**  
The bitumen shall be of the quality specified on the drawings. The bitumen shall be of the quality specified on the drawings. The bitumen shall be of the quality specified on the drawings.
- CONCRETE**  
The concrete shall be of the quality specified on the drawings. The concrete shall be of the quality specified on the drawings. The concrete shall be of the quality specified on the drawings.
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- BITUMEN**  
The bitumen shall be of the quality specified on the drawings. The bitumen shall be of the quality specified on the drawings. The bitumen shall be of the quality specified on the drawings.

**TYPE GROSS SECTIONS, TURNOUT, LEVEES, SIGNS, BACKFILLING AT RC SLAB DECK CULVERTS, SPECIAL CATCH DRAINS & NOTES.**

APPROVED: [Signature]  
DATE: [Date]  
JOB No. 8-41E-9  
PLAN No. 104294

**LOCATION OF SIGNS**

**BACKFILLING AT RC SLAB DECK CULVERTS**

**LEVEES**  
(Refer Plan Nos. 10450S & 10430C)

**TURNOUT AT 48915**

**SPECIAL CATCH DRAINS**  
(Refer Note No. 16)

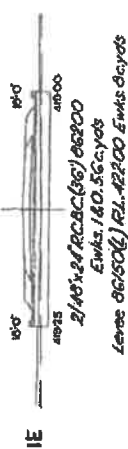
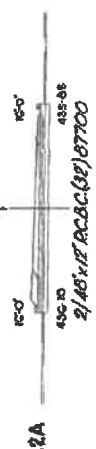
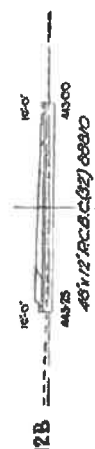
MAIN ROADS DEPARTMENT BANANA SHIRE  
BURNETT HIGHWAY (BILOELA - MOUNT MORGAN)  
PEGGED CHAINAGE 41500 - 91500











**12D.** Exst. 3' RC&C (24) 03327  
Take up & Stack

PLAN AMENDED	STARTED	APPROVED	RECOMMENDED	APPROVED	No. 14. OF 34 PLANS	JOB No.	PLAN No.
MAIN ROADS DEPARTMENT				BANANA SHIRE			
BURNETT HIGHWAY ( BILOELA - MT. MORGAN )							
PGD. CHGE.				85950 - 89927			

APPROVED  
19.10.66  
ACCOUNTANT

RECOMMENDED  
DISTRICT ENGINEER

Parish of Bundalba

DON RIVER

Parish of Don

MT. MORGAN

TOMLINS ROAD  
(NORTHERN INTERSECTION)  
CHAINAGE - 53.3km

DOONEYS ROAD  
CHAINAGE - 51.6km

BURNETT HIGHWAY

DOONEY-SMITHS ROAD  
CHAINAGE - 44.3km

TOMLINS ROAD  
(SOUTHERN INTERSECTION)  
CHAINAGE - 38.9km

BILOELA



EXTENDED DESIGN DOMAIN DECISIONS

No.	Issue	File Reference
1	Tomlins Road North Intersection CHRS Intersection Layout	810/487

Drawing Number	Date	Series Number	Drawing Description
378987 B		1	LOCAL INDEX PLAN
378988 B		2	TYPE CROSS SECTIONS
378989 B		3	PROPERTY ACCESS DETAILS
404002 B		4	TOMLINS ROAD (SOUTH) INTERSECTION DETAIL
404004 B		5	TOMLINS ROAD (SOUTH) INTERSECTION LINEMARKING & DETAILS
404005 B		6	DOONEYS ROAD INTERSECTION DETAIL
404006 B		7	DOONEYS ROAD INTERSECTION LINEMARKING & DETAILS
404007 B		8	DOONEY-SMITHS ROAD INTERSECTION DETAIL
404008 B		9	DOONEY-SMITHS ROAD INTERSECTION LINEMARKING & DETAILS
404009 B		10	TOMLINS ROAD (NORTH) INTERSECTION DETAIL
404010 B		11	TOMLINS ROAD (NORTH) INTERSECTION LINEMARKING, ROAD FURNITURE & DETAILS
404011 B		12	VEHICLE STOPPING PLACE DETAILS
		13	DRAINAGE DETAILS

TOTAL NUMBER OF DRAWINGS = 13

**SCHEME SUBMITTED (External Consultants or Internal Business Unit):**  
I hereby certify that the design complies with the requirements of the 'Professional Engineers Act' and other relevant Legislation and Main Roads - Policies, References, Standards and Codes, Guidelines, Brief/Functional Specification and that the names inserted in the drawing title are correct.

**SCHEME APPROVED (District Director or Delegate):**  
I hereby certify that the scheme complies with the intent of the relevant project on the Roads Program and funding is available for construction and the scheme release is approved for contract establishment purposes.

SIGNED: ORIGINAL SIGNED BY JARRE HURRY TITLE: MANAGER (ROAD) DATE: 15/1/08  
 SIGNED: ORIGINAL SIGNED BY TERRY HILL TITLE: DISTRICT DIRECTOR DATE: 16/1/08

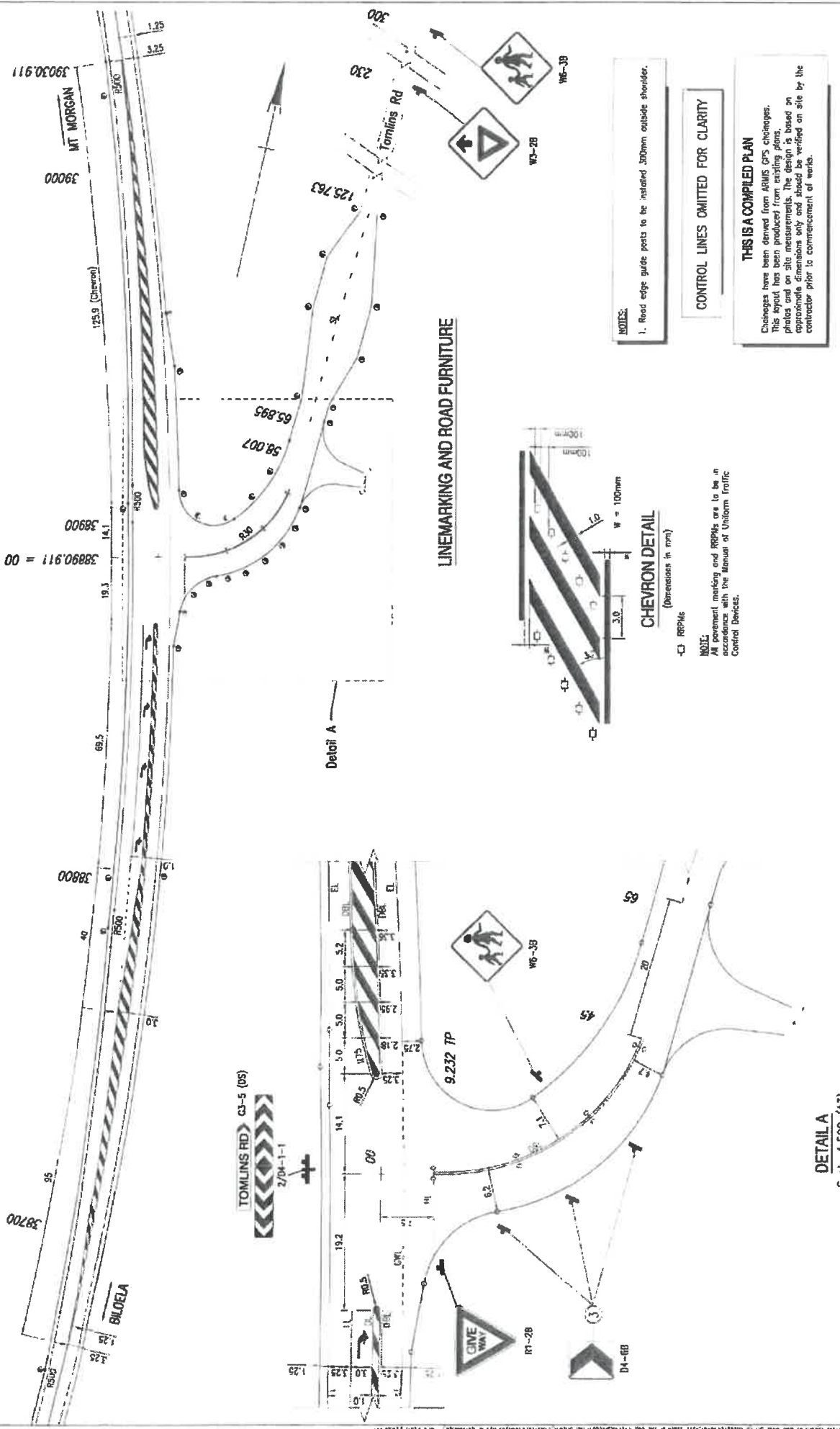
<b>Revisions</b> Verified Date B As Constructed A Original Issue		<b>Associated Job Nos</b> Auxiliary Dwg Nos 378987-378989 404002-404011		<b>Survey Data</b> Horiz. Datum Height Datum Survey Books 11/4 11.32 16.97 0.69 116/5		<b>Scale</b> NOT TO SCALE		<b>BANANA SHIRE</b> BURNETT HIGHWAY (BILOELA-MT.MORGAN) CTL CHG 38650km - 53623km (ARMS GPS)		<b>LOCAL INDEX PLAN</b> Design TYP Verified CDP Design Review GMS 1/08 Designing Certification Original Certified by Lennie Martin 15/1/08 For scheme approval please refer to 82832 (1 of 13) (1 of 13)		Queensland Government Department of Main Roads Job No. B/41E/307 Contract No. CEND 792 Drawing No. 378987 B Sheet Number 1 of 13	
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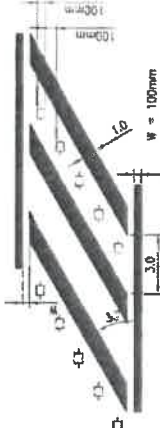




Parish of Don



LINEMARKING AND ROAD FURNITURE



CHEVRON DETAIL

(Dimensions in mm)  
 □ RRP16  
 NOTE: All pavement marking and RRP16 are to be in accordance with the Manual of Uniform Traffic Control Devices.

NOTES:  
 1. Road edge guide posts to be installed 300mm outside shoulder.

CONTROL LINES OMITTED FOR CLARITY

**THIS IS A COMPILED PLAN**  
 Changes have been derived from ARMS GPS choroplegs. This layout has been produced from existing plans, photos and on site measurements. The design is based on approximate dimensions only and should be verified on site by the contractor prior to commencement of works.

Revisions		Confirmed	Date	Issued	Approved	Job No.	Scale	Survey Data	
A	Original Issue At AS					378857 - 378858 404002 - 404001	1:500 (A3)	North	Don
B	As Constructed						1:1000 (A3)	North	Don

BANANA SHIRE		TOMLINS ROAD (SOUTH) INTERSECTION	
BURNETT HIGHWAY (BILOELA-MT.MORGAN)		LINEMARKING & DETAILS	
Preceding RP	411/4	Design Verified	RGC
Reference Points	From start of job (m)	Design Check	RGC
	11.32	Original Scheme Certified	RGC
	14.87	Checked	RGC
	0.8	For scheme approval	
	0.8	Job No.	8/41E/307
	0.8	Contract No.	CEND 792
	0.8	Drawing No.	404003
	0.8	Series Number	5 of 13
	0.8	Date	15/1/2011
	0.8	By	RPED 6580

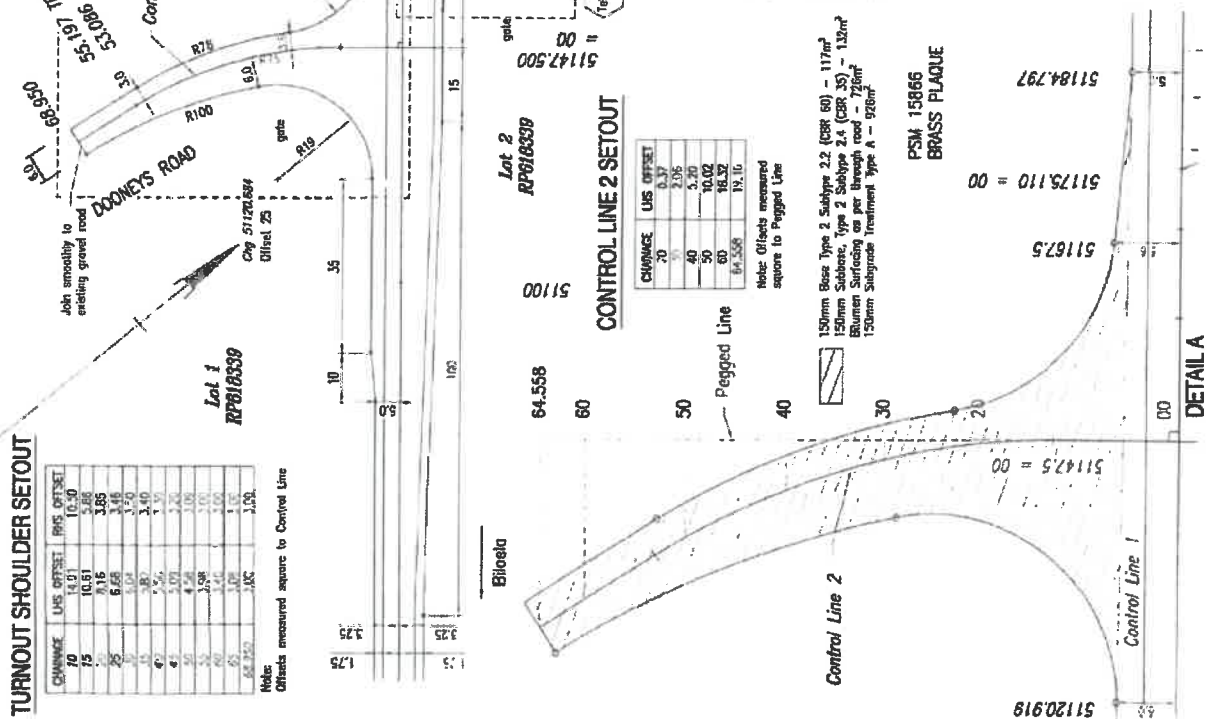
  

Queensland Government	
Department of Main Roads	

**TURNOUT SHOULDER SETOUT**

CHANCE	US OFFSET	RHS OFFSET
0	0.01	0.40
5	0.15	0.60
10	0.30	0.80
15	0.45	1.00
20	0.60	1.20
25	0.75	1.40
30	0.90	1.60
35	1.05	1.80
40	1.20	2.00
45	1.35	2.20
50	1.50	2.40
55	1.65	2.60
60	1.80	2.80
65	1.95	3.00
70	2.10	3.20
75	2.25	3.40
80	2.40	3.60
85	2.55	3.80
90	2.70	4.00
95	2.85	4.20
100	3.00	4.40

Note: Offsets measured square to Control Line



- Notes:**
1. 3% nominal cross fall is required for the typical crowned road profile. Cross fall construction tolerance is ± 1%. 2. Grade table drains to a suitable inlet/outlet.

Chainages have been derived from ARMS GPS photographs. This layout has been produced from existing plans, photos and on site measurements. The design is based on approximate dimensions only and should be verified on site by the contractor prior to commencement of works.

**Public Utility Mark.**  
No work is to be done within 1m of services without first consulting the relevant Service Authority.  
The Contractor shall locate all existing services prior to constructing.  
Possible service authority contact points are shown thus: (Telstra)

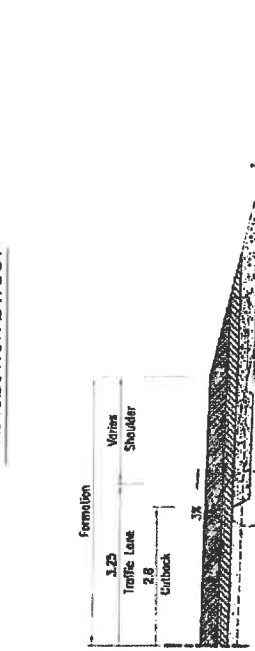
**THIS IS A COMPILED PLAN**  
Chainages have been derived from ARMS GPS photographs. This layout has been produced from existing plans, photos and on site measurements. The design is based on approximate dimensions only and should be verified on site by the contractor prior to commencement of works.

**CONTROL LINE 2 SETOUT**

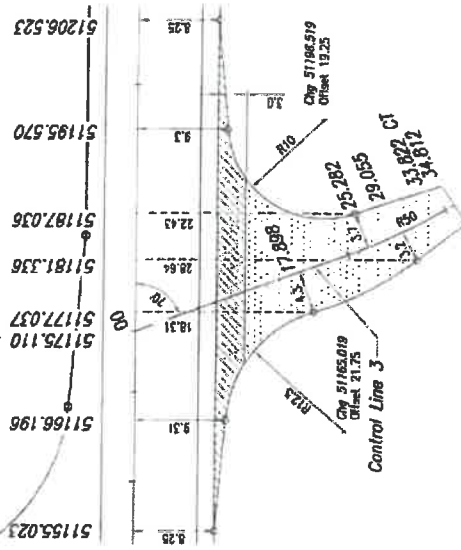
CHANCE	US OFFSET
20	0.37
30	0.75
40	1.12
50	1.50
60	1.87
70	2.25
80	2.62
90	3.00

Note: Offsets measured square to Pugged Line

**INTERSECTION LAYOUT**



- 200mm Cement Modified (2nd Pass)
- 2nd Make Up - 175mm nom. Type 2, Subtype 2.5. (DBR 15)
- 200mm Cement Modified (1st Pass)
- 1st Make Up - 100mm nom. Type 2, Subtype 2.5. (DBR 15)
- Shoulder Widening - 175mm nom. Type 2, Subtype 2.5. (DBR 15)



**TURNOUT WIDENING**  
NTS

**DETAIL A**  
Scale 1:500 (A3)

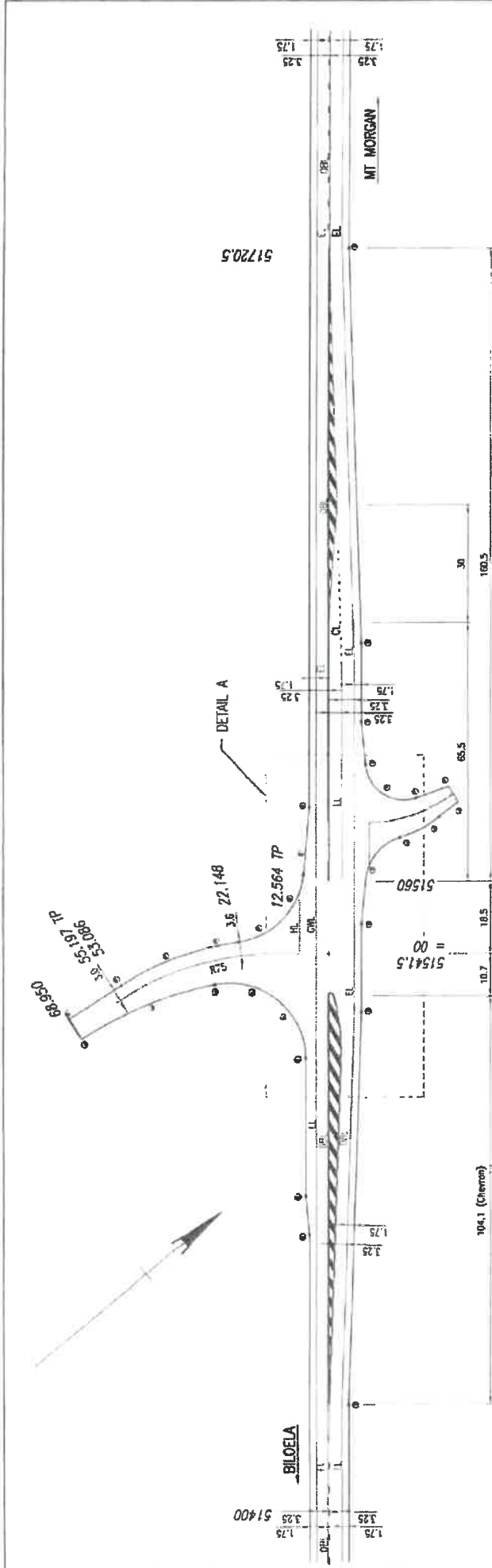
Scale 0 5 10 15 20m  
Intersection layout.

**DETAIL B**  
Scale 1:500 (A3)

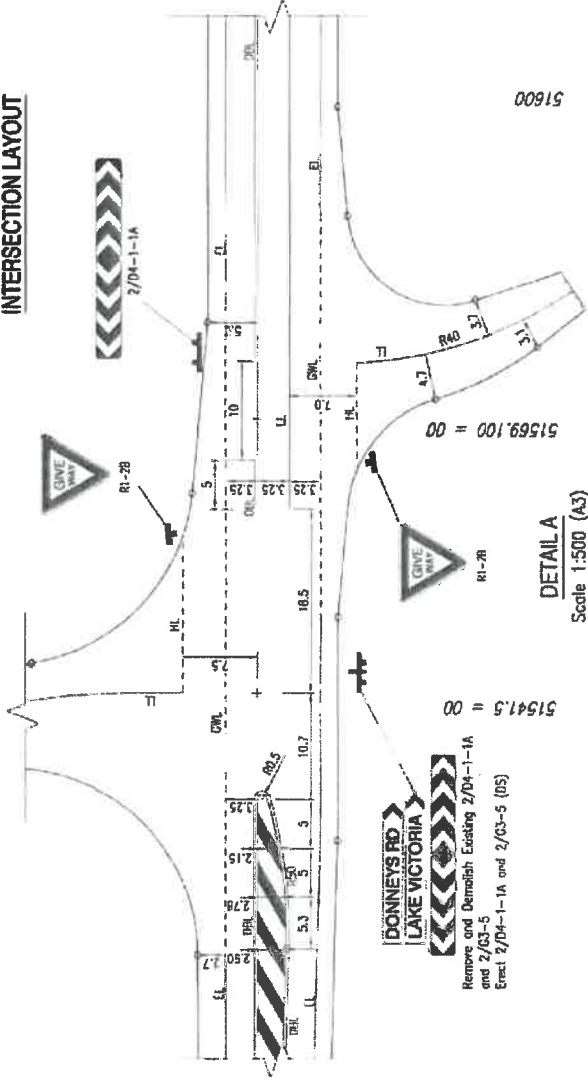
Scale 1:500 (A3)

Revisions B All Constructed A Original Issue	Checked Date Drawn Date	Memo Date Issued Job No	Scale 0 5 10 15 20m Intersection layout.	Survey Date GDA	BANANA SHIRE BURNETT HIGHWAY (BILOELA-MT.MORGAN) C7L CHGE 51037.5 - 51337.5 (ARMS GPS)	Queensland Government Department of Main Roads				
					Design Review Check Date 1/08 11:32	Design Review Check Date 15/11 11:32	Drawing C/P Checked Date 4/12/6 11:32	Job No. 8/41E/307	Contract No. CEND 792	Drawing No. 404004 B
					Design Review Check Date 15/11 11:32	Design Review Check Date 15/11 11:32	Drawing C/P Checked Date 4/12/6 11:32	For advice approval Status Date 19/1/08 11:32	Server Number 6 of 13	Job No. 8/41E/307





**INTERSECTION LAYOUT**



**DETAIL A**  
Scale 1:500 (A3)

**THIS IS A COMPILED PLAN**  
Changes have been derived from Existing Road Centre Line (RCL). This layout has been produced from existing plans, photos and on site measurements. The design is based on appropriate dimensions only and should be verified on site by the contractor prior to commencement of works.

**CONTROL LINES OMITTED FOR CLARITY**

**NOTES:**  
1. Road edge guide posts to be installed 300mm outside shoulder.  
2. For RRPW details refer Plan 404003.

<b>Queensland Government</b> Department of Main Roads		Job No. <b>B/41E/307</b> Contract No. <b>CEND 792</b> Drawing No. <b>404005 B</b> Series Number <b>7</b> of <b>13</b> <small>Min. Scale at 1:1000</small>
<b>DOONEYS ROAD INTERSECTION LINEMARKING &amp; DETAILS</b>		Engineering Certification Design Review Date: <b>1/28</b> Original Scheme Certified By: <b>Liam J. Miller</b> (15/0/00) For scheme approval station refer: <b>Fig. No. 37887 (1 of 13)</b>
Design: <b>CPD</b> Checked: <b>RAC</b>	Design Review: <b>CPD</b> Verified: <b>RAC</b>	Design: <b>CPD</b> Checked: <b>RAC</b>
<b>BANANA SHIRE</b> <b>BURNETT HIGHWAY (BILOELA-MT.MORGAN)</b> <b>CTL CHGE 51037.5 - 51337.5 (ARMIS GPS)</b>		Referenced Points From start of job (m): <b>11.2</b> From end of job (m): <b>14.97</b> From and to following RP: <b>0.48</b> Following RP: <b>41E/5</b>
<b>GDA</b>		Survey Data Height: <b>1.75</b> Datum: <b>AD63</b> Height: <b>78987 - 37893</b> Datum: <b>AD63</b> Survey: <b>104002 - 40400</b> Books:
Verified:	Date:	Associated Job No: <b>78987 - 37893</b> <b>104002 - 40400</b>
Revision:	No.	Description:
B	As Constructed	Original Issue





Parish of Bundamba

Lot 2  
RP616384

53100  
53114  
53127  
EXTEND 2.4 RHS  
SC E&L 5/1200/600 RCBC (9.8)

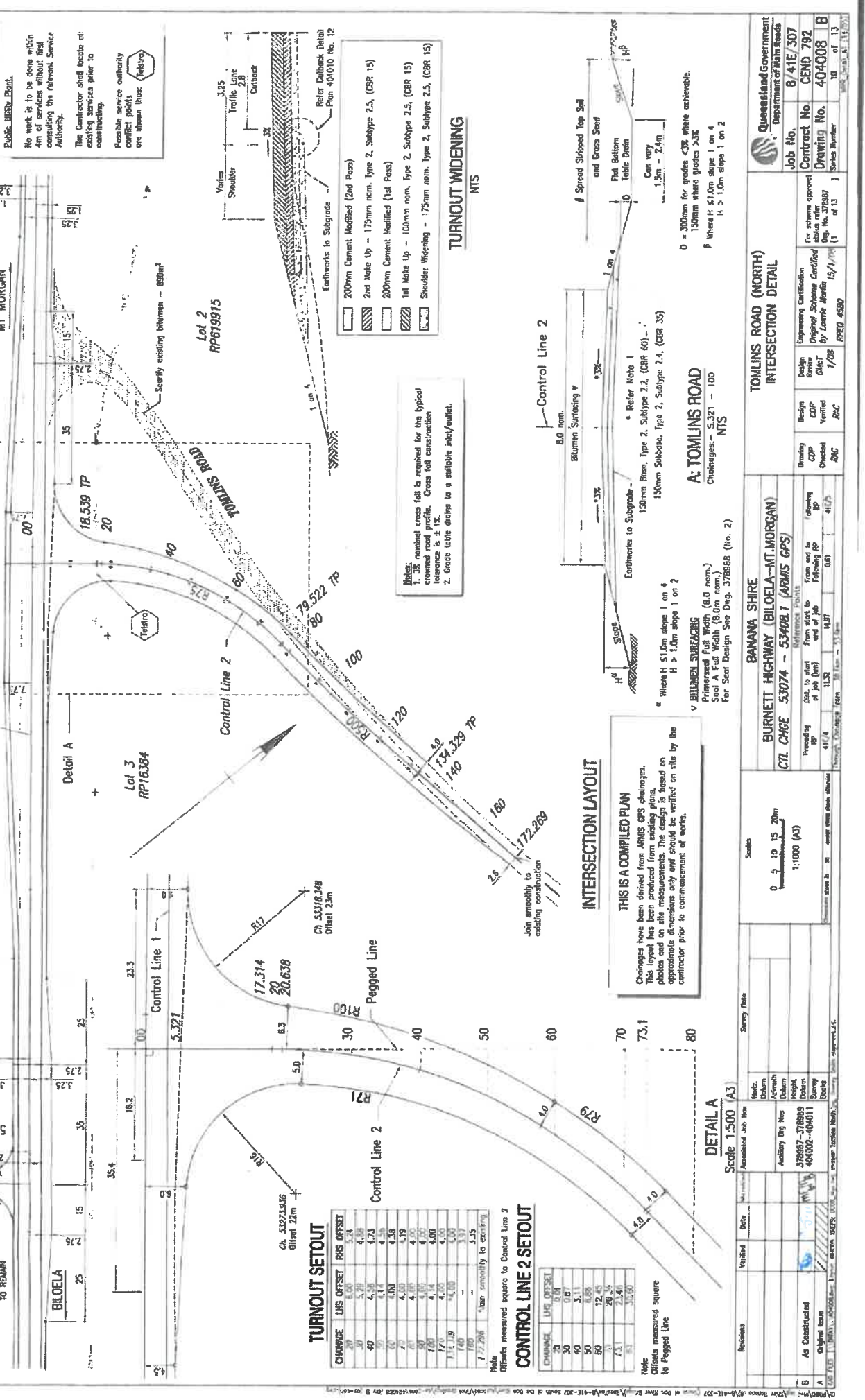
53310  
53314  
533295  
53310  
53318.348  
53353.348  
53356 =  
53368.348  
53368.348

Control Line 1 (Existing White Line)

Control Line 2

Control Line 2

Control Line 2



Public Utility Plant  
No work to be done within  
4m of services without first  
consulting the relevant Service  
Authority.  
The Contractor shall locate all  
existing services prior to  
constructing.  
Possible service authority  
conflict points  
are shown thus: (Telstra)

15D Existing 375 RCP (12.46)  
TO REMAIN

Detail A

Lot 3  
RP16384

Lot 2  
RP616384

Lot 4  
RP619915

MT MORGAN

BILOELA

TOMLINS ROAD

TURNOUT SETOUT

CONTROL LINE 2 SETOUT

INTERSECTION LAYOUT

DETAIL A

TURNOUT WIDENING  
NITS

A: TOMLINS ROAD  
Chairsheet: S.321 - 100  
NITS

BANANA SHIRE  
BURNETT HIGHWAY (BILOELA-MT MORGAN)  
CIL CHGE 53074 - 53408.1 (ARMS GPS)

TOMLINS ROAD (NORTH)  
INTERSECTION DETAIL

Queensland Government  
Department of Main Roads

Job No. 8/41E/307  
Contract No. CEND 702  
Drawing No. 40-4008 B

For scheme approval  
status refer  
Drg. No. 27887  
(1 of 13)

Engineering Certification  
Original Scheme Certified  
by Lorenz Martin 15/1/16

Design  
GACF  
4/08

Drawing  
CDP  
Checked  
RBC

Design  
CDP  
Verified  
RBC

From start to  
end of job  
14.37

From end to  
following RP  
6.61

From RP  
417.4

From RP  
417.7

TURNOUT SETOUT

CHANGE	LWS OFFSET	RHS OFFSET	IRIS OFFSET
30	5.00	4.38	5.4
40	4.38	4.73	4.38
50	4.73	4.38	4.38
60	4.38	4.73	4.38
70	4.73	4.38	4.38
80	4.38	4.73	4.38
90	4.73	4.38	4.38
100	4.38	4.73	4.38
110	4.73	4.38	4.38
120	4.38	4.73	4.38
130	4.73	4.38	4.38
140	4.38	4.73	4.38
150	4.73	4.38	4.38
160	4.38	4.73	4.38
170	4.73	4.38	4.38
180	4.38	4.73	4.38
190	4.73	4.38	4.38
200	4.38	4.73	4.38
210	4.73	4.38	4.38
220	4.38	4.73	4.38
230	4.73	4.38	4.38
240	4.38	4.73	4.38
250	4.73	4.38	4.38
260	4.38	4.73	4.38
270	4.73	4.38	4.38
280	4.38	4.73	4.38
290	4.73	4.38	4.38
300	4.38	4.73	4.38
310	4.73	4.38	4.38
320	4.38	4.73	4.38
330	4.73	4.38	4.38
340	4.38	4.73	4.38
350	4.73	4.38	4.38
360	4.38	4.73	4.38
370	4.73	4.38	4.38
380	4.38	4.73	4.38
390	4.73	4.38	4.38
400	4.38	4.73	4.38
410	4.73	4.38	4.38
420	4.38	4.73	4.38
430	4.73	4.38	4.38
440	4.38	4.73	4.38
450	4.73	4.38	4.38
460	4.38	4.73	4.38
470	4.73	4.38	4.38
480	4.38	4.73	4.38
490	4.73	4.38	4.38
500	4.38	4.73	4.38
510	4.73	4.38	4.38
520	4.38	4.73	4.38
530	4.73	4.38	4.38
540	4.38	4.73	4.38
550	4.73	4.38	4.38
560	4.38	4.73	4.38
570	4.73	4.38	4.38
580	4.38	4.73	4.38
590	4.73	4.38	4.38
600	4.38	4.73	4.38
610	4.73	4.38	4.38
620	4.38	4.73	4.38
630	4.73	4.38	4.38
640	4.38	4.73	4.38
650	4.73	4.38	4.38
660	4.38	4.73	4.38
670	4.73	4.38	4.38
680	4.38	4.73	4.38
690	4.73	4.38	4.38
700	4.38	4.73	4.38
710	4.73	4.38	4.38
720	4.38	4.73	4.38
730	4.73	4.38	4.38
740	4.38	4.73	4.38
750	4.73	4.38	4.38
760	4.38	4.73	4.38
770	4.73	4.38	4.38
780	4.38	4.73	4.38
790	4.73	4.38	4.38
800	4.38	4.73	4.38
810	4.73	4.38	4.38
820	4.38	4.73	4.38
830	4.73	4.38	4.38
840	4.38	4.73	4.38
850	4.73	4.38	4.38
860	4.38	4.73	4.38
870	4.73	4.38	4.38
880	4.38	4.73	4.38
890	4.73	4.38	4.38
900	4.38	4.73	4.38
910	4.73	4.38	4.38
920	4.38	4.73	4.38
930	4.73	4.38	4.38
940	4.38	4.73	4.38
950	4.73	4.38	4.38
960	4.38	4.73	4.38
970	4.73	4.38	4.38
980	4.38	4.73	4.38
990	4.73	4.38	4.38
1000	4.38	4.73	4.38

CONTROL LINE 2 SETOUT

CHANGE	LWS OFFSET	RHS OFFSET
30	5.00	5.4
40	4.38	4.38
50	4.73	4.38
60	4.38	4.73
70	4.73	4.38
80	4.38	4.73
90	4.73	4.38
100	4.38	4.73
110	4.73	4.38
120	4.38	4.73
130	4.73	4.38
140	4.38	4.73
150	4.73	4.38
160	4.38	4.73
170	4.73	4.38
180	4.38	4.73
190	4.73	4.38
200	4.38	4.73
210	4.73	4.38
220	4.38	4.73
230	4.73	4.38
240	4.38	4.73
250	4.73	4.38
260	4.38	4.73
270	4.73	4.38
280	4.38	4.73
290	4.73	4.38
300	4.38	4.73
310	4.73	4.38
320	4.38	4.73
330	4.73	4.38
340	4.38	4.73
350	4.73	4.38
360	4.38	4.73
370	4.73	4.38
380	4.38	4.73
390	4.73	4.38
400	4.38	4.73
410	4.73	4.38
420	4.38	4.73
430	4.73	4.38
440	4.38	4.73
450	4.73	4.38
460	4.38	4.73
470	4.73	4.38
480	4.38	4.73
490	4.73	4.38
500	4.38	4.73
510	4.73	4.38
520	4.38	4.73
530	4.73	4.38
540	4.38	4.73
550	4.73	4.38
560	4.38	4.73
570	4.73	4.38
580	4.38	4.73
590	4.73	4.38
600	4.38	4.73
610	4.73	4.38
620	4.38	4.73
630	4.73	4.38
640	4.38	4.73
650	4.73	4.38
660	4.38	4.73
670	4.73	4.38
680	4.38	4.73
690	4.73	4.38
700	4.38	4.73
710	4.73	4.38
720	4.38	4.73
730	4.73	4.38
740	4.38	4.73
750	4.73	4.38
760	4.38	4.73
770	4.73	4.38
780	4.38	4.73
790	4.73	4.38
800	4.38	4.73
810	4.73	4.38
820	4.38	4.73
830	4.73	4.38
840	4.38	4.73
850	4.73	4.38
860	4.38	4.73
870	4.73	4.38
880	4.38	4.73
890	4.73	4.38
900	4.38	4.73
910	4.73	4.38
920	4.38	4.73
930	4.73	4.38
940	4.38	4.73
950	4.73	4.38
960	4.38	4.73
970	4.73	4.38
980	4.38	4.73
990	4.73	4.38
1000	4.38	4.73

INTERSECTION LAYOUT

THIS IS A COMPILED PLAN  
Changes have been derived from ARMS GPS electronics.  
This layout has been produced from existing plans,  
photos and on site measurements. The design is based on  
approximate dimensions only and should be verified on the  
contractor prior to commencement of works.

DETAIL A

Scale 1:500 (A3)

0 5 10 15 20m  
1:1000 (A3)

TURNOUT WIDENING  
NITS

200mm Cement Modified (2nd Pass)  
2nd Make Up - 175mm nom. Type 2, Subtype 2.5, (CBR 15)  
200mm Cement Modified (1st Pass)  
1st Make Up - 100mm nom. Type 2, Subtype 2.5, (CBR 15)  
Shoulder Widening - 175mm nom. Type 2, Subtype 2.5, (CBR 15)

Control Line 2

5.0 nom.  
Blumen Surfacing v

Refer Note 1  
150mm Base, Type 2, Subtype 2.2, (CBR 60)

Refer Note 2  
150mm Subbase, Type 2, Subtype 2.4, (CBR 30)

When H < 1.0m slope 1 on 4  
When H > 1.0m slope 1 on 2

BELOWEN SURFACING  
Primerised Full Width (6.0 nom.)  
Seal A Full Width (8.0 nom.)  
For Seal Design See Drg. 37888B (No. 2)

Earthworks to Subgrade  
Earthworks to Subgrade

Refer Note 1  
150mm Base, Type 2, Subtype 2.2, (CBR 60)

Refer Note 2  
150mm Subbase, Type 2, Subtype 2.4, (CBR 30)

When H < 1.0m slope 1 on 4  
When H > 1.0m slope 1 on 2

BELOWEN SURFACING  
Primerised Full Width (6.0 nom.)  
Seal A Full Width (8.0 nom.)  
For Seal Design See Drg. 37888B (No. 2)

Earthworks to Subgrade  
Earthworks to Subgrade

Refer Note 1  
150mm Base, Type 2, Subtype 2.2, (CBR 60)

Refer Note 2  
150mm Subbase, Type 2, Subtype 2.4, (CBR 30)

When H < 1.0m slope 1 on 4  
When H > 1.0m slope 1 on 2

BELOWEN SURFACING  
Primerised Full Width (6.0 nom.)  
Seal A Full Width (8.0 nom.)  
For Seal Design See Drg. 37888B (No. 2)

Earthworks to Subgrade  
Earthworks to Subgrade

Refer Note 1  
150mm Base, Type 2, Subtype 2.2, (CBR 60)

Refer Note 2  
150mm Subbase, Type 2, Subtype 2.4, (CBR 30)

When H < 1.0m slope 1 on 4  
When H > 1.0m slope 1 on 2

BELOWEN SURFACING  
Primerised Full Width (6.0 nom.)  
Seal A Full Width (8.0 nom.)  
For Seal Design See Drg. 37888B (No. 2)

Earthworks to Subgrade  
Earthworks to Subgrade

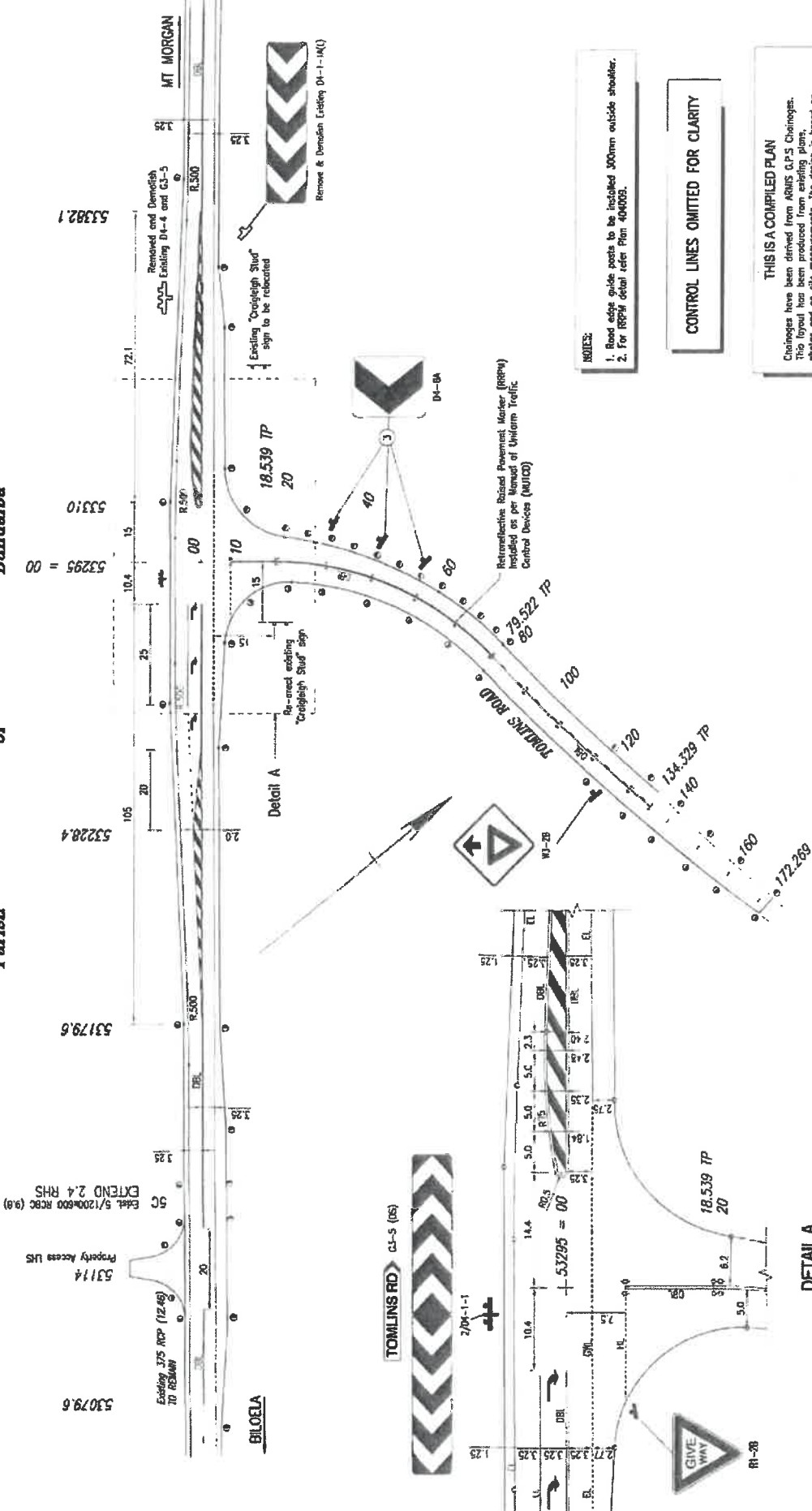
Refer Note 1  
150mm Base, Type 2, Subtype 2.2, (CBR 60)

Refer Note 2  
150mm Subbase, Type 2, Subtype 2.4, (CBR 30)

When H < 1.0m slope 1 on 4  
When H > 1.0m slope 1 on 2

BELOWEN SURFACING  
Primerised Full Width (6.0

Parish of Bundamba



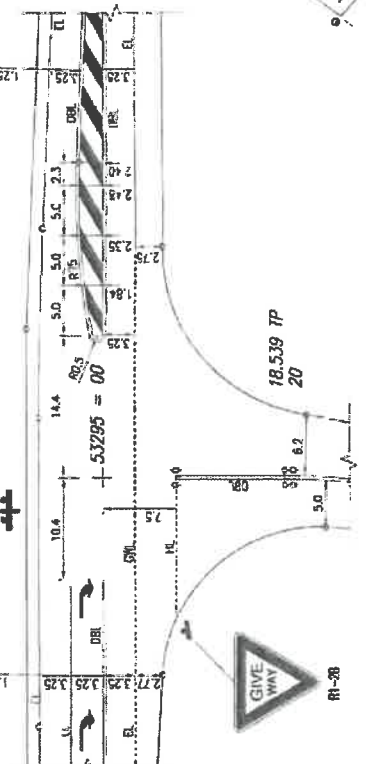
LINEMARKING AND ROAD FURNITURE

**NOTES:**  
 1. Road edge guide posts to be installed 300mm outside shoulder.  
 2. For RSPM detail refer Plan 404009.

**CONTROL LINES OMITTED FOR CLARITY**

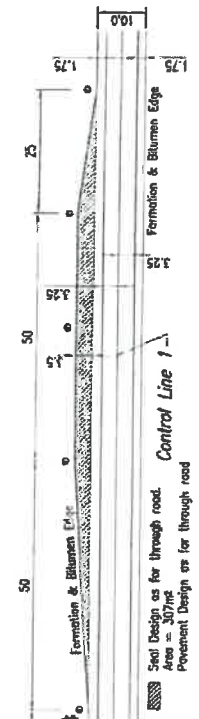
**THIS IS A COMPILED PLAN**  
 Changes have been derived from ARMS GPS Chainages. This layout has been produced from existing plans, photos and on site measurements. The design is based on the information provided and it is the contractor's responsibility to verify the data on site prior to commencement of work.

**DETAIL A**  
 SCALE 1:500 (A3)

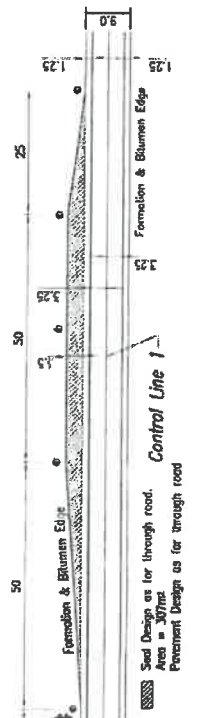


Revisions		Vertical	Date	Drawn	Approved	Job No.	Scale	Survey Data	Scale	BANANA SHIRE		TOMLJINS ROAD (NORTH) INTERSECTION LINEMARKING, ROAD FURNITURE & DETAILS		Queensland Government Department of Main Roads	
B	As Constructed					53079.6	1:1000 (A3)		0 5 10 15 20m	BURNETT HIGHWAY (BILOELA-MT.MORGAN) CTL CHGE 53074 - 53408.1 (ARMS GPS)		Design CJP	Design CJP	Job No. 8/41/307	Contract No. CEND 792
A	Original Issue					53114	1:1000 (A3)		1:1000 (A3)	Reference Points From start to end of job From end to following RP		Design CJP	Design CJP	Contract No. 404009	
						53228.4	1:1000 (A3)		1:1000 (A3)	Previous RP 117.4		Design CJP	Design CJP	Contract No. 404009	Drawing No. 404009
						53284.4	1:1000 (A3)		1:1000 (A3)	Dist. to start 117.4		Design CJP	Design CJP	Contract No. 404009	
						53295.0	1:1000 (A3)		1:1000 (A3)	Dist. to end 117.4		Design CJP	Design CJP	Contract No. 404009	Drawing No. 404009
						53310	1:1000 (A3)		1:1000 (A3)	From end to 117.4		Design CJP	Design CJP	Contract No. 404009	
						53321.1	1:1000 (A3)		1:1000 (A3)	Following RP 117.4		Design CJP	Design CJP	Contract No. 404009	Drawing No. 404009

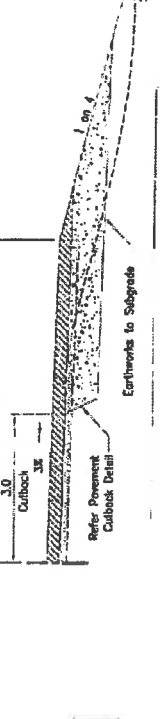
All changes are approximate only.  
Contractor shall confirm location of features with  
Superintendent on site prior to construction.



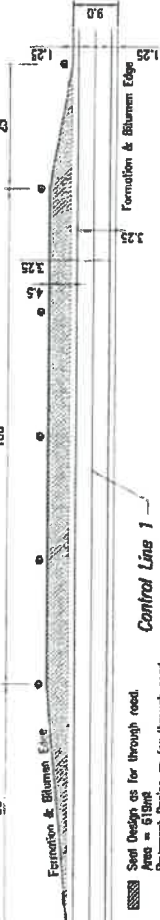
**PASSENGER VEHICLE STOPPING PLACE**  
CHGS: 48450 - 48575 LHS 48920 - 49045 RHS  
50240 - 50365 RHS 50785 - 50910 LHS



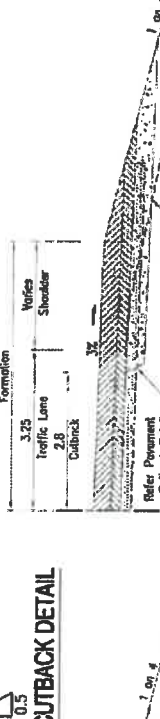
**PASSENGER VEHICLE STOPPING PLACE**  
CHGS: 46425 - 46550 LHS  
46980 - 47105 RHS  
52105 - 52230 LHS



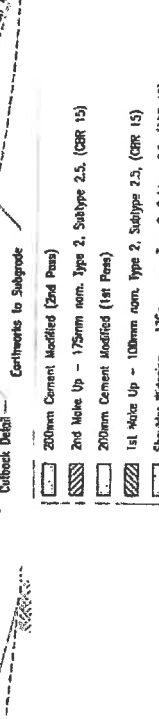
**A: WIDENING DETAIL**  
CHGS: 38875 - 40050 LHS



**C: WIDENING DETAIL**  
CHGS: 46425 - 46550 LHS 46980 - 47105 RHS



**B: WIDENING DETAIL**  
CHGS: 48450 - 48575 LHS 48920 - 49045 RHS  
50240 - 50365 RHS 50785 - 50910 LHS



**D: WIDENING DETAIL**  
CHGS: 51480 - 51650 LHS 52105 - 52230 LHS



**PAVEMENT CUTBACK DETAIL**  
CHGS: 39875 - 40050 LHS  
51480 - 51650 RHS

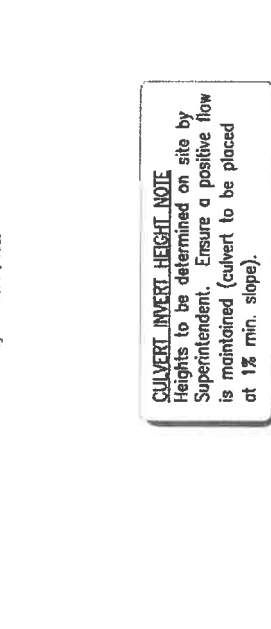
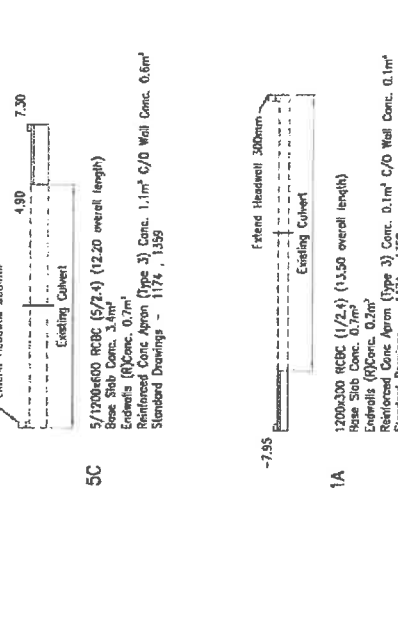
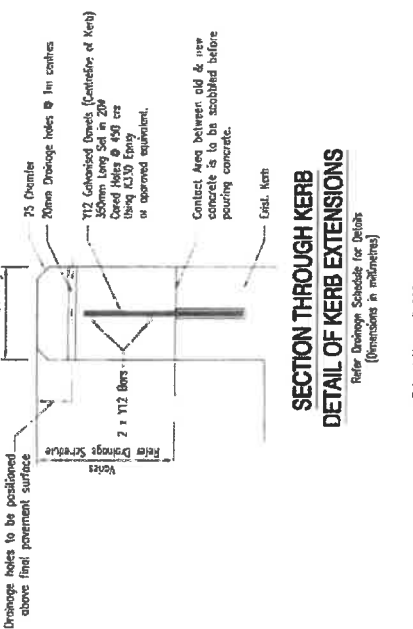
Reference Points	From start to end of job (m)	From end to end of job (m)	Following BPC	Following BPC
Preceding BPC	417.4	11.2	14.97	117.5
Following BPC	417.4	11.2	14.97	117.5

Reference Points	From start to end of job (m)	From end to end of job (m)	Following BPC	Following BPC
Preceding BPC	417.4	11.2	14.97	117.5
Following BPC	417.4	11.2	14.97	117.5

Reference Points	From start to end of job (m)	From end to end of job (m)	Following BPC	Following BPC
Preceding BPC	417.4	11.2	14.97	117.5
Following BPC	417.4	11.2	14.97	117.5

Reference Points	From start to end of job (m)	From end to end of job (m)	Following BPC	Following BPC
Preceding BPC	417.4	11.2	14.97	117.5
Following BPC	417.4	11.2	14.97	117.5

Queensland Government Department of Roads  
Job No. 8/41E/307  
Contract No. CEND 792  
Drawing No. 404010 B  
Series number 12 of 13



Drainage holes to be positioned above final pavement surface

Match Existing

75 Diameter  
30mm Drainage holes @ 1m centres

Y12 Coloured Bands (Centreline or Kerb)  
150mm Long Spd @ 20m  
Cored Holes @ 400 crz  
Using A330 Epoxy  
or approved equivalent.

Contact Area between old & new concrete is to be scabbled before pouring concrete.

Ext'd. Kerb

5C

Refer Design Schedule for Details (References in italics)

5/1200-600 RBC (S/Z-3) (12.20 overall length)  
Base Slab Conc. 3.0m<sup>3</sup>  
Endwalls (R/C) Conc. 0.7m<sup>3</sup>  
Reinforced Conc Apron (Type 3) Conc. 1.1m<sup>3</sup> C/O Wall Conc. 0.6m<sup>3</sup>  
Standard Drawings - 1174, 1359

1A

1200-300 RBC (1/2-3) (3.50 overall length)  
Base Slab Conc. 0.7m<sup>3</sup>  
Endwalls (R/C) Conc. 0.2m<sup>3</sup>  
Reinforced Conc Apron (Type 3) Conc. 0.1m<sup>3</sup> C/O Wall Conc. 0.1m<sup>3</sup>  
Standard Drawings - 1174, 1359

Extend Headwall 300mm  
Existing Culvert

Extend Headwall 300mm  
Existing Culvert

Extend Headwall 300mm  
Existing Culvert

**CULVERT INVERT HEIGHT NOTE**  
 Heights to be determined on site by Superintendent. Ensure a positive flow is maintained (culvert to be placed at 1% min. slope).

Change Order No.	Item Number	Item Description	Unit	Quantity	Rate	Total	Remarks
1A	1A	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1B	900 x 300 (9.9)	m	2.00	9.9	19.8	
1A	1C	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1D	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1E	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1F	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1G	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1H	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1I	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1J	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1K	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1L	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1M	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1N	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1O	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1P	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1Q	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1R	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1S	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1T	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1U	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1V	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1W	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1X	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1Y	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	1Z	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2A	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2B	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2C	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2D	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2E	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2F	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2G	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2H	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2I	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2J	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2K	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2L	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2M	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2N	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2O	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2P	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2Q	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2R	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2S	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2T	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2U	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2V	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2W	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2X	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2Y	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	2Z	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3A	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3B	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3C	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3D	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3E	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3F	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3G	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3H	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3I	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3J	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3K	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3L	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3M	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3N	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3O	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3P	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3Q	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3R	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3S	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3T	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3U	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3V	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3W	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3X	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3Y	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	3Z	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4A	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4B	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4C	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4D	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4E	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4F	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4G	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4H	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4I	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4J	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4K	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4L	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4M	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4N	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4O	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4P	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4Q	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4R	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4S	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4T	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4U	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4V	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4W	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4X	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4Y	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	4Z	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5A	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5B	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5C	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5D	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5E	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5F	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5G	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5H	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5I	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5J	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5K	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5L	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5M	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5N	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5O	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5P	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5Q	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5R	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5S	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5T	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5U	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5V	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5W	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5X	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5Y	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	5Z	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	6A	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	6B	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	6C	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	6D	1200 x 300 (11.1)	m	2.00	11.1	22.2	
1A	6E	1200 x 300 (11.1)	m	2.00	11.1	22.2	

## APPENDIX B

### Northern Consulting Engineers – Traffic and Calculation Spreadsheets





Transport Component	CONSTRUCTION MONTH								TOTAL
	1	2	3	4	5	6	7	8	

PV Panels		463	463	463	463	463	463	463	2778
Power Conversion Units		63	63	63	63	63	63	63	250
Supports and fixings		834	834	834	834	834	834	834	3334
Switchgear				2					2
Power Transformer				2					2
Balance of system	83	83	83	83	83	83	83	83	667
Construction Labour Traffic (Licenc)	750	750	750	750	750	750	750	750	6000
Gravel roads (Internal)	372	372	372	372	372	372	372	372	2231
<b>TOTAL</b>	<b>1205</b>	<b>2502</b>	<b>2564</b>	<b>2568</b>	<b>2564</b>	<b>1731</b>	<b>1296</b>	<b>833</b>	<b>15264</b>

Assumed working days per month 26

Daily Movements 46 96 99 99 99 67 50 32 Max 99

Assumed working hours per day 8

Peak Movements per hour 17 23 23 23 23 19 17 15 Max 23

Solar Array System		500
Expected MWp	MWp per Container	Movements
PV Panels	0.18	2778
Power Conversion Units	2.00	250
Supports and fixings	0.15	3334
Switchgear	250.00	2
Power Transformer	250.00	2
Balance of System	0.75	667
Construction Labour Traffic	0.08	6000
Gravel_58m3/MWp @13m3/HV	58	2231
<b>Total Heavy Vehicle Movements</b>		<b>9264</b>

Construction Labour	
Site Labour (20-40 trips 5000MWp)	30
Mini Bus Capacity	15
Mini Bus Activity	1000
Additional Daily LV (Misc)	10
<b>Total Light Vehicle Movements</b>	<b>6000</b>

Operations and Maintenance Traffic Movements Trip / MWp / Wk Trips per week

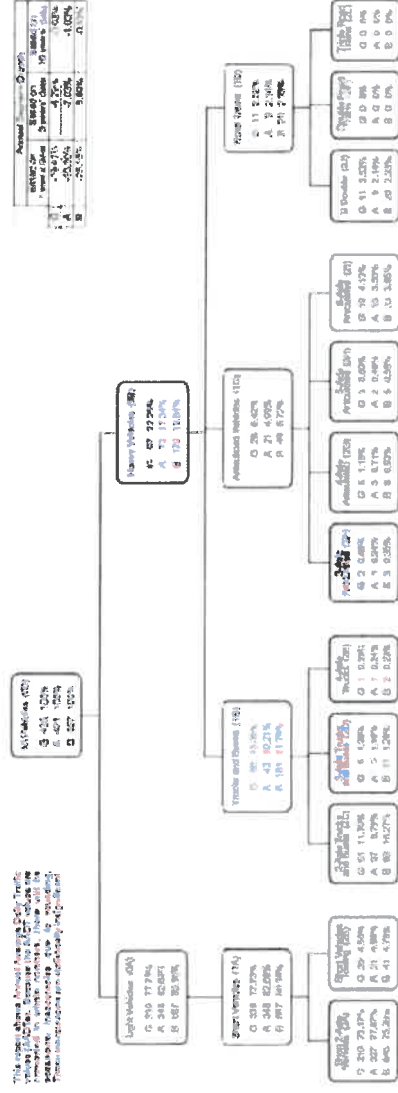
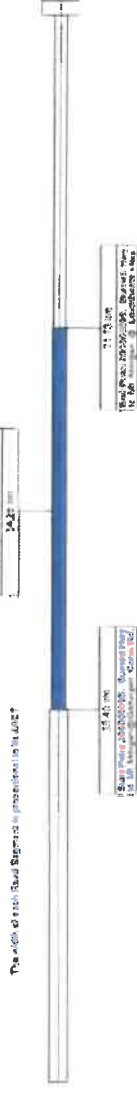
	Year 1	Year 2	Year N
Electricians	0.075	38	1950
Water Trucks	0.3	3	150
Labour for Module Cleaning	0.9	9	450
Labour for General Maintenance	0.52	5	260
<b>Total Annual Movements</b>	<b>2810</b>	<b>2388</b>	<b>1965</b>
<b>Average Weekly Movements</b>	<b>54</b>	<b>46</b>	<b>38</b>
<b>Average Daily movement</b>	<b>8</b>	<b>7</b>	<b>5</b>

Road 41E	
Description of entry	Road 41E
Linear Growth Equation $A = rt + P$	2017
Year - Traffic Survey Data Collected	2019
Year - Commencement of Use	2019
Projected Growth Rate (percentage)	0.00%
AAADT (G) [Traffic Flow in Gazetted Direction]	436
AAADT (A) [Traffic Flow Against Gazetted Direction]	421
AAADT (B) [Traffic Flow Both Directions]	857
(G) Future value including growth rate	436.0
(A) Future value including growth rate	421.0
(B) Future value including growth rate	857.0
P Initial value	(G), (A) or (B) above
r Annual growth rate (decimal)	0.00%

Road 41E	
Continuous Compound Growth Equation $A = P \cdot e^{rt}$	
Year - Traffic Survey Data Collected	2017
Year - Commencement of Use	2019
Projected Growth Rate (percentage)	0.00%
AAADT (G) [Traffic Flow in Gazetted Direction]	436
AAADT (A) [Traffic Flow Against Gazetted Direction]	421
AAADT (B) [Traffic Flow Both Directions]	857
(G) Future value including growth rate	436.0
(A) Future value including growth rate	421.0
(B) Future value including growth rate	857.0
P Initial value	(G), (A) or (B) above
r Annual growth rate (decimal)	0.0000
e Continuous Growth	exp
t Number of year projected.	2.0

**Traffic Analysts and Planning Group**  
**AAADT Segment Analysis Report (Continued)**  
 400-408 - Heavy Duty Traffic for 857 - 0.00% Growth Rate  
 11/11/2019

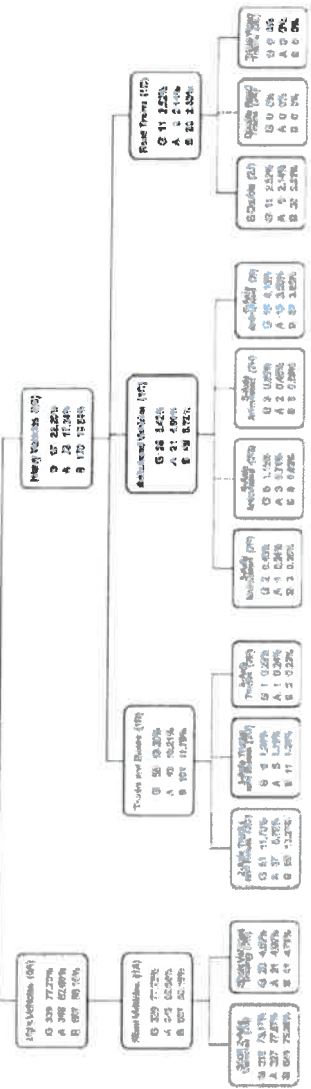


Category	Annual	Peak Hour
Light Vehicles (LV)	290	111
Medium Trucks (MT)	348	127
Heavy Trucks (HT)	219	79
<b>Total</b>	<b>857</b>	<b>317</b>



This report shows Annual Average Daily Traffic (AADT) values for the project area. The values are based on the traffic data collected for the project area. The values are based on the traffic data collected for the project area. The values are based on the traffic data collected for the project area.

Year	ADOT	ADOT	ADOT
2017	10,000	10,000	10,000
2019	10,000	10,000	10,000
2029	10,000	10,000	10,000



Description of entity	Road 41E
Linear Growth Equation $A = r \cdot P$	
Year - Traffic Survey Data Collected	2017
Year - Commencement of Use	2019
Year - Projected Design Horizon	2029
Projected Growth Rate (percentage)	0.00%
AADT (G) [Traffic Flow in Gazetted Direction]	436
AADT (A) [Traffic Flow Against Gazetted Direction]	421
AADT (B) [Traffic Flow Both Directions]	857
(G) Future value including growth rate	436.0
(A) Future value including growth rate	421.0
(B) Future value including growth rate	857.0
P Initial value	(G), (A) or (B) above
r Annual growth rate (decimal)	0.00%

Description of entity	Road 41E
Continues Compound Growth Equation $A = P \cdot e^{rt}$	
Year - Traffic Survey Data Collected	2017
Year - Commencement of Use	2019
Year - Projected Design Horizon	2029
Projected Growth Rate (percentage)	0.00%
AADT (G) [Traffic Flow in Gazetted Direction]	436
AADT (A) [Traffic Flow Against Gazetted Direction]	421
AADT (B) [Traffic Flow Both Directions]	857
(G) Future value including growth rate	436.0
(A) Future value including growth rate	421.0
(B) Future value including growth rate	857.0
P Initial value	(G), (A) or (B) above
r Annual growth rate (decimal)	0.0000
t Continuous growth	exp
e Number of year projected.	12.0

1

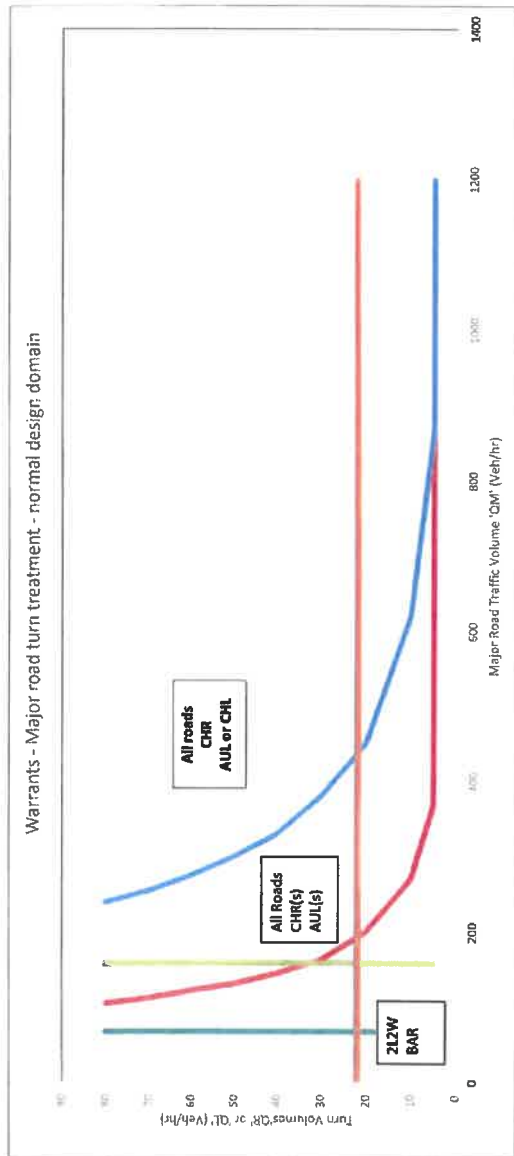
Biloeifa

Mt. Morgan

2019  
Smokey Creek Solar Farm  
(Distribution 50/50 Right/Left)  
(50/50 Split In/Out)

QL	22	veh/hr
QML	22	veh/hr
QR	22	veh/hr
QMR	22	veh/hr

22 22  
Development Access



Bilbela

QT1  
QR 33

70

Mt Morgan

2019  
Smoby Creek Solar Farm  
(Distribution 50/50 Right/Left)  
(50/50 Split In/Out)

DL	10	veh/hr
QWIL	31	veh/hr
QR	33	veh/hr
QWR	17	veh/hr

33 10  
Development Access

ad type

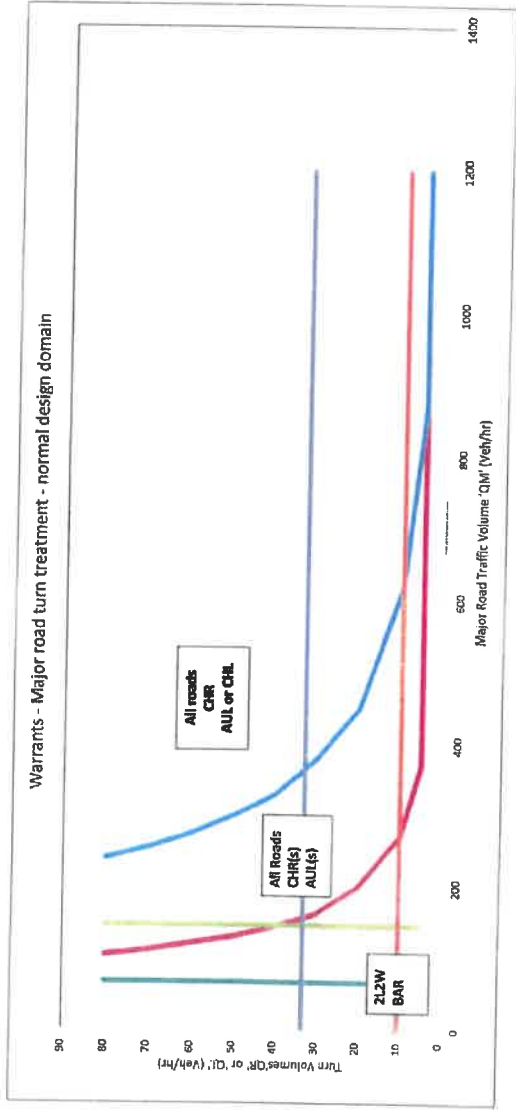
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Nr.

GS

ef



Blotels

M1 Morgan

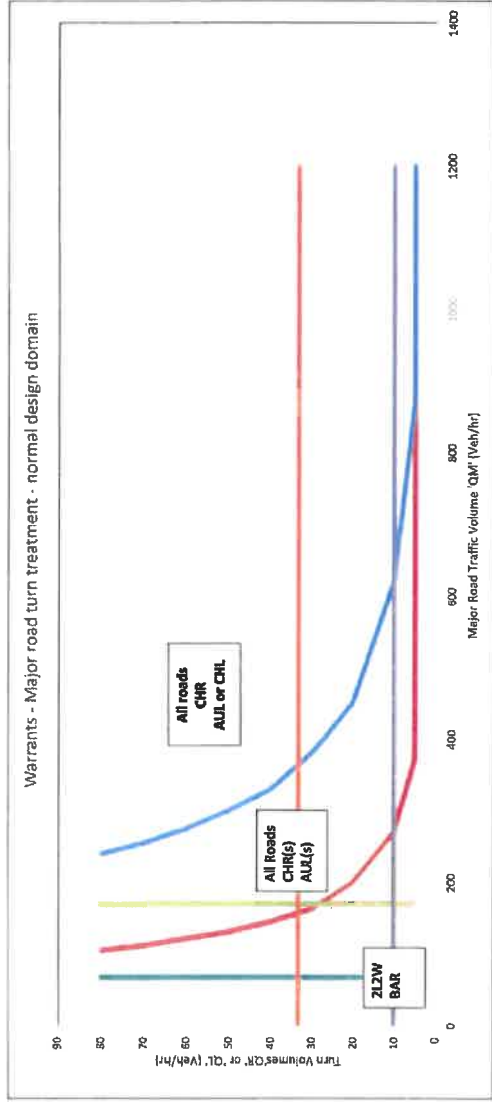
2019  
 Smoky Creek Solar Farm  
 (Distribution 50/50 Right/Left)  
 (50/50 Split In/Out)

CL	11	veh/hr
QWIL	67	veh/hr
QR	16	veh/hr
QMR	170	veh/hr

10      35

Development Access

e  
 e



Blinda

Mt Morgan

70

14

2019  
 Smoky Creek Solar Farm  
 (Distribution 50/50 Right/Left)  
 (50/50 Split In/Out)

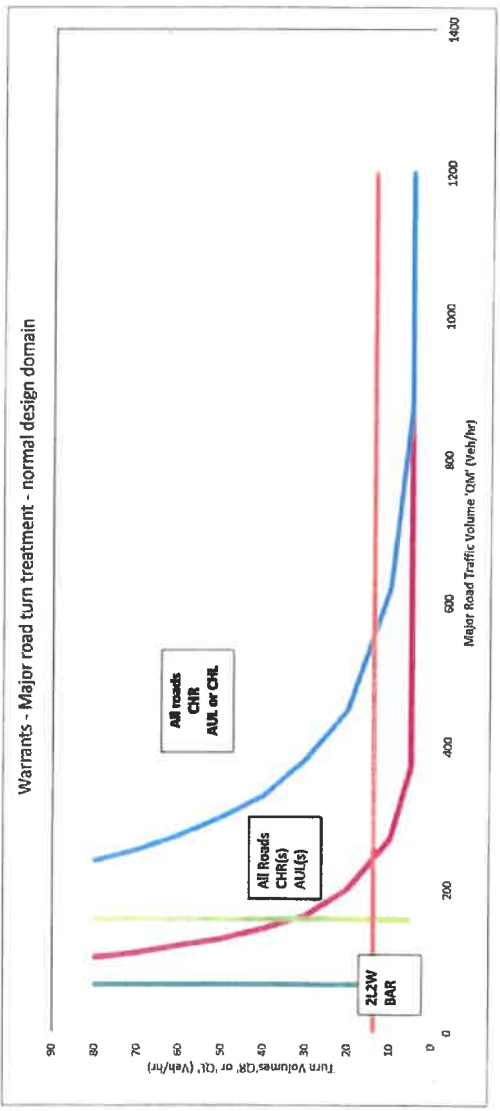
QL	1.6	veh/hr
QVIL	1.4	veh/hr
QR	1.4	veh/hr
QMR	151	veh/hr

14

14

Development Access

S is at







Bloodia

Mt Morgan

2

2019  
 Smoky Creek Solar Farm  
 (Distribution 50/50 Right/Left)  
 (50/50 Split In/Out)

QL	1.2	veh/hr
QML	0.1	veh/hr
QR	1.1	veh/hr
QMR	1.5	veh/hr

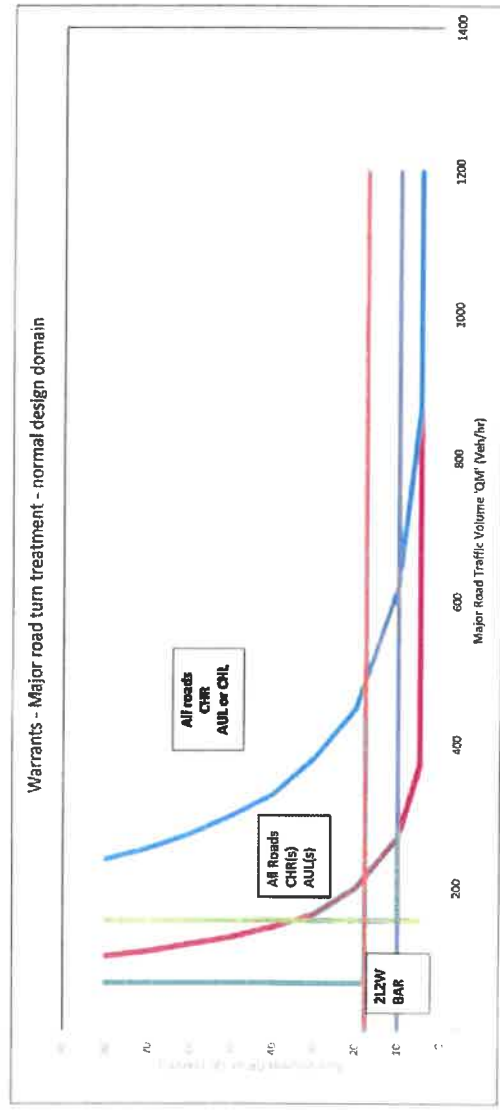
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 18  
 Development Access

road type

inter island

Right

Left



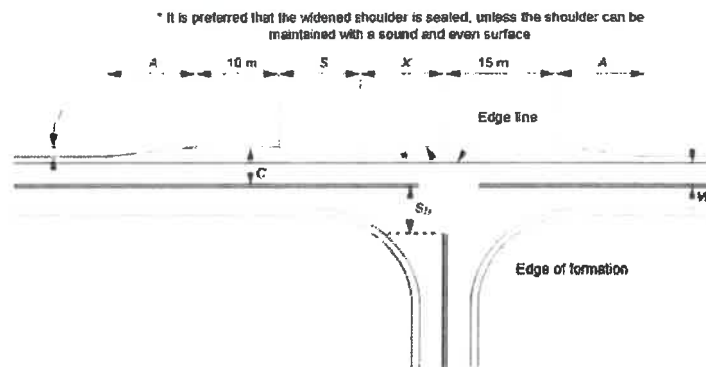
## Right Turn Treatments (Rural/Urban)

Operating/Posted Speed	100 km/h	Storage Length (S)	35 m
Design Speed (V)	110 km/h	Roadway Widening (F)	3.5 m
Through Lane Width (W)	3.5 m	Decal Rate	2.5 m/s
Turning Lane Width (Wt)	3.5 m	Stop Condition	

### BAR Treatment

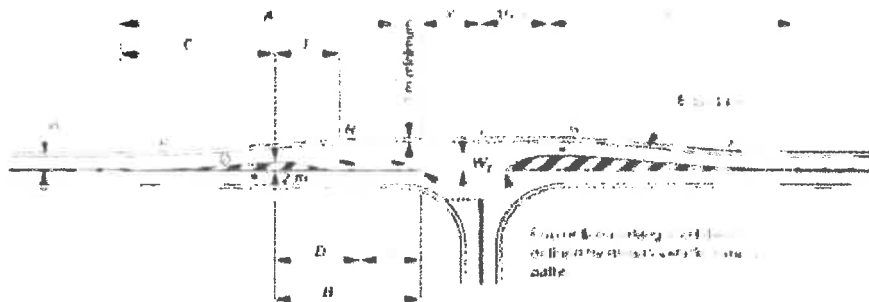
A	C	X
54	7	10-15m

Straight (Type 1 & 2 road train)



### CHR(S) Treatment

A	B	D	E	R	T	X
95	120	85	55	500	36	10-15m



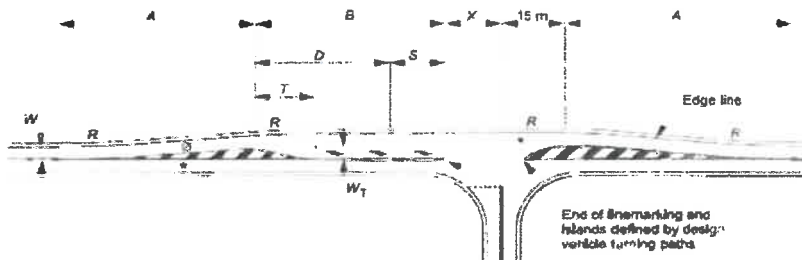
**Notes:**

Ø - double barrier line not to be used this side of the island

\* - Islands are to comprise line marking only, i.e. no raised or depressed medians. Diagonal rows of RRPAC within the painted islands should be used to improve the delineation of diagonal pavement marking

### CHR Treatment

A	B	D	R	T	X
110	220	185	500	36	10-15m



**Notes:**

An alternative to the double white line on the offside edge of the right-turn slot is a 1.0 m painted median. The 1.0 m median is particularly useful when the major road is on a tight horizontal curve and oncoming vehicles track across the centreline. Provision of this median will require the dimension 'A' to be increased.

A raised concrete median on the minor road may be used with this treatment to minimise 'corner cutting' particularly for higher turning volumes.

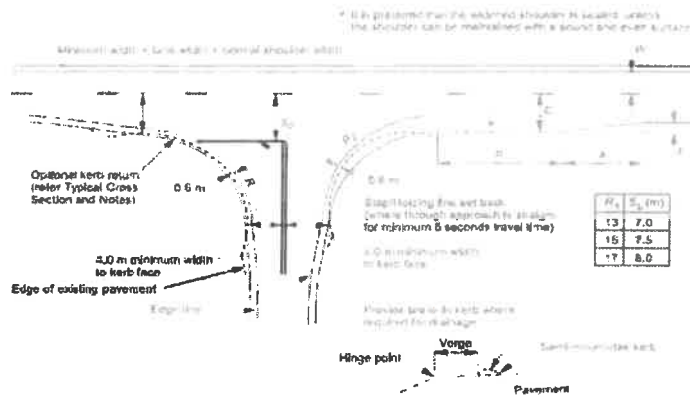
### Left Turn Treatments (Rural)

Operating/Posted Speed	100 km/h	Turning Lane Width (W <sub>t</sub> )	3.5 m
Design Speed (V)	110 km/h	Roadway Widening (F)	3.5 m
Through Lane Width (W)	3.5 m	Decel rate	2.5 m/s
		Stopping condition/Turning Speed	20 m/s

#### BAL Treatment

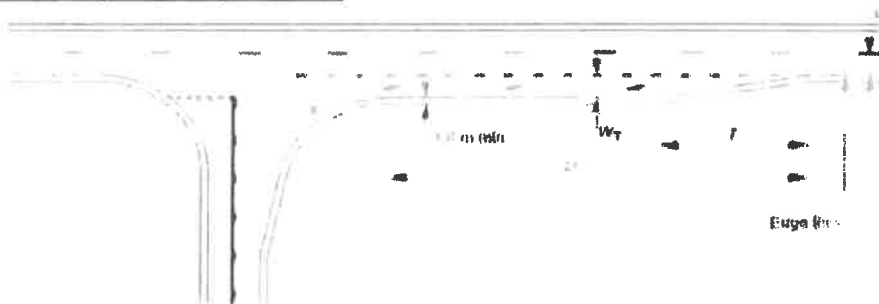
A	C	P
54	6	35

Straight



#### AUL(S) Treatment

D	T	Ld
85	36	72



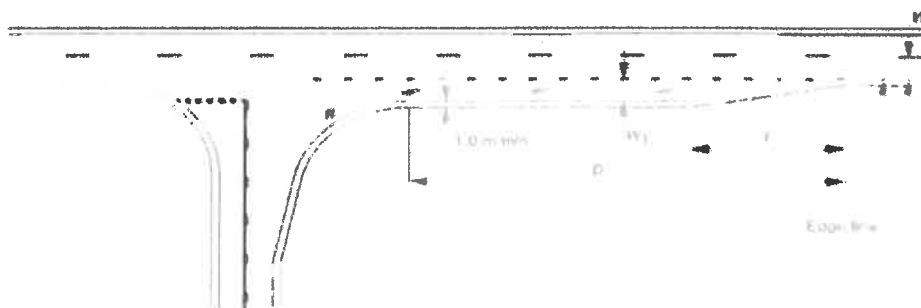
Notes:

- # For setting out details of the left-turn geometry, use vehicle turning path templates and/or Table B.2.
- Approaches to left-turn slip lanes can create hazardous situations between cyclists and left-turning motor vehicles. Treatments to reduce the number of potential conflicts at left-turn slip lanes are given in AGRD Part 4 (Ausroads 2017)

#### AUL Treatment

D	T	Ld
180	36	72

Calculated deceleration length (D>Ld)  
 Adopt Diverge Length (D<Ld)



Notes:

- # For setting out details of the left-turn geometry, use vehicle turning path software or templates

## APPENDIX C

### **Northern Consulting Engineers – Preliminary Design Stage Safety Audit**

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## CHECKLIST 2: PRELIMINARY DESIGN STAGE AUDIT

Issue	Yes	No	Comment
<b>2.1 General topics</b>			
<b>2.1.1 Changes since previous audit</b>			
Do the conditions for which the scheme was originally designed still apply? (for example, no changes to the surrounding network, area activities or traffic mix)	X		Lawful transport corridors to and from allotments.
Has the general form of the project design remained unchanged since previous audit (if any)?			N/A
<b>2.1.2 Drainage</b>			
Will the scheme drain adequately?			Assumed that the scheme will be designed to mimic existing conditions
Has the possibility of surface flooding been adequately addressed, including overflow from surrounding or intersecting drains and water courses?	X		Will form part of the development conditions
<b>2.1.3 Climatic conditions</b>			
Has consideration been given to weather records or local experience that may indicate a particular problem? (for example, snow, ice, wind, fog)			N/A
<b>2.1.4 Landscaping</b>			
If any landscaping proposals are available, are they compatible with safety requirements? (for example, sight lines and hazards in clear zones)		X	
<b>2.1.5 Services</b>			
Does the design adequately deal with buried and overhead services? (especially in regard to overhead clearances, etc)			
Has the location of fixed objects or furniture associated with services been checked, including the position of poles?			
<b>2.1.6 Access to property and developments</b>			
Can all accesses be used safely? (entry and exit/merging)	X		Introduction of a CHR(s) / BAL suitable for 19m Articulated vehicles within local government and suitable development access driveways, will ensure safe entry and exit movements.
Is the design free of any downstream or upstream effects from points of access, particularly near intersections?			Development Access off local roads to be assessed at OPW Phase.
Have rest areas and truck parking accesses been checked for adequate sight distance, etc.?			N/A
<b>2.1.7 Adjacent developments</b>			
Does the design handle accesses to major adjacent generators of traffic and developments safely?	X		Burnett Highway and Tomlins Road CHR/AUL intersection suitable to composition and volume of development generated traffic.

Issue	Yes	No	Comment
Is the driver's perception of the road ahead free of misleading effects of any lighting or traffic signals on an adjacent road?	X		
<b>2.1.8 Emergency vehicles and access</b>			
Has provision been made for safe access and movements by emergency vehicles?	X		
Does the design and positioning of medians and vehicle barriers allow emergency vehicles to stop and turn without unnecessarily disrupting traffic?	X		
<b>2.1.9 Future widening and/or realignments</b>			

If the scheme is only a stage towards a wider or dual carriageway is the design adequate to impart this message to drivers? (is the reliance on signs minimal/appropriate, rather than excessive?)		X	
Is the transition between single and dual carriageway (either way) handled safely?	X		
<b>2.1.10 Staging of the scheme</b>			
If the scheme is to be staged or constructed at different times: are the construction plans and program arranged to ensure maximum safety?  do the construction plans and program include specific safety measures, signing; adequate transitional geometry, etc. for any temporary arrangements?		X	
<b>2.1.11 Staging of the works</b>			
If the construction is to be split into several contracts, are they arranged safely?		X	
<b>2.1.12 Maintenance</b>			
Can maintenance vehicles be safely located?	X		
<b>2.2 Design issues (general)</b>			
<b>2.2.1 Design standards</b>			
Is the design speed and speed limit appropriate? (for example, consider the terrain, function of the road)		X	Dodsons Road requires improved carriageway width to allow passing of construction traffic.
Has the appropriate design vehicle and check vehicle been used?	X		Class 9 (19m Semi-trailer)

Issue	Yes	No	Comment
<b>2.2.2 Typical cross-sections</b>			
Are lane widths, shoulders, medians and other crosssection features adequate for the function of the road?		X	Tomlins Rd is considered to be satisfactory in relation to the predicted traffic volumes, however the pavement profile is yet to be confirmed. Dodsons Road is considered to be inadequate for the volume and composition of traffic generated from the development and is recommended to be upgraded.
Is the width of traffic lanes and carriageway suitable in relation to: alignment? traffic volume? vehicle dimensions? the speed environment? combinations of speed and traffic volume?		X	Alignment = Yes Traffic Volume = No Vehicles Dimensions = No Speed Environment = N/A Drivers will drive to conditions Speed and Volume = No
Are overtaking/climbing lanes provided if needed?		X	
Have adequate clear zones been achieved?	X		Clear zones in accordance with ARRB Unsealed roads manual are recommended.
<b>2.2.3 The effect of cross-sectional variation</b>			
Is the design free of undesirable variations in cross-section design?	X		
Are crossfalls safe? (particularly where sections of existing highway have been used or there have been compromises to accommodate accesses, etc.)	X		
Does the cross-section avoid unsafe compromises such as narrowings at bridge approaches or past physical features?	X		
<b>2.2.4 Roadway layout</b>			
Are all traffic management features designed to avoid creating unsafe conditions?			N/A

Is the layout of road markings and reflective materials able to deal satisfactorily with changes in alignment? (particularly where the alignment may be substandard)			N/A
<b>2.2.5 Shoulders and edge treatment</b>			
Are the following safety aspects of shoulder provision satisfactory:			
provision of sealed or unsealed shoulders	X		
width and treatment on embankments			
crossfalls all of shoulders			
Are the shoulders likely to be safe if used by slow moving vehicles or cyclists?	X		
Are any rest areas and truck parking areas safely designed?			N/A

Issue	Yes	No	Comment
<b>2.2.6 Effect of departures from standards or guidelines</b>			
Any approved departures from standards or guidelines: is safety maintained?			N/A
Any hitherto undetected departures from standards: is safety maintained?			N/A
<b>2.3 Alignment details</b>			
<b>2.3.1 Geometry of horizontal and vertical alignment</b>			
Do the horizontal and vertical design fit together correctly?			Assumed to be satisfactory as they are existing roadways.
Is the design free of visual cues that would cause a driver to misread the road characteristics? (for example, visual illusions, subliminal delineation such as lines of trees, poles, etc.)			Assumed to be satisfactory as they are existing roadways.
Does the alignment provide for speed consistency?	X		
<b>2.3.2 Visibility; sight distance</b>			
Are horizontal and vertical alignments consistent with the visibility requirements?			Assumed to be satisfactory as they are existing roadways.
Will the design be free of sight line obstructions due to safety fences or barriers?			
boundary fences?			
street furniture?			
parking facilities?			
signs?	X		
landscaping?			
bridge abutments?			
parked vehicles in laybys or at the kerb?			
queued traffic?			
Are railway crossings, bridges and other hazards all conspicuous?			N/A
Is the design free of any other local features which may affect visibility?			Assumed to be satisfactory as they are existing roadways.
<b>2.3.3 New/existing road interface</b>			
Does the interface occur well away from any hazard? (for example, a crest, a bend, a roadside hazard or where poor visibility/distractions may occur)			Assumed to be satisfactory as they are existing roadways.
If carriageway standards differ, is the change effected safely?	X		Changes in road profiles effected at intersections.

Issue	Yes	No	Comment
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Is the transition where the road environment changes (for example, urban to rural; restricted to unrestricted; lit to unlit) done safely?			N/A
Has the need for advance warning been considered?	X		Truck turning warning signs recommended during the construction period.
<b>2.3.4 Readability of the alignment by drivers</b>			
Will the general layout, function and broad features be recognised by drivers in sufficient time?	X		Assumed to be satisfactory as they are existing roadways.
Will approach speeds be suitable and can drivers correctly track through the scheme?	X		Assumed to be satisfactory as they are existing roadways. Construction traffic expected to be briefed adequately.
<b>2.4 Intersections</b>			
<b>2.4.1 Visibility to and at intersections</b>			
Are horizontal and vertical alignments at the intersection or on the approaches to the intersection consistent with the visibility requirements?	X		Assumed to be satisfactory as they are existing roadways.
Will drivers be aware of the presence of the intersection? (especially on the minor road approach)	X		Assumed to be satisfactory as they are existing roadways. Construction traffic expected to be briefed adequately.
Will the design be free of sight line obstructions due to: safety fences or barriers? boundary fences? street furniture? parking facilities? signs? landscaping? bridge abutments?	X		Assumed to be satisfactory as they are existing roadways.
Are railway crossings, bridges and other hazards near intersections conspicuous?			N/A
Will the design be free of any local features which adversely affect visibility?	X		
Will intersection sight lines be obstructed by permanent or temporary features such as parked vehicles in laybys, or by parked or queued traffic generally?		X	
<b>2.4.2 Layout, includes its appropriateness</b>			
Is the type of intersection selected (cross roads, T, roundabout, signalised, etc.) appropriate for the function of the two roads?	X		
Are the proposed controls (Give Way, Stop signals, etc.) appropriate for the particular intersection?	X		
Are junction sizes appropriate for all vehicle movements?	X		

Issue	Yes	No	Comment
Are the intersections free of any unusual features which could affect road safety?	X		
Are the lane widths and swept paths adequate for all vehicles?	X		
Is the design free of any upstream or downstream geometric features that could affect safety? (for example, merging of lanes)	X		
Are the approach speeds consistent with the intersection design?	X		
Where a roundabout is proposed: have pedal cycle movements been considered? have pedestrian movements been considered? are details regarding the circulating carriageway sufficient?		X	
<b>2.4.3 Readability by drivers</b>			

Will the general type, function and broad features be perceived correctly by drivers?	X		
Are the approach speeds and likely positions of vehicles as they track through the scheme safe?	X		
Is the design free of sunrise or sunset problems that may create a hazard for motorists?	X		
<b>2.5 Special road users</b>			
<b>2.5.1 Adjacent land</b>			
Will the scheme be free of adverse effects from adjacent activity and intensity of land use? (if not, what special measures are needed?)	X		
<b>2.5.2 Pedestrians</b>			
			No pedestrian activity expected.
Have pedestrian needs been satisfactorily considered?			N/A
If footpaths are not specifically provided, is the road layout safe for use by pedestrians? (particularly at blind corners or on bridges)			N/A
Are pedestrian subways or footbridges sited to provide maximum use? (i.e. Is the possibility of pedestrians crossing at grade in their vicinity minimised?)			N/A
Has specific provision been made for pedestrian crossings, school crossings or pedestrian signals?			N/A
Where present, are these facilities sited to provide maximum use with safety?			N/A

Issue	Yes	No	Comment
Are pedestrian refuges/kerb extensions provided where needed?			N/A
Has specific consideration been given to provision required for special groups? (for example, young, elderly, disabled, deaf or blind)			N/A
<b>2.5.3 Cyclists</b>			
			No Cyclists activity expected
Have the needs of cyclists been satisfactorily considered, especially at intersections?			N/A
Have cycle lanes been considered?			N/A
Are all cycleways of standard or adequate design?			N/A
Where a need for shared pedestrian/cycle facilities exists, have they been safely treated?			N/A
Where cycleways terminate at intersections or adjacent to the carriageway, has the transition treatment been handled safely?			N/A
Have any needs for special cycle facilities been satisfactorily considered? (for example, cycle signals)			N/A
<b>2.5.4 Motorcyclists</b>			
Has the location of devices or objects that might destabilise a motorcycle been avoided on the road surface?			Assumed to be satisfactory as they are existing roadways.
Will warning or delineation be adequate for motorcyclists?			Assumed to be satisfactory as they are existing roadways.
Has barrier kerb been avoided in high-speed areas?			Assumed to be satisfactory as they are existing roadways.
In areas more likely to have motorcycles run off the road is the roadside forgiving or safely shielded?			Assumed to be satisfactory as they are existing roadways.
<b>2.5.5 Equestrians and stock</b>			
Have the needs of equestrians been considered, including the use of verges or shoulders and rules regarding the use of the carriageway?		X	
Can underpass facilities be used by equestrians/stock?			N/A
<b>2.5.6 Freight</b>			

Have the needs of truck drivers been considered, including turning radii and lane widths?	X		
<b>2.5.7 Public transport</b>			
Has public transport been catered for?		X	
Have the needs of public transport users been considered?		X	

Issue	Yes	No	Comment
Have the manoeuvring needs of public transport vehicles been considered?		X	
Are bus stops well positioned for safety?		X	
<b>2.5.8 Road maintenance vehicles</b>			
Has provision been made for road maintenance vehicles to be used safely at the site?	X		
<b>2.6 Signs and lighting</b>			
<b>2.6.1 Lighting</b>			
Is this project to be lit? Will safety be maintained if the project is not lit?			N/A
Is the design free of features that make illuminating sections of the road difficult? (for example, shadow from trees or over bridges)			N/A
Has the question of sighting of lighting poles been considered as part of the general concept of the scheme?			N/A
Are frangible or slip-base poles to be provided?			N/A
Are any special needs created by ambient lighting? Will safety be maintained if special treatments are not provided?			N/A
Have the safety consequences of vehicles striking lighting poles (of any type) been considered?			N/A
<b>2.6.2 Signs</b>			
Are signs appropriate for their location?			Assumed to be satisfactory as they are existing roadways.
Are signs located where they can be seen and read in adequate time?			Assumed to be satisfactory as they are existing roadways.
Will signs be readily understood?			Assumed to be satisfactory as they are existing roadways.
Are signs located so that visibility to and from accesses and intersecting roads is maintained?			Assumed to be satisfactory as they are existing roadways.
Are signs appropriate to the driver's needs? (for example, destination signs, advisory speed signs, etc.)			Assumed to be satisfactory as they are existing roadways.
Have the safety consequences of vehicles striking sign posts been considered?			Assumed to be satisfactory as they are existing roadways.
Are signs located so that drivers' sight distance is maintained?			Assumed to be satisfactory as they are existing roadways.
Where signs are to be located in the clear zone, are they frangible or adequately shielded by a crash barrier?			Assumed to be satisfactory as they are existing roadways.

Issue	Yes	No	Comment
<b>2.6.3 Marking and delineation</b>			
Has the appropriate standard of delineation and marking been adopted?			Assumed to be satisfactory as they are existing roadways.
Are the proposed markings consistent with the works in the adjoining section of the route?			Assumed to be satisfactory as they are existing roadways.
Are the previous/adjacent markings to be upgraded? If not, will safety be maintained?			Assumed to be satisfactory as they are existing roadways.
<b>2.7 Traffic management</b>			
<b>2.7.1 Traffic flow and access restrictions</b>			

Can traffic volumes from the proposed scheme be safely accommodated on existing sections of road?	X		
Have parking provision and parking control been adequately considered?		X	
Can any turn bans be implemented without causing problems at adjacent intersections?		X	
Has the effect of access to future developments been considered?		X	
Is safety maintained for any traffic diverting to other roads? (for example, to avoid a traffic control device)			N/A
<b>2.7.2 Overtaking and merges</b>			
Are overtaking sight distance and stopping distance adequate?			N/A
Have suitable shoulder widths been provided at lane drop merges?			N/A
Have standard signs and markings been provided for any lane drop?			N/A
Has adequate sight distance been provided to any lane drop?			N/A
Are shoulders wide enough opposite access points and intersections?			N/A
<b>2.7.3 Rest areas and stopping zones</b>			
Are there sufficient roadside stopping areas, rest areas and truck parking areas?			N/A
Are any entries and exits to rest areas or truck parking areas safe?			N/A

Issue	Yes	No	Comment
<b>2.7.4 Construction and operation</b>			
If the scheme is to be constructed 'under traffic', can this be done so safely?	X		
Can the scheme be safely constructed?	X		
Have the maintenance requirements been adequately considered?	X		
Is safe access to and from the works available?	X		
<b>2.8 Additional questions to be considered for development proposals</b>			
<b>2.8.1 Horizontal alignment</b>			
Is visibility adequate for drivers and pedestrians at proposed accesses?			N/A
Is adequate turning space provided for the volume and speed of traffic?			Assumed to be satisfactory as they are existing roadways.
Are curve radii and forward visibility satisfactory?			Assumed to be satisfactory as they are existing roadways.
Are sight and stopping distances adequate?			Assumed to be satisfactory as they are existing roadways.
<b>2.8.2 Vertical alignment</b>			
Are gradients satisfactory?			Assumed to be satisfactory as they are existing roadways.
Are sight and stopping distances adequate?			Assumed to be satisfactory as they are existing roadways.
<b>2.8.3 Parking provision</b>			
Is on-site parking adequate to avoid on-street parking and associated risks?			N/A
Are parking areas conveniently located?			On-Site parking facilities will be made available.
Is adequate space provided in parking areas for circulation and intersection sight distance?	X		
<b>2.8.4 Servicing facilities</b>			

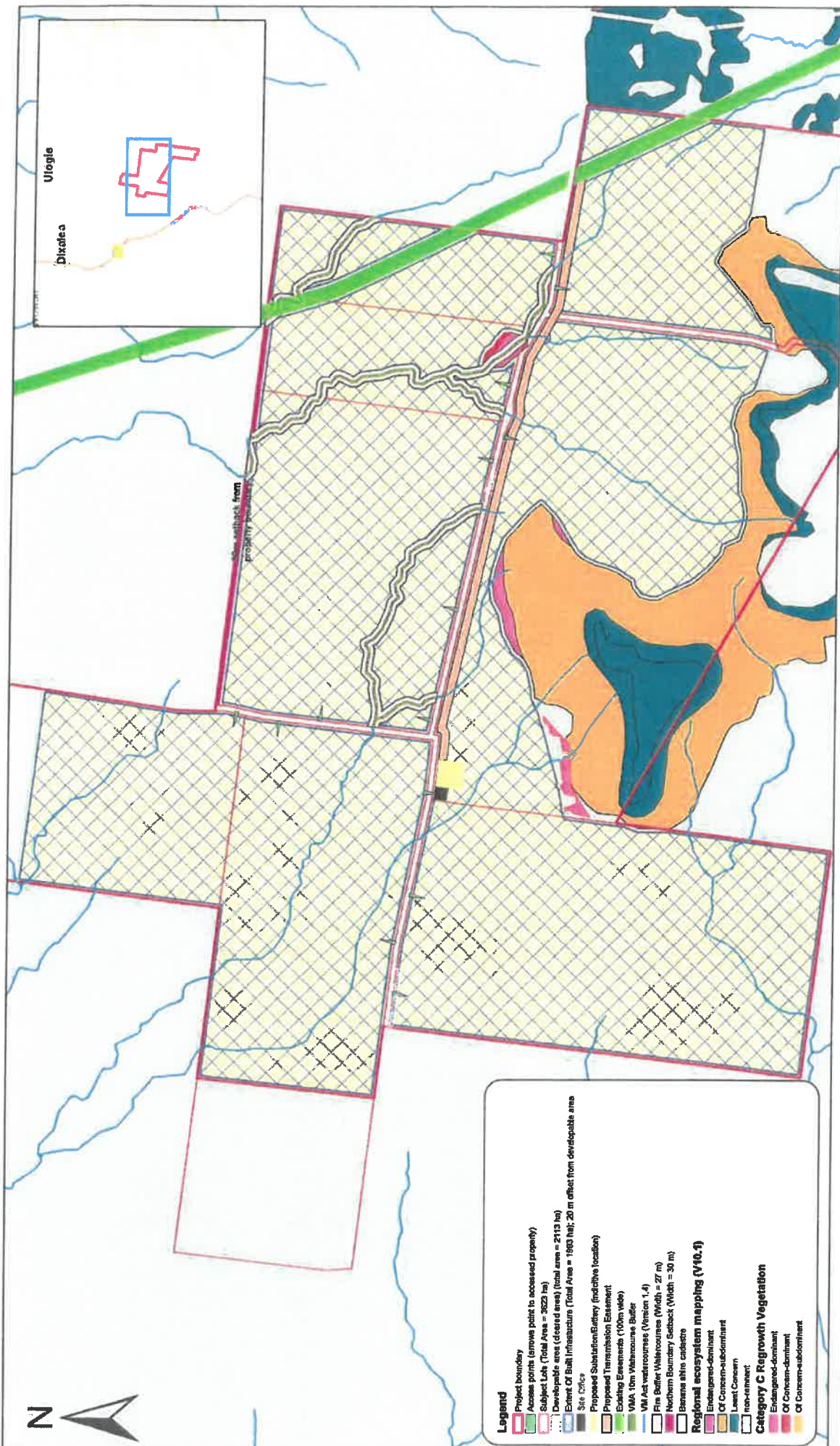
Are off-street loading/unloading areas adequate?	X		
Are turning facilities for large vehicles provided in safe locations?	X		
Is emergency vehicle access adequate?	X		
<b>2.8.5 Signs and markings</b>			
Have necessary traffic signs and road markings been provided as part of a development?			Assumed to be satisfactory as they are existing roadways.

Issue	Yes	No	Comment
Is priority clearly defined at all the intersection points within the car park and access routes?	X		
Will the signs and markings be clear in all conditions, including day/night, rain, fog, etc.?	X		
<b>2.8.6 Landscaping</b>			
Does landscaping maintain visibility at intersections, bends, accesses and pedestrian locations?			N/A
Has tree planting been avoided where vehicles are likely to run off the road?			N/A
<b>2.8.7 Traffic management</b>			
Have any adverse area-wide effects been addressed?			N/A
Will the design keep travel speeds at the safe level?			N/A
Are the number and location of accesses appropriate?			N/A
Are the facilities for public transport services safely located?			N/A
Are any bicycle facilities safely located in respect to vehicular movements?			N/A
Are pedestrian facilities adequate and safely located?			N/A
<b>2.8.8 Other</b>			
Has appropriate street lighting been provided?			N/A
Are any roadside hazards appropriately dealt with?	X		
Has safe pedestrian access to the development been provided?			N/A
<b>2.9 Any other matter</b>			
<b>2.9.1 Safety aspects not already covered</b>			
Have all unusual or hazardous conditions associated with special events been considered?			N/A
Is the road able to safely handle oversize vehicles, or large vehicles like trucks, buses, emergency vehicles, road maintenance vehicles?	X		
If required, can the road be closed for special events in a safe manner?	X		
If applicable, are special requirements of scenic or tourist routes satisfied?			N/A
Have all other matters which may have a bearing on safety been addressed?	X		

## APPENDIX D

### Edify Energy – Development Plans





**Legend**

- Project boundary
- Access points (arrows point to accessed property)
- Subject Lots (Total Area = 3623 ha)
- Developable areas (cleared areas) (total area = 2113 ha)
- Extent Of Built Infrastructure (Total Area = 1893 ha); 20 m offset from developable area
- Site Office
- Proposed Substation/Gallery (indicative location)
- Proposed Transmission Easement
- Existing Easements (100m wide)
- 100m Wetland Buffer
- 100m Wetland Buffer
- Pin Better Watercourses (Width = 1.4)
- Pin Better Watercourses (Width = 27 m)
- Northern Boundary Subback (Width = 30 m)
- Bonnie shire caddis
- Regional ecosystem mapping (V10.1)
- Endangered-dominant
- Of Concern-subdominant
- Least Concern
- non-assess

**Category C Regrowth Vegetation**

- Endangered-dominant
- Of Concern-dominant
- Of Concern-subdominant

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Plan Ref	Rev	Sheet
140339-1-02	D	A3

**PROJECT**

# SMOKY CREEK SOLAR PROJECT

## PROPOSED DEVELOPMENT PLAN

0 800 1 980 2 970 3 960 Meters

Reference Scale: 1:26,000

Source: Department of Natural Resources & Mines - Coloured data including select Townsville Local Government Area  
 © State of Queensland (Department of Natural Resources and Mines) 2016  
 Vegetation management resources and change history map (1:100 000 and 1:250 000) - version 1.4 © State of Queensland (Department of Natural Resources and Mines) 2016  
 Wetland resources and history 2016  
 Wetland protection area - high ecological significance wetland © State of Queensland (Department of Environment and Heritage Protection) 2016  
 Vegetation management - essential habitat map - version 4.3 © State of Queensland (Department of Natural Resources and Mines) 2016

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission.  
 Please verify the accuracy of all information prior to use.

Coordinate System: GDA 1984 MGA Zone 81  
 Projection: Transverse Mercator  
 Datum: GDA 1984

Document Name: 140339-1-02RevD\_ProjectProposalPlan  
 Date: 27/07/2018  
 Author: AF  
 Project Manager: MC





# LAND CONDITION ASSESSMENT Smoky Creek Solar Farm



Client: RPS Australia East Pty Ltd

Banana Shire Council  
**PLANNING APPROVAL**

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**23 OCT 2019**

Project Number: J000283  
Status: Final  
Date: 27/09/2019





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### Document Version Register

Version	Purpose	Lead Author	Reviewer	Approved for Issue	
				Approver	Date
1	Final	SD & JH	LMT	LMT	27/09/2019



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Photograph 5 View to the south of low groundcover due to drought conditions ..... 22

## Appendices

Appendix A: LRAM (2019) Report ..... A.1  
Appendix B: Land Degradation Features (Dunn Property) ..... B.1  
Appendix C: Land Degradation Features (Fenech Property) ..... C.1  
Appendix D: Land Degradation Features (Maynard Property) ..... D.1



## 1. Introduction

Range Environmental was engaged by RPS Australia East Pty Ltd (RPS) on behalf of Edify Energy Pty Ltd to undertake a land condition assessment for the proposed Smoky Creek Solar Farm (Figure 1).

The proposed solar farm includes 10 lease areas that have a total area of 2188 hectares and are located within the following landholder properties:

- Maynard property: Lot 39 RN395 (Lease A) and Lot 37 RN1147 (Lease B1 & B2);
- Dunn property: Lot 29 RN210 (Lease E), Lot 32 RN194 (Lease F) and Lot 33 RN210 (Lease G1 & G2); and
- Fenech property: Lot 28 RN211 (Lease C) and Lot 18 RN271 (Lease D1 & D2).

The proposed solar farm site is currently used for cattle grazing. Land Resource Assessment and Management (LRAM) (2019<sup>1</sup>) prepared an indicative Agricultural Land Class (ALC) map for the site which indicated that it may potentially include cropping (ALC A) and grazing land (ALC C) (refer to Map 2 of the LRAM (2019) report) (Appendix A:).

The proposed solar farm is a temporary use and the land can be returned to agricultural use at the end of the solar farm life. The solar farm will not have a permanent impact on agricultural land values or quality if construction, operational and decommissioning works are managed correctly to minimise the risk of further land degradation occurring.

The land condition assessment was conducted to document and describe pre-development land and soil features at the site of the proposed solar farm. The purpose of this was to inform the preparation of further detailed plans for the development to prevent any worsening of existing land degradation or the creation of new land degradation issues. Examples of detailed plans may include: Erosion and Sediment Control Plan (ESCP), Environmental Management Plans (Construction and Operational), Soil and Rehabilitation Management Plan, Site Layout Plan, Earthworks Plan and Stormwater Drainage Plan.

---

<sup>1</sup> LRAM. 2019. Review of Qualitative Agricultural Land Assessment Smoky Creek Solar Farm. Prepared for Banana Shire Council.

# Figure 1 Site Locality

**Project:**  
Land Condition  
Assessment

**Client:** RPS Australia  
East Pty Ltd

**Project No.:** J000283

Compiled by: J.H Date: 25/09/2019  
Approved by: SKD Date: 25/09/2019

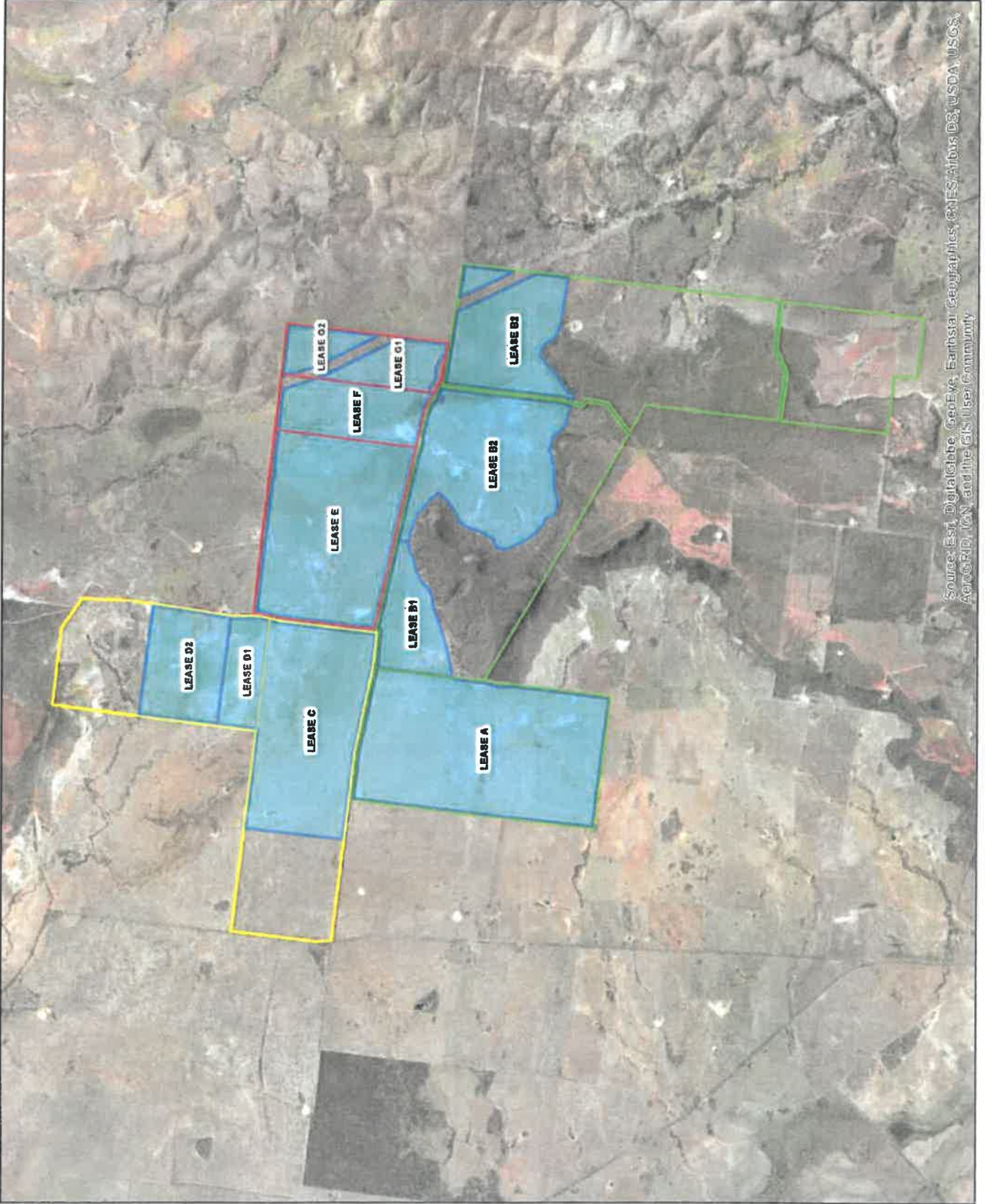


## Legend

- Lease Area
- Site Boundary
- Owner**
- Dunn
- Fenech
- Maynard

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Source: Chatterton data sourced from Queensland State (2017). Aerial Imagery sourced from Esri (2019).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

## 2. General Property Descriptions

Table 1 below provides a general description of the properties that comprise the lease areas of the Smoky Creek Solar Farm, including the current and proposed agricultural land use activities. The locations of agricultural infrastructure at the properties is provided at Figure 2, Figure 3, Figure 4 and Figure 5.

**Table 1 General description and agricultural conditions of the properties that comprise the lease areas**

Descriptors	Maynard Property	Dunn Property	Fenech Property
<b>General Property Descriptions</b>			
Property Size (ha)	2093	657	874
Leases	A, B1 and B2	E, F, G1 and G2	C, D1 and D2
Leased area (ha)	1046	657	539
Property Plans	Appendix B	Appendix C	Appendix D
<b>Current Agricultural Use<sup>2</sup></b>			
Type of activity	Cattle grazing	Cattle grazing	Cattle grazing
Stocking rate	1 head per 8 acres	1 head per 8 acres	1 head per 7-10 acres
Key pasture species	Buffel grass and Urochloa	Buffel grass and Urochloa	Buffel grass and Urochloa
<b>Existing agricultural infrastructure</b>			
Contour banks	Yes	Yes	Yes
Bores	No	No	No
Dams	Yes	Yes	Yes
Windmills	Yes	No	No
Cattle yards	Yes	Yes	No
Cattle dips	Yes - Lease A	Yes - Lease E	No
Homestead	No (abandoned)	Yes	No
<b>Agricultural Uses During the Operational Life of Solar Farm<sup>3</sup></b>			
Co-location	As detailed in previous reports, there is no proposed co-location of agricultural land uses within the lease areas. Vegetation (grass cover) will be managed by slashing as required to simulate grazing pressures, with weed control also undertaken as required.		
Co-existence	Yes	No (lease areas occupy entire property)	Yes
Type of activity	Cattle grazing on land outside the lease areas	Not applicable	Cattle grazing on land outside the lease areas

<sup>2</sup> Findings of the site inspection and interviews with land holders on 18-19 September 2019.

<sup>3</sup> Information sourced from land holders during onsite interviews on 18-19 September 2019.



**Figure 2**  
**Key Infrastructure**  
**Dunn Property**

**Project:**  
 Land Condition  
 Assessment

**Client:** RPS Australia  
 East Pty Ltd

**Project No.:** J000283

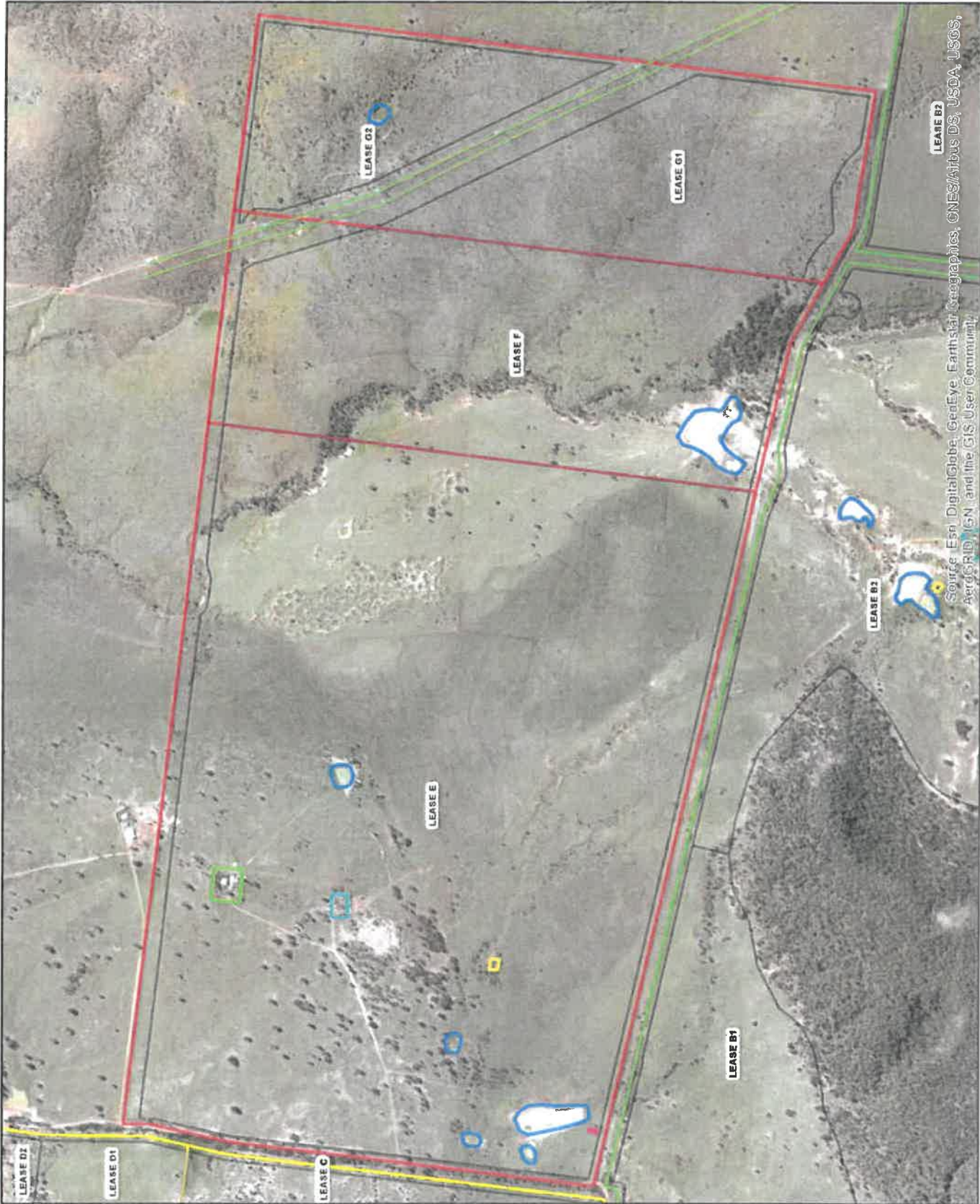
Compiled by: JLH      Date: 25/09/2019  
 Approved by: SKD      Date: 25/09/2019



**Legend**

- Lease
- Key Infrastructure**
- Cattle dip
- Cattle yard
- Dam
- Homestead
- Waste burial pit
- Trough
- Watertank
- Powerlines
- Site Boundary
- Owner**
- Dunn
- Fenech
- Maynard

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 Source: Cadastral data sourced from Queensland (2017), Aerial imagery sourced from Esri (2019).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**Figure 3**  
**Key Infrastructure**  
**Fenech Property**

**Project:**  
Land Condition  
Assessment

**Client:** RPS Australia  
East Pty Ltd

**Project No.:** J000283

Compiled by: J.L.H. Date: 25/09/2019  
Approved by: SKD Date: 25/09/2019



**Legend**

□ Lease Area

**Key**

**Infrastructure**

□ Cattle dip

□ Cattleyard

□ Dam

□ Homestead

□ Waste burial pit

□ Trough

□ Water tank

□ Powerlines

□ Site Boundary

**Owner**

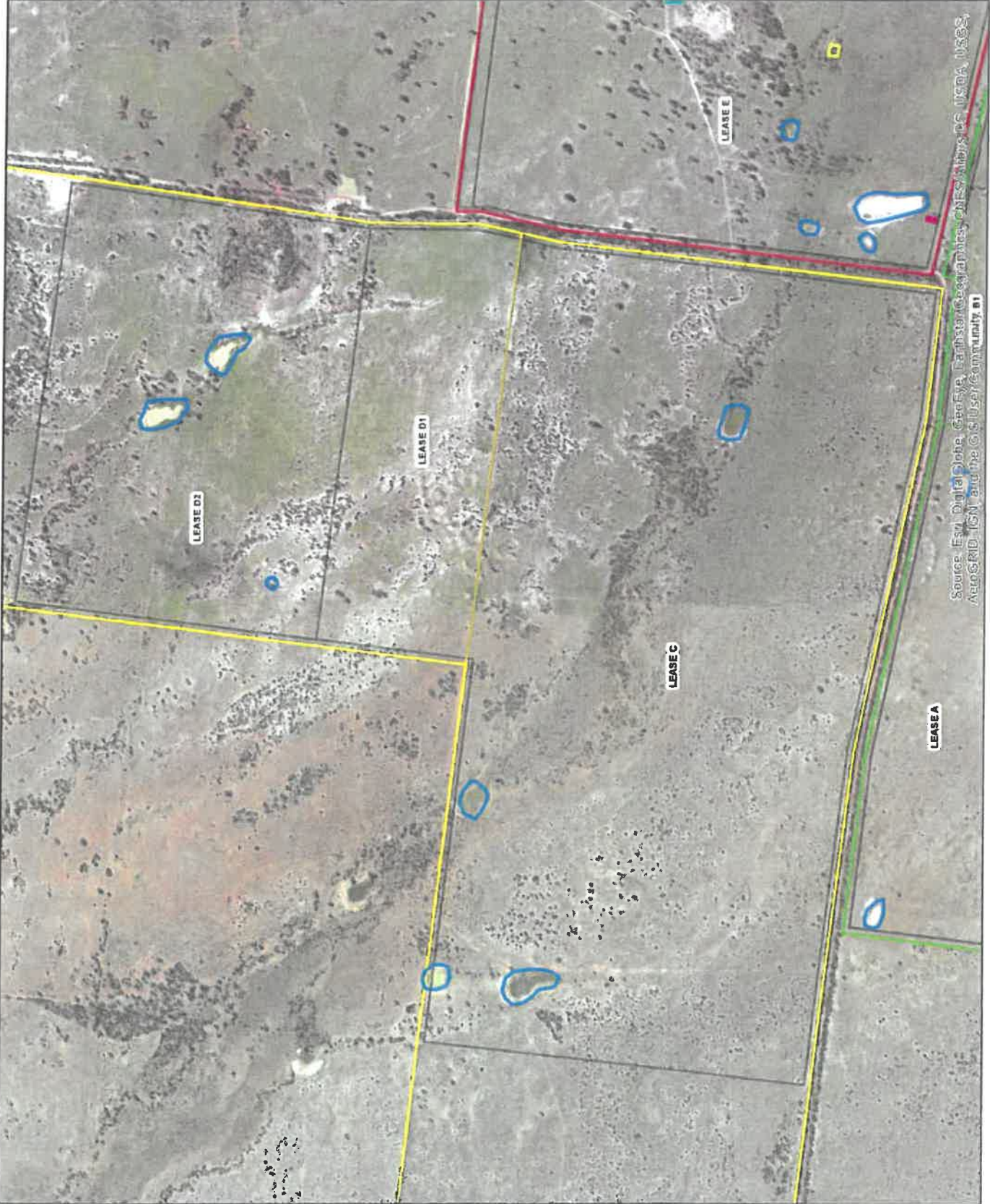
□ Dunn

□ Fenech

□ Maynard

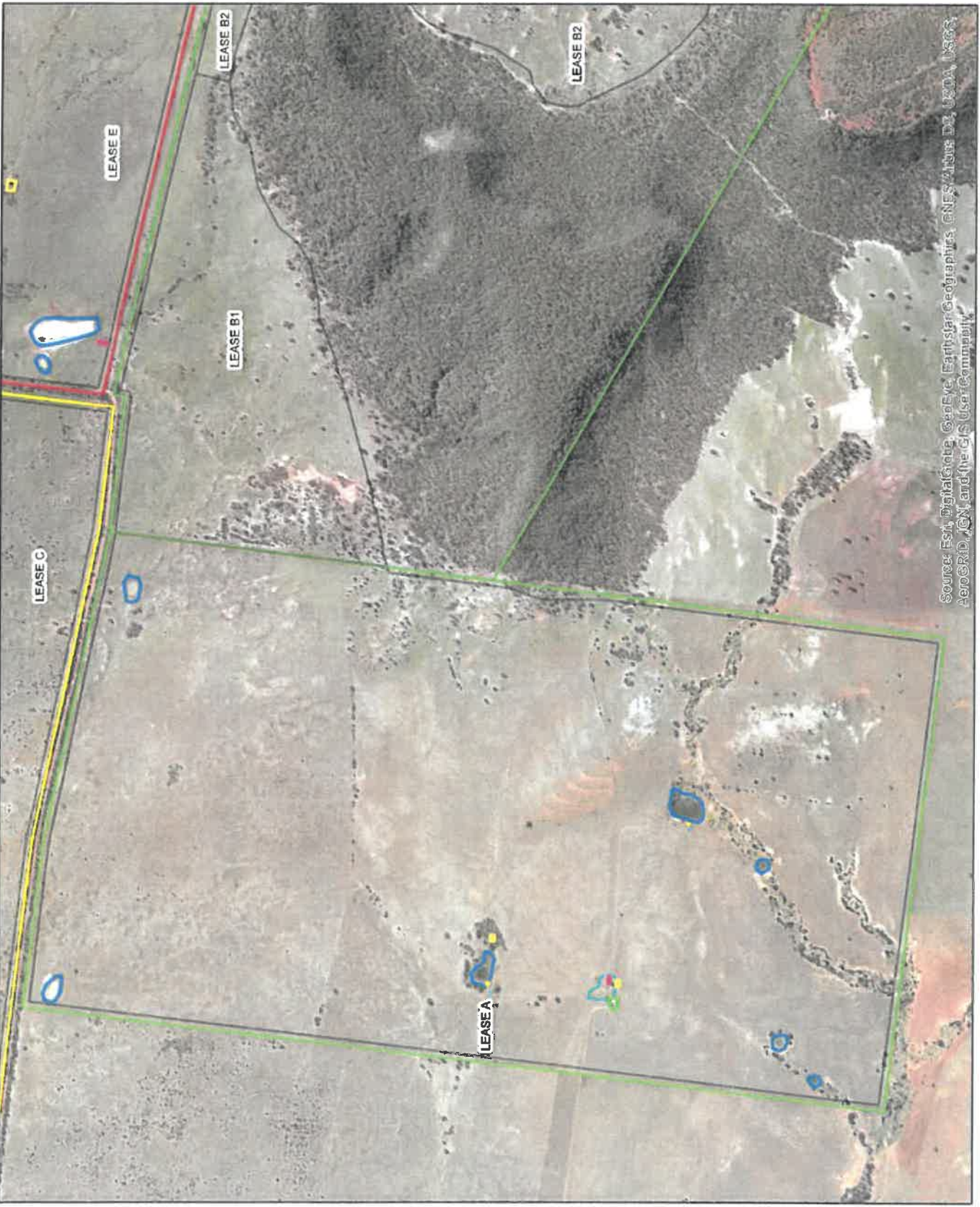
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Source: Calculated data sourced from Queensland GIS (2017). Aerial Imagery sourced from Esri (2019).



Source: Esri, DigitalGlobe, GeoEye, EarthstarGeographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. 2019

<b>Figure 4</b> <b>Key Infrastructure</b> <b>Maynard Property</b>	
Project: Land Condition Assessment	
Client: RPS Australia East Pty Ltd	
Project No.: J000283	
Compiled by: JLH	Date: 25/09/2019
Approved by: SKD	Date: 25/09/2019
<b>Legend</b>	
Lease Area	
<b>Key Infrastructure</b>	
Cattle dip	
Cattleyard	
Dam	
Homestead	
Waste burial pit	
Trough	
Watertank	
Powerlines	
<b>Site Boundary</b>	
Owner	
Dunn	
Fenech	
Maynard	
<small>The content of this document includes third party information. We do not guarantee the accuracy of such data.</small> <small>Source: Aerial data sourced from Queensland Globe (2017). Aerial imagery sourced from Esri (2016).</small>	



**Figure 5**  
**Key Infrastructure**  
**Maynard Property**

**Project:**  
Land Condition  
Assessment

**Client:** RPS Australia  
East Pty Ltd

**Project No.:** J000283

Compiled by: JLH Date: 25/09/2019  
Approved by: SKD Date: 25/09/2019



**Legend**

Lease Area

Key Infrastructure

Cattle dip

Cattleyard

Dam

Homestead

Waste burial pit

Trough

Watertank

Powerlines

Site Boundary

Owner

Dunn

Fenech

Maynard

The content of this document includes third party data. We do not guarantee the accuracy of such data.

Source: Geospatial data sourced from Queensland Geospatial Data (2017). Aerial imagery sourced from Esri (2019).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNR/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community




### 3. Land and Soil Features


Land and soil features observed at the site and determined from Muller (2008<sup>4</sup>) which may present potential constraints to future agriculture and/or construction and rehabilitation of the solar farm are identified in Table 2 and shown in Figure 6.

---


<sup>4</sup> Muller, P. G. 2008. Soils of the Banana Area Central Queensland.

**Table 2 Key land and soil features**

Constraint	Description	Soils	Representative Photograph
Gilgai microrelief (melonholes)	<ul style="list-style-type: none"> <li>Gilgai are depressions that form in the surface of cracking clay soils (Vertosols). They can hold water during wet conditions.</li> <li>Continuous cultivation can level out some shallow gilgai. But they will reform if the ground is left undisturbed.</li> <li>Gilgai soil profiles include soils that are dispersive, very strongly acid and moderately saline.</li> <li>Melonhole gilgai were observed in the field to commonly be greater than 0.5 m deep and at least several metres wide.</li> <li>Soils that form gilgai occur across 20% of the lease areas</li> </ul>	<p>Beldeen, Greycliffe and Greycliffe Melonhole Phase.</p>	 <p>View to the north of gilgai microrelief</p>


Constraint	Description	Soils	Representative Photograph
Shrink swell soils	<ul style="list-style-type: none"> <li>Shrink-swell soils (or cracking clay soils) move or react to soil moisture.</li> <li>Infrastructure engineering designs need to account for soil movement by shrink-swell soils.</li> <li>Shrink swell soils occur across 39% of the lease areas.</li> </ul>	<p>Annandale, Belldean, Ciancy, Earlsfield, Greycliffe and Greycliffe Melonhole Phase.</p>	

Example of shrink swell (Vertosol) soils

Constraint	Description	Soils	Representative Photograph
Surface rock	<ul style="list-style-type: none"> <li>Dense surface rock was observed in parts of the lease areas. Rocks ranged in size from medium pebbles (6-20mm) to stones (60-200 mm).</li> <li>Surface rock can impede cultivation practices.</li> </ul>	<p>Kokotungo, Spier, Ulogie and Annandale</p>	

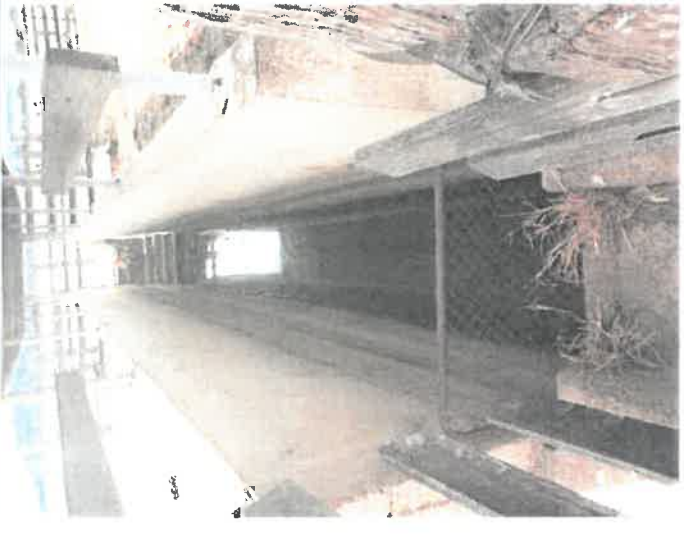
Example of dense surface rock cover



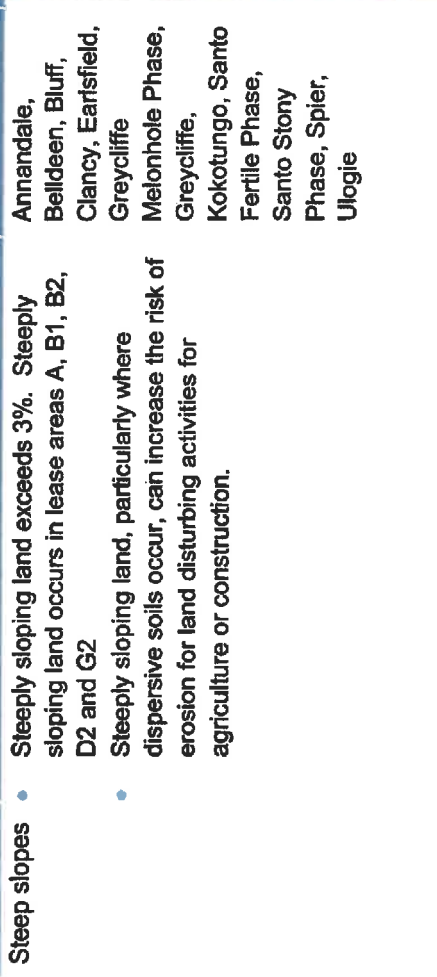
Constraint	Description	Soils	Representative Photograph
Dispersive soils	<ul style="list-style-type: none"> <li>Dispersive soils include soils with an Exchangeable Sodium Percentage (ESP) of 15 or more or a Ca:Mg ratio &lt;0.1. Dispersive soils present a high erosion risk if exposed. They also impede drainage and root growth.</li> <li>Topsoil (A horizon) is not normally dispersive soil. Dispersive soils commonly occur in the subsoil (B horizon).</li> <li>Dispersive soils at the site are mainly associated with gilgai soils (from 0.2 m) and texture contrast soils (from 0.2 m). Dispersive soils occur at 0.8 m for Earlsfield soils (Vertosols).</li> <li>Soils with dispersive soils in their profile occur across 75% of the lease areas.</li> </ul>	Bluff, Desdemona, Earlsfield, Greycliffe, Greycliffe Melonhole Phase, Kokotungo and Ulogie.	 <p>Example of dispersive soil erosion. Not available.</p>
Very strongly acid soils	<ul style="list-style-type: none"> <li>Very strongly acid soils have a pH &lt;5. Very strongly acid soils can limit plant growth for agriculture or rehabilitation due to decreased nutrient availability and increased elemental toxicity.</li> <li>Very strongly acid soils at the site are mainly associated with gilgai soils (from 0.4 m) and acid texture contrast soils (Kurosols) (throughout the profile). Very strongly acid soils occur at depth (1.4 m) for the Spier soils.</li> <li>Soils with very strongly acid soils in their profile occur across 27% of the lease areas.</li> </ul>	Greycliffe, Greycliffe Melonhole Phase, Bluff and Spier.	



Constraint	Description	Soils	Representative Photograph
Moderately saline soils	<ul style="list-style-type: none"> <li>Moderately saline soils have an ECse greater than 4 dS/m. Saline soils can affect plant growth for agriculture or rehabilitation works.</li> <li>Topsoil (A horizon) is not normally saline soil. Saline soils commonly occur in the subsoil (B horizon).</li> <li>Moderately saline soils at the site are mainly associated with gilgai soils (from 0.2 m) and texture contrast soils (from 0.7m). Moderately saline soils occur at 0.6 m for Earlsfield soils (Vertosols).</li> <li>Soils with moderately saline soils in their profile occur across 74% of the lease areas.</li> </ul>	<p>Bluff, Earlsfield, Greycliff, Greycliff, Melonhole Phase, Kokotungo and Ulogie.</p>	Not available.

Constraint	Description	Soils	Representative Photograph
Contaminated soil	<ul style="list-style-type: none"> <li>• Cattle dips were located at Lease Areas A and E.</li> <li>• Common soil contaminants at cattle dips include arsenic and DDT.</li> <li>• Contamination at cattle dips is usually localised to the dip area (i.e. nominally within 30m of the dip and associated infrastructure<sup>5</sup>).</li> </ul>	Greycliff and Kokotungo	 <p>View to the east of a livestock plunge dip</p>

<sup>5</sup> NSW Agriculture. 1996. Assessment and Cleanup of Cattle Tick Dip Sites for Residential Purposes.

Constraint	Description	Soils	Representative Photograph
Steep slopes	<ul style="list-style-type: none"> <li>Steeply sloping land exceeds 3%. Steeply sloping land occurs in lease areas A, B1, B2, D2 and G2</li> <li>Steeply sloping land, particularly where dispersive soils occur, can increase the risk of erosion for land disturbing activities for agriculture or construction.</li> </ul>	<p>Annandale, Belldeen, Bluff, Clancy, Earlsfield, Greycliffe, Melonhole Phase, Greycliffe, Kokotungo, Santo Fertile Phase, Santo Stony Phase, Spier, Ulogie</p>	

View to the north of steeply sloping land.

# Figure 6 Key land & soil features

Project:  
Land Condition  
Assessment

Client: RPS Australia  
East Pty Ltd

Project No.: J000283

Compiled by: J.L.H Date: 25/09/2019  
Approved by: SKD Date: 26/09/2019



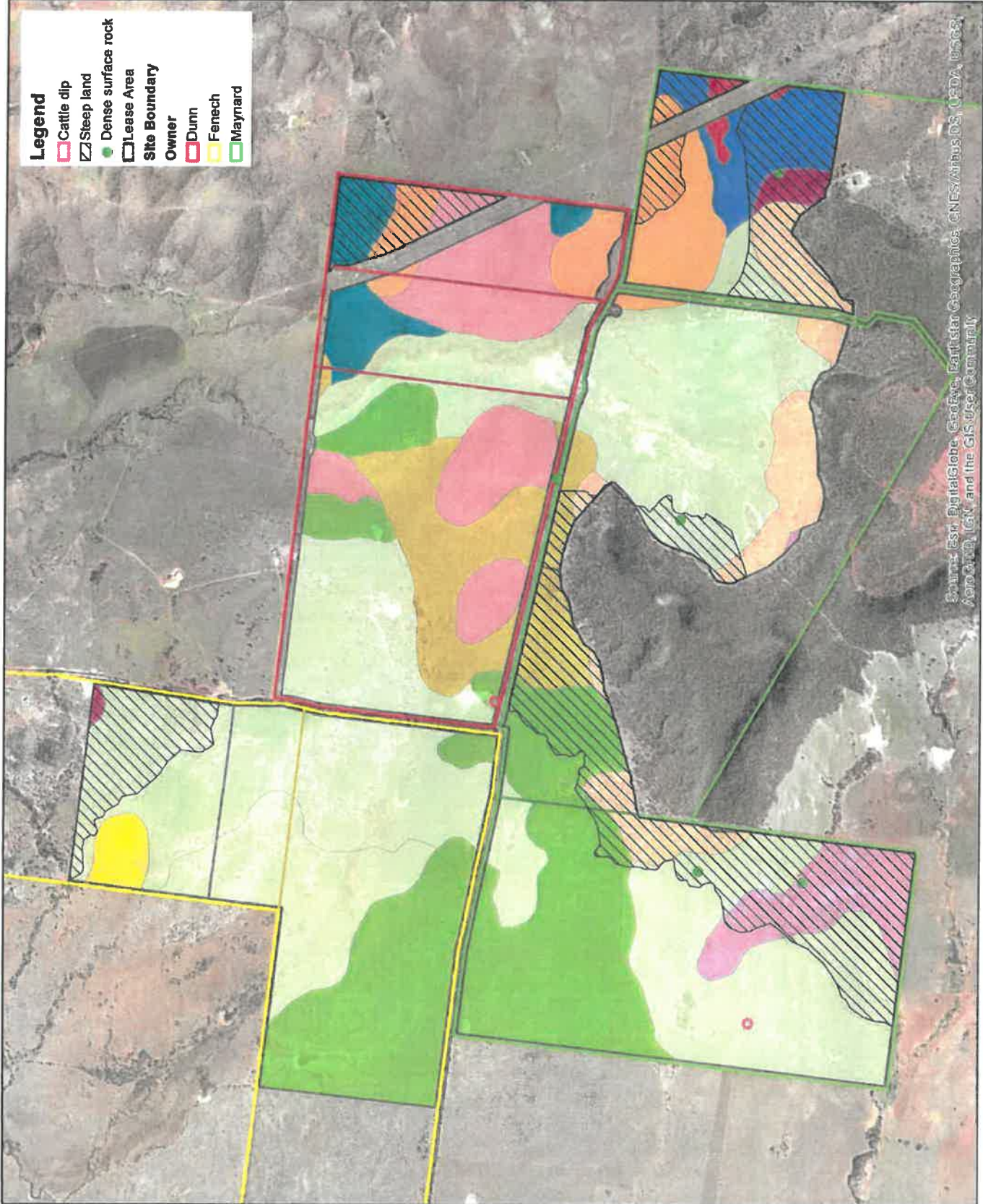
## Legend

### Soils of the Banana Region (Muller, 2008)

- Annandale
- Beldeern
- Bluff (BAN)
- Clancy
- Desdemona
- Earlsfield
- Greycliffe
- Greycliffe
- Meltonhole Phase
- Kokutungo
- Santo Fertile Phase
- Santo Stony Phase
- Spier
- Ulogie

The content of this document indicates third party data. We do not guarantee the accuracy of such data.

Source: Cadastre data sourced from Queensland Govt (2017), Aerial Imagery sourced from Esri (2018).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



## 4. Existing Land Degradation

A summary of existing land degradation features across the lease areas is provided at Table 3 and is based on observations and measurements made during the land condition assessment undertaken by Sam Donald and Lucas Talbot of Range Environmental on 18-19 September 2019.

Further detailed assessment of existing land degradation features is provided at Appendix B: (Dunn Property) Appendix C: (Fenech Property) and Appendix D: (Maynard Property) and shown in Figure 7, Figure 8, Figure 9 and Figure 10.



**Table 3 Summary of existing land degradation features across the lease areas**

	Maynard Property	Dunn Property	Fenech Property
<b>Land degradation features</b>	<ol style="list-style-type: none"> <li>1. Gully erosion (including lateral bank erosion).</li> <li>2. Sheet erosion.</li> <li>3. Erosion of banks of watercourses.</li> <li>4. Vegetation clearing.</li> <li>5. Exposed subsoil.</li> </ol>	<ol style="list-style-type: none"> <li>1. Gully erosion.</li> <li>3. Erosion of banks of watercourses.</li> </ol>	<ol style="list-style-type: none"> <li>1. Gully erosion.</li> <li>3. Erosion of banks of watercourses.</li> <li>4. Vegetation clearing.</li> </ol>
<b>General causes</b>	<ol style="list-style-type: none"> <li>1. Factors contributing to gully erosion included:                             <ol style="list-style-type: none"> <li>a. Concentration of overland flow by contour banks and natural topographical features including open depressions (Photograph 3).</li> <li>b. Reduced groundcover by pastoral activities and climatic conditions, including drought (Photograph 1 and Photograph 5).</li> <li>c. Removal of vegetation, including along watercourses (Photograph 4).</li> <li>d. Livestock tracking.</li> <li>e. Exposure of dispersive subsoils (Photograph 2).</li> </ol> </li> <li>2. Sheet erosion was generally formed on areas with reduced groundcover, shallow topsoil (A horizon) and on steeper slopes, including adjoining banks of watercourses.</li> <li>3. Factors contributing to the erosion of banks of watercourses included:                             <ol style="list-style-type: none"> <li>a. Concentration of overland flow.</li> <li>b. Reduced groundcover by pastoral activities and climatic conditions, including drought.</li> <li>c. Removal of vegetation.</li> <li>d. Livestock tracking.</li> <li>e. Exposure of dispersive subsoils.</li> </ol> </li> <li>4. Vegetation clearing was considered to have been undertaken to facilitate the agricultural land use.</li> </ol>		
<b>General condition</b>	<ol style="list-style-type: none"> <li>1. The erosion features at the site (including gully, sheet and within watercourses) was generally described as active, unstable and eroding. This was due to:                             <ol style="list-style-type: none"> <li>a. The lack of vegetation stabilising gully heads, sidewalls and gully floors.</li> <li>b. Fresh sediment deposits present on gully floors and deep cracking sidewalls.</li> <li>c. Dispersive subsoils which are common across the lease areas.</li> <li>d. Limited or ineffective management.</li> </ol> </li> </ol>		

Maynard Property

Dunn Property

Fenech Property

**General locations** 1. Gully erosion was generally observed adjoining watercourses (e.g. lateral bank erosion) and within open depressions. Gully erosion was also observed at the ends of contour banks where flows were concentrated.

2. Sheet erosion was generally formed on steeper slopes, adjoining banks of watercourses and at areas with reduced groundcover.

3. Erosion of the banks of watercourses generally occurred on dispersive (sodic) soils.

4. Vegetation clearing occurred on Maynard and Fenech properties, including along drainage lines.

Establishment of exclusion areas (by fencing) around some high-risk areas such as dams and watercourses. Contour banks. Contour banks.

**Existing management**

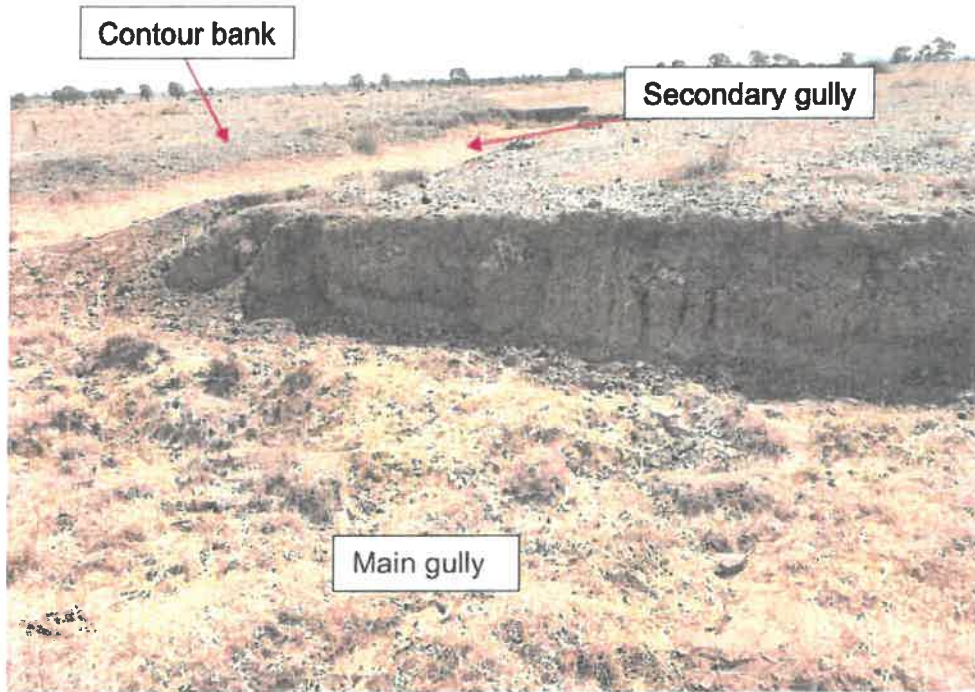




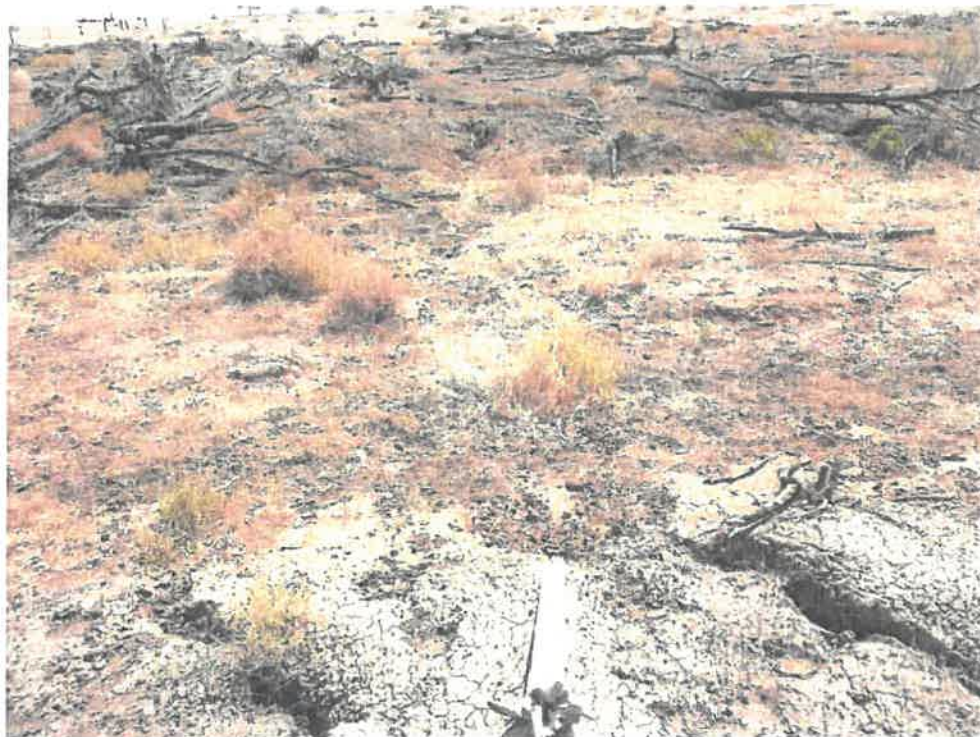
**Photograph 1** View to the west of a gully head with limited adjoining groundcover



**Photograph 2** View to the north of a gully sidewall in dispersive soils



**Photograph 3 View to the north of a secondary gully formed along the contour bank**



**Photograph 4 View to the north of cleared trees along a drainage line**



**Photograph 5 View to the south of low groundcover due to drought conditions**

**Figure 7**  
**Land Degradation**  
**Features**  
**Dunn Property**

**Project:**  
**Land Condition**  
**Assessment**

**Client:** RPS Australia  
 East Pty Ltd

**Project No.:** J000283

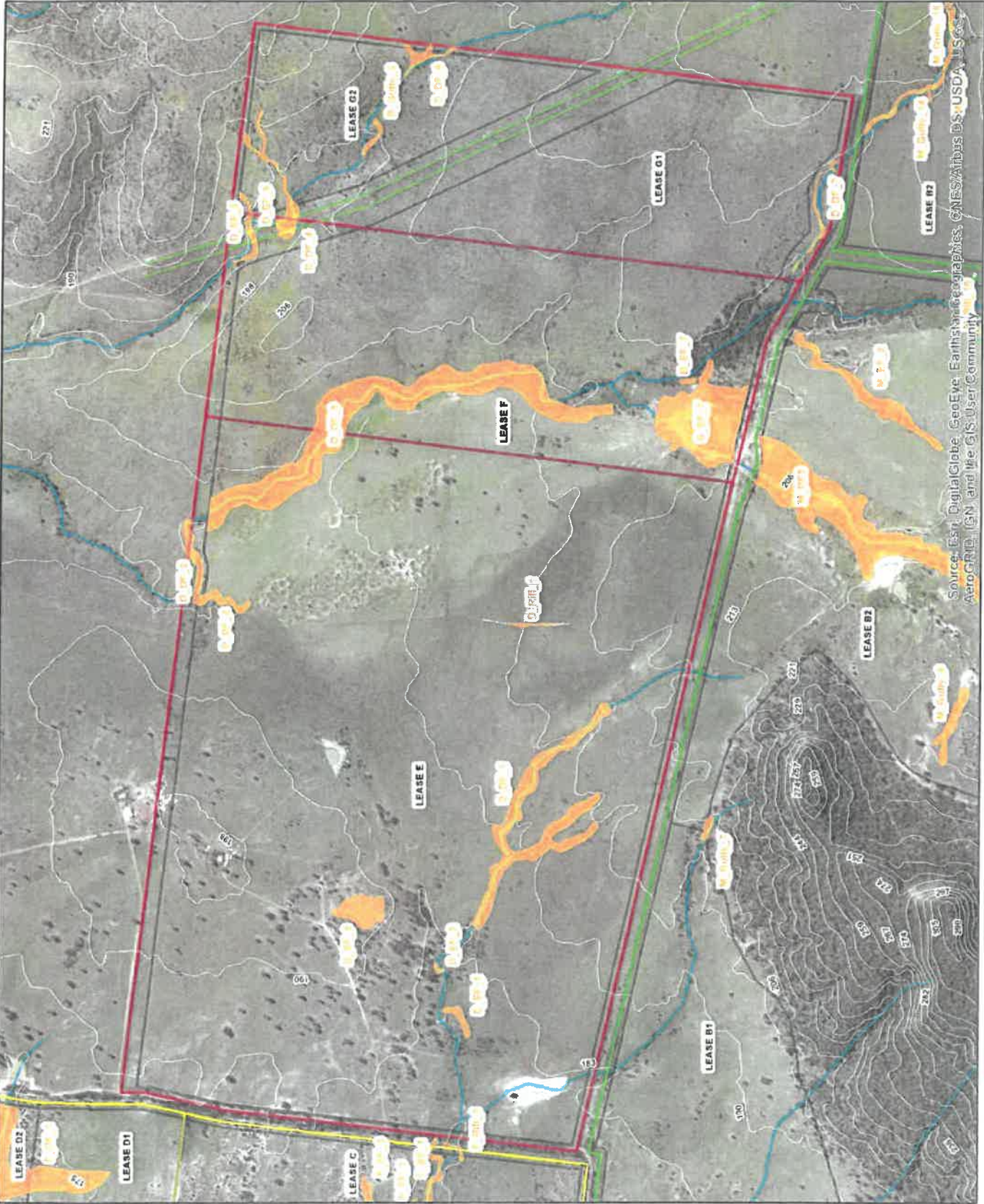
Compiled by: J.L.H Date: 25/08/2019  
 Approved by: SKD Date: 25/08/2019





**Legend**

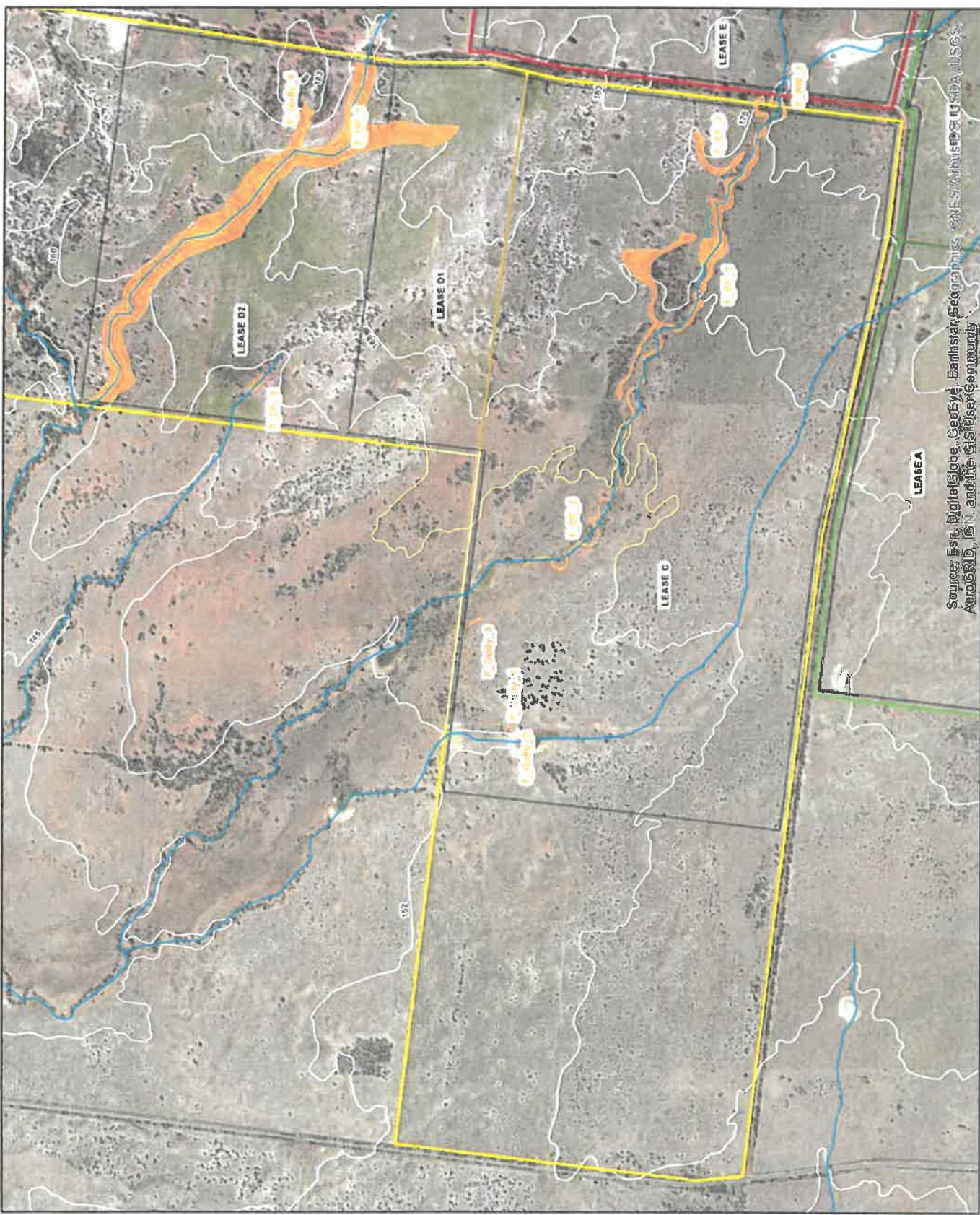
- Powerlines
- Regulated Vegetation
- (MSES) - watercourse
- Land Degradation Feature
- Lease Area
- 5m contours
- Site Boundary
- Owner
- Dunn
- Fenech
- Maynard

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 Source: Cadastre data sourced from Queensland (2017). Aerial Imagery sourced from Esri (2019).



Source: Esri, DigitalGlobe, GeoEye, Earthstar (imagery), CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

<p><b>Figure 8</b> <b>Land Degradation Features</b> <b>Fenech Property</b></p>	<p><b>Project:</b> Land Condition Assessment</p>	<p><b>Client:</b> RPS Australia East Pty Ltd</p>	<p><b>Project No.:</b> J000283</p>	<p>Compiled by: JLH Date: 25/09/2019 Approved by: SKD Date: 25/09/2019</p>		<p><b>Legend</b></p> <ul style="list-style-type: none"> <li><span style="color: green;">—</span> Powerlines</li> <li><span style="color: green;">—</span> Regulated Vegetation</li> <li><span style="color: blue;">—</span> (MSES) - Intersecting a watercourse</li> <li><span style="background-color: orange; border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> Land Degradation Feature</li> <li><span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> Lease</li> <li><span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> Site Boundary</li> <li><b>Owner</b></li> <li><span style="border: 1px solid red; display: inline-block; width: 10px; height: 10px;"></span> Dunn</li> <li><span style="border: 1px solid yellow; display: inline-block; width: 10px; height: 10px;"></span> Fenech</li> <li><span style="border: 1px solid green; display: inline-block; width: 10px; height: 10px;"></span> Maynard</li> <li><span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> 5m contours</li> </ul>	<p><small>The content of this document includes third party data. We do not guarantee the accuracy of such data. Source: Current data sourced from Queensland Survey (2017), Aerial Imagery sourced from Esri (2018).</small></p>	
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Source: Esri, DigitalGlobe, GeoEye, Earthstar, GeoGraphics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**Figure 9 Land Degradation Features Maynard Property West**

**Project:**  
Land Condition Assessment

**Client:** RPS Australia East Pty Ltd

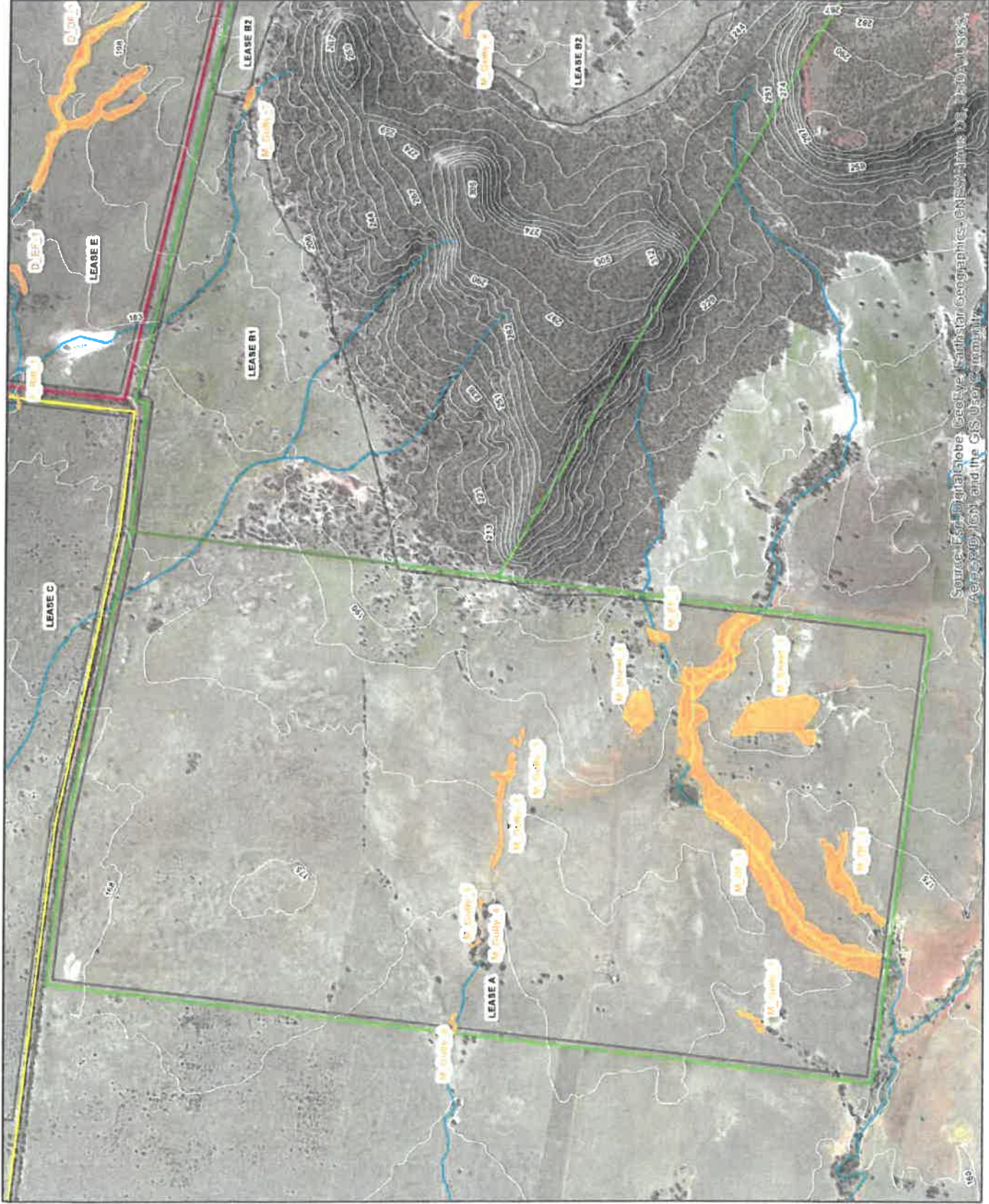
**Project No.:** J000283

Compiled by: J.H Date: 25/09/2019  
Approved by: SKD Date: 25/09/2019



- Legend**
- Regulated Vegetation
  - Vegetation (MSES) -
  - Intersecting a watercourse
  - Powerlines
  - Land Degradation Feature
  - Lease Area
  - 5m contours
  - Site Boundary
  - Owner
  - Dunn
  - Fenech
  - Maynard

The contents of this document includes the 3rd party data. We do not guarantee the accuracy of such data.  
Source: Cadastre data sourced from Queensland Government (2017). Aerial Imagery sourced from Earth (2018).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNR/Electra, USDA, AeroGRID, IGN, and the GIS User Community

**Figure 10 Land Degradation Features Maynard Property East**

**Project:**  
Land Condition Assessment

**Client:** RPS Australia East Pty Ltd

**Project No.:** J000283

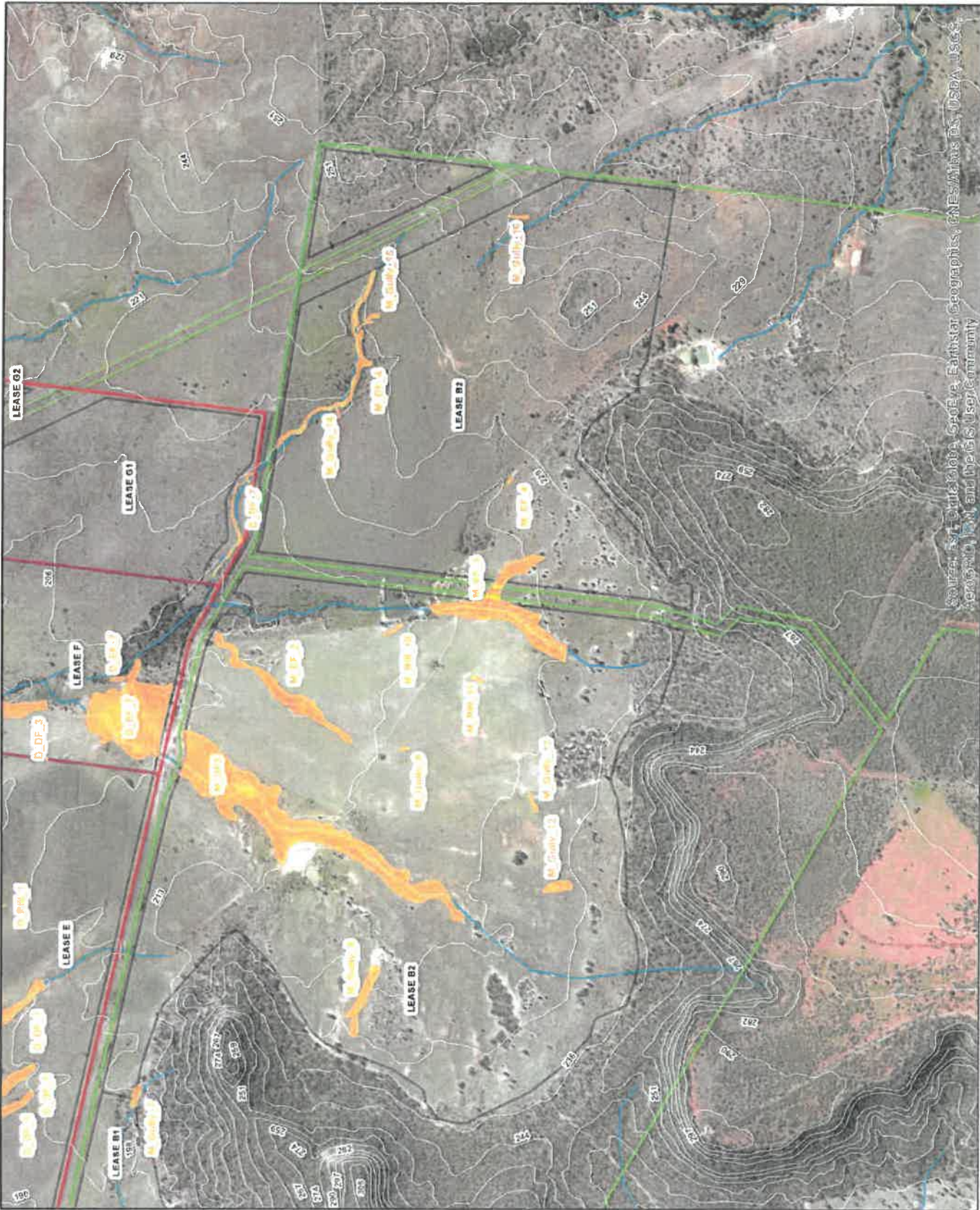
Compiled by: JLH Date: 25/09/2019  
Approved by: SKD Date: 25/09/2019



**Legend**

- Regulated Vegetation (MSES) - Intersecting a watercourse
- Powerlines
- Land Degradation Feature
- Lease Area
- 5m contours
- Site Boundary
- Owner
- Dunn
- Fenech
- Maynard

The content of this document includes third party data. We do not guarantee the accuracy of such data.  
Source: Cadastral data sourced from Queensland (2017), Aerial Imagery sourced from Esri (2018).



Source: Esri, DeLorme, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

## 5. Land Management Principles

Land degradation, namely in the form of erosion, has already occurred in parts of the solar farm lease areas. The construction, operation and decommissioning of the solar farm should be planned to prevent any worsening of existing land degradation or the creation of new land degradation issues. Achieving this will preserve the agricultural land values of the solar farm site.

Overarching land management principles are presented below to provide general guidance for more detailed planning for the solar farm development.

### 5.1 Management of Existing Land Degradation Features

Key management principles are provided in the subsections below and described in further detail in the following key resources:

- Carey BW, Stone B, Norman PL, Shilton P (2015) Chapter 13 - Gully Erosion and its control. In: Soil conservation guidelines for Queensland, Department of Science, Information Technology and Innovation, Brisbane.
- Wilkinson S, Hawdon A, Hairsine P, Austin J. 2015. Gully Toolbox. A technical guide for the Reef Trust Gully Erosion Control Programme 2015–16. Commonwealth of Australia.

#### 5.1.1 Land Management

The following land management recommendations are provided to stabilise existing erosion features and manage the progression of erosion:

- Exclusion of established erosion features, including an adequate buffer area. Fences can be installed to establish exclusion areas. Exclusion areas prevent further physical disturbance (including grazing by native fauna) and assists in the rehabilitation (including groundcover) of erosion features.
- The design and layout of the solar farm should consider the location of vehicle tracks, fence lines, built infrastructure and rainfall runoff from solar panel driplines. These features can reduce the groundcover and concentrate stormwater flows.
  - This should include minimising the disturbance footprint upgradient of existing erosion features where practicable, including during construction and operation of the solar farm.
  - Where flows are concentrated (e.g. from solar panels, drains, roads etc), drainage works should be designed to ensure runoff is dispersed onto stable areas that have the capacity to receive increased flows.





- Promote rehabilitation and revegetation of natural drainage features where practicable. Direct sowing of grass species at upgradient areas may be required.
  - Surface cover is the key mitigating factor to the formation of erosion, including gully erosion. Surface cover reduces the risk of erosion by stabilising soils, improves rainfall infiltration and dissipates rainfall.
  - Retaining or re-establishing trees will assist in lowering the water table, drying out the soil profile and stabilising subsoils. This may only be practical in exclusion and riparian areas not subject to development and where shading will not impact solar panel performance.
  - Erosion control mats can be considered as they may assist with seed germination and provide protection from raindrop impact erosion. The mats are not intended for use in high-flow velocity areas.

### 5.1.2 Soil Management

The following soil management recommendations are provided to stabilise erosion features:

- Soil amelioration may assist in reducing the susceptibility of exposed soils to erosion, including sodic soils which are considered high risk and which occur across an extensive portion of the site.
  - Soil amelioration will also increase the rehabilitation success by promoting plant strike and persistence.
  - Soil sampling and analysis is required to calculate the appropriate amelioration rates.
- Reshaping or filling a gully may be considered if stabilisation (including amelioration and revegetation) is unsuccessful, impractical or if reclamation of land is beneficial to the development. Reshaping and filling works are not recommended in watercourses.
  - Reshaping can include earthmoving activities to batter the sides and head to a more gentle grade. Other reshaping activities include the installation of flumes, chutes, grade stabilisation which are further discussed in Section 5.1.3.
  - Shaping of the gully walls should be carried out only after the head of the gully has been stabilised.

### 5.1.3 Stormwater Management

Controlling stormwater flows in and surrounding gullies is a critical element for preventing worsening of existing erosion. Options for the management of stormwater flows include



diverting water around gullies or gully head management to control incoming flows. Examples include the following:

- Diversion banks can be used to direct runoff away from the gully and to a stable discharge point. Diversion banks are preferable where the gully is away from a natural drainage line. If the gully has formed in a drainage line care needs to be taken when using diversion banks to avoid causing erosion elsewhere. Discharge points need to be stable and capable of handling the increased runoff. This is very relevant to the site where gully erosion has already occurred due to concentration of flows by existing contour banks.
- Options to manage incoming flows to a gully may include gully stabilised chutes or drop-structures. Chutes are preferred over drop structures if the fall at the gully head is greater than 1m. Careful consideration needs to be given to undermining of structures that may occur in dispersive soils and managing erosion on the downstream side of stabilised gully head structures.
- Weirs can be used to manage flows to stabilise the gully bed. Weirs can be constructed from a range of materials. Careful consideration needs to be given to undermining of weirs that may occur in dispersive soils and managing erosion on the downstream side of the weir when it overtops.

## 5.2 Guidance for Detailed Management Planning

### 5.2.1 Erosion and Sediment Control

Erosion and Sediment Control Plans (ESCP) should be prepared for the construction and decommissioning phases of the development in accordance with Best Practice Erosion and Sediment Control (Aust IECA 2008<sup>6</sup>). ESCPs must consider proposed ground disturbing work, soil chemical properties (dispersive subsoils), topography and climate.

The ESCPs should all address the following three key elements of erosion and sediment control:

1. **DRAINAGE** - direct clean water around disturbed areas, control drainage in work areas and manage the discharge at the end of drains to prevent erosion.
2. **EROSION** - minimise the extent and duration of ground cover disturbance and progressively stabilise disturbed areas.
3. **SEDIMENT** - implement appropriate sediment controls to treat runoff from disturbed areas.

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<sup>6</sup> Aust IECA. 2008. Best Practice Erosion and Sediment Control. Picton, Australia.

Temporary erosion and sediment controls should be implemented prior to the commencement of ground disturbing works, maintained throughout the works phase and only removed once permanent controls are in place and functioning correctly and the site is stable.

### 5.2.2 Soil Management

Soils at the site may have a range of properties that require careful management to prevent harm to soil resources during construction, operation and decommissioning of the solar farm. Such properties include dispersive subsoils, very strongly acid soils and moderately saline soils.

A baseline soil assessment should be undertaken prior to construction in accordance with the Guidelines for Surveying Soil and Land Resources (McKenzie et al., 2008<sup>7</sup>). It should focus on key areas of proposed soil disturbance at the site (i.e. areas of trenching, roads, pads for switching yard and laydown areas etc) to obtain the following information on soil resources:

- Topsoil (A horizon) depth and structure; and
- Exchangeable cations, pH, Electrical Conductivity (EC) and Chloride.

The findings of the baseline soil assessment can inform the preparation of a Soil and Rehabilitation Management Plan. Examples of fundamental soil management measures for construction and decommissioning works include:

- Strip and segregate topsoil and subsoil;
- Do not invert the soil profile when backfilling trenches; and
- Cover or ameliorate dispersive soils, very strongly acid soils or moderately saline soils.

Contaminated soils may occur near cattle dips. This matter will need to be considered and be managed appropriately to prevent exposure, mobilisation or redistribution of potential contaminants.

### 5.2.3 Groundcover Management

Groundcover within the solar farm lease areas should be slashed as required to simulate grazing pressure. This should be incorporated into the Operational Environmental Management Plan (OEMP).

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<sup>7</sup> McKenzie et al., 2008. Guidelines for Surveying Soil and Land Resources. CSIRO Publishing. Australia.



#### 5.2.4 Rehabilitation

At the end of the solar farm life the lease areas should be rehabilitated to allow agricultural land uses to recommence. Rehabilitation measures should be detailed in a Soil and Rehabilitation Management Plan. Overarching rehabilitation measures may include:

- Removal of all surface infrastructure that is not required by the landholder or other stakeholder;
- Removal of below ground infrastructure within 1 m of the ground surface that is not required by the landholder or other stakeholder;
- Reinstate soils as follows:
  - Do not have dispersive, very strongly acid or moderately saline soils within 300mm of the surface in areas of ALC A land or 100 mm in all other areas (except where this naturally occurs, for example very strongly acid soils are reported to occur in the surface of the Bluff soils).
  - Topsoil texture in rehabilitated areas should be consistent with the pre-disturbed condition determined by the baseline soil assessment.
- Areas that have been compacted shall be ripped.
- Disturbed areas shall be revegetated with existing pasture species (Buffel Grass and Urochloa).

#### 5.2.5 Biosecurity

To meet the General Biosecurity Obligation (GBO) under the *Biosecurity Act 2014*, it is recommended that weed and pest control measures be outlined in the following documents to be prepared as part of the detailed planning and design works for the solar farm development:

- Construction Environmental Management Plan (CEMP);
- Operational Environmental Management Plan (OEMP); and
- Soil Management and Rehabilitation Plan.



## Appendix A: LRAM (2019) Report

Council Chambers  
62 Valencia Shire Road  
Valencia Plains  
Biloela Qld 4715

All Correspondence to  
Chief Executive Officer  
PO Box 412  
Biloela Qld 4715

Phone 07 4992 9500  
Fax 07 4992 3433  
enquiries@banana.qld.gov.au  
www.banana.qld.gov.au  
ABN 85 836 118 646



**Your Reference:** PR140339-1

**Our Reference:** CW:nz 19-06 (FID 85501, COM002-18/19, 14704/00000, 14706/00000, 14682/10000, 14299/50000, ID1451981, ID15456646, 1462164, ID1478211)

**Contact:** Chris Welch

13 June 2019

Edify Energy  
C/- RPS  
PO Box 977  
TOWNSVILLE QLD 4810

Attn: Mark Carter

Dear Mark

**Re: COM002 - 18/19 Public Facility - Other (Solar PV Power Station)  
Tomlins, Dodsons & Hibbs Roads, Goovigen & Dixalea  
(Lots 39RN395, 28RN211, 18RN271, 37RN1147, 29RN210, 32RN194 &  
33RN210)**

Council acknowledges receipt of your response to our Information Request which contained the Qualitative Agricultural Land Assessment (QALA) prepared by Range Environmental Consultants. Council has engaged the services of Land Resource Assessment and Management Pty Ltd to review the QALA. That review raises a number of issues, most particularly the methodology used to determine that the site contains only Class C agricultural land. A copy of the review is attached for your information.

Council takes the opportunity provided by section 35 of the Development Assessment Rules (DA Rules) to provide you with this review as further advice and how the application may be amended as a result.

It is recommended that the methodology of the QALA be revisited to expand the schema of reviewed mapping to include those carried out in Council's review and that the assessment be validated by field investigations. In the event that the further assessment identifies that Class A and/or B exist on the development site, you are invited to amend the proposed panel layout area to avoid the identified areas.

In addition, Council's review identified concerns about possible erosion potential on the site as a result of the development. A more detailed assessment of this issue would enable a clearer understanding of the risk of erosion that would allow for appropriate and reasonable conditioning of the development.

Please note that section 26 of the DA Rules identifies that this correspondence and any subsequent changes to the development application does not alter the statutory timeframes under the *Planning Act 2016*.

Should you require further assistance in relation to this matter, please do not hesitate to contact Council's Development Services, on (07) 4992 9500.

Yours sincerely



Chris Welch  
**MANAGER ENVIRONMENT & PLANNING**

Enc            QALA Review

**Review of  
Qualitative Agricultural Land Assessment  
Smoky Creek Solar Farm**

**Prepared by**

**W.P. (Bill) Thompson**

**Monday, June 10, 2019**



## Summary

This review finds that up to 50% of the subject area is better quality agricultural land (ALC A and B) rather than the zero percent in the report. Whilst the applicant report appears to have accessed the same soil survey data as this review has accessed, the applicant misapplied the strategic cropping land rather than the regional framework land suitability criteria to their determination of what is cropping land as opposed to grazing land.

The review has also found that whilst it is highly likely that up to 50% may be better quality land, the frameworks and state planning data sets as well as the original soil survey data sets (accessed by the applicant) are inconsistent in identifying actual area location or extent. The applicant having presumably accessed these various data sets ought to have recommended that the location of the cropping suited land be mapped in the field using the state wide framework as part of the DA process.

The applicants report appears to understate the actual extent of impact in terms of grazing. 50% of leased area will not be able to be grazed and it is highly unlikely that the availability of lease payments will result in a 50% increase in sustainable grazing of that part of the lease area that remains in grazing land use. The impact on the grazing area, let alone access to croppable land will be major for the lifetime of the project.

The current low erosion status of the land appears to be based on land holder comments. In other projects of this type, the impact of changes in the hydrology of the area under panels has been a significant consideration when designing to avoid erosion impacts both within the development area and downstream of the development area.

The assessment of this project by council is therefore constrained in the following ways:

- The actual location and extent of better quality lands that ought to be avoided in the layout of the panel arrays has not been established.
- Because council has before it a proposal to condition rehabilitation on the basis that the land is grazing quality only, accepting this report would mean a lower level of compliance than what in fact would be advisable.
- The various layout and physical buffering requirements to mitigate impact from changes in hydrology appears not to have been identified

## Introduction

This report is a desk based review of the report Qualitative Agricultural Land Assessment Smoky Creek Solar Farm prepared by Range Environmental Consultants (REC).

This review was requested by the Banana Shire Council. Whilst a desk based review, the author of this report is familiar with the mix of old softwood scrubs, deeply weathered uplands and adjoining tertiary clay plains.

The Range Environmental Consultants report was prepared to address the shires response to the application that found the application did not satisfy the performance criteria to sustain the productivity, viability or use of the identified agricultural land for agricultural purposes. The councils further requested that a qualitative agricultural land assessment was required to demonstrate the viability of Council's agricultural land class mapping of A, C1 and C2 for the subject site. The council also requested that if the agricultural assessment confirms the mapping then the applicant is to provide alternative agricultural uses and potential impacts that could co-exist with the intended use on the land during the life span of the solar farm.

## Overview of REC report

The proposed development comprises 1993 ha within 3623 ha of land parcels which have a total cleared area of 2113 ha. This review assumes that 1993 ha of development footprint will be within the cleared lands although that is not clear from the REC report.

The report does not map the land uses on the proposed impact area, but simply states that the existing land use is grazing. Recent satellite imagery as well as historic imagery along with comments from landholders cited in the report indicates that dryland cropping has been practiced on the subject land. A decline in rainfall is cited as a primary driver of the decline in dryland cropping.

The report cites the 100,000 soil survey of the Banana Sheet by Muller in terms of soils and references the Agricultural Land Class map supplied by QDNRM on which the agricultural land overlay mapping in the shire plan is based.

REC concludes that the overlay mapping indicates that 25% of the subject area is in fact what used to be known as GQAL (Agricultural Land Class A and B) and the remainder is ALC or grazing quality land.

REC then uses the Strategic Cropping Land (SCL) criteria to conclude that all of the land is pastoral quality land.

REC then concludes that the impact on rural economic activity will be restricted to the loss in slaughter animal production from the solar farm area. This conclusion appears to assume that there is no current or future potential cropping activity and that grazing cannot be co-located within the panel area.

The report further cites the Mirani solar farm P&E court case decision involving a solar farm on cane lands in support of this project.

### Agricultural Land Classes

The author of this review has reviewed a large number of projects within the rural sector over the last 20 years where developers and councils have reliance on land suitability at all stages of projects (feasibility, design, approval and compliance monitoring). The assessment of this project suffers from the same types of problems encountered in many projects which rely on land suitability schema and maps produced by the state agencies. Best practice would normally be to use the various schema that exist and do validate any assessment by field investigations.

In this case, there are in fact 4 schema that could help inform planning and assessment. These are as follows. These are discussed below.

### Agricultural Land Overlay

The agricultural land overlay map used by the council in its strategic plan was provided to council by DNRM, however, the basis of the map and its classification system is not known, hence field validation is simply not possible. REC concluded that that mapping shows that 25% of the subject area is potential cropping land (ALC A or B) and that is a reasonable interpretation of the map face

### Muller 1:100,000 soil survey

This mapping is very excellent quality regional scale soils mapping and in fact is the last in a series of this mapping. Whilst the mapping and report itself do not contain any land suitability classification; the report contains reference to soil parameters of critical importance to Agricultural Land Class Assessments that use land suitability. The digital data set supplied by QDNRM does however contain ALC codes. Map 1 contains the result and Table 1 shows that 85% of the subject land is either ALC A or B as opposed to the 25% figure from the overlay mapping.

### Regional Framework Land Suitability Schema

This schema was published in 2013<sup>1</sup>. It posts dates the Muller report but pre dates the REC report. data is from. AALC can be inferred from this framework. The result is shown in Map 2 and also tabled in Table 1. It is important to stress that the land suitability and ALC designations is based solely on the Muller soils data. Table 1 shows that 47% of the subject land is ALC A or B compared to 25% from the overlay mapping and 85% from the Muller digital data.

### Queensland agricultural land classes land class A and B with urban mask

This state planning data post dates all of the above systems and whilst it is not referenced to the regional land suitability framework, it is likely that it uses that framework.

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<sup>1</sup> DSITIA (2013) Regional Land Suitability Frameworks for Queensland

The data is available in GIS format<sup>2</sup> and is shown in Map 3 overlaying the regional framework map shown in Map 2. The proportion of the area that is ALC A or B is similar to that from applying the regional framework, although notably there one large area of land ranked as ALC C which this mapping shows as ALC A/B.

#### SCL framework

Finally, there is the SCL framework. This framework was developed to clearly identify those soils which were the very best quality cropping lands in the state. The plethora of classifications for land suitability using sometimes different criteria and thus producing different outcomes as shown in this study area meant that more quantified method was needed.

REC applied the SCL schema to the Muller data and concluded as a result that there was no ALC A in the project area. Whilst the schema reviewed above are obviously quantitatively different because they used different approaches to identify ALC A and B, the REC assessment is simply wrong. SCL criteria are a much stricter data set and at the very best will only identify a small part of those soils that are ALC A. Map 2 shows the one area which is likely to be SCL based on the Muller work. It is simply wrong to conclude that there is no ALC A because there is no SCL.

#### Extent ALC A and B

It is very regrettable that a decade of land assessment based on a very good quality soils map should produce such divergent desk based assessments. It is true that the soils and landscape of this area are complex but they are not as complex as the land suitability systems referred to above would lead one to believe.

It is regrettable that REC did not complete a similar review and, in that process, it is highly likely that somewhere between 10 and 40% of the project area would be ALC A and B. A quick field inspection of the potential areas could then refine that figure. The proposed solar farm layout could then be adjusted to avoid as much as possible of the better quality soils.

Apart from avoiding any unnecessary alienation of better quality land, this information is critical to ensuring that the project is conditioned (if approved) to return land to its pre project condition. If land is ALC A, then returning it to the soil depth, soil water store, salinity and pH condition of ALC C land would be a lower level of rehabilitation.

**It is recommended that the location of ALC A and B be accurately determined and where appropriate the solar farm layout be adjusted to minimize being co-located on these lands.**

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<sup>2</sup> This dataset comprises the 'best available' agricultural land class (ALC) data – land classes A and B only with an urban mask applied. This data set is a subset of the state-wide ALC Class A, B, C, D layer and is produced for use in the DSDMIP State Planning Policy interactive mapping system. ALC mapping identifies agricultural land that can be used sustainably for a range of land uses with minimal land degradation. The classes imply a decreasing range of land use choice and an increase in the severity of limitations and/or land degradation hazard. This data was released in January 2019. The data is sourced from individual soil surveys in the Queensland Governments corporate soil information system

## Land Use Impact

The report draws a number of conclusions on the land use impact. These conclusions are paraphrased and commented on below.

1. The report concludes that 0.03% of the CQ grazing lands will be directly impacted from the 1082 ha of lease area under panels out of 2188 ha. This conclusion ought to have been qualified by an interpretation of the same data which shows that 50% of the lease area of 2188 ha will be directly impacted. Such a statement would more accurately give indication of the impact on agricultural activities on the subject land.
2. The report then indicated that only one of the land holders has indicated a belief that grazing production will increase on the remainder of the holding because income from the solar lease payments will be directed to improving productivity on the rest of the property. If the proposition that lease payments will be re-invested within the area of the property that is leased but not used for panels is an outcome, then subject to other planning issues, that would require an almost 50% doubling of grazing production each and every year of the lease period. This is not at all likely and ought not to be used as a justification for the project.
3. Rural Land Use co-exists or co-locates on the impact area. The report does indicate that grazing will be possible on the 50% of the leased not under panels. In other words, rural land use is not proposed to co-exist in the panel field. The report also cites the recent Mirani case in support of this project. It is important to note that in that case rural land use was proposed to co-exist in the panel area as grazing use under panels in order to manage excess growth. That is not proposed on this site and if proposed would require significant amendment to the design, for example to use form of grazing (sheep) and panel array changes that could co-locate on the panel area<sup>3</sup>.
4. The report also notes that there are a number of drainage lines throughout the area and that the land holders also report that there is no erosion on the site. The report does not discuss the impact of changes in the runoff volume and intensity resulting from hard surfacing due to panels and access tracks on the erosion status or on the down stream impacts outside of panel area. Mitigation of these impacts may need to involve such strategies as drainage lines and overland flow path buffering strategies based on hydrological assessments, use of detention basins and diversion bunds and pasture improvement strategies. It is possible that these fundamental design and layout strategies may be identified in a hydrology assessment, however, the absence of such an assessment and reliance solely on land holders interpretation would suggest that caution is required before any conditions on the project or its designs can be properly identified.

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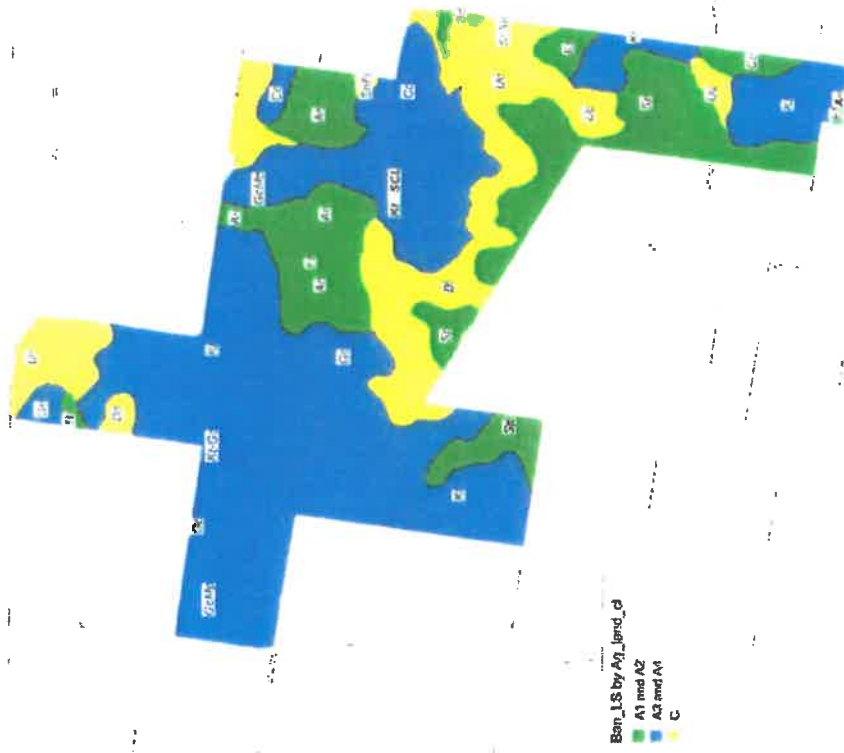
<sup>3</sup> The author of this review was an expert witness in that case and has also been involved in the DA process for numerous solar farm proposals where the issues of excluding ALC A and B, mitigation of impacts and co-exist versus co-locate are central matters

**Table 1 Land Suitability within solar farm lease area**

Bill Thompson description adapted from Appendix 1 of Muller 2008 1:100,000 soil survey	Data within QDNRM digital GIS files			Area in solar farm ha	Regional Framework	
	MAP CODE	Agricultural Land Class	Max Slope %		Land Suitability	ALC
Anandale, black CC on olivine basalt, 50 to 85 cm deep, PAWC >105	An	A1	2	5	3	A
Beildeen, BE linear gilgai on Permian Rocks, 70 to 150 cm deep PAWC >130	An	A1	4	81	3	A
Bluff, strongly acid duplex, deeply weathered sedimentary rock, 70 to 150, PAWC <40	An	A1	6	94	3	A
Clancy, similar to Anandale but slightly deeper and higher clay content PAWC >85	Bd	A2	5	12	3	A
Desdemona neutral sodic duplex on sediment, over 150 cm deep PAWC >90	Bf	C	200	332	4	C
Earlsfield, deep self mulching CC, on alluvium, over 150 cm deep and PAWC >140	Cc	A1	3	33	3	A
Greycliffe, deep sodic brown cracking clay, on alluvium, over 150 cm deep and PAWC 70	Cc	A4	4	25	3	A
Granville sodic duplex over sandstone, 70 to 130 cm deep, PAWC 75	Cc	A4	6	106	3	A
Kokotungo, Very deep sodic duplex on sediments, over 150 cm deep, PAWC 90 mm	Dd	C	4	19	3	A
	Ef	A1	3	160	2	A
	Ef	A1	5	37	3	A
	Gc	A4	2	77	5	C
	GcMp	A4	2	28	5	C
	GcMp	A4	3	519	5	C
	Gn	A4	6	25	4	C
	Kt	A3	2	341	2	A
	Kt	A3	4	353	3	A
	Kt	A3	5	63	4	C

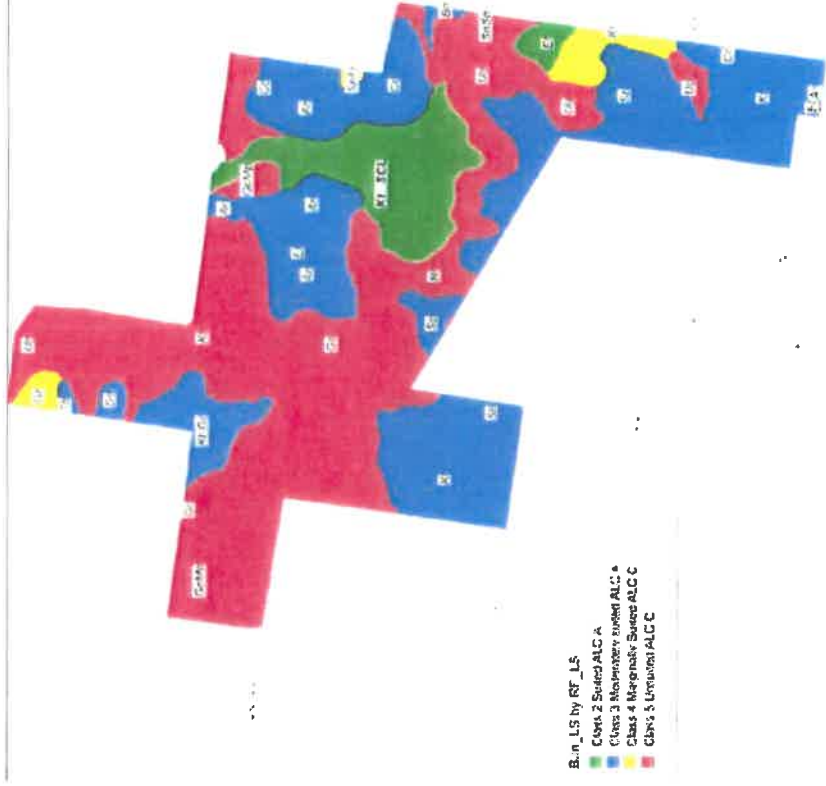
Bill Thompson description adapted from Appendix 1 of Muller 2008 1:100,000 soil survey	Data within QDNRM digital GIS files			Area in solar farm ha	Regional Framework	
	MAP CODE	Agricultural Land Class	Max Slope %		Land Suitability	ALC
	Kt	A3	8	419	5	C
	Kt-Gc	A3	3	120	2	
	SnFp	B2	5	6	4	C
	SnFp	B2	8	57	5	C
Santo fertile phase, softwood scrub red/brown non cracking clay on basalt, 30 to 90 cm deep, PAWC avg 70 mm	SnSp	B2	30	111	5	C
Spier, very deep red gradational soils on deeply weather sandstone, >110 cm deep and PAWC avg 90	Sp	A1	4	72	3	A
	Sp	A1	5	371	3	A
Thalberg, brown duplex very deep on sediments, PAWC 130	Tb	A1	3	10	3	A
	Ug	C	4	52	5	C
Ulogie very deep sodic duplex on sediments, >150 cm deep, PAWC <50	Ug	C	6	108	5	C
	Ug	C	10	45	5	C
% of area as ALC A or B		85%				47%

Map 1 Muller Agricultural Land Classes

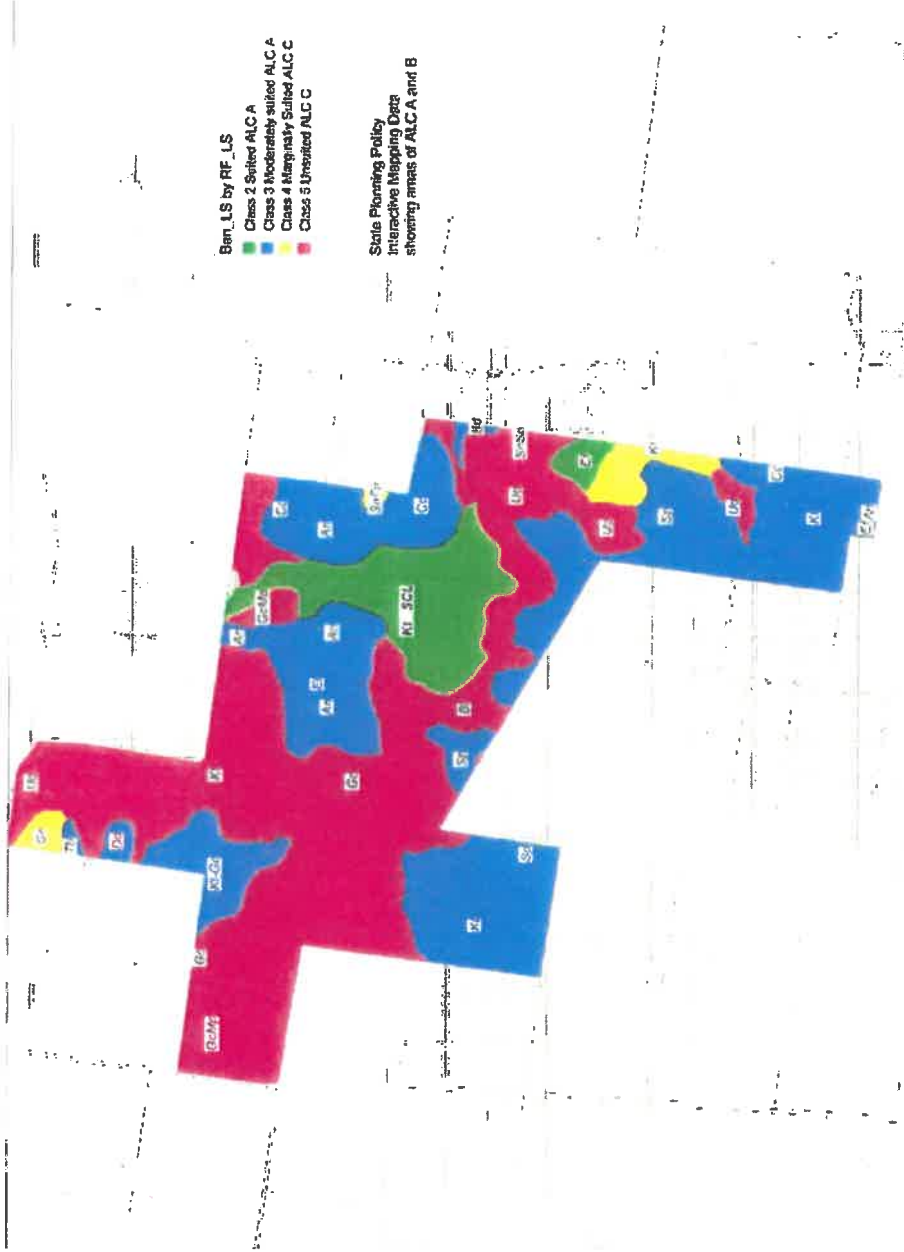




Map 2 Regional Framework Land Suitability Data



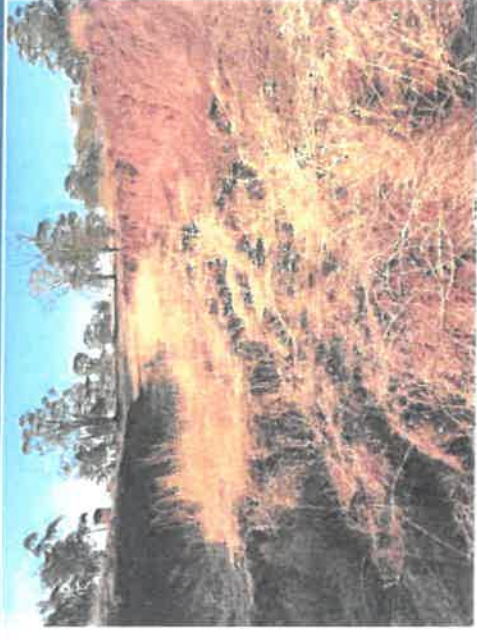
Map 3 SPP Agric Land Classes over the Regional Framework





## Appendix B: Land Degradation Features (Dunn Property)

Erosion feature I.D	Description	Photograph
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**D\_EF\_1**

Type of erosion feature: Gully  
 Lease Area: E  
 Landform: Simple slope  
 Location: Downgradient of Dam7  
 Soil Type (Muller, 2008): Earlsfield  
 ALC (Thompson): Class A  
 Soil Condition: Cracking clay soils  
 Gully head coordinate: Latitude: -24.043813  
 Longitude: 150.405252

Maximum gully depth (m): 1.6  
 Maximum width (m): 11  
 Length (m): 170  
 Description: Contributing causes include concentrated flow from upgradient dam and limited groundcover.

**D\_EF\_4**

Type of erosion feature: Erosion of bank of watercourse  
 Lease Area: E  
 Landform: Watercourse  
 Location: Northern bank  
 Soil Type (Muller, 2008): Earlsfield  
 ALC (Thompson): Class A  
 Soil Condition: Cracking clay soils  
 Start of feature coordinate: Latitude: -24.043743  
 Longitude: 150.406647

Maximum depth (m): 1.3  
 Maximum width (m): Not applicable  
 Length (m): 45

Erosion feature I.D	Description	Photograph
---------------------	-------------	------------

**Description**  
 Contributing factors to the erosion of the northern bank of a watercourse include unstable ground surface condition and sidewall (low groundcover).



<b>D_EF_3</b>	<p>Type of erosion feature            Lease Area            Landform            Location            Soil Type (Muller, 2008)            ALC (Thompson)            Soil Condition:            Top of feature coordinate            Maximum depth (m)            Maximum width (m)            Length (m)</p>	<p>Anthropogenic            E            Crest            Downgradient of cattle yards            Kokotungo            ALC C            Texture contrast soils, sodic subsoil and shallow topsoil.            Latitude: -24.0407578            Longitude: 150.408544            2 m at cutting for vehicle access            90            120</p>
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Erosion feature I.D	Description	Photograph
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Unstable sidewalls and limited upgradient groundcover.

D\_Rill\_1

Type of erosion feature	Rill
Lease Area	E
Landform	Simple slope
Location	Formed from cattle track
Soil Type (Muller, 2008)	Annandale
ALC (Thompson)	Class A
Soil Condition:	Cracking clay soils
Rill head coordinate	Latitude: -24.047835 Longitude: 150.418234
Maximum depth (m)	0.4
Maximum width (m)	3
Length (m)	310

Erosion feature I.D Description Photograph

**Description**  
 Rill erosion with head formed at cattle track. Gently inclined sidewalls.



D\_DF\_1

**Type of erosion feature**  
 E Erosion of bank of watercourse  
**Lease Area**  
 E Watercourse  
**Landform**  
 Banks  
**Location**  
 Earlsfield & Annandale  
**Soil Type (Muller, 2008)**  
 Class A  
**ALC (Thompson)**  
 Cracking clay soils  
**Soil Condition:**  
 Latitude: -24.048862  
 Longitude: 150.415501  
**Start of feature coordinate**  
 1.5  
**Maximum depth (m)**  
 8  
**Maximum width (m)**  
 935  
**Length (m)**  
 Description  
 Contributing factors to the erosion of some banks of the watercourse



Erosion feature I.D	Description	Photograph
---------------------	-------------	------------

**D\_EF\_7**

include unstable ground surface conditions and sidewalls (low groundcover). Evidence of lateral bank erosion at some locations.

Type of erosion feature

Lease Area

Landform

Location

Soil Type (Muller, 2008)

ALC (Thompson)

Soil Condition:

Start of feature coordinate

Maximum depth (m)

Maximum width (m)

Length (m)

Description

Type of erosion feature

Lease Area



Extensive erosion

F

Watercourse and lower slope

North of Dodson Road surrounding

Dam9

Kokotungo

ALC A

Texture contrast soils, sodic subsoil and shallow topsoil.

Latitude: -24.05323

Longitude: 150.424797

Note: Start of feature at Dodson

Road

2.5

280

290


Contributing causes include concentrated flow from upgradient watercourses and dams, groundcover and dispersive subsoils.


Gully & watercourse


E & F

**D\_DF\_3**

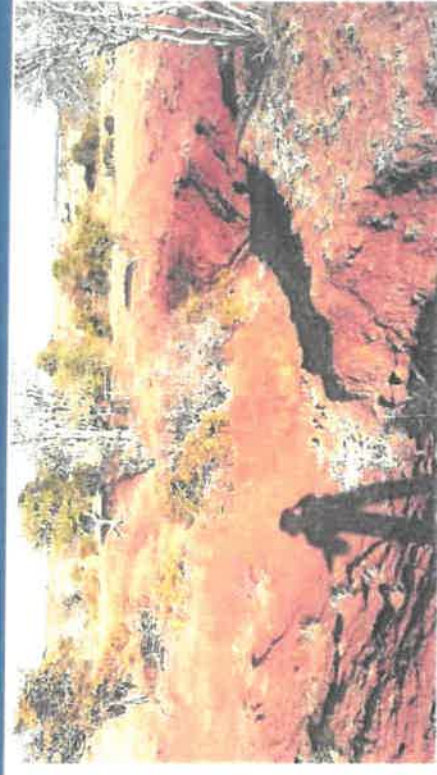


Erosion feature I.D	Description	Photograph
D_DF_6	<p>Watercourse and lower slope Downgradient of Dam Kokotungo ALC A Texture contrast soils, sodic subsoil and shallow topsoil. Latitude: -24.0484 Longitude: 150.425296 Range from &lt;0.5-&gt;2 50 1.56 Contributing causes include concentrated flow from upgradient watercourses and dams, groundcover and dispersive subsoils. Unstable sidewalls and limited upgradient groundcover. Evidence of lateral bank erosion at some locations. Erosion of banks of watercourse &amp; rill G2 Watercourse &amp; lower slope Gully erosion formed at upgradient property east of the site and extended onto the site. Clancy</p>	

Erosion feature I.D	Description	Photograph
D_Gully_3	<p><b>Class A</b></p> <p><b>ALC (Thompson)</b>  <b>Soil Condition:</b> Cracking clay soils  <b>Top of feature coordinate</b>  Latitude: -24.043093  Longitude: 150.437625</p> <p><b>Maximum depth (m)</b> 1  <b>Maximum width (m)</b> 8  <b>Length (m)</b> 230  <b>Description</b> Contributing factors to the erosion of some banks of the watercourse include low groundcover and cattle traffic.</p>	
	<p><b>Type of erosion feature</b> Gully  <b>Lease Area</b> G2  <b>Landform</b> Watercourse &amp; lower slope  <b>Location</b> Gully erosion formed at downgradient extent of Dam10  <b>Soil Type (Muller, 2008)</b> Clancy  <b>ALC (Thompson)</b> Class A  <b>Soil Condition:</b> Cracking clay soils  <b>Gully head coordinate</b>  Latitude: -24.04213  Longitude: 150.43515</p> <p><b>Maximum gully depth (m)</b> 1.5  <b>Maximum width (m)</b> 10</p>	

Erosion feature I.D	Description	Photograph
<p><b>Length (m)</b> <b>Description</b></p>	<p><b>135</b> Contributing factors to the erosion include low groundcover, concentrated flow from the dam and cattle traffic.</p>	
<p><b>D_DF_4</b></p>	<p><b>Type of erosion feature</b> Erosion of banks of watercourse</p> <p><b>Lease Area</b> G2</p> <p><b>Landform</b> Watercourse, upper to lower slopes</p> <p><b>Location</b> Gully erosion formed at upgradient property north of the site and extended onto the site.</p> <p><b>Soil Type (Muller, 2008)</b> Santo</p> <p><b>ALC (Thompson)</b> Class C</p> <p><b>Soil Condition:</b> Friable non-cracking clay or clay loam soils</p> <p><b>Start of feature coordinate</b> Latitude: -24.038453 Longitude: 150.435185</p>	

Erosion feature I.D | Description | Photograph



1  
 14  
 450  
 Contributing factors to the erosion included low groundcover and steep slope.  
 Unstable sidewalls and limited upgradient groundcover.

D\_EF\_5


Type of erosion feature: Gully  
 Lease Area: G2  
 Landform: Upper slopes and crest  
 Location: Lateral bank erosion from watercourse.  
 Soil Type (Muller, 2008): Santo  
 ALC (Thompson): Class C  
 Soil Condition: Friable non-cracking clay or clay loam soils  
 Head of gully coordinate: Latitude: -24.038453  
 Longitude: 150.435185  
 Maximum depth (m): 3  
 Maximum width (m): 20  
 Length (m): 140

Erosion feature I.D | Description | Photograph



Contributing factors to the erosion included low groundcover, steep slope and sodic subsoils. Unstable sidewalls and limited upgradient groundcover.


D_DF_2	<p>Type of erosion feature</p> <p>Lease Area</p> <p>Landform</p> <p>Location</p> <p>Soil Type (Muller, 2008)</p> <p>ALC (Thompson)</p> <p>Soil Condition:</p>	<p>Erosion of banks of watercourse</p> <p>G2</p> <p>Watercourse and lower slopes.</p> <p>Erosion formed from watercourse originating upgradient property north of the site and extended onto the site.</p> <p>Kokotungo</p> <p>ALC A</p> <p>Texture contrast soils, sodic subsoil and shallow topsoil.</p>
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Erosion feature I.D	Description	Photograph
3	<p><b>Top of feature coordinate</b>  <b>Latitude: -24.036238</b>  <b>Longitude: 150.421</b></p> <p><b>Maximum depth (m)</b>            16</p> <p><b>Maximum width (m)</b>            450</p> <p><b>Length (m)</b>            450</p> <p><b>Description</b>            Contributing factors to the erosion included low groundcover, steep slope and sodic subsoils. Unstable sidewalls and limited upgradient groundcover.</p>	







## Appendix C: Land Degradation Features (Fenech Property)

Erosion feature I.D	Description	Photograph
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F_Rill_1	<p>Type of erosion feature                      Rill                      Lease Area                      C                      Landform                      Lower slope                      Location                      Adjoining Dodsons Road                      Soil Type (Muller, 2008)                      Kokotungo                      ALC (Thompson)                      Class C                      Soil Condition:                      Friable non-cracking clay or clay loam soils                      Rill head coordinate                      Latitude: -24.044339                      Longitude: 150.400246                      Maximum depth (m)                      0.5                      Maximum width (m)                      30                      Length (m)                      110                      Description                      Contributing factors to the erosion included low groundcover and cattle traffic.</p>	
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F_EF_1	<p>Type of erosion feature                      Erosion of banks of watercourse and lateral bank erosion and gullies.                      Lease Area                      G2                      Landform                      Watercourse                      Location                      Watercourse from property to the east across Dodsons Road                      Soil Type (Muller, 2008)                      Kokotungo &amp; Kokotungo-Greycliffe complex                      ALC (Thompson)                      Class A &amp; C                      Soil Condition:                      Friable non-cracking clay or clay loam soils and cracking clay soils.                      Top of feature coordinate                      Latitude: -24.043596                      Longitude: 150.401046</p>	
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Erosion feature I.D	Description	Photograph
1.5	Maximum depth (m)	
14	Maximum width (m)	
2.1 km	Length (m)	
	Description	

Contributing factors to the erosion included low groundcover, concentrated flow from dams, including upgradient, cattle traffic and sodic subsoils at some locations. Unstable head and sidewalls and limited upgradient groundcover.

Erosion feature I.D	Description	Photograph
F_EF_3	<p>Type of erosion feature Lease Area Landform Location Soil Type (Muller, 2008) ALC (Thompson) Soil Condition: Head of gully coordinate Maximum depth (m) Maximum width (m) Length (m) Description</p>	
F_Gully_3	<p>Type of erosion feature Lease Area Landform Location Soil Type (Muller, 2008) ALC (Thompson) Soil Condition: Head of gully coordinate Maximum depth (m) Maximum width (m) Length (m)</p>	<p>Gully C Lower slope Adjoining Dodsons Road Kokotungo Class C Friable non-cracking clay or clay loam soils Latitude: -24.041294 Longitude: 150.399831 0.6 8 20 Contributing factors to the erosion included low groundcover and sodic subsoils. Unstable head and sidewalls and limited upgradient groundcover. Gully C Simple slope Adjoining Dodsons Road Kokotungo Class A Friable non-cracking clay or clay loam soils Latitude: -24.034123 Longitude: 150.382404 0.6 6 40</p>

Erosion feature I.D

Description

Description  
 Contributing factors to the erosion included low groundcover and concentrated flow from upgradient dam.

Photograph



F\_Gully\_1


Type of erosion feature  
 Gully  
 Lease Area  
 C  
 Landform  
 Simple slope  
 Location  
 Upgradient of dams  
 Soil Type (Muller, 2008)  
 Grecliffe (including Melonhole Phase)  
 ALC (Thompson)  
 ALC C  
 Soil Condition:  
 Cracking clay soils  
 Head of gully coordinate  
 Latitude: -24.034631  
 Longitude: 150.378544  
 Maximum depth (m)  
 0.6  
 Maximum width (m)  
 10  
 Length (m)  
 20



Erosion feature I.D	Description	Photograph
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<b>Description</b>	Contributing factors to the erosion included low groundcover and cattle traffic.	
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<b>F_Gully_2</b>	<b>Type of erosion feature</b>	Gully
	<b>Lease Area</b>	C
	<b>Landform</b>	Simple slope
	<b>Location</b>	Upgradient of dams
	<b>Soil Type (Muller, 2008)</b>	Greycliffe (including Melonhole Phase)
	<b>ALC (Thompson)</b>	ALC C
	<b>Soil Condition:</b>	Cracking clay soils
	<b>Head of gully coordinate</b>	Latitude: -24.035096 Longitude: 150.3784
	<b>Maximum depth (m)</b>	1
	<b>Maximum width (m)</b>	6
	<b>Length (m)</b>	10

Erosion feature I.D	Description	Photograph
F_DF_2	<p><b>Description</b></p> <p>Contributing factors to the erosion included low groundcover and cattle traffic. Unstable head and sidewalls and limited upgradient groundcover.</p> <p><b>Type of erosion feature</b></p> <p>Erosion of banks of watercourse and lateral bank erosion and gullies</p> <p><b>Lease Area</b></p> <p>D2</p> <p><b>Landform</b></p> <p>Watercourse and lower slopes.</p> <p><b>Location</b></p> <p>Watercourse from the western portion of the property</p> <p><b>Soil Type (Muller, 2008)</b></p> <p>Kokotungo</p> <p><b>ALC (Thompson)</b></p> <p>ALC C</p> <p><b>Soil Condition:</b></p> <p>Texture contrast soils, sodic subsoil and shallow topsoil.</p> <p><b>Top of feature coordinate</b></p> <p>Latitude: -24.026443 Longitude: 150.390647</p>	

Erosion feature I.D	Description	Photograph
0.3	Maximum depth (m)	
2	Maximum width (m)	
80	Length (m)	
	Description	
Contributing factors to the erosion included low groundcover, sodic subsoils and cattle tracking.		
F_DF_1	Type of erosion feature	
Lease Area	Erosion of banks of watercourse and lateral bank erosion	
Landform	D1 & D2	
Location	Watercourse and lower slopes.	
Soil Type (Muller, 2008)	Erosion formed from watercourse originating upgradient property to the east across Dodsons Road.	
ALC (Thompson)	Kokotungo	
Soil Condition:	ALC C	
Top of feature coordinate	Texture contrast soils, sodic subsoil and shallow topsoil.	
Latitude: -24.030501	Longitude: 150.402416	
Head of secondary watercourse	Latitude: -24.033482	
Longitude: 150.399922	Longitude: 150.399922	

Erosion feature I.D	Description	Photograph
F_Gully_4	<p> <b>Maximum depth (m)</b> 0.5-2  <b>Maximum width (m)</b> 5-15  <b>Length (km)</b> 1.8  <b>Description</b> Contributing factors to the erosion included low groundcover, cattle tracking and sodic subsoils. Unstable head and sidewalls (including of banks) and limited upgradient groundcover.  <b>Type of erosion feature</b> Gully  <b>Lease Area</b> D2  <b>Landform</b> Upper slope  <b>Location</b> East of Dodsons Road  <b>Soil Type (Muller, 2008)</b> Kokotungo  <b>ALC (Thompson)</b> ALC C  <b>Soil Condition:</b> Texture contrast soils, sodic subsoil and shallow topsoil.  <b>Gully head coordinate</b> Latitude: -24.028504  Longitude: 150.401092  <b>Maximum depth (m)</b> 1.2  <b>Maximum width (m)</b> 3  <b>Length (m)</b> 175  <b>Description</b> Contributing factors to the erosion included contour banks and sodic subsoils. Unstable head and sidewalls (including of banks) and limited upgradient groundcover. Secondary gullies formed. </p>	

Erosion feature I.D	Description
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Photograph









# Appendix D: Land Degradation Features (Maynard Property)

Erosion feature I.D	Description	Photograph
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M_Gully_1	<p>Type of erosion feature  Lease Area  Landform  Location  Soil Type (Muller, 2008)  ALC (Thompson)  Soil Condition</p> <p>Gully  A  Plain  North of Dam17  Kokotungo  Class A  Texture contrast soils, sodic subsoil and shallow topsoil.  Latitude: -24.067906  Longitude: 150.377679  0.5  10  120  Contributing factors to the erosion included contour banks and sodic subsoils.  Unstable head and sidewalls (including of banks) and limited upgradient groundcover.</p>	
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M_Gully_2	<p>Type of erosion feature  Lease Area  Landform  Location  Soil Type (Muller, 2008)  ALC (Thompson)</p> <p>Gully  A  Plain  Upgradient of Dam18  Kokotungo  Class A</p>	
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Erosion feature I.D	Description	Photograph
Soil Condition	Texture contrast soils, sodic subsoil and shallow topsoil.	
Gully head coordinate	Latitude: -24.06052 Longitude: 150.387346	
Maximum depth (m)	1.5	
Maximum width (m)	18	
Length (m)	460	
Description	Contributing factors to the erosion included contour banks and sodic subsoils. Unstable head and sidewalls (including of banks) and limited upgradient groundcover. Secondary gullies formed along contour banks. Gully includes several secondary heads.	





<b>M_Gully_3</b>	<p>Type of erosion feature</p> <p>Lease Area</p> <p>Landform</p> <p>Location</p> <p>Soil Type (Muller, 2008)</p> <p>ALC (Thompson)</p> <p>Soil Condition</p>	<p>Gully</p> <p>A</p> <p>Open depression</p> <p>Upgradient of Dam18</p> <p>Kokotungo</p> <p>Class A</p> <p>Texture contrast soils, sodic subsoil and shallow topsoil.</p>
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Erosion feature I.D Description Photograph

Gully head coordinate Latitude: -24.06088 Longitude: 150.386281  
 Maximum depth (m) 0.5  
 Maximum width (m) 8  
 Length (m) 80  
 Description Contributing factors to the erosion included contour banks and sodic subsoils.



M\_Gully\_4  
 Type of erosion feature Gully  
 Lease Area A  
 Landform Lower slope  
 Location Upgradient of Dam 18  
 Soil Type (Muller, 2008) Kokotungo  
 ALC (Thompson) Class A  
 Soil Condition Texture contrast soils, sodic subsoil and shallow topsoil.  
 Gully head coordinate Latitude: -24.059453 Longitude: 150.382186  
 Maximum depth (m) 1  
 Maximum width (m) 6

Erosion feature I.D	Description	Photograph
M_Gully_5	<p>Length (m) Description</p> <p>25 Contributing factors to the erosion included contour banks and sodic subsoils. Unstable head and sidewalls (including of banks) and limited upgradient groundcover.</p> <p>Gully</p> <p>Type of erosion feature</p> <p>A</p> <p>Lease Area</p> <p>Landform</p> <p>Plain</p> <p>Location</p> <p>Upgradient of Dam18</p> <p>Soil Type (Muller, 2008)</p> <p>Kokotungo</p> <p>ALC (Thompson)</p> <p>Class A</p> <p>Soil Condition</p> <p>Texture contrast soils, sodic subsoil and shallow topsoil.</p> <p>Gully head coordinate</p> <p>Latitude: -24.058343</p> <p>Longitude: 150.380686</p> <p>Maximum depth (m)</p> <p>0.5</p> <p>Maximum width (m)</p> <p>5</p> <p>Length (m)</p> <p>20</p> <p>Description</p> <p>Contributing factors to the erosion included contour banks and sodic subsoils. Unstable head and sidewalls (including of banks) and limited upgradient groundcover.</p>	
M_Gully_6	<p>Type of erosion feature</p> <p>Gully</p> <p>Lease Area</p> <p>A</p> <p>Landform</p> <p>Simple slope</p>	

Erosion feature I.D	Description	Photograph
	<p>Location Downgradient of Dam18 Gleycliffe, melonhole phase</p> <p>Soil Type (Muller, 2008) Class C</p> <p>Soil Condition Texture contrast soils, sodic subsoil.</p> <p>Gully head coordinate Latitude: -24.058761 Longitude: 150.37833</p> <p>Maximum depth (m) 1</p> <p>Maximum width (m) 8</p> <p>Length (m) 70</p> <p>Description Contributing factors to the erosion included low groundcover and sodic subsoils. Unstable head and sidewalls (including of banks) and limited upgradient groundcover.</p>	
M_EF_1	<p>Type of erosion feature Gully</p> <p>Lease Area A</p> <p>Landform Simple slope</p> <p>Location Upgradient of drainage feature Kokotungo</p> <p>Soil Type (Muller, 2008) Class A</p> <p>Soil Condition Texture contrast soils, sodic subsoil and shallow topsoil.</p>	


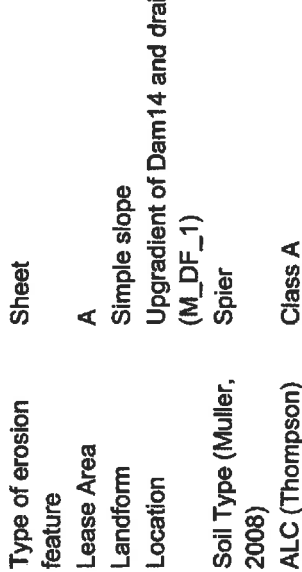
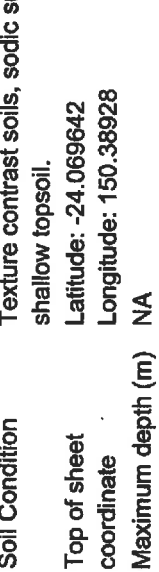


Erosion feature I.D Description Photograph




**Gully head coordinate**  
 Latitude: 24.065114  
 Longitude: 150.391657  
**Maximum depth (m)**  
 0.5  
**Maximum width (m)**  
 5  
**Length (m)**  
 48  
**Description**  
 Contributing factors to the erosion included low groundcover, steep slope and sodic subsoils.

**M\_Sheet\_2**  
**Type of erosion feature**  
 Sheet erosion  
**Lease Area**  
 A  
**Landform**  
 Crest  
**Location**  
 Upgradient of Dam14  
**Soil Type (Muller, 2008)**  
 Spier & Kokotungo  
**ALC (Thompson)**  
 Class A  
**Soil Condition**  
 Texture contrast soils, sodic subsoil and shallow topsoil.



Erosion feature I.D	Description	Photograph
M_Sheet_3	<p>Latitude: -24.064506  Longitude: 150.389563  NA  110 (north to south)  190 (east to west)  Contributing factors to the sheet erosion include unstable ground surface condition, low groundcover and cattle tracking.</p>	
	<p>Type of erosion feature  Lease Area  Landform  Location  Soil Type (Muller, 2008)  ALC (Thompson)  Soil Condition</p>	
	<p>Top of sheet coordinate  Maximum depth (m)  Maximum width (m)  Length (m)  Description</p>	
	<p>Type of erosion feature  Lease Area  Landform  Location  Soil Type (Muller, 2008)  ALC (Thompson)  Soil Condition</p>	
	<p>Top of sheet coordinate  Maximum depth (m)</p>	

Erosion feature I.D	Description	Photograph
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M_DF_1	<p><b>Maximum width (m)</b> 180 (east to west)</p> <p><b>Length (m)</b> 290 (north to south)</p> <p><b>Description</b> Contributing factors to the sheet erosion include unstable ground surface condition, low groundcover and cattle tracking.</p> <p><b>Type of erosion feature</b> Erosion of banks of watercourse and lateral bank erosion and gullies.</p> <p><b>Lease Area</b> A</p> <p><b>Landform</b> Watercourse</p> <p><b>Location</b> Erosion of banks of watercourse Spier &amp; Kokotungo</p> <p><b>Soil Type (Muller, 2008)</b> Class A</p> <p><b>ALC (Thompson)</b> Texture contrast soils, sodic subsoil and shallow topsoil.</p> <p><b>Soil Condition</b> Latitude: -24.068399 Longitude: 150.392243 Note: start of feature at eastern lease boundary</p> <p><b>Start of feature coordinate</b> 6</p> <p><b>Maximum depth (m)</b> 90</p> <p><b>Maximum width (m)</b> 90</p> <p><b>Length (km)</b> 1.8</p> <p><b>Description</b> Contributing factors to the erosion included low groundcover, concentrated flow, cattle traffic, shallow topsoil and sodic subsoils. Unstable head and sidewalls and limited upgradient groundcover causing lateral bank erosion.</p>	
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Erosion feature I.D	Description
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Significant gully erosion adjoining dam.

Photograph





M_DF_2	Type of erosion feature	Sheet
Lease Area	Open depression adjoining watercourse	A
Landform	East of drainage feature	Kokotungo
Location	Kokotungo	Class A
Soil Type (Muller, 2008)	Texture contrast soils, sodic subsoil and shallow topsoil.	Latitude: -24.070707
ALC (Thompson) Soil Condition	Top of feature coordinate	Longitude: 150.384056

Erosion feature I.D	Description	Photograph
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Note: top of feature measured on northern head

Maximum depth (m) NA

Maximum width (m) 65

Length (m) 395

Description Contributing factors to the erosion included low groundcover, cattle traffic, shallow topsoil and sodic subsoils.

M_Gully_7	Type of erosion feature	Gully
	Lease Area	B1 & B2
	Landform	Simple slope
	Location	South of Dodson's Road
	Soil Type (Muller, 2008)	Eartsville
	ALC (Thompson)	Class A
	Soil Condition	Friable non-cracking clay or clay loam soils
	Top of gully coordinate	Latitude: -24.052188 Longitude: 150.411517

Erosion feature I.D | Description | Photograph

Maximum depth (m) 1  
 Maximum width (m) 4  
 Length (m) 70  
 Description Contributing factors to the erosion included low groundcover and cattle traffic.



M\_Gully\_8  
 Type of erosion feature Gully  
 Lease Area B2  
 Landform Simple slope  
 Location Upgradient of drainage feature (M\_DF\_3)  
 Soil Type (Muller, 2008) Kokotungo  
 ALC (Thompson) Class A  
 Soil Condition Texture contrast soils, sodic subsoil and shallow topsoil.

Erosion feature I.D | Description | Photograph



Top of gully coordinate Latitude: -24.059256  
 Longitude: 150.413334  
 Maximum depth (m) 1  
 Maximum width (m) 20  
 Length (m) 205  
 Description Contributing factors to the erosion included low groundcover, cattle traffic, steep slopes, shallow topsoil and sodic subsoils.

M\_Gully\_9

Type of erosion feature Gully  
 Lease Area B2  
 Landform Simple slope  
 Location East of cattleyard2  
 Soil Type (Muller, 2008) Kokotungo  
 ALC (Thompson) Class A  
 Soil Condition Texture contrast soils, sodic subsoil and shallow topsoil.

Erosion feature I.D Description Photograph



**Top of feature coordinate** Latitude: -24.061241  
 Longitude: 150.423583  
**Maximum depth (m)** 0.5  
**Maximum width (m)** 9  
**Length (m)** 35  
**Description** Contributing factors to the erosion included low groundcover, cattle traffic, shallow topsoil and sodic subsoils.

<b>M_Rill_10</b>	<b>Type of erosion feature</b>	Rill
	<b>Lease Area</b>	B2
	<b>Landform</b>	Simple slope
	<b>Location</b>	West of Dam11
	<b>Soil Type (Muller, 2008)</b>	Kokotungo
	<b>ALC (Thompson)</b>	Class A
	<b>Soil Condition</b>	Texture contrast soils, sodic subsoil and shallow topsoil.
	<b>Top of feature coordinate</b>	Latitude: -24.061072 Longitude: 150.428054
	<b>Maximum depth (m)</b>	0.4
	<b>Maximum width (m)</b>	8
	<b>Length (m)</b>	80



Erosion feature I.D      Description      Photograph



**Description**  
 Contributing factors to the erosion included low groundcover and cattle traffic.

<b>M_Rill_11</b>	<b>Type of erosion feature</b>	Gully
	<b>Lease Area</b>	B2
	<b>Landform</b>	Simple slope
	<b>Location</b>	South of Dam11
	<b>Soil Type (Muller, 2008)</b>	Kokotungo
	<b>ALC (Thompson)</b>	Class A
	<b>Soil Condition</b>	Texture contrast soils, sodic subsoil and shallow topsoil.

Erosion feature I.D | Description | Photograph

**Top of gully coordinate** Latitude: -24.063676  
 Longitude: 150.425923  
**Maximum depth (m)** 0.4  
**Maximum width (m)** 8  
**Length (m)** 35  
**Description** Contributing factors to the erosion included low groundcover and cattle traffic.



**M\_Gully\_12** Type of erosion Gully  
 feature  
**Lease Area** B2  
**Landform** Simple slope  
**Location** Southern portion of lease area B2  
**Soil Type (Muller, 2008)** Bluff  
**ALC (Thompson)** Class C  
**Soil Condition** Texture contrast soils, sodic subsoil and shallow topsoil.  
**Top of feature coordinate** Latitude: -24.06644  
 Longitude: 150.418547  
**Maximum depth (m)** 0.6  
**Maximum width (m)** 10

Erosion feature I.D | Description | Photograph



65  
 Contributing factors to the erosion included low groundcover, cattle traffic, steep slopes, shallow topsoil and sodic subsoils.


M_Gully_13	Type of erosion feature	Gully
	Lease Area	B2
	Landform	Simple slope
	Location	Southern portion of lease area B2
	Soil Type (Muller, 2008)	Kokotungo
	ALC (Thompson)	Class A
	Soil Condition	Texture contrast soils, sodic subsoil and shallow topsoil.
	Top of feature coordinate	Latitude: -24.065527 Longitude: 150.42116

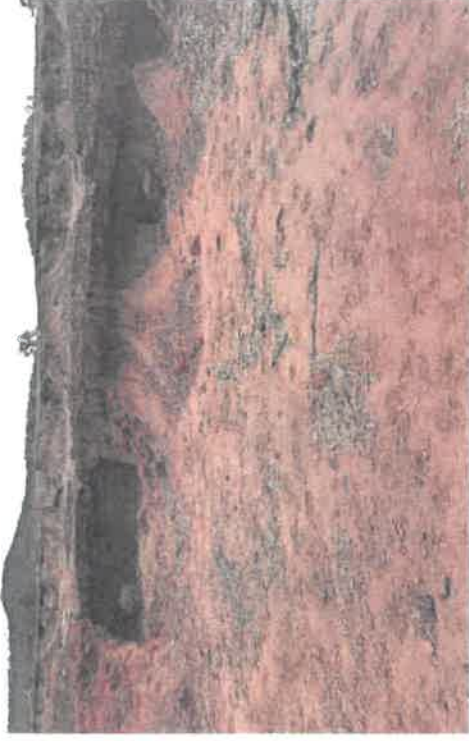
Erosion feature I.D | Description | Photograph



Maximum depth (m) 0.5  
 Maximum width (m) 10  
 Length (m) 110  
 Description Contributing factors to the erosion included low groundcover, cattle traffic, steep slopes, shallow topsoil and sodic subsoils.

M\_DF\_3  
 Type of erosion feature Erosion of banks of watercourse and lateral bank erosion  
 Lease Area B2  
 Landform Watercourse and open depression.  
 Location Central portion of lease area B2  
 Soil Type (Muller, 2008) Kokotungo  
 ALC (Thompson) Class A  
 Soil Condition Texture contrast soils, sodic subsoil and shallow topsoil.  
 Top of feature coordinate Latitude: -24.053879  
 Longitude: 150.423404  
 Note: start of feature at northern lease area B2 boundary  
 Maximum depth (m) 1  
 Maximum width (m) 170

Erosion feature I.D	Description	Photograph
1.2	<p>Incorporates Dam22.</p> <p>Contributing factors to the erosion included low groundcover, concentrated flow, cattle traffic, shallow topsoil and sodic subsoils. Unstable head and sidewalls and limited upgradient groundcover causing lateral bank erosion.</p> <p>Extends north onto Dunn property.</p>	




<b>M_EF_2</b>	<p>Type of erosion feature</p> <p>Lease Area</p> <p>Landform</p> <p>Location</p> <p>Soil Type (Muller, 2008)</p> <p>ALC (Thompson)</p> <p>Soil Condition</p> <p>Top of feature coordinate</p>	<p>Minor gully</p> <p>B2</p> <p>Open depression</p> <p>North east of Dam12</p> <p>Kokotungo</p> <p>Class A</p> <p>Texture contrast soils, sodic subsoil and shallow topsoil.</p> <p>Latitude: -24.059245</p> <p>Longitude: 150.42395</p>
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Erosion feature I.D	Description	Photograph
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Maximum depth (m)	0.5
Maximum width (m)	40
Length (m)	640
Description	Contributing factors to the erosion included low groundcover, cattle traffic, steep slopes, shallow topsoil and sodic subsoils.

M_EF_3	Type of erosion feature	Minor gulying along watercourse
	Lease Area	B2
	Landform	Watercourse and open depression.
	Location	Upgradient of Dam11
	Soil Type (Muller, 2008)	Kokotungo
	ALC (Thompson)	Class A
	Soil Condition	Texture contrast soils, sodic subsoil and shallow topsoil.

Erosion feature I.D	Description	Photograph	
M_EF_4	Top of feature coordinate		
	Western head Latitude: -24.066466 Longitude:150.426898 Eastern head Latitude: -24.065877 Longitude:150.430585		
	Maximum depth (m) 0.5		
	Maximum width (m) 90		
	Length (m) 565		
	Description		
	Contributing factors to the erosion included concentrated flow, low groundcover, cattle traffic, shallow topsoil and sodic subsoils.		
	Type of erosion feature		Gully
	Lease Area		B2
	Landform		Open depression
Location	North of access track		
Soil Type (Muller, 2008)	Bluff		
ALC (Thompson)	Class C		
Soil Condition	Cracking clay soils		
Top of feature coordinate	Latitude: -24.064725 Longitude: 150.433094		
Maximum depth (m)	0.4		
Maximum width (m)	4		
Length (m)	10		



Erosion feature I.D	Description	Photograph
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M_Gully_14	<p><b>Description</b></p> <p>Contributing factors to the erosion included concentrated flow along access track, cattle traffic, shallow topsoil and sodic subsoils.</p> <p><b>Type of erosion feature</b> Gully</p> <p><b>Lease Area</b> B2</p> <p><b>Landform</b> Open depression adjoining watercourse</p> <p><b>Location</b> West of drainage feature (M_DF_4) and parallel to a contour bank</p> <p><b>Soil Type (Muller, 2008)</b> Clancy</p> <p><b>ALC (Thompson)</b> Class A</p> <p><b>Soil Condition</b> Cracking clay soils</p> <p><b>Top of feature coordinate</b> Latitude: -24.059087 Longitude: 150.435579</p> <p><b>Maximum depth (m)</b> 1.2</p> <p><b>Maximum width (m)</b> 6</p> <p><b>Length (m)</b> 30</p> <p><b>Description</b> Contributing factors to the erosion included steep slope, low sidewall and base groundcover, contour banks and cattle traffic.</p>	
M_Gully_15	<p><b>Type of erosion feature</b> Gully</p> <p><b>Lease Area</b> B2</p> <p><b>Landform</b> Open depression</p> <p><b>Location</b> Upgradient of drainage feature (M_DF_4)</p>	

Erosion feature I.D | Description | Photograph



Soil Type (Muller, 2008) Clancy  
 ALC (Thompson) Class A  
 Soil Condition Cracking clay soils  
 Top of feature coordinate Latitude: -24.060447  
 Longitude: 150.439223  
 Maximum depth (m) 2  
 Maximum width (m) 6  
 Length (m) 95  
 Description Contributing factors to the erosion included steep slope, concentrated flow, low sidewall groundcover, contour banks and cattle traffic.


**M\_Gully\_16** Type of erosion feature Gully  
 Lease Area B2  
 Landform Simple slope  
 Location South-west of powerlines  
 Soil Type (Muller, 2008) Santo  
 ALC (Thompson) Class C  
 Soil Condition Cracking clay soils  
 Top of feature coordinate Latitude: -24.064806  
 Longitude: 150.442652

Erosion feature I.D | Description | Photograph

Maximum depth (m) 1  
 Maximum width (m) 7  
 Length (m) 75  
 Description Contributing factors to the erosion included steep slope, contour banks and cattle traffic.



M\_DF\_4  
 Type of erosion feature Erosion of banks of watercourse and lateral bank erosion  
 Lease Area B2  
 Landform Open depression/ watercourse  
 Location South of Dodson Road  
 Soil Type (Muller, 2008) Clancy  
 ALC (Thompson) Class A  
 Soil Condition Cracking clay soils

Erosion feature I.D	Description	Photograph
	<p><b>Start of feature coordinate</b></p> <p>Latitude: -24.060367            Longitude: 150.440836            Note: start of feature at eastern lease boundary</p>	
	<p><b>Maximum depth (m)</b></p> <p>1.-1.2</p>	
	<p><b>Maximum width (m)</b></p> <p>10</p>	
	<p><b>Length (m)</b></p> <p>860</p>	
	<p><b>Description</b></p> <p>Contributing factors to the erosion included concentrated flow, low groundcover and cattle traffic.</p>	

## **Attachment 4**

### **Environmental Obligations**

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## ***Environmental Obligations***

### **SCHEDULE A – General**

- A1 The *Environmental Protection Act 1994* places a general environmental duty on everyone. Activity that causes or is likely to cause environmental harm must not be carried out unless all reasonable and practicable measures are taken to prevent or minimise the harm. Anyone becoming aware of serious or material environmental harm being caused or threatened by an activity they are involved in, has a duty to report that harm.
- A2 It is an offence under the *Environmental Protection Act 1994* to cause environmental nuisance. Environmental nuisance includes unreasonable interference caused by noise, dust, fumes, odour, smoke, aerosols, particles or light.
- A3 All reasonable precautions must be taken to avoid or minimise nuisance to adjacent premises or other property during construction work on the site, to the satisfaction of Council. Such precautions are to be discussed and agreed to by Council prior to construction commencing and will form part of any Construction Site Management Plan.

### **SCHEDULE B - Noise**

- B1 Activities must be managed such that noise emissions from the premises do not cause harm or nuisance to adjoining residents and comply with the requirements of the *Environmental Protection Act 1994* and *Environmental Protection (Noise) Policy 2019*.

- B2 Noise must not be emitted outside the hours specified below-

<b>Noise Source</b>	<b>Allowable Hours</b>
Building work <i>(Builders and owner-builders, including excavation. For home renovations or other uses refer to regulated devices)</i>	<b>6:30am and 6:30pm Monday to Saturday, excluding public holidays.</b>
Regulated devices <i>(eg mowers, power tools, compressors, leaf blowers, nail guns etc)</i>	<b>7:00am to 7:00pm Monday to Saturday 8:00am to 7:00pm Sundays and public holidays</b>
Amplifier devices <i>(other than indoor venues and open air events)</i>	<b>7am to 10pm Business days 8am to 6pm Other days</b>

- B3 All noise producing machinery and equipment (including air conditioners, compressors and cooling systems) are to be fitted with noise attenuation features so that noise at a sensitive receptor does not exceed the levels indicated in Schedule 1 of the *Environmental Protection (Noise) policy 2019* as follows -

## Schedule 1 Acoustic quality objectives

Column 1	Column 2	Column 3		
Sensitive receptor	Time of Day	Acoustic quality objectives (measured at the receptor <i>dB(A)</i> )		
		<i>L</i> <sub>eq,adj,1hr</sub>	<i>L</i> <sub>10,adj,1hr</sub>	<i>L</i> <sub>1,adj,1hr</sub>
residence (for outdoors)	daytime and evening	50	55	65
residence (for indoors)	daytime and evening	35	40	45
	night-time	30	35	40
library and educational institution (including a school, college and university) (for indoors)	when open for business or when classes are being offered	35		
childcare centre or kindergarten (for indoors)	when open for business, other than when the children usually sleep	35		
childcare centre or kindergarten (for indoors)	when the children usually sleep	30		
school or playground (for outdoors)	when the children usually play outside	55		
hospital, surgery or other medical institution (for indoors)	visiting hours	35		
hospital, surgery or other medical institution (for indoors)	anytime, other than visiting hours	30		
commercial and retail activity (for indoors)	when the activity is open for business	45		
protected area or critical area	anytime	the level of noise that preserves the amenity of the existing area or place		
marine park	anytime	the level of noise that preserves the amenity of the existing marine park		
park or garden that is open to the public (whether or not on payment of an amount) for use other than for sport or organised entertainment	anytime	the level of noise that preserves the amenity of the existing park or garden		

## SCHEDULE C – Air and Light

- C1 Air and light emissions must be appropriately managed to prevent environmental nuisance beyond the boundaries of the property during all stages of the development including earthworks and construction.
- C2 Suitable dust suppression should be used and/or screens or barriers should be erected, where required during excavation and building works, to reduce the emission of dust or other such emissions from the site.

- C3 All artificial illumination is to be designed and installed so as not to cause a nuisance to occupants of nearby premises and any passing traffic. Security and flood lighting is to be directed away from adjacent premises to minimise the protrusion of light outside the site.

#### **SCHEDULE D – Water and Stormwater**

- D1 It is an offence under the *Environmental Protection Act 1994* to discharge sand, silt, mud and other such contaminants to a stormwater drain, roadside gutter or a water course.
- D2 During construction, stockpiles and areas of bare soil or earth that are likely to become eroded must be adequately protected – by upslope surface water diversion, downslope sediment fencing and/or temporary surface coverings.
- D3 It is an offence under the *Environmental Protection Act 1994* to discharge oils, chemicals, cement or concrete, paint, thinner, degreaser, rubbish and other such contaminants to a stormwater drain, roadside gutter or a water course.
- D4 Any spills of oils, paints, chemicals etc must be contained and cleaned up as soon as possible.
- D5 Concrete, paint or thinner waste must not be washed out near a drain, gutter or anywhere waste could end up in a water course – appropriate containment and disposal should be used rather than discharging to the ground.

#### **SCHEDULE E – Waste Management**

- E1 It is an offence under the *Waste Reduction and Recycling Act 2011* to leave litter behind or allow litter to blow from site. All waste must be appropriately contained on site prior to removal.
- E2 All waste should be collected by a licensed contractor and taken to an approved waste disposal facility by an approved transporter.
- E3 Trap Gully Landfill is the only approved waste facility within the Banana Shire for the disposal of commercial waste. No commercial waste is to be deposited at other Banana Shire landfills or transfer stations without prior written approval from Council.
- E4 It is an offence under the *Environmental Protection Regulation 2019* to fail to comply with signage or directions at a waste facility.
- E5 Any building repairs involving asbestos material must be undertaken in accordance with Workplace Health and Safety requirements.
- E6 Regulated waste (including asbestos) is only to be disposed of at Trap Gully Landfill and an application form must be completed and approved prior to disposal.



- E7 Council will not enter onto private property to service wheelie bins, any bins to be serviced by Council will be required to be placed at the kerbside for collection.

#### **SCHEDULE F – Land**

- F1 Section 23 of the Biosecurity Act 2014 outlines the General Biosecurity Obligation. All landowners have a General Biosecurity Obligation (GBO) for managing biosecurity risks that are under their control and that they know about or should reasonably be expected to know about. All individuals and organisations whose activities pose or is likely to pose a biosecurity risk must:

- take all reasonable and practical measures to prevent or minimise the biosecurity risk
- minimise the likelihood of causing a biosecurity event and limit the consequences if such an event occurs
- prevent or minimise the harmful effects a biosecurity risk could have
- not do anything that might make any harmful effects of a biosecurity risk worse

A biosecurity risk exists when you deal with any pest, disease, weed or contaminant. This includes moving an animal, plant, turf, soil, machinery and/or equipment that could carry a pest, disease, weed or contaminant.