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19 June 2024
Kellie Galletta
Manager Planning and Development
Burdekin Shire Council
145 Young Street | PO Box 974
Ayre QLD 4807
By email: kellie.galletta@burdekin.qld.gov.au

Dear Kellie,

Lodgement of a minor change application for Haughton Solar Farm pursuant to the Planning Act 2016
Please find enclosed documents for a change application for development application number CONS17/0002 (development approval), latest decision approved in pursuant of Section 78 of the Planning Act 2016 on 9th March 2020.
The development permit outlines the approval for a renewable energy facility (Solar Farm and Battery) in Upper Haughton. Haughton Solar Farm Stage 1 was completed in 2019. Key project achievements for the proposed Battery Energy Storage System (BESS) and Solar Farm 2 stage includes undertaking & completing technical assessments and grid connection application.
This minor change application is for an amendment to the development approval to include the latest information for the approved BESS and associated substation area detailed as 'Indicative Layout Plan - Figure 4' and extension of Condition 1.3 which outlines the development approval currency period.
To support this change application, please see attached:

- 1.

Planning Act Form 5 - Change application form - which outlines the proposed changes under Section 6.1;

- 2.

Haughton BESS Development Approval Variation Report, detailing the increased BESS & substation areas and further technical assessments against potential impacts; and

- 3.

Updated indicative layout for increased BESS area.

Noting that the application fee of \$2,361 will be paid on lodgement. We hope that the above information is sufficient for your approval purposes.
Please reach out to Mariah Stellato on 03 8621 6367 or mstellato@pacificblue.com.au for further information regarding this minor change application request.
Yours sincerely

Simon Maan
General Manager, Development & Delivery

Pacific Hydro Australia Developments Pty Ltd trading as Pacific Blue Australia
Developments
ABN 56 161 024 755

Change application form

Planning Act Form 5 (version 1.2 effective 7 February 2020) made under Section 282 of the Planning Act 2016.

This form is to be used for a change application made under section 78 of the Planning Act 2016. It is important when making a change application to be aware of whether the application is for a minor change that will be assessed under section 81 of the Planning Act 2016 or for an other change that will be assessed under section 82 of the Planning Act 2016.

An applicant must complete all parts of this form, and provide any supporting information that the form identifies as being required to accompany the change application, unless stated otherwise.

Additional pages may be attached if there is insufficient space on the form to complete any part.

Note: All terms used in this form have the meaning given under the Planning Act 2016, the Planning Regulation 2017, or the Development Assessment Rules (DA Rules).

PART 1 – APPLICANT DETAILS

1) Applicant details

Applicant name(s) (individual or company full name)

Pacific Hydro Australia Developments Pty Ltd trading as Pacific Blue Australia Developments

Contact name (only applicable for companies)

Mariah Stellato

Postal address (P.O. Box or street address)

Level 13, 700 Collins Street

Suburb

Docklands

State

Victoria

Postcode

3008

Country

Australia

Email address (non-mandatory)

mstellato@pacificblue.com.au

Mobile number (non-mandatory)

+61 449 657 710

Applicant's reference number(s) (if applicable)

2) Owner's consent - Is written consent of the owner required for this change application?

Note: Section 79(1A) of the Planning Act 2016 states the requirements in relation to owner's consent.

Yes - the written consent of the owner(s) is attached to this change application
No

PART 2 - LOCATION DETAILS

3) Location of the premises (complete 3.1) or 3.2), and 3.3) as applicable)

3.1) Street address and lot on plan

Street address AND lot on plan (all lots must be listed), or

Street address AND lot on plan for an adjoining or adjacent property of the premises (appropriate for development in

water but adjoining or adjacent to land e.g. jetty, pontoon. All lots must be listed).

Unit No.

a)

Street No.

Street Name and Type

Suburb

832 Keith Venables Road

Upper Haughton

Postcode

Lot No.

Plan Type and Number (e.g. RP, SP)

Local Government Area(s)

4809

1

SP313057

Burdekin Shire Council

Unit No.

Street No.

Street Name and Type

Suburb

Postcode

Lot No.

Plan Type and Number (e.g. RP, SP)

Local Government Area(s)

b)

3.2) Coordinates of premises (appropriate for development in remote areas, over part of a lot or in water not adjoining or adjacent to land
e.g. channel dredging in Moreton Bay)

Note: Place each set of coordinates in a separate row.

Coordinates of premises by longitude and latitude

Longitude(s)

Latitude(s)

Datum

147.0479971

-19.74947014

WGS84

GDA94

Local Government Area(s) (if applicable)

Burdekin Shire Council

Other:

Coordinates of premises by easting and northing

Easting(s)

Northing(s)

Zone Ref.

54

55

56

Datum

Local Government Area(s) (if applicable)

WGS84

GDA94

Other:

3.3) Additional premises

Additional premises are relevant to the original development approval and the details of these premises have

been attached in a schedule to this application

Not required

PART 3 – RESPONSIBLE ENTITY DETAILS

4) Identify the responsible entity that will be assessing this change application

Note: see section 78(3) of the Planning Act 2016

Burdekin Shire Council - Planning & Development

PART 4 – CHANGE DETAILS

5) Provide details of the existing development approval subject to this change application

Approval type

Development permit

Preliminary approval

Reference number

Date issued

Assessment
manager/approval entity

CONS17/0002

12th November 2019

Burdekin Shire Council

6) Type of change proposed

6.1) Provide a brief description of the changes proposed to the development approval (e.g. changing a development approval for a five unit apartment building to provide for a six unit apartment building):

Pacific Hydro Australia Developments Pty Ltd trading as Pacific Blue Australia Developments Pty Ltd (Pacific Blue) is seeking a variation to the existing Development Approval CONS17/0002 (DA), which allows for the construction and operation of the Haughton Solar Farm (HSF) Stages 1 & 2 and a Battery Energy Storage System (BESS).

Pacific Blue is seeking two changes to CONS17/0002:

- Expanding the approved BESS area provided in DA as 'Indicative Layout Plan - Figure 4' and detailing the BESS and substation areas. As the original application only spoke to potential BESS and allocated a small area to the north-east of the site, Pacific Blue seeks to vary the DA to increase the BESS and substation areas in accordance with Clause 1.1(a) of the DA. It is key to note that this increase does not go outside the approved development boundary.

- Condition 1.3 - the DA currently lapses if the uncompleted aspects of the whole approved use has not occurred by 20th June 2025. Due to multiple factors, such as principal contractors of Haughton Solar Farm 1 construction entering receivership & impacts of Covid-19, Pacific Blue is requesting a currency period extension request, from 20th June 2025 to 20th June 2028.

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Planning Act Form 5 - Change application form
Version 1.2 - 7 February 2020

Pacific Blue acknowledges that significant time has passed since the approval was granted and that legislation within the Council and Queensland Government has varied. Upon previous discussions with Council, Council has confirmed that a minor change application is required for this request, but further detail is required.

To support this, Pacific Blue has produced a report on the BESS Project and associated infrastructure, inclusive of technical assessments of acoustic, hazard & fire safety, traffic management impacts and flora & fauna. This is provided in as a separate document.

6.2) What type of change does this application propose?

Minor change application – proceed to Part 5

Other change application – proceed to Part 6

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PART 5 – MINOR CHANGE APPLICATION REQUIREMENTS

7) Are there any affected entities for this change application

No – proceed to Part 7

Yes – list all affected entities below and proceed to Part 7

Note: section 80(1) of the Planning Act 2016 states that the person making the change application must give notice of the proposal and the details of the change to each affected entity as identified in section 80(2) of the Planning Act 2016.

Affected entity

Pre-request response provided? (where a pre-

Date notice given (where no pre-

request response notice for the application has been given, a copy of the notice must accompany this change application)

request response provided)

No

Yes – pre-request response is attached to this change application

No

Yes – pre-request response is attached to this change application

No

Yes – pre-request response is attached to this change application

PART 6 – OTHER CHANGE APPLICATION REQUIREMENTS

Note: To complete this part it will be necessary for you to complete parts of DA Form 1 – Development application details and in some instances parts of DA Form 2 – Building work details, as mentioned below. These forms are available at <https://planning.dsdmip.qld.gov.au>.

8) Location details - Are there any additional premises included in this change application that were not part of the original development approval?

No

Yes

9) Development details

9.1) Is there any change to the type of development, approval type, or level of assessment in this change application?

No

Yes – the completed Sections 1 and 2 of Part 3 (Development details) of DA Form 1 – Development application details as these sections relate to the new or changed aspects of development are provided with this application.

9.2) Does the change application involve building work?

No

Yes – the completed Part 5 (Building work details) of DA Form 2 – Building work details as it relates to the change application is provided with this application.

10) Referral details – Does the change application require referral for any referral requirements?

Note: The application must be referred to each referral agency triggered by the change application as if the change application was the original development application including the proposed change.

No

Yes – the completed Part 5 (Referral details) of DA Form 1 – Development

application details as it relates to the change application is provided with this application. Where referral is required for matters relating to building work the Referral checklist for building work is also completed.

11) Information request under Part 3 of the DA Rules

I agree to receive an information request if determined necessary for this change application

I do not agree to accept an information request for this change application

Note: By not agreeing to accept an information request I, the applicant, acknowledge:

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Version 1.2 – 7 February 2020

•

that this change application will be assessed and decided based on the information provided when making this change application and the assessment manager and any referral agencies relevant to the change application are not obligated under the DA Rules to accept any additional information provided by the applicant for the change application unless agreed to by the relevant parties

- Part 3 of the DA Rules will still apply if the application is an application listed under section 11.3 of the DA Rules.

Further advice about information requests is contained in the DA Forms Guide: Forms 1 and 2.

12) Further details

Part 7 of DA Form 1 – Development application details is completed as if the change application was a development application and is provided with this application.

PART 7 – CHECKLIST AND APPLICANT DECLARATION

13) Change application checklist

I have identified the:

- responsible entity in 4); and
- for a minor change, any affected entities; and
- for an other change all relevant referral requirement(s) in 10)

Yes

Note: See the Planning Regulation 2017 for referral requirements

For an other change application, the relevant sections of DA Form 1 – Development application details have been completed and is attached to this application

Yes

Not applicable

For an other change application, where building work is associated with the change application, the relevant sections of DA Form 2 – Building work details have been completed and is attached to this application

Yes

Not applicable

Supporting information addressing any applicable assessment benchmarks is attached to this application

Note: This includes any templates provided under 23.6 and 23.7 of DA Form 1 – Development application details

that are relevant as a result of the change application, a planning report and any technical reports required by the relevant categorising instrument(s) (e.g. the local government planning scheme, State Planning Policy, State Development Assessment Provisions). For further information, see DA Forms Guide: Planning report template.

Yes

Relevant plans of the development are attached to this development application
Note: Relevant plans are required to be submitted for all relevant aspects of this change application. For further information, see DA Forms Guide: Relevant plans.

Yes

14) Applicant declaration

By making this change application, I declare that all information in this change application is true and correct.

Where an email address is provided in Part 1 of this form, I consent to receive future electronic communications from the responsible entity and any relevant affected entity or referral agency for the change application where written information is required or permitted pursuant to sections 11 and 12 of the Electronic Transactions Act 2001.

Note: It is unlawful to intentionally provide false or misleading information.

Privacy – Personal information collected in this form will be used by the responsible entity and/or chosen assessment manager, any relevant affected entity or referral agency and/or building certifier (including any professional advisers which may be engaged by those entities) while processing, assessing and deciding the change application.

All information relating to this change application may be available for inspection and purchase, and/or published on the assessment manager's and/or referral agency's website.

Personal information will not be disclosed for a purpose unrelated to the Planning Act 2016, Planning Regulation 2017 and the DA Rules except where:

- such disclosure is in accordance with the provisions about public access to documents contained in the Planning Act 2016 and the Planning Regulation 2017, and the access rules made under the Planning Act 2016 and Planning Regulation 2017; or
- required by other legislation (including the Right to Information Act 2009); or
- otherwise required by law.

This information may be stored in relevant databases. The information collected will be retained as required by the Public Records Act 2002.

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PART 8 – FOR COMPLETION OF THE ASSESSMENT MANAGER – FOR OFFICE
USE ONLY

Date received:

Reference number(s):

QLeave notification and payment

Note: For completion by assessment manager if applicable

Description of the work

QLeave project number

Amount paid (\$)

Date paid (dd/mm/yy)

Date receipted form sighted by assessment manager

Name of officer who sighted the form

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Haughton BESS
Development Approval Variation Report

pacificblue.com.au

19 June 2024

L13, 700 Collins Street
Docklands VIC 3008
Australia

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Haughton BESS

19 June 2024

Acronyms

Word

Definition

ACHA Act

Aboriginal Cultural Heritage Act 2003

BESS

Battery Energy Storage System

CBSP

Community Benefit Sharing Program

CEMP

Construction Environmental Management Plan

CHMA

Cultural Heritage Management Agreement

DA

Development Approval

DMP

Decommissioning Management Plan

EPBC Act

Environmental Protection Biodiversity Conservation Act 1999

EP Act

Environment Protection Act 1994

FCAS

Frequency Control Ancillary Services

GED

General Environmental Duty

HSF

Haughton Solar Farm

MNES

Matters of National Environmental Significance

MSES

Matters of State Environmental Significance

Pacific Blue

Pacific Hydro Australia Developments Pty Ltd t/a Pacific Blue Australia
Developments

PHA

Preliminary Hazard Assessment

RAP

Reconciliation Action Plan

SCADA

Supervisory Control and Data Acquisition

SPP

State Planning Policy

TIA

Traffic Impact Assessment

TMP

Traffic Management Plan

Haughton BESS
19 June 2024

1.

Introduction

Pacific Hydro Australia Developments Pty Ltd trading as Pacific Blue Australia Developments Pty Ltd (Pacific Blue) is seeking a variation to the existing Development

Approval CONS17/0002 (DA), which allows for the construction and operation of the

Haughton Solar Farm (HSF) Stages 1 & 2 and a Battery Energy Storage System (BESS)

(Appendix A).

The first stage for the solar farm was completed in 2019 with a generation capacity of

100MWac and is supported by a 65MVAR Synchronous Condenser. Stage 2 of the Project

proposes a further 300MW of generating capacity that is adjacent to the existing asset.

Once constructed, it will increase the solar farms total energy output to power approximately 232,000 homes.

Pacific Blue is proposing to develop a 200 MW/400 MWh BESS adjacent to the existing

Haughton Solar Farm.

Whilst the BESS (the Project) is mentioned within the existing DA submission, detail

regarding size, location, operation, and potential impacts of the BESS were not highlighted. This report aims to detail these requirements to aid in the variation to ensure

that the Project meets regulatory, community and key stakeholder expectations.

In addition, Pacific Blue is requesting an extension of the currency period extension

request detailed in Condition 1.3 of the DA and in Section 8 of this report.

2.

Project location

The Project will be located adjacent to the Haughton Solar Farm, a large-scale solar

photovoltaic power station located in north Queensland's Burdekin Shire, 40 km west of

Ayr and 60 km south of Townsville (Figure 1).

Figure 1

Haughton BESS

19 June 2024

Haughton Solar Farm & BESS location

1

3.

Project summary

An indicative site layout of the Project is shown in Figure 2 (PDF provided in Appendix B).

Figure 3 outlines the site layout over the existing approved compounds from 'indicative

layout plan - figure 4' of the DA.

Project summary and details are summarised in Table 1 below.

Table 1

Project Summary

Project Component

Information

Battery capacity/duration

Battery capacity of 200 MW/400 MWh, connecting into a 275kV line via a 240/120/120 MVA transformer.

The BESS development (permanent footprint): ~53,020 m²

This is the measurement of the boundary fence for the BESS and for the BESS substation area combined:

- BESS area: ~46,280 m²
- BESS substation area: ~ 3,719 m²

Estimated Dimensions (approx.)

The battery containers are unlikely to exceed 3 m in height (inclusive of 100 mm height plinth). The inverter containers are unlikely to exceed 3 m in height (inclusive of 100 mm height plinth). Figure 4 provides a 3D render of the Project depicting the scale of the infrastructure against the completed HSF Stage 1.

New substation components within BESS permanent footprint may be up to 20 m in height but consistent with adjacent existing substation equipment. A new gantry may be required within the existing substation compound for facilitate the BESS's connection. If required, this gantry would also be consistent in form and height.

Site establishment works

The area has previously been levelled to provide a generally flat site, albeit with minor gradients to allow site drainage to balance cut and fill so that minimal or no import/export of soil/fill is required.

Native vegetation works

The site was previously cleared during the HSF Stage 1 civil works. There is estimated to be no to very low native vegetation removal.

Temporary construction areas

The temporary construction area, outlined in Figure 2, is to accommodate the laydown of additional construction materials, infrastructure and temporary car parking during construction phase.

Existing storage facilities

Climate controlled storage will be required for spare parts. The storage area is likely to be incorporated within or attached to the BESS's Operations and Maintenance building. Alternatively, existing facilities at the HSF may require minor expansion or re-configuration of to allow for climate controlled spare parts storage.

Access tracks

Access to the new areas will stem off the existing access tracks from HSF Stage 1. These will be unsealed tracks.

Perimeter fencing and screening

The new substation and BESS area will be fenced separately with clear entry access points marked.

Haughton BESS
19 June 2024

Figure 2

Haughton BESS Site Layout (also shown in Appendix B)

Figure 3

BESS layout over existing approved area layout
4

Figure 4

3D Render of the Project and associated infrastructure against HSF Stage 1

5

3.1

Haughton Solar Farm – Stage 2

The second stage of the Haughton Solar Farm (Haughton 2) will have a 300MWAC export capacity utilising centralised inverter technology with string combiner boxes, tilted axis tracking hardware and modern bifacial photovoltaic (PV) panels.

Haughton 2 will be located to the west of the existing Solar Farm utilising the available

land within the existing development area. PV arrays shall be laid out east to west and the

design shall generally utilise well-defined, repeatable blocks of consistent generating

capacity where topography and other site restrictions allow.

A new substation shall be comprised of two transformers, associated field equipment and

control buildings and will be located directly adjacent to the existing Solar Farm

substation as depicted in blue in Figure 2. Connection to the existing Powerlink Switching

station shall be via an extension of the network assets as shown in red in Figure 2.

An aerial view which encompasses all aspects of the Haughton Project is shown in Figure

5 below. Please note that this is only preliminary and meant to be for concept purposes.

Figure 5

Haughton Preliminary Aerial View

4.

Development cost, economic and community benefits

The expected capital cost of the development is approximately \$780 million across both

the Project and HSF Stage 2.

Pacific Blue will seek to encourage the procurement of local Queensland businesses by

weighting this requirement through the tendering process. The use of local labour and

contractors will also be supported and encouraged by working with the supply and install

contractors in publicising local recruitment and business opportunities.

Following

construction, it is expected that testing/commissioning will occur over a 6-month period.

Pacific Blue is completing and adhering to an Australian Industry Participation Plan under

the Australian Jobs Act 2013.

Periodic servicing, repair and maintenance of assets will either be managed by in house

Pacific Blue staff or through a locally based contracting team, creating the opportunity

for more technical service jobs in Queensland and regional locations as the total market

for energy storage products increases. BESS's, by their very nature are low maintenance

and typically require periodic maintenance or service visits (e.g. bi- annual).

The Project will continue to generate direct and indirect benefits for the local community,

the broader region, and beyond. In addition to the direct employment created through

the construction of the BESS facility, indirect economic benefits will be realised by

businesses. Those sectors/businesses expected to benefit during the construction period

are hospitality, accommodation, vehicle & fuel services, concrete suppliers, transport

operators, earthworks & fencing business, general labour and electrical services.

Pacific Blue values the support of the communities in which it operates and supports local

initiatives through our Community Benefit Sharing Program (CBSP). The CBSP provides a

portion of revenue from each of our operating renewable energy facilities back into our

host communities for the operating life of the facility (typically 20-25 years). Since the CBSP

was launched in 2005, over \$5 million has been provided to support over 1000 communityled projects across regional Victoria, New South Wales, South Australia and Queensland.

Since 2019, the Houghton Sustainable Community Fund has provided over \$300,000 to

support 52 community projects from the surrounding townships of Ayr, Brandon, Clare,

Dalbeg, Giru, Home Hill and Millaroo.

5.

BESS Key considerations and potential impacts

The Project is deemed to have low to negligible impacts to the environment and surrounding areas. Pacific Blue assessed key environmental and planning considerations for the Project, factoring in cumulative impacts that would occur from HSF Stages 1 & 2.

5.1

Aboriginal Cultural Heritage

Through initial work undertaken for the Haughton Solar Farm, Pacific Blue has a Cultural Heritage Management Agreement (CHMA) in place with the Traditional Owners, the Bindal People. The CHMA is being reviewed and revised due to the last update being completed 7 years ago. This is done in collaboration with the Gudjuda Reference Group advisors, a Bindal Elder and in accordance with the Aboriginal Cultural Heritage Act 2003 (ACHA Act).

Pacific Blue will work with the Bindal People and in accordance with the revised and finalised CHMA throughout all phases of the Project and HSF Stage 2. In addition, Pacific Blue engages Uncle Eddie, a Bindal Elder and Chair of the Gudjuda Reference Group, as an advisor and supporter to Pacific Blue's Reconciliation Action Plan (RAP) Working Group. Pacific Blue is currently in the process of completing and actioning our Innovate RAP, the next stage in Reconciliation Australia's action plan process.

5.2

Fire safety and hazards

Pacific Blue engaged SMEC and Advitech Consultants to undertake a Preliminary Hazard

Analysis (PHA) for the Project, provided in Appendix C.

The PHA factored in the safety hazards with evidence-based mitigation and fire intervention measures, inclusive of firefighting and emergency services considerations

against relevant state planning guidelines. A hazard workshop was undertaken in late 2023, in which:

- No risk scenarios were identified with a high-risk score, due to basis of design and proposed safeguards.
- Off-site impacts with potential are air quality impacts and site operational noise.

Site operational noise is detailed in Section 5.5 below.

From this workshop and factoring in key stakeholder concerns, mitigation measures to

reduce potential hazards will be:

- Development of an Emergency Management Plan/Emergency Response Plan for the potential risk of bushfire, particularly grass fires, to ensure protection of human life and the infrastructure assets.
- A fire break width of 10 m, in accordance with the Design Guidelines and Model Requirements for Renewable Energy Facilities (CFA Vic, v4 2023), to be provided around the perimeter of the development to mitigate risks & hazards to the facility and surrounding areas.

- Design, inclusive of fire water containment location & site layout to be reviewed and to the satisfaction of the Queensland Fire and Emergency Services Rural Fire Service Northern Queensland department.
- Relevant protocols and procedures to manage any unique hazards throughout all stages of the Project.

5.3

Flora and Fauna

Pacific Blue engaged AECOM in 2017 to undertake an ecological technical assessment for the development area. This formed part of the information that was submitted under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Referral (2017/8000) in 2017. The Project was determined to be Not a Controlled Action (NCA) and the boundary outlined within the original DA avoids significant vegetation, including Matters of State Environmental Significance (MSES) and Matters of National Environmental Significance (MNES).

The Project is in an area that was cleared for the construction and operational safety of HSF Stage 1.

Pacific Blue acknowledges that significant time has passed since this assessment and reengaged AECOM to undertake a reassessment of the HSF Stage 2 area to provide an updated ecological assessment. AECOM completed an environment due diligence assessment via a desktop and site visit on 16th April 2024 to verify and confirm the existing

information. The above results and recommendations are detailed in Ecological Due

Diligence Assessment Report (Appendix D). An overview of the report states:

- The ecological values present within the investigation area in 2024 were fundamentally the same as 2017.
- There are small areas of regrowth, but these however do not form a regional ecosystem.
- The Project may continue as described within the EPBC Referral without further assessment or consultation with the Department of Climate Change, Energy, the Environment and Water (DCCEEW).
- It is recommended that the site has the presence of suitably qualified fauna spotter/catcher during clearing activities.

The above factors in the regulation changes that will be occurring under the EPBC Act reform.

5.4

Surface water and drainage

The Project area is adjacent to the Haughton River, Piccaninny Creek and Oaky Creek.

Drainage design will be incorporated and finalised during the detailed design stage of the Project, ensuring that cumulative impacts from both stages of the Solar Farm are considered.

As the site is located in the Flood Hazard Area – Level 1 – Queensland floodplain

assessment overlay an initial flood impact assessment for the entire development area

was undertaken as part of the 2017 DA application. The assessment found that the proposed development is not anticipated to cause any significant impact. Further assessment against this overlay is provided in Table 2 in Section 6.1.

Through experience with operating HSF Stage 1 and discussions with stakeholders within

the area, the proposed development area drains efficiently due to the advanced irrigation scheme within the area. Drainage design and stormwater mitigation measures

will be included during the detailed design stage of the Project.

5.5

Noise

Pacific Blue engaged SLR Consulting to undertake an acoustic modelling assessment,

which is provided in Appendix E.

There are 6 identified noise sensitive receivers to the site, with the closest being 3.3 km away (Figure 6). Day time and Night-time compliance is achieved at all receptors when the BESS is operating. Mitigation measures will still be considered but not deemed necessary for the Project.

Noise will be generated during the construction of the Project, however due to the nature of the surrounding rural land uses and the distance to sensitive receivers, it is deemed that the Project will not create any noise nuisances. Whilst this is the case, potential noise impacts during construction will be mitigated through implementing a Construction Environmental Management Plan (CEMP), including the following mitigation measures:

- Commencing any particularly noisy part of the activity (such as masonry sawing or jack hammering) after 9:00 am.
- Locating noisy equipment (such as masonry saws or cement mixers) or processes so that their impact on neighbouring premises is minimised, whether by maximising the distance to the premises, using structures or elevations to create barriers or otherwise.
- Shutting or throttling equipment down whenever it is not in actual use.
- Ensuring that noise reduction devices such as mufflers are fitted and operating effectively.
- Operating equipment and handling materials to minimise impact noise.

Figure 6

Sensitive Receivers

11

5.6

Landscape and visual

The Project is not located near (and not visible from) existing public roads, with the nearest township, Clare, being 17 km away. Nearby land uses consist of sugar cane

farming, cattle grazing, water storage and irrigation channels.

Pacific Blue will aim to ensure that external finishes of the battery containers comprise of neutral, low reflective colours that are consistent with the surrounding buildings and environment.

5.7

Traffic

Pacific Blue engaged SLR Consulting to review the 2017 Traffic Impact Assessment (TIA)

that was prepared for the original DA and provide advice on its suitability for the Project

and HSF Stage 2. the

SLR assessed the below (but not limited to) factors in relation to the Project:

- Potential construction vehicle fleet.
- Traffic generation of both projects.
- Transportation routes.
- Construction worker arrangements.
- Road hierarchy & existing conditions.
- Traffic count data.
- Crash records.

Details of the above can be found in the technical memorandum provided by SLR in Appendix F.

SLRs assessment concluded that additional traffic from the construction of the BESS will

result in a modest incremental increase in traffic impacts from what was detailed in the

2017 TIA and is therefore causing no significant disruptions to the existing road network.

Pacific Blue and its chosen contractor will ensure that traffic impacts are mitigated

through an approved Traffic Management Plan, which is further detailed below.

5.7.1

Road and traffic conditions

The Project site is accessible via Keith Venables Road, traversing through Upper Haughton

Road and Barratta Road. Conditions 6.1 to 6.5 of the DA have been met through the

construction of HSF Stage 1.

Pacific Blue obtained a development permit for operational works (OPW20/0002) to widen and strengthen the bridge that crosses the Sunwater channel on land adjacent to

Lot 5 on SP107479 and located at Keith Venables Road, Upper Haughton. This work was

completed in 2023 with approval provided by Council.

This upgrade will support the type and volume of the proposed construction traffic for the

Project and HSF 2, alongside local traffic.

5.7.2

Mitigation measures

In accordance with Condition 12.2 of the DA, the below will be considered in the

Projects

construction Traffic Management Plan (TMP):

- A dilapidation survey along the route that will carry Project related traffic to be

conducted prior to the commencement of construction to provide a baseline of pre-construction road conditions to be maintained during and at the conclusion of the construction works. This is to be done in conjunction with the Haughton Solar

Farm Stage 2 construction.

- Warning signs to be erected at junctions.

- Regular communications, with both contractors and the community will be established, to discuss safety risks, transport schedules, changing road conditions and address any complaints that may arise during the construction period.
- Travel will be discouraged during extreme adverse weather conditions and periods of low visibility, including night-time.
- TMP to factor in details of construction & operation, further detailing traffic routes, safety hazards and community & stakeholder engagement/notifications.

6.

Planning assessment

The Project was granted approval (CONS17/0002) on 15 June 2017 under Section 78 of the Planning Act 2016 (Planning Act) and had an approved change application pursuant to Section 27 of the Planning Act on 12 th November 2019 (Appendix A). The original application was assessed under the Burdekin Shire IPA Planning Scheme 2011. The Projects original application was assessed against the rural zone code under the Burdekin Shire IPA Planning Scheme 2011.

Since the application, the Burdekin Shire Council has developed the Burdekin Shire

Planning Scheme 2022 (2022 Planning Scheme), which commenced on 1 March 2023 and supersedes the 2011 Planning Scheme.

The 2011 Planning Scheme did not factor in key state planning provisions, in which the

2022 Planning Scheme now does. Through completing a reassessment under the 2022 Planning Scheme, Pacific Blue has assessed:

- State Planning Policy (SPP) July 2017.
- Northern Queensland Regional Plan.
- Planning Regulation 2017.

It is key to note that this development application variation is deemed to still not require referral to the State Assessment Referral Agency (SARA).

As the Project is not extending beyond the approved development boundary, it has been

confirmed by the Regulatory Authority that the assessment will result in a minor change

variation application to CONS17/0002.

6.1

Burdekin Shire Planning Scheme 2022

The 2022 Planning Scheme focuses on providing a thriving economy, lifestyle and environment within the Burdekin Shire area.

The Project is considered to achieve the above strategic intents through:

- Enhancing and facilitating diversified growth of Burdekin's economic development through substantial job growth during construction, expanding into other service industries within the community.
- Seeking to retain the natural biodiversity of the subject site which features a

watercourse and associated vegetation on the southern and eastern boundaries.

- Being located in an area to have significantly limited visibility from the public roads

or residential dwellings that are neighbours to the Project, thus minimising any potential visual impacts to the wider community.

Pacific Blue has provided a review of the Project against the 2022 Planning Scheme in

Table 2 below.

Table 2

Planning Assessment against 2022 Planning Scheme

Area

Desired Outcome

Response

Maintain the capacity of

land for rural uses and activities, to ensure that rural land will be used sustainably to ensure the viability of the primary production base.

The Project remains located within a rural zone. Following Table 3.4.9 – Rural Zone of the 2022 Planning Scheme, a 'use not listed in this table' within the rural zone is 'impact assessable' against the entire Planning Scheme. In accordance with 4.2.9.2.(j)(v). of the 2022 Planning Scheme, industries which may

Zones

Rural Zone

Area

Desired Outcome

Response

establish in the rural zone include renewable energy facilities.

Pacific Blue will work with the community and key stakeholders to ensure that during construction and operation of the Project & HSF Stage 2, key rural uses e.g. sugarcane harvesting, will be able to operate as usual and won't be impacted through normal construction activities i.e. delivery of materials to site.

Overlay

Development within areas at risk from bushfire is designed to reduce exposure and disruption, ensure safety of the community and environment.

Bushfire

Hazard

Overlay -

Medium

The development does not result in a material increase in the severity of the bushfire hazard, risk to public safety or the environment.

Whilst the project footprint within the Development Area is not located within a bushfire hazard overlay, it is surrounded by medium potential bushfire intensity (inclusive of the potential impact buffer).

Even though the Project is not located within this overlay, Pacific Blue will still ensure mitigation measures and operational practices are in place, in line with details provided in Section 5.2.

The development area is not currently used for high value agricultural cropping purposes.

Good quality
agricultural
land

Flood Hazard

Area - Level

1-

Queensland
floodplain
assessment
overlay

6.2

Protection of agricultural
production to ensure

Burdekin remains its strong and diverse rural economy.

Development in a flood hazard area avoids the risk of flooding. Development to be compatible with the level of flood risk affecting the site and risk to life and property is minimised.

Pacific Blue currently allows the agistment of cattle within a small proportion of the land within the development area but will end this arrangement prior to the construction of the second stage of the solar farm.

The current land use classification will not impact on the long-term use of the land for the purposes of agriculture or rural uses due to the limited-on site impacts that the Project causes. Further to Section 5.4, through the experience of operating HSF Stage 1 and discussions with stakeholders within the area, the proposed development area drains efficiently because of the advanced irrigation scheme within the area.

Pacific Blue will aim to ensure that our General Environmental Duty (GED) to prevent water contamination into the local streams are mitigated.

Other Approvals

In addition to adhering to the Planning Act, Pacific Blue will work in line with other legislative requirements as detailed in Table 3 below.
Table 3

Relevant Legislations Assessments

Act/Legislation
Vegetation
Management Act 1999
(VMA)

Assessment

The Project has been designed to avoid native vegetation and only impacts Category X (non-remnant vegetation which is not regulated under the VMA).

No further approval is required.

Aboriginal Cultural
Heritage Act 2003
(ACHA Act)

Environment Protection
and Biodiversity
Conservation Act 1999
(EPBC Act)

Transport Infrastructure
Act 1994

A CHMA is in place between the Bindal People and Pacific Blue. All works will be completed in accordance with this CHMA. Ongoing collaboration will continue with the Bindal People in line with the revised CHMA and in Pacific Blue's daily operations.
EPBC Ref: 2017/8000. The Federal Government declared that the proposed action of establishing and operating a solar farm with battery energy storage facilities at Upper Haughton is not a controlled action.

Due to the site being previously cleared for the HSF stage 1, another referral is deemed as not necessary.

Pacific Blue and chosen EPC Contractor will adhere to this Act and the conditions outlined in the DA for all works. In accordance with Condition 12.2 of the DA, a Transport Management Plan (TMP) must be prepared in accordance with the TIA and by a Registered Professional Engineer of Queensland.

Pacific Blue and chosen EPC Contractor are required to adhere to the EP Act and its duties, including:

-

Environment Protection
Act 1994 (EP Act)

-

GED – a person must not carry out any activity that causes or is likely to cause environmental harm, unless measures to prevent or minimise the harm have been taken; and
duty to notify of environmental harm – to inform the administering authority and landowner or occupier when an incident has occurred that may have caused or threatens serious or material environmental harm.

Pacific Blue has actively avoided areas that contained MNES & MSES.

7.

Operations and decommissioning

7.1

Operations

During its operational life, the Haughton BESS is expected to provide numerous network services including energy arbitrage, Frequency Control Ancillary Services (FCAS) and system strength services. To ensure this facility can provide continuous services, it will require an operations team to maintain the sites upkeep. Whilst the site is intended to be an unmanned site during day-to-day operation, it will be expected that this Operations team attend the facility for both preventative and corrective maintenance from time to time. In saying this, whilst the BESS will be unmanned during its day-to-day operations, staff members will be present on the Haughton site for solar farm activities and will be able to action if a hazard or safety incident occurs. Preventative maintenance is likely to include regular housecleaning and site checks, periodic enclosure cleaning & filter maintenance and annual battery performance testing. Corrective maintenance is likely in response to a loss of output capacity from a defective or failed component in the power conversion system (inverter), the BESS (energy storage) system or an ancillary system that is detected by the facilities Supervisory Control and Data Acquisition (SCADA) system. The operations team is likely to consist of a small, contracted workforce engaged by the main construction contractor on behalf of Pacific Blue to perform or manage the abovedescribed activities. Given the remoteness of the site, this team is likely to be based in the nearby regional centres such as Ayr or Townsville.

7.2

Decommissioning

The Project is anticipated to have an operational life of approximately 15 to 20 years. When the Project has reached the end of its life, the facility will be decommissioned, which will likely involve:

- Dismantling and removing infrastructure – both BESS and associated infrastructure.
- Rehabilitation of the site.

Pacific Blue will be responsible for the decommissioning of the Project and will follow a Decommissioning Management Plan (DMP), which is proposed to be prepared just prior to when the decommissioning will occur. The DMP and associated works will be undertaken in accordance with the applicable regulations. Battery modules are able to be replaced throughout the operational life of the facility. Pacific Blue commits to sustainable practices, and will, where possible, recycle plant material (steel & concrete) and recover electronic equipment (e.g. inverters,

control
systems etc). Towards the end of the life of the BESS project, Pacific Blue will
seek input
from all relevant stakeholders regarding the next phase for the established site
and
potential recycling of plant material.

8.

Extension of Time Request

Pacific Blue is seeking a 3-year extension to Condition 1.3 of the DA:

'Pursuant to s342 of the Sustainable Planning Act 200, the uncompleted aspects of this

development approval lapse if the whole of the approved use has not happened by 20th June, 2025 (8 years)'

Pacific Blue is requesting an extension from the 20th June 2025 to 20th June 2028. This will

allow for the completion of both HSF Stage 2 and the BESS. Both projects will form a critical

link in the Queensland Governments 2030 push for 70% renewable generation.

8.1

Reasoning

During the construction of HSF Stage 1, the onboarded Principal Contractor went into

receivership, requiring the Pacific Blue project team to step in to recover the project. This

resulted in a delayed completion of the project with some obligations not fully resolved

until 2023. Additionally, and most significantly, after the commissioning of the first stage of

the Haughton Solar Farm, the COVID-19 pandemic hit world markets and devastated supply

chains which directly impacted on the financial viability of both solar and BESS projects

globally.

Consequently, many energy projects nationally and internationally were delayed or

slowed down until the economics of progressing projects again made sense. During this

period, the project team continued to focus on geotechnical and concept design to

ensure that appropriate technologies and technical solutions were being considered and

could be actioned once projects were able to progress again.

With increasing demand for renewable energy driven by the Queensland Government and supply chains showing signs of improved resilience, both HSF Stage 2 and the BESS

are now progressing through the grid connection process.

Pacific Blue in mid-to-late 2024 is seeking to commence the contractor selection process.

Once a contractor is selected for each project, detailed design and preconstruction

activities will commence in the leadup to a final financial investment sanction.

8.2

Preliminary Schedule

An estimated and high-level schedule for both HSF Stage 2 and the Project is provided in

Table 4 to 5 below. Please note that this is preliminary at this state and may be subject to

change.

Table 4

Haughton BESS Approximate ~Construction Timeframes

Action

Duration

~Start

~Finish

Site access, preliminary civils, site setup etc.

12-weeks

July 2026

Oct 2026

Construction

11-months

Dec 2026

Oct 27

Commissioning

6-months

Oct 27

Apr 28

Table 5

Haughton Solar Farm Stage 2 ~Construction Timeframes

Action

Duration

~Start

~Finish

Site access, preliminary civils, site setup etc.

14-weeks

Nov 2025

Jan 2026

Construction

17-months

Jan 2026

May 2027

Commissioning

6-months

May 2027

Sept 2027

9.

Conclusion

This report has been prepared to support a variation application request to Development

Authorisation (CONS17/0002) which allows for the construction and operation of the

Haughton Solar Farm Stages 1 & 2 and a Battery Energy Storage System.

DA (CONS17/0002) provided approval for a XXXMW Solar Farm and BESS Facility. Now that

further information is known about the BESS facility, the existing approval can be updated

to reflect the latest design layouts and BESS sizing. The key components of the Project and

the DA area, remains unchanged from the previously approved DA.

The Project provides a positive outcome for the surrounding area and provides a development opportunity that complies with the relevant provisions of the Burdekin Shire

Planning Scheme 2022 and other legal instruments.

Updated hazard, acoustic and traffic assessments show that the Project will not introduce

any additional environment impacts. In addition, the Project is:

- Considered to be a compatible land use with the rural area and will not have any

negative impacts on the surrounding land uses.

- Project has been sited to ensure minimal visibility from public roads, including the

Bruce Highway and non-landholder residential dwellings.

- Projects layout has been designed to avoid impacts to remnant native vegetation and wetlands.

- Substantial job growth within the region during the construction and operational

phases that will expand into other service industries within the community.

The number of materials required during the construction of the BESS will result in an

incremental increase in traffic and transport impacts. This is mitigated through previous

upgrades to the road network occurring in line with the original DA for HSF Stage 1 and

varying delivery timeframes for the construction of HSF Stage 2 and the BESS.

The Project will make a positive contribution to the Burdekin region and represents an

investment of \$780 million. Direct employment opportunities will be created through the

construction phase of the Project and indirect benefits are expected to be realised by

local and regional businesses in many sectors. In addition to these benefits, Pacific Blue

will continue to support local initiatives through our Community Benefit Sharing Program

that has to date provided over \$300,000 to local community projects since HSF Stage 1

commenced operations.

To ensure that the Project is delivered sufficiently and without major disruptions to the

environment and community, Pacific Blue requests a three-year extension against Condition 1.3 of the original DA. This is stemming from delayed construction due

to Covid19 and the onboarded Principal Contractor for HSF Stage 1 entering receivership.

Variation approval for both the BESS sizing details and extension of time request is

respectfully recommended subject to appropriate conditions that ensure best practice

environmental outcomes.

Appendix A

Development Approval CONS17/0002

10
5
2, 18

5

3, 39

3, 49

13, 42

5

2, 54

7, 9

10
3, 2

5

3, 09

37, 59

10

5

37, 59

12

CONTROL/

AMENITIES

BUILDING

WT

5

, 8
7

Fan
1
Fan

Fan

2

10

Fan
Fan

3
9

4

Fan

Fan

8

5

Fan

Fan

7

10

Fan

5

C

6

z

c2

bar

b2

EB2

EB2

B

Earthing

EB2

EB1

a2

EB1

EB1

NB

c1

b1

a1

A

N

37.184

Fan

1

2

Fan

Fan
10

Fan
3

Fan
9

Fan
4

Fan
8

Fan
5

Fan
7

C
Fan
6

Z
Earthing
EB2

B

c2

bar
EB2

b2

EB2
EB1

a2

EB1
NB

EB1

c1
b1
a1

A
N
36.824

N

EB

EB

M

Fan
1

2

Fan

Fan
10

3

Fan

Fan
9

4

Fan

Fan

8

5

Fan

Fan

7

C
Fan
36.691

6

c2

e

b2

EB2
EB1
EB1

Gat

EB2

a2

EB2

B

bar

37.231

Z
Earthing

EB1
NB

Gat

e

37.231

36.658

35.555

c1
a1

36.653

b1

A
36.157

36.705

N

5

36.573

36.909

35.554

36.924

36.936

2.2m

35.823

ce
en
hF
Hig

35.541

35.399

36.738

37.005

A
B
35.383
35.814

C

n

a

bc

36.705

35.655

35.970

36.906

35.729

35.380

35.630

36.641

10

35.770

36.651

36.632

35.693

35.634

35.689

35.539

36.679

35.616

35.446

10

35.482

10

35.377

35.404

13,82

3,89

5

547,7

5

44,83

C ABN 47 065 475 149

LEVEL 6, 480 ST PAULS TERRACE
FORTITUDE VALLEY QLD 4006

SMEC PROJECT No 30032699

Appendix C

Preliminary Hazard Analysis

22

Report

Preliminary Hazard Analysis
for Battery Energy Storage
System (BESS)
Haughton 2 BESS - QLD

Prepared for:
Pacific Blue c/o SMEC Australia

Prepared by:
Advitech Pty Limited
Job: AV-J-231373, Folder: F23217
Revision: 2 (Final) 24 April 2024

A member of Emergent Group

Document Details

Preliminary Hazard Analysis for Battery Energy Storage System (BESS)

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5-04-2024

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2

Final Issue (revised site layout and client commentary)

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23217 SMEC Haughton BESS PHA Rev2.docx | Final

Executive Summary

Advitech Pty Limited (Advitech) was engaged by SMEC Australia (SMEC), to prepare a Preliminary Hazard Analysis (PHA) for a large-scale battery energy storage system (BESS) located in Upper Haughton, QLD.

The proposed BESS has a capacity of 200 MW / 400 MWh and will be developed next to the Haughton

Solar Farm, located on Keith Venables Rd, Upper Haughton QLD 4809. Advitech understands that Pacific

Blue Australia (Pacific Blue) have submitted a Change Application for the proposed large-scale BESS

being developed by Pacific Blue.

This report was prepared by Advitech at the request of Pacific Blue and SMEC to address the Burdekin

Shire Council (Council) which have requested that:

The safety hazards are addressed with evidence-based mitigation and fire intervention measures

including any firefighting and emergency services considerations.

A qualitative PHA assessment was undertaken to determine their potential for off-site impacts. The PHA

was carried out with reference to the relevant state planning guidelines:

☞

QLD State Development Assessment Provisions, State code 21: Hazardous chemical facilities;

☞

NSW Department of Planning, Hazardous Industry Planning Advisory Paper (HIPAP) No. 6, Hazard Analysis; and

☞

NSW Department of Planning, Assessment Guideline: Multi-Level Risk Assessment.

In the absence of state-specific guidelines, the HIPAP guidelines are frequently utilised for preliminary

hazard analysis in Queensland and other state jurisdictions.

From the hazard identification (HAZID) workshop undertaken on the 15th of November, 2023, there were

no risk scenarios identified with a high-risk score. Of the 17 scenarios identified and discussed during the

workshop, all 17 scenarios were assigned a low-risk score on the basis of design and proposed

safeguards. Following submission for review, an additional scenario was included (i.e. the impact of a

cyclone). This scenario was also given a low-risk score. Risk scenarios were also assessed in terms of

potential off-site impacts as well as the potential to result in an escalating domino event. The risk

scenarios considered to have potential for off-site impacts include:

☞

Air quality impacts (toxic fumes and particulates) caused from potential fires within a BESS unit or

from a transformer or electrical fire (in the substation yard); and

☞

General site operational noise (i.e., noise from BESS or substation whilst under normal working conditions).

However, the proximity to the nearest sensitive receptors is approximately 2.7 kilometres (km) away, and the potential impact to any receptors has been assessed by an independent noise impact assessment report and determined there will be no adverse impact to sensitive receptors. Prior to the construction of the proposed BESS facility, the following recommendations (as identified during the PHA) should be undertaken. The recommendations include development of the following additional analysis or plans:



Fire water containment design.



Battery management plan.



Relevant protocols and procedures to manage any unique hazards and risks during the installation and commissioning stages of the project.



Fire management and emergency plans.



Ventilation system design verification.



Spill management plan.



On-site traffic management plan.

The PHA has demonstrated that if the recommendations of the hazard assessments above are addressed, the development will meet all the performance outcomes of the QLD SDAP State code 21.

23217 SMEC Haughton BESS PHA Rev2.docx | Final

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3

1.

Introduction

Advitech Pty Limited (Advitech) was engaged by SMEC Australia (SMEC) to prepare a Preliminary Hazard Analysis (PHA) for a large-scale battery energy storage system (BESS) located in Upper Haughton, QLD.

The proposed BESS has a capacity of 200 MW / 400 MWh and will be developed next to the Haughton

Solar Farm, located on Keith Venables Rd, Upper Haughton QLD 4809. Advitech understands that SMEC

has submitted a Change Application for the proposed large-scale BESS being developed by Pacific Blue

Australia.

This report was prepared by Advitech to address the Burdekin Shire Council (Council) has requested that:

The safety hazards are addressed with evidence-based mitigation and fire intervention

measures, including any firefighting and emergency services considerations.

It should be noted that this report was prepared by Advitech Pty Limited for Pacific Blue c/o SMEC

Australia ('the customer') in accordance with the scope of work and specific requirements agreed

between Advitech and the customer. This report was prepared with background information, terms of

reference and assumptions agreed with the customer. The report is not intended for use by any other

individual or organisation and as such, Advitech will not accept liability for use of the information

contained in this report, other than that which was intended at the time of writing.

2.

Site Details and Surrounding Land Use

2.1

Location

The customer is currently seeking approval for the large-scale BESS located in Upper Haughton, located

within the Burdekin Shire Council area QLD. The site is located approximately 50 km west of Ayr and

80 km southwest of Townsville. The total area of the proposed BESS facility is approximately 37,000 m²,

located in the northeast corner of the current Haughton 1 Solar Farm. As it is collocated with the Solar

Farm, the access road has already been developed. Figure 1 presents the proposed BESS facility in

relation to the Haughton Solar Farm and the substation. Additional details of components located within

the site (i.e., BESS units), refer to the site plan presented in Appendix C.

Figure 1: Site Location (Ref 18)

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Surrounding Land Uses

2.1.1

The proposed BESS facility is located within the Burdekin Shire Council area. The site itself is classified as 'Rural', as defined from Burdekin Shire Planning Scheme Zone Map - ZM1.0 2021 (Ref 6), with the properties surrounding the proposed development all being similarly classified. There are a low number of rural residences in the directly locality. The Haughton Solar Farm has been undertaken in stages. The first stage (dubbed 'Haughton 1') was completed in 2019, which included a solar array with generating capacity up to 165 MW. The next stage proposed is set to include an additional 300 MW Solar generation capacity (Haughton Solar Farm 2), a large-scale BESS with 200MW/400MWh of storing capacity, ancillary 33 kV substation and operation and maintenance (O&M) building. Haughton 1 currently occupies Lot 1 SP 313057. With the proposed upgrades, Haughton Solar Farm 2 is set to extend over Lot 2 SP 313057, while the Powerlink Substation to Lot 7 SP 302825. The large-scale BESS is to be located within the existing boundaries of Lot 1 SP 313057 which will be subdivided in the future. Figure 2 presents the general staging layout.

Figure 2: 'Haughton Solar Farm 1', 'Haughton Solar Farm 2' and Haughton BESS - General Staging Layout

The following sites/features surrounding the proposed BESS facility include:

2.2



The closest residential receptor is located approximately 2.7 km to the west of the development area (western extremity);



Another residential receptor is located approximate 7.5km northwest of the BESS facility;



Approximately 30 km to the northeast lies the (small) township of Giru. Giru is largely rural/residential with a number of small businesses and a school; and



A creek (Oak Creek) lies to the south and south-east of the proposed BESS facility.

Proposed Development Description

The proposed layout of the BESS facility is presented in Figure 3 , and reproduced in Appendix

Appendix C.

C The

development includes the installation of 144 battery energy storage system

(BESS) containers, storing approximately 498,000 cells onsite. Based on information provided by SMEC [Ref 19], the cells are a

23217 SMEC Haughton BESS PHA Rev2.docx | Final

lithium iron phosphate (LFP) chemistry, manufactured by XYZ Storage Technology Corporation LTD (XYZ Storage Technology). Each cell has a nominal voltage of 3.2 V and nominal capacity of 306 Ah (approximate capacity of 979 Wh). As per Section 4.3, 4.3 the PHA has been undertaken on the basis of the Haughton BESS facility utilising XYZ based products. Throughout this document 'XYZ Storage Technology', 'XYZ battery technology', or just 'XYZ' has been used to reference the manufacturer of the BESS technology.

Figure 3: Proposed Site Plan (as adapted from Drawing Number: HSF-SMEC-EL-DWG-021_F, Appendix C)

The proposed BESS facility is located in the Burdekin Shire Council area and is surrounded by open rural land with a low number of rural properties. The proposed expansion of the substation lies directly adjacent to the already existing Haughton Solar Farm, and southeast from the proposed BESS facility development. Due to the region, there are a limited number of neighbouring residential dwellings in the direct locality. A small house is located approximately 2.7 km to the west-southwest of the Haughton Solar Farm, and a small cluster on the north of the proposed development, approximately 3.5 km away. The BESS facility consists of the following elements:



144 BESS containers, spaced approximately 3 m apart;



72 power conversion units (PCUs) with one ring main unit (RMU) per PCU. Each PCU connects to 2 adjacent BESS containers;



Dedicated operational and maintenance (O&M) building, with limited storage for spares and depleted/damaged modules;



A 33 kV / 275 kV substation, with step up connections on site and a 275 kV connection on the transmission network connection point (TNCP) switchyard; and



Control and switchroom building.

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Battery Storage Details

2.2.1

The Haughton BESS facility includes a large-scale outdoor BESS and associated infrastructure, comprising of 144 BESS units. The 3.384 MWh battery compartment system is a modular fully integrated system, consisting of lithium iron phosphate (LFP) cells. Figure 4 presents a visual representation of a typical XYZ 3.384 MWh BESS container. The 3.384 MWh container consists of the following components, as defined within the XYZ technical documents (Ref 19 & 20):



Battery pack system including modules;



Container box;



Battery management system (BMS);



Fire-fighting system;



Thermal management system (TMS);



Liquid cooling unit and piping system; and



Auxiliary (support) power supply.

Figure 4: XYZ 3.384 MWh container (with external walls and doors) (Ref 19)

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2.2.1.1

Battery Modules

The fundamental unit of all batteries, both small and large scale, is the battery cell. The XYZ BESS utilise a lithium iron phosphate (LiFePO₄) chemistry. According to the manufacturer, the XYZ containers have approximately 48 cells per module, 8 modules and 1 switchgear per cluster and 9 clusters per container, for a total of approximately 3,500 cells per container. Each cell has a capacity of 306 Ah. Figure 5 presents a visual representation of a typical battery cluster within a container.

Figure 5: Battery Cluster (Ref 19)

2.2.1.2

Battery Management System

The BMS is the most important control unit of the containerised system. It is able to manage the energy absorption and release of individual cells, monitor the TMS and low voltage power supply, including the cell voltage level, current and temperature. The BMS is installed in each of the battery clusters. This approach provides a more tailored and effective method to monitoring, fault detection and energy management of each cluster, contributing to the overall reliability and performance of the energy storage system. The BMS is also connected to an uninterruptible power supply (UPS), internal to the BESS container. Further details of control and management systems are presented in detail in Section 5.1.

5.1

2.2.1.3

Fire Suppression System

The fire suppression system (FSS) has the key function of monitoring for abnormal conditions that may cause potential fire hazards (e.g., thermal runaway), through the detectors installed within the container. Should a fire event arise, the FSS will engage fire suppression measures to keep the potential loss to a minimum. Further details of the prevention measures are detailed in Section 5.1.

5.1 The FSS is independent

of all systems within the container and has its own auxiliary power supply to continue to operate during the loss of external power.

The FSS consists of the following components:



Pack level detection and spraying;



Entire compartment immersion;



Water fire-fighting piping; and



Three-stage fire extinguishing, including in-pack detection, water fire-fighting piping and other installation services stored-pressure type tank, equipped with a fire-fighting data centralised controller.

2.2.1.4

Thermal Management System

Each unit has a thermal management system (TMS), to maintain the battery cells within ideal operating temperature. The system utilises an ethylene glycol mixture as a heat transfer fluid. At one end of the container is a chiller unit and positive temperature coefficient (PTC) heating element, with internal piping distributed across each module of the container. In addition, thermal protection is incorporated into the battery design at each level (i.e., pack, cluster, container levels) (Ref 19).

3.

Hazardous Chemicals and Dangerous Goods

Materials that are expected to be stored on site are listed under Table 1 . Details including United Nations (UN) Number, Global Harmonised System of Classification (GHS), Australian Dangerous Goods Code (ADG Code) class and packing group (PG), alongside quantities of materials to be stored where applicable, are given as reference of potential hazards that may arise from the store. It should be noted, the proposed Haughton BESS facility will not store large quantities of materials classified as a Hazardous Chemical (HC) or a Dangerous Good (DG). The largest quantity is that of the Lithium Iron Phosphate (LFP) cells, which under the ADG Code [Ref 1] are classified as 'Class 9 - Miscellaneous'.

Table 1: Hazardous Chemicals and Dangerous Goods to be stored at the Haughton 2 BESS Facility
Material 1

UN Number

GHS classification

Class and Packing
Group

WHS Regulation 4

Quantity to be
stored

Largest Individual
Quantity
Cell – 5.5 kg
Module – 264 kg
(48 cells)

Lithium Iron
Phosphate Cells

3480

NA

9

NA

Cluster – 2.1 t
(8 modules)

2,737 t

Container – 19.0 t
(9 clusters)
Overall – 144
containers
Fire suppression
aerosol
(perfluorohexanone)²

-

Transformer Oil
(mineral oil)

-

Ethylene Glycol
Coolant³

NA

NA
Flammable Liquid
Category 3
Acute toxicity
Category 4

Container – 35 kg

NA

NA

5t

3 PG III

50,000 t

180 kL / 150 t

Main tank – 60,000 L
per transformer

NA

NA

57.6 t

Container – 400 kg

Overall – 5.04 t

Note:

1

: Materials defined from resources provided by SMEC.

2

: No SDSs was found / supplied for the fire suppression aerosol. With consideration to similar product available for BESS units, it has been assumed to be not overtly hazardous/dangerous and should not cause significant harm to people (as it will be contained within the BESS container).

3

: From the review of documents, Advitech understands the BESS units are liquid cooled, with each container having its own closed loop system.

4 Threshold quantity for major hazard facility status.

NA: Not applicable (or not available) with reviewed documentation

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4.

Hazard Identification

4.1

General

The aim of the hazard identification process is to highlight any residual risks after incorporating the proposed project design safeguards associated with the interaction of Pacific Blue's proposed battery storage facility with the surrounding environment. A qualitative PHA assessment was undertaken to determine their potential for off-site impacts. The PHA was carried out with reference to the relevant state planning guidelines:

☞

QLD State Development Assessment Provisions, State code 21: Hazardous chemical facilities [Ref 2];

☞

NSW Department of Planning, Hazardous Industry Planning Advisory Paper (HIPAP) No. 6, Hazard Analysis [Ref 22]; and

☞

NSW Department of Planning, Assessment Guideline: Multi-Level Risk Assessment [Ref 23].

In the absence of state-specific guidelines, the HIPAP guidelines are frequently utilised for preliminary hazard analysis in Queensland and other state jurisdictions. Hazard identification is a systematic process designed to identify potential hazardous events, their causes and consequences (in qualitative terms). During this process reference is also made to the proposed operational and organisation safeguards that would prevent such hazardous events from occurring, or should they occur, that would protect the site, its equipment, people, and the environment. This process provides an in-principle understanding of the adequacy and relevancy of proposed safeguards. A range of possible hazard scenarios were developed and ranked in terms of qualitative risk in consultation with relevant stakeholders.

Objective

4.2

The objectives of this PHA include:

☞

Identification of plausible hazard scenarios associated with the development of the Haughton large-scale BESS facility;

☞

Analysis of the consequences (effects) for the people and the environment and outline the protective controls for each plausible hazard scenario;



Assessment of relative risks and potential for off-site impact, including risk to surrounding land users and environment;



Evaluate whether the proposed safeguards are adequate and assess whether the operation will not impose a level of risk that is intolerable with respect to its surroundings;



Of the plausible hazards identified, undertake a qualitative assessment to determine their potential for both on-site and off-site impacts; and



Identification of further investigations required where current information is not comprehensive and/or complete.

Assumptions

4.3

In undertaking hazard identification, a number of assumptions were made. These include:



The PHA has been undertaken on the basis of the BESS containers to be installed on site are that of XYZ Storage Technology 3.384 MWh units. Advitech understands a final decision is yet to be made on the model and supplier for the BESS units. Should a decision be reached, new risks may be present from an alternate BESS unit, and as such, cause for a further PHA and hazard identification session may need to be undertaken;

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4.4



The operation and maintenance (O&M) building, substation utility area, BESS and transformers are built and to be designed in accordance with appropriate Australian and International Standards, codes and guidelines;



The location and layout of the proposed BESS facility is as provided. See layout drawing in Appendix C;
C



All equipment, systems and infrastructure on site will be designed to relevant Australian and International standards;



The proposed BESS ethylene glycol cooling system is capable of maintaining the BESS battery cell operational temperature to within XYZ Storage Technology specified limits;



The firefighting methodology is based on a hierarchical system; detection and alarm notification, fire suppressant, and in the event the fire cannot be managed, water can be directly applied through the container sprinkler system. The fire management plan is yet to be formalised;



During the construction and commissioning of the facility, the BESS safety or hazard reduction systems are fully operational and reflect the safety performance of the final design. It should be noted, the commissioning plan is yet to be formalised; and



The hazard identification workshop focused on the operational stage of the BESS project, and examined the general risks encountered during construction or commissioning. Site specific construction or commissioning stage risks were not discussed in detail as plans for these project stages were not available at the time of the hazard analysis.

Methodology

The hazard identification was conducted in the form of a structured workshop, facilitated by Advitech and attended by SMEC and Pacific Blue personnel. The facilitated workshop was conducted on 15 November and covered a broad range of potential hazards. Each hazard was assessed with the goal of

identifying the risks requiring further consideration. The objective of the risk assessment workshop was to identify and evaluate risks with the potential to cause injury and/or death to those present on site or with potential to cause off-site impacts. The workshop excluded occupational risks and detailed design issues. Following an initial draft PHA for review, an additional scenario was included (i.e., impact of a cyclone).

The hazard identification workshop was conducted in the form of teleconference workshop, facilitated by Advitech and remotely attended by representation from SMEC and Pacific Blue. The attendance list for the facilitated workshop is provided in Table 2.

Table 2: Haughton Risk Assessment Workshop – Attendance
Attendee name

Position

Alwyn Ramshaw

SMEC - Experienced Engineer, Power & Energy

Jason Gao

SMEC – Project Manager, Power & Energy

Stuart Miles

SMEC – Team Lead, Power & Energy

Caitlin Barnes

Pacific Blue – Senior Project Engineer

Mark Rathbone

Pacific Blue – Project Director: Solar & Storage

Niluksha Herath

Pacific Blue – Executive Manager, Engineering Services

Nora Fahr

Pacific Blue – Project Manager

Patrick McGaw

Advitech – Experienced Project Engineer (Facilitator)

Martin Belk

Advitech – Senior Environmental Engineer

Öleg Fina

Advitech – Undergraduate Renewables Engineer (Scribe)

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A systematic approach within the framework of AS/NZS ISO 31000:2018 Risk Management – Principles and guidelines [Ref 11] was used to identify risk scenarios and minimise the possibility of missing important information. The minutes of the risk assessment process provide a record of the procedure used and the information obtained (refer to Appendix D).

D

4.5

Terms and Definitions

At the commencement of the workshop, the team was briefed on the context of the risk assessment and the methodology that would be used. The terms and definitions shown in Table 3 were discussed at relevant stages during the workshop.

Table 3: Risk Assessment Terms and Definitions

Term

Definition

Risk
Assessment

The formalised means by which hazards are systematically identified, assessed, ranked according to perceived risk, and addressed by means of appropriate and effective controls. Such an assessment is generally undertaken by a group with extensive knowledge of the system or area being reviewed.

Asset

Tangible and intangible items of value or processes, procedures or tasks performing as intended.

Guidewords

Key supporting elements in the execution of a risk assessment. Identification of deviations from the design intent is achieved by a questioning process using predetermined 'guide words'. The role of these words is to stimulate imaginative thinking, to focus the study and elicit ideas and discussion.

Hazard

A source of potential harm or a situation with the potential to cause loss.

Risk
Scenario

An identified situation where an asset and hazard could come together to create a risk event.

Barrier

The current intended systems, procedures or equipment in place (or included as

part of the design) or actions taken to eliminate or mitigate a hazard, or render the risk of occurrence acceptable.

Risk

The chance of a potential hazard being realised that will have an impact on a desired outcome. It is measured in terms of consequence and probability.

4.6

Key Elements

The hazard identification process was conducted in a comprehensive and systematic manner, so that as far as practicable, all possible risk scenarios were identified. Each component relating to the proposed development was paired systematically with Hazard Guidewords, provided to enable risk scenarios with off-site implications to be comprehensively identified. The hazard guidewords used during the risk assessment of the development of the BESS facility are listed in Table 4 .

Table 4: Risk Assessment Guidewords
Hazard Guidewords
High temperature

Process Control

Movement / Impact

Toxicity

Fire / Explosion

Natural Hazards

Electrical safety

Sabotage

Loss of Containment

Contamination

Noise

Fault / Malfunction

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4.7

Risk Identification

During the workshop, each asset within the facility, including but not limited to the BESS units, transformers, and buildings on site etc., were paired systematically with each hazard guideword (refer to Table 4). For each asset-hazard pair, the workshop team determined verbally whether a plausible risk scenario existed. If a risk scenario did exist, it was registered and studied further according to Section 4.8.

4.8 If no scenario existed or determined not to exist, the team moved to the next pair.

For each risk scenario identified, a description of the possible causes and potential consequences of the risk scenario, and the current barriers in place to prevent the risk scenario occurring or to minimise the consequences was made. Each potential scenario was then qualitatively assessed to provide a definition of risk level and potential for off-site impact. The level of risk (i.e., high, medium, or low) associated with each scenario was based on the potential to cause harm to receptors (or the environment) offsite, as well as how effective the proposed control measures to prevent the hazard scenario from arising. The hazards identified are a result of deviation from normal operations and the qualitative risk assigned to each scenario takes into account the inherent and proposed physical, operational and organisation safeguards designed to reduce the consequence and probability of these hazards. Table 5 presents the level of risk and the applied definition.

Table 5: Risk Level Definitions
Risk Level

Definition

High

Hazards that could lead to offsite severe injury, environmental pollution, illness, or damage, and are likely to occur. The conditions present allow for a significant probability of an accident; immediate action is needed to manage the risk.

Medium

Hazards that may lead to offsite moderate injury, environmental pollution, illness, or damage and could occur under certain circumstances. These conditions warrant attention to lessen the likelihood of an incident.

Low

Hazards that may result in offsite minor injury, environmental pollution, illness, or damage and are unlikely to occur, given the conditions. These risks are managed by routine procedures and precautions.

It should be noted that when determining consequences and how that applies to each risk level, the 'most probable' or 'most likely' consequence was addressed. Further consideration to the potential for impact off site was applied and a definitional risk level could then be applied (as applied under Section 5).

4.8

Risk Treatment

Risk treatment actions identified during the risk assessment aimed to reduce the identified risk to As Low as Reasonably Practicable (ALARP). Most identified risks cannot be eliminated but can be mitigated or reduced in some way. The preferred method of risk treatment uses engineered (physical) barriers to prevent the risk occurring, otherwise procedural controls may be proposed to prevent the risk or respond appropriately if the risk scenario does occur. It should be noted that in a workshop setting, it is inefficient to discuss detailed design issues when determining the most appropriate treatment for a risk scenario. As such, the actions recorded tended to be general in nature. The Pacific Blue project team is responsible for realising (or designing) risk treatment solutions, as well as ensuring that personnel are assigned responsibility for actions, and that every identified risk scenario is addressed.

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5.

Hazard Identification Outcomes

Results of the risk assessment workshop were recorded during the workshop and input directly into a spreadsheet template provided by Advitech. The spreadsheet is treated as the formal minutes for the workshop. The spreadsheet is contained in Appendix D.

D

The plausible hazard scenarios as considered/identified by the workshop attendees during the hazard identification are listed in Table 6 . Control measures that were considered during the workshop have also been included in Table 6 . Further descriptions of the control measures are provided in Section 5.1.

5.1

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Table 6: Hazard Identification and Classification Table
Hazard

Cause

Consequence

Current Barriers

Offsite - site
impact

Recommended Actions / Comments

LOW

N

Determining and implementing a method to contain fire water is yet to be decided. The location of the site is near a waterway. A plan will need to be devised to safeguard the waterway in the event of possible leaks or spills.

LOW

N

Develop a battery management plan that incorporates the safety protocol for any work related to the BESS units.

LOW

N

The risk scoring assumes relevant protocol and commissioning procedure will be upheld and supervised throughout the commissioning process. The scoring is determined by assessing the vulnerability of delivery to the site.

LOW

N

-

Y

Undertake a fire safety study to assess the consequences of possible fire incidents and assess the fire prevention strategies and measures.

Risk Level 1

Restricted access.
Substation short
circuit or
equipment fault

Design and installation in accordance with AS standards (AS 2067:2016 -

Substation and high voltage installations exceeding 1 kV A.C.)
Minimum separation distance of 1.5 m from each BESS Unit / Inverter as per
FM Global 5-33 guideline (Ref 12).
Restricted access to site / unit.
Lockout tagout procedure.
Emergency STOP button.

Electrical

BESS unit short
circuit or
equipment fault

Electrocution
Possible for injury or fatality
Damage to on-site structures
and equipment
Potential for spark/arcing (fire
hazard)

Software to monitor the functionality of the unit.
BMS architecture to control and manage the battery status.
Each unit can be disconnected and isolated in case of emergency (i.e., fire,
short circuit etc.)
Each unit is grounded.
Each unit has an IP rating of IP 55.
Each module has an IP rating of IP 67.
Project risk register.

Incorrect
installation during
construction phase

Control measures in place.
Energised checks undertaken by OEM (due diligence prior to bringing systems
online).
Anti-condensation system is installed within each BESS unit.

Condensation
build up

Fire

Battery thermal
runaway leading to
fire (due to an
equipment fault)

Each module has an IP rating of IP 67.
Possible injury or fatality
Damage to on-site structures
and equipment

Battery management systems and ventilation systems are installed in each
unit to control and maintain safe working conditions.

LOW

1st - Real time temperature monitoring, fire extinguishing of battery module.
2nd - Heat, smoke, and combustible gas detectors are linked to explosion
proof ventilation and gas spraying fire extinguishers.
3rd - Water sprinklers in the unit are activated.

Fire

Battery thermal runaway leading to fire due to bushfire encroachment

Propagation to adjacent BESS containers or transformers

The batteries selected are LFP, which are considered more fire resistant among other Li-chemistries.

Contamination to local watercourse / local environment (firefighting water)

Each BESS container has a closed-loop liquid cooling system with a temperature control system.
Minimum separation distance of 1.5 m from each BESS Unit / Inverter as per FM Global 5-33 guideline (Ref 12).

Prepare fire water containment to address water used in case of emergency (forms an aspect of the water management plan).
LOW

Y

Prepare a fire/bush fire management plan and an emergency plan to provide a detailed response procedure during a potential fire event.

The surrounding vegetation is regularly maintained (mechanical machinery). Stringent buffer zone maintained, approximately 20 m from any adjacent vegetation.

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Hazard

Cause

Consequence

Current Barriers

Risk Level 1

Offsite - site
impact

Restricted access.

Development of a strategy/protocol for deenergisation of the substation.

Authorised personnel only.
Transformer oil fire

Switchyard design and separation in accordance with AS 2067:2016.

Electrical fire

Oil containment.

Recommended Actions / Comments

LOW

Y

LOW

N

Transformers are sealed and contained within a bunded area.
30 m separation fire break from non-combustible services.

Risk scoring assumes the transformers have
sufficient containment and management in the
event of a fire scenario to meet AS 2067:2016
[Ref 8] (forms an aspect of the fire
management plan).

Project risk register
Incorrect
installation during
construction phase

Control measures in place.

-

Energised checks undertaken by OEM (due diligence to bringing systems
online).
Implement an onsite and/or remote alarm
verification process.

External bushfire
smoke triggering
Fire Suppression
System in BESS
unit(s)

Short circuit, potential for spark
/ arcing (fire hazard)
Damage to structures and
equipment

Develop an emergency response for handling
false alarms and external threats.

Each BESS unit is well sealed against external environmental conditions and
has an IP rating of IP 55.
Each unit has real-time temperature monitoring.
Advanced smoke detection technology.

LOW

Y

LOW

Y

Smoke detectors are triggered once a certain level of combustible gas has
been detected inside the unit.

Add an additional smoke detection system on
the outside of each unit that actively monitors
and compares inside data against outside
values. Additionally, or alternatively, add
additional temperature sensors along the
perimeter monitoring external environmental
conditions comparing inside data against
outside values. Coupling external detection
systems with internal ones via software can
minimise accidental activation of fire-fighting
systems.

Possible injury or fatality

Toxic fumes

BESS fire resulting
in toxic fume
emissions

Damage to structures and
equipment
Contamination to site and local
environment

Each unit has its own individual fire suppression system (as outlined under
'battery thermal runaway leading to fire due to bushfire encroachment').
Each unit is equipped with a fire-fighting protection system comprising of
smoke, heat and combustible gas detectors.

Low risk score based on the absence of nearby
neighbouring receptors, with the closest
neighbouring receptor being 2.7 km away.

Smoke and/or visual pollution
offsite
Possible injury or fatality

Loss of

containment

Damage to
battery casing
leaking electrolyte
Battery thermal
runaway

Damage to structures and
equipment

Concrete floor beneath BESS units.

Potential for spark / arcing
(causing potential fire hazard)

BESS unit is to be disconnected from the rest of the system in case of a
hazardous event (i.e., fire, short circuit, etc).

Propagation to adjacent BESS
containers or transformers

LOW

N

Risk scoring assumes that there will be
sufficient storage capacity for water runoff and
that appropriate procedures will be in place to
handle any potential water contamination
(forming part of the water management plan).
Prepare spill and environmental management
plans to address the potential for liquid spills
within the BESS container.

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Hazard

Cause
Damage to
coolant piping

Consequence

Current Barriers

Contamination to site and local
environment

BESS unit is to be disconnected from the rest of the system in the event of a hazardous event (i.e., fire, short circuit, etc).
BMS will isolate all modules within a container in the absent of hazardous conditions (e.g., fire).

Incorrect
installation

Risk Level 1

LOW

Offsite - site
impact

Recommended Actions / Comments

N

-

Once detected, the system will shut down.
Possible injury or fatality

Explosion

Build-up of
explosive
atmosphere due to
cell thermal
runaway, or
bushfire, or
adjacent battery
fire

Damage to structures and
equipment

Each unit is equipped with a firefighting protection system comprising of smoke, heat and combustible gas detectors.

Propagation to adjacent BESS
containers or transformers

Fire water sprinklers are located on the ceiling of the unit compartment.

Contamination to site and local
environment
Smoke and/or visual pollution
offsite

Ventilation system within the unit is explosion proof and connected to the combustible gas detector through a control unit.

Prepare fire water containment to address water used in case of emergency (forms an aspect of the water management plan).

LOW

N

Each unit can be disconnected and isolated in case of emergency.

Restricted access.

Ensure the battery units and substation equipment meets requirements of IEC 62479:2010 Assessment of the compliance

Authorised personnel only.
Electromagnetic
Forces

High voltage
equipment

Possible injury or fatality

Underground cabling.

LOW

N

Synchronous condenser.
Compliance to exposure standards (inverters and transformers).
Possible injury or fatality
Natural hazards -
lightning

Lightning strike

Damage to structures and
equipment
Propagation to adjacent BESS
containers or transformers

Lightning masts.
Fence line.

LOW

N

Torrential rain /
flood water

Possible injury or fatality

Natural hazards -
cyclones

Noise

Torrential rain /

high cyclonic wind
speed

Operation

Possible injury or fatality
Propagation to adjacent BESS
containers or transformers

Hardstand to be built up, raising the BESS units above the 1-in-100 year
flood level.

Risk scoring assumes suitably proposed hard
stand, which should be designed to withstand
scouring, be protected from erosion, and meet
other civil considerations.

LOW

N

Each unit has an IP rating of IP 55.
Each module has an IP rating of IP 67.
Each BESS unit is firmly anchored to the ground/subfloor (cement
foundation), complying with National Construction Code Volume 2 Building
Code of Australia (NCC) (Class 1 and Class 10 Buildings) and AS/NZS 1170.2
- Design action, Part 2: wind actions.

Potential for spark / arcing (fire
hazard)

Each BESS unit can be disconnected and isolated in case of emergency

Nuisance to neighbouring land
users

-

Complaints from neighbours

Confirm that the earthing requirements meet
the necessary standards for lightning
protection.
Risk scoring based on confirmation of sufficient
earthing for the required level of protection.

Potential for spark / arcing (fire
hazard)

Damage to structures and
equipment

of low-power electronic and electrical
equipment with the basic restrictions related to
human exposure to electromagnetic fields (10
MHz to 300 GHz).

Earthing.

Damage to structures and
equipment
Natural hazards -
flooding

Risk scoring assumes the ventilation system

effectively removes off-gases, ensuring that the environment inside the container remains below the hydrogen Lower Explosive Limit (LEL). Additionally, it is expected that the ventilation fan is adequately safeguarded for use in hazardous areas.

LOW

N

LOW

Y

Structure should have appropriate cyclone classification.
Appropriate wind rating for an area classified as 'Wind Region C'.

Low risk score based on the absence of immediate neighbours, remote area.

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Hazard
Damage to
equipment (with
potential to
cause fire)

Cause

Consequence

Current Barriers
Fencing surrounding the facility.

Vehicular Accident
/ Collision

Vehicle collision with BESS unit,
or transformer, significant
damages to site assets
(potential for greater scenario
to develop)

Road speed limits.
BESS and switchyard are away from the immediate boundary.

Offsite - site
impact

Recommended Actions / Comments

LOW

N

Develop a procedure which enforces and
outlines the traffic management requirements
for internal roads.

LOW

N

-

Risk Level 1

No unauthorised access to the site.
Restricted access to the site.

Unauthorised
access

Sabotage to BESS
units or
transformers

Damage to the unit causing
potential thermal runaway or
fire event.

Fencing surrounding the site.
CCTV cameras on the premises.
Batteries can be monitored remotely (24/7) using software.

Notes:

1

: Risk level (i.e., high, medium and low) is defined in Table 5 , under Section 4.7.

- Where applicable, cells containing '-' have been deliberately left blank.

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The hazard identification workshop determined the most significant off-site risks are associated with the potential malfunction of the lithium-ion batteries. This malfunction, known as thermal runaway, may result in a single battery cell catching fire, cascading to other cells within the module. The fire can then continue to propagate, triggering a similar reaction in nearby modules. The modes of failure which may lead to thermal runaway of the BESS lithium-ion batteries identified in the workshop include:



Equipment fault;



External fire;



Natural disaster such as lightning; and



Short circuiting from coolant leak

Despite the thermal runaway event reported globally since lithium-ion technology's early implementation, the industry's understanding of and ability to manage these risks has improved. The proposed XYZ cell products have undergone testing, and successfully met the testing UL 9540A requirements for the cells and for the energy storage systems (Ref 17). The UL 9540A testing demonstrates that thermal runaway from a cell is unlikely to propagate to the entire container and lead to a fire event. Based on the global reports of fire incidents, the workshop team identified the foreseeable hazard scenario as a fire involving the complete contents of a single XYZ container. From the hazard identification, there were no risk scenarios identified with a high-risk score. Of the 17 scenarios discussed during the workshop session, all 17 were given a low-risk score, as presented in Table 6. Following the initial submission of the PHA, an additional scenario was included (impact of cyclone). This scenario was also given a low-risk score. Risk scenarios were also assessed in terms of potential for offsite impact. The risk scenarios considered to have the potential for offsite impacts include:



Air quality impacts (toxic fumes and particulars) caused from potential fires within a BESS unit;
and



General site operational noise (i.e., noise from BESS or substation whilst under normal working conditions).

From the risk assessment, a BESS unit fire, bushfire causing a fire within a BESS unit, and a transformer fire are three individual scenarios and were addressed as such. The points above form

a summary of the off-site impacts from these, and further detail is provided in Table 6 . None of the scenarios considered to have potential offsite impacts were scored with a 'medium' or 'high' risk scores.

It should be noted that many of the low-risk scenarios identified have further requirements in order to achieve this risk rating- some outlying measures that need to be addressed.

Generally, these requirements are additional specialist reports that detail plans or measures to mitigate risk. Where applicable, these further requirements presented with further detail in Section 5.1.

5.1

A considerable number of the 'current barriers' assessed rely on the chosen technologies' ability to mitigate or control potential hazards from occurring, alongside site design and proposed implementations. These control measures are detailed in Section 5.1.

5.1

As there were no risk scenarios scored as 'medium' or 'high', it can be acceptable to conclude that the current physical procedural and management barriers (alongside additional requirements to meet the classification) are sufficient to maintain the identified risks to an acceptable level, in the context of societal, environment and human safety. A quantitative assessment is reasonably considered not necessary, given the number of low-risk hazards.

5.1

Control Measures

5.1.1

BESS Units

5.1.1.1

Battery Management System

The Battery Management System (BMS) forms the key element of control for continued stable operation of the BESS units [Ref 19]. Its essential role is ensuring the BESS is operating within safe and manageable margins. In the event of abnormal conditions or hazard scenarios, the BMS is directly connected to an

auxiliary uninterruptible power supply (UPS) located in the combiner control cabinet, allowing for continued operation and management. The BMS can monitor individual cell's voltage, current, temperature as well as manage energy absorption and release, fault diagnosis and communicate external with the power conversion system (PCS) and energy management system (EMS). The XYZ Storage Technology BESS unit incorporates a three-tier control architecture BMS consisting of; a Battery Management Unit (BMU) which is responsible for monitoring the battery operating parameters and balance the charge and discharge of individual cells; Battery Clusters System (BC) which summarises the data collected from the BMU to control the operational status of the battery cluster; and the Battery Array Management Unit (BA) allows for communication with the PCS and the energy storage monitoring system. The BMS has a number of stages of management across the BESS container. It monitors and provides relevant battery information through to the energy management system. Should the BMS detect abnormal conditions within the battery, the BMS will alarm any supervisory equipment to shift to safety protocols. These safety procedures include limiting of charge and discharge current from the battery, as well as controlling the opening of high voltage contactors. At a module level, the BMS also controls and monitors the management of charge and discharge. This is undertaken in accordance with the status of the battery (i.e., temperature or state of charge), alongside the current performance of electrical components. Signals are sent to the BMU to control charge and discharge limits and maintain balance within the system (so that individual cells are not over charged or over discharged). The temperature of battery modules is a key operational concern. The BMS controls the TMS based on the cells detected temperature and the temperature of the coolant passing through the module. Alongside the direct control of the TMS, the BMS has functionality to measure the ambient temperature and humidity (exterior to the BESS container), to further maintain the interior conditions of the BESS within operational bounds. Historical data can also be stored and accessed onsite (or remotely). This includes operational parameters and historical alarms associated with events.

5.1.1.2

Fire Suppression System

The Fire Suppression System (FSS) is divided into three key parts, the detection system, explosion-proof system, and fire extinguishing system [Ref 19]. The fire extinguishing strategy comprises of a multi-level protection system including:

☞

Battery module level immersion level protection, heat and smoke detection and alarm level warning;

☞

Ventilation and smoke exhaust, which is also explosion-proof;



Aerosol (Perfluorohexanone) automatic fire extinguishing system within each battery compartment; and



Water spraying to control the spread of fire.

Detection of abnormal gas and smoke conditions arising during operation is managed by several detectors: heat, smoke and combustible gas. According to the documentation provided, it is assumed that in the event of an abnormal condition, the UPS integrated within the control cabinet will provide power to critical components, including electrical sensors and detectors linked to the fire-fighting system, allowing for safe, continuous operation and management of the BESS unit. All signals are received and processed by the unit's information system integrated within the combiner control cabinet.

The explosion-proof ventilation system comprises a set of exhaust fans and a set of inlet louvres situated on the bulkhead of the internal compartment. The ventilation system is linked to the combustible gas detector. In the scenario where hydrogen, volatile organic compounds, carbon monoxide or other combustible gases are detected within the BESS unit, a signal will be sent to activate:

1.

The acousto-optic fire alarm located on the outer wall of the bulkhead compartment; and

2.

The ventilation system to dispel the combustible gas through the louvre set.

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Once a safe concentration level of combustible gas(es) has been reached, another signal will be sent to the ventilation system to be deactivated.

In the event of a fire scenario, there are two suppressant methods in place.

Firstly, an aerosol based

Perflourohexanone suppression system, followed by a fire water sprinkler system.

Should the heat and

smoke detectors perceive a fire within the compartment, a fire alarm signal will be sent to:

1.

The gas spraying indicator light (installed on the outer wall of the compartment); and

2.

The fire extinguishing system.

Once the signal has been sent, it will trigger a controlled release of aerosol suppressant. The water

sprinkler pipeline has a standard fire hydrant connection located on the outside of the container,

designed for directional spray within the container allowing first responders to effectively fight a fire. The

closest fire station is Queensland Fire and Rescue Giru Station (Station Number 24), located

approximately 30 km away (or a 30-minute drive). Timing regarding control of a fire is critical. Should the

fire not be controlled within 1-hour of initiation, the protection turns to the surrounding units and allowing

the fire to burn itself out.

For the FSS to maintain control in the event of fire scenarios, an UPS allows for the FSS to maintain

operation without external power. The UPS is installed within the combined control cabinet, integrated

within the BESS container and allows a 'standby power' for up to 2 hours.

5.1.1.3

Thermal Management System

Each of the proposed XYZ containers to be installed at the Haughton BESS facility are thermally

managed. This allows for the battery compartment and batteries to be maintained within an acceptable

temperature range. The units come equipped with a thermal management system (TMS), to maintain the

battery cells within an ideal operating temperature range. The system utilises an ethylene glycol mixture

as a heat transfer fluid. At one end of the container is a chiller unit and positive temperature coefficient

(PTC) heating element, with internal piping distributed across each module of the container. In addition,

thermal protection is incorporated into the battery design at each level, that is the pack, cluster and

container as a whole.

5.1.1.4

Anti Condensation System

Each BESS unit features a dedicated anti-condensation design system. The system operates

independently of the TMS and allows the relative humidity inside the container to be within a defined and

safe range.

The anti-condensation system is designed to prevent the formation of detrimental internal conditions for the electrical insulation of the battery clusters and TMS. The system comprises of an air conditioner unit maintaining a consistent internal temperature of the XYZ storage container and of desiccant units strategically distributed internally of the container, preventing the accumulation of excessive humidity within the compartment.

5.1.2

Site Specific

5.1.2.1

Security

Based on information available, Advitech understands that the site security system is yet to be finalised. Advitech proposes that upon security system development, the Haughton facility should be fully fenced, with a 2.4 m high chain wire fence to surround the development with the fencing surrounding the substation having a barbed wire topping. CCTV cameras should be utilised for the perimeter protection and for all buildings within the site boundary. Access should be restricted, with motorised slide gates requiring swipe card access and intercom. Visitors to the site should be required to complete a full induction via an online portal, followed by an onsite induction covering all the risks associated for the operation of the facility. In addition to the operators on site, the BESS units will be monitored for any abnormal conditions remotely 24 hours a day, 7 days a week, by Pacific Blue's asset management team.

5.2

Recommendations and Actions

This PHA was conducted during the project's planning stage, to identify potential hazards and evaluate risks associated with the proposed operations of the battery energy storage system (BESS). As the project

is only in the planning stage, the following recommendations should be confirmed and undertaken prior to the construction phase of the project commences.

The PHA was carried out following the methodology outlined in Planning Guideline State Code 21:

Hazardous chemical facilities and HIPAP No. 6 Hazard Analysis, as well as the guidelines provided in the Multi-Level Risk Assessment for assessment against the criteria specified in HIPAP No. 4.

Specifically, a Level 1 PHA, which involved qualitative analysis, was completed based on the information available at the time. The recommendations developed through this process are proposed to be addressed prior to construction and include to demonstrate the residual risk of the development is as low as reasonably possible:



Fire water containment design: Determine and implement a method to contain fire water, which will include consideration of how to safeguard the nearby waterway. Ensure there is sufficient storage capacity for water runoff and establish appropriate procedures to handle any potential water contamination.



Battery management plan: Create a comprehensive battery management plan that incorporates safety protocols for any work related to the Battery Energy Storage System (BESS) units.



Relevant protocol and commissioning procedures: Ensure that protocols and commissioning procedures exist for the construction and commissioning phases of the project, that don't materially change the risks or hazards identified for when the project is at the operational stage;



Fire management and emergency plan: Prepare a fire management plan and emergency plan that outlines detailed response procedures in the event of a potential fire incident.



Ventilation system: Verify that the ventilation system effectively removes off-gases, maintaining the environment inside the container below the hydrogen Lower Explosive Limit (LEL). Ensure that the ventilation fan is adequately protected for use in hazardous areas.



Spill management plan: Prepare a spill management plan that describes how potential spills from the BESS container will be managed. At this preliminary stage of the development, there is not sufficient information to complete a comprehensive spill management plan. It is

recommended
that the fire water containment design and fire management plans be completed
initially.



Traffic management: Develop a procedure that outlines the traffic management
requirements for
internal roads within the project site.

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6.

Queensland Code Compliance Statements

It is understood Queensland has a dedicated approval process for state developments. The State Development Assessment Provisions (SDAP) provide assessment benchmarks for the assessment of development applications involving the State Assessment and Referral Agency (SARA). In assessment of a development application, SARA is bound by rules outline in the Planning Act 2016. The benchmarks considered for the Haughton BESS facility are detailed under State Code 21: Hazardous Chemical Facilities (February 2022) [Ref 2].

The objective of State Code 21: Hazardous Chemical Facilities (February 2022) (the Code) is to determine whether a development is designed and sited to ensure human health and safety, and the built environment, are protected so far as reasonably practicable from potential off-site risks, resulting from physical or chemical hazards. The development itself is to be protected from potential off-site hazard scenarios at existing chemical facilities as well as natural hazards.

As presented in Table 1 , the quantities set to be stored on site do not exceed their respective chemical threshold quantities under the Work Health and Safety Regulation – Schedule 15. State Code 21 also considers the potential off-site risks. Several public incidents have occurred in BESS sites in recent years, resulting in off-site impacts. Based on this consideration, and Advitech's experience with BESS facilities and the hazards pertaining to them, the Performance Outcomes (POs) from State Code 21: Hazardous chemical facilities under the State Development Assessment Provisions (2022), have been applied to determine if the proposed development is compliant against the Code. Table 7 presents the Performance Outcome (PO), relevant comments associated with the proposed development and whether or not the PO has been met.

Table 7: Planning Guideline State Code 21 Compliance Statements
Performance Outcome (PO)

Comments
Comments

Off-site impacts–vulnerable land use or
land zoned for a vulnerable land use

The subject site is approximately 30 km southwest of the (small) township of Giru, 50 km west of Ayr and 80km southwest of Townsville. There are no locations considered vulnerable land use within 5 km of the Haughton BESS site.

PO1 The hazardous chemical facility does not create a dangerous dose to human health.

Off-site impacts–sensitive land use or land
zoned for a sensitive land use

PO2 The hazardous chemical facility does

not create a dangerous dose to human health.

Compliance

Yes

Dangerous dose to human health offsite impacts are not anticipated at any vulnerable land use location.

The closest residential receptor is located approximately 2.7 km to the west of the development area (western extremity).

Another residential receptor is located approximately 7.5 km northwest of the proposed BESS facility.

Given that all the receptors are located further than 1.0 km from the proposed facility, and with consideration to similar facilities, it is Advitech's opinion there is a very low risk of dangerous doses to sensitive land use.

Yes

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Performance Outcome (PO)

Off-site impacts—commercial or community activity land use or land zoned for a commercial or community activity land use
PO3 The hazardous chemical facility does not create a dangerous dose to human health.

Off-site impacts—open space land use or land zoned for an open space land use
PO4 The hazardous chemical facility, does not create:
a) dangerous dose to human health; or
b) where (a) cannot be achieved, an individual fatality risk level of 10×10^{-6} /year and the societal risk criteria in figure 21.1.

Off-site impacts—industrial land use or land zoned for an industrial land use
PO5 The hazardous chemical facility, does not create either of the following:
a) dangerous dose to the built environment; and
b) an individual fatality risk level of 50×10^{-6} /year.

Comments
Comments

Compliance

The closest location to the proposed BESS facility considered 'commercial or community' activity, is that of the Australian Agricultural College. The college lies approximately 15 km to the east of the development.

Yes

Dangerous dose to human health
off-site impacts are not anticipated at commercial or community activity land use location.
The subject site is approximately 30 km south-west of the (small) township of Giru, 50km west of Ayr and 80km southwest of Townsville. There are no locations considered vulnerable land use within 5 km of the Haughton BESS site.

Yes

Dangerous dose to human health
off-site impacts are not anticipated at any open space land use location.

The area surrounding the subject site is zoned as rural. There are no 'industrial' receptors within 5 km of the proposed development.

Yes

Dangerous dose to human health
off-site impacts are not anticipated at
any industrial land use location.

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Performance Outcome (PO)

P06 Storage and handling areas for fire risk hazardous chemicals are provided with a 24-hour monitored fire detection system that has the ability to detect a fire in its early stages and notify an emergency responder at all times

Comments

Comments

Compliance

The facility will be manned with maintenance staff and/or contractors during daylight hours (notionally 6 am through to 6 pm). The facility will also be monitored remotely 24 hours a day, 7 days a week. Each BESS container to be installed at the proposed development has monitors for off-gases, and fire suppression methods should a fire scenario arise. The closest emergency (fire and ambulance) responders

-

-

Yes

Giru ~30 km (or a 30 min drive) to the north of the development.
Ayr ~50 km (or a 45 min drive) to the northeast of the development.

Details of how the emergency responders will be notified shall be provided in an Emergency Management Plan and Fire Management Plan.

P07 Storage and handling areas for packages of liquid or solid fire risk hazardous chemicals are provided with a spill containment system with a working volume capable of containing a minimum of 100 percent of all packages (prescribed hazardous chemicals and/or nonhazardous chemicals) within the area plus the output of any fixed firefighting system provided for the area over a minimum of 90 minutes.

P08 Storage and handling areas for liquid or solid fire risk hazardous chemicals in tanks are provided with a spill containment system with a working volume capable of containing a minimum of:

a) 110 percent of the largest tank within a spill compound or 25 percent of the aggregate where multiple tanks are located within a spill compound, whichever is the

greater; and

Spill of internal components within the XYZ container (i.e., cells and coolant) is considered unlikely in the case of battery cells, and is unknown based on information provided regarding the coolant. Should a coolant leak occur, it would be considered a catastrophic failure of the closed loop system. Considering the firefighting application within the container, it can be considered compliant based on provision of upkeep of an appropriate water management plan.

If the transformers have been designed in accordance with the applicable requirements of AS 2067:2016 and AS 1940:2017, respectively, it can be concluded that the spill containment measures will be in compliance with the relevant standards.

Yes,
regarding
battery cell
contents
spillage.

Yes

b) the output of any fixed firefighting system provided for any bulk tank within a spill compound over a minimum of 90 minutes.

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Performance Outcome (PO)

Comments

Comments

Compliance

P09 Storage and handling areas for prescribed hazardous chemicals that, if in contact with each other, may react to produce a fire, explosion or other harmful reaction, or a flammable, toxic or corrosive vapour are designed to prevent contact between the prescribed hazardous chemicals.

No incompatible hazardous chemicals are stored at the BESS site

Yes

All natural hazard risks were assessed as low. Given the proposed barriers, protective measures and management practices, this aspect has been considered as being compliant.

Yes

The area surrounding the subject site is zoned as rural. There are no identified hazardous chemical facilities adjacent to the proposed facility.

Yes

P010 Development is designed and sited to mitigate impacts on storage and handling areas from natural hazard including, but not limited to:

- a) flood;
- b) bushfire;
- c)

erosion;

- d) storm tide inundation;
- e)

landslide;

- f)

earthquake; and

- g) wind action.

P011 Development is designed and sited to mitigate the risks from hazard scenarios occurring at existing hazardous chemical facilities.

7.

Conclusion

All risks as identified during the risk assessment workshops as having potential for offsite impacts (as presented in Table 6) have been qualitatively assessed. It was found the most significant offsite impacts are associated with the unlikely malfunction of the lithium-ion batteries. In this maturing industry, these inherent hazards are being progressively better understood and managed, with greater controls and management strategies in place. From the risk assessment, three hazard scenarios were determined to have the greatest potential for off-site impacts, including a BESS unit fire, bushfire causing thermal runaway and fire within a BESS unit and the transformer fire (as identified in Section 5). Potential offsite impacts include:



Air quality impacts (toxic fumes and particulates) caused from potential fires within a BESS unit or from a transformer or electrical fire (in the substation yard or from transformers across the site); and



General operational noise generated on site.

Of the scenarios with offsite impacts considered, only the BESS fire resulting in the emission of toxic fumes and noise generation resulted in a 'low' risk. From the hazard identification, the remaining risk scenarios were classified as 'low' risk levels. A number of assumptions and requirements for further consideration, where relevant, are detailed under Section 5.2.

5.2

Under State code 21: Hazardous chemical facilities [Ref 2], a development can be deemed compliant if it complies with all the performance outcomes (POs), or if a development does not meet all the POs and the State Assessment and Referral Agency (SARA) determines that the development complies with the

purpose statement. From Section 6 , it is Advitech's opinion that the proposed Haughton 2 BESS facility complies with all POs, on the basis that it meets the proposed recommendations and actions (Section 5.2).
5.2

As none of the hazard scenarios assessed reached a 'medium' and 'high' classification, it is Advitech's opinion that it is unlikely any of the hazard scenarios identified will exceed the maximum risk acceptability criteria. This is under the provision that Pacific blue see to and maintain the following prior to construction of the facility:



Prepare and implement a fire water management plan and containment strategy;



Undertake a comprehensive battery management plan, that incorporates safety protocols for any work relating to the BESS units;



Ensure that protocols and commissioning procedures exist for the construction and commissioning phases of the project, that don't materially change the risks or hazards identified for when the project is at the operational stage;



Prepare a fire management plan and emergency management plan;



Verify that the ventilation system to be used effectively removes off-gases and the ventilation fan is adequately protected for use in hazardous areas; and



Develop a procedure that outlines traffic management requirements for internal roads.

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8.

References

The analyses in this report were based on the following Australian Standards, codes and/or design references:

1.

Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code Edition 7.7),
The National Transport Commission July 2020.

2.

Workplace Health and Safety Queensland Planning guideline State Code 21:
Hazardous chemical
facilities March 2022.

3.

State of Queensland (Planning) – State Development Assessment Provisions
(Version 3.0) February
2022.

4.

State of Queensland – Work Health and Safety Regulation 2011, July 2023.

5.

QLD Department of Resources – Queensland Globe 2023.

6.

Burdekin Shire Council, 2021. Burdekin Shire Planning Scheme Zoning Map.

7.

AS 1940:2017 – The Storage and Handling of Flammable and Combustible Liquids.

8.

AS 2067:2016 Substations and high voltage installations exceeding 1 kV a.c.

9.

AS 2419.1:2021 - Fire hydrant installations, Part 1: System design, installation and commissioning.

10. AS/NZS 4681:2000 – The Storage and Handling of Class 9 (Miscellaneous) Dangerous Goods and Articles.

11. AS/NZS ISO 31000:2018 – Risk management – principles and guidelines.

12. FM Global – Property Loss Prevention Data Sheets: Lithium-Ion Battery Energy Storage Systems,
July 2023.

13. Safe Work Australia – Classifying Hazardous Chemicals National Guide July 2020.

14. United Nations – Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
(Seventh Revised Edition 2017).

15. International Commission on Non-Ionizing Radiation Protection (ICNIRP) -
ICNIRP Guidelines for

Limiting Exposure to Electromagnetic Fields (100 kHz to 300 GHz) March 2020.

16. Q. Wang, P. Huang, P. Ping, Y. Du, K. Li, J. Sun – Combustion behaviour of lithium iron phosphate battery induced external heat radiation (Journal of Loss Prevention in the Process Industries, (2016), 1-9).

17. UL (Changzhou) Quality Technical Service Co. Ltd – UNIT TEST REPORT UL9540A Test Method for

Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems September 2022

18. SMEC, 2023, Traffic Management Plan – Houghton Solar Farm.

19. XYZ Storage Technology Corp. Ltd., 2023a. Technical Proposal for 1.575 MW / 3.384 MWh 20-foot

Liquid Cooling Energy Storage System, September 2023.

20. XYZ Storage Technology Corp. Ltd., 2023b. Battery Energy Storage System Operation & Maintenance Manual, August 2023.

21. Department of Planning (DoP), 2011a, Hazardous Industry Planning Advisory Paper No. 4 – Risk

Criteria for Land Use Safety Planning, NSW Government.

22. Department of Planning (DoP), 2011b, Hazardous Industry Planning Advisory Paper No. 6 –

Guidelines for Hazard Analysis, NSW Government.

23. Department of Planning and Infrastructure (DP&I), 2011, Multi-level Risk Assessment , NSW Government.

24. National Fire Protection Association – NFPA69: Standard on Explosion Prevention Systems 2019.

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Appendix A
A: Glossary

23217 SMEC Haughton BESS PHA Rev2.docx | Final

Table 8: Terms and Abbreviations
Abbreviations

Term / Definition

ADG Code

Australian Dangerous Goods Code

Ah

Amp-hours (cell capacity)

ALARP

As Low As Reasonably Possible

AS

Australian Standards

AS/NZS

Australian and New Zealand Standards

BA

Battery Array Management

BC

Battery Cluster System

BESS

Battery Energy Storage System

BMS

Battery Management System

BMU

Battery Management Unit

CCTV

Closed Circuit Television

DG

Dangerous Good

EMS

Energy Management System

FSS

Fire Suppression System

GHS

Global Harmonised System

HAZID

Hazard Identification

HC

Hazardous Chemical

HIPAP

Hazardous Industry Planning Advisory Paper

IEC

International Electrochemical Commission

IP

Ingress Protection

ISO

International Organisation for Standardisation

kg

Kilogram

km

Kilometre

kV

Kilovolt

L

Litre(s)

LEL

Lower explosion limit

LFP

Lithium Iron Phosphate
LiFePO4

m

Metres

m²

Metres Squared (Area)

MW

MegaWatt

MWh

MegaWatt hour

NA

Non-Available

NSW

New South Wales

O&M

Operation and Maintenance

OEM

Original Equipment Manufacturer

PCU

Power Conversion Units

PG

Packing Group

PO

Performance Outcomes

PTC

Positive Temperature Coefficient

PHA

Preliminary Hazard Analysis

QLD

Queensland

RMU

Ring Main Unit

SARA

State Assessment and Referral Agency

SDAP

State Development Assessment Provisions

TMS

Thermal Management System

TNCP

Transmission Network Connection Point

t

Tonnes

UN

United Nations

UPS

Uninterruptible Power Supply

V

Volts

WHS

Work Health Safety

Wh

Watt-hour

Appendix B
B: Customer Furnished Log

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Customer Furnished Information Log
Customer:

Pacific Blue c/o SMEC Australia

Job:

Job # AV-J-231373, Folder # F23217, Coordinator: Patrick McGaw

Date:

24 April 2024

The following items have been received from the customer and approved for use on this project.

Item
Ref.

File Name

Title or Description

Date
Accessed

1

HSF-SMEC-EL-DWG-101_[B].pdf

Substation Layout Drawing

12/11/2023

2

HSF-SMEC-EL-DWG-010_[C].pdf

MV Cable Route Plan

12/11/2023

3

HSF-SMEC-GE-DWG-001_[D].pdf

Preliminary Overall Layout Plan

12/11/2023

4

1.575MW3.384MWh BESS Container
Technical Proposal.pdf

XYZ Storage - Technical Proposal for
1.575 MW / 3.384 MWh 20-foot Liquid
Cooling Energy Storage System

12/11/2023

5

Operation and Maintenance

Manual.pdf

XYZ Storage - Battery Energy Storage
System Operation & Maintenance
Manual

12/11/2023

6

HAU2 BESS Site General Layout.pdf

Site Layout Image

7/12/2023

7

Haughton Solar Farm TMP.docx

Traffic Management Plan - Haughton
Solar Farm

7/12/2023

8

HSF-SMEC-EL-DWG-021_[C].pdf

Substation Layout Drawing

7/12/2023

9

TM - 30032699 - HSF Noise
Assessment Rev01.pdf

Technical Memorandum - Noise
Assessment - Haughton Solar Farm
OE Stage 2 Bess Design

7/12/2023

10

HSF-SMEC-EL-DWG-021_[D].pdf

Revised Substation Layout Drawing

8/12/2023

11

3_UL9540A.pdf

Unit Test Report - UL9540A

11/12/2023

12

HSF-SMEC-EL-DWG021_[C]_edit.pdf

Substation Layout Drawing

13

HSF-SMEC-EL-DWG-021_F.pdf

Revised Haughton BESS Site Layout

21/12/2023

22/02/2024

Note:

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Appendix C
C: Site Plan and Layout

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10
5
2, 18

5

3, 39

3, 49

13, 42

5

2, 54

7, 9

10
3, 2

5

3, 09

37, 59

10

5

37, 59

12

CONTROL/

AMENITIES

BUILDING

WT

5

, 8
7

Fan
1
Fan

Fan

2

10

Fan
Fan

3
9

4

Fan

Fan

8

5

Fan

Fan

7

10

Fan

5

C

6

z

c2

bar

b2

EB2

EB2

B

Earthing

EB2

EB1

a2

EB1

EB1

NB

c1

b1

a1

A

N

37.184

Fan

1

2

Fan

Fan
10

Fan
3

Fan
9

Fan
4

Fan
8

Fan
5

Fan
7

C
Fan
6

Z
Earthing
EB2

B

c2

bar
EB2

b2

EB2
EB1

a2

EB1
NB

EB1

c1
b1
a1

A
N
36.824

N

EB

EB

M

Fan
1

2

Fan

Fan
10

3

Fan

Fan
9

4

Fan

Fan

8

5

Fan

Fan

7

C
Fan
36.691

6

c2

e

b2

EB2
EB1
EB1

Gat

EB2

a2

EB2

B

bar

37.231

Z
Earthing

EB1
NB

Gat

e

37.231

36.658

35.555

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35.539

36.679

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35.482

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35.404

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547,7

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C ABN 47 065 475 149

LEVEL 6, 480 ST PAULS TERRACE
FORTITUDE VALLEY QLD 4006

SMEC PROJECT No 30032699

Appendix D

D: Hazard Identification Workshop Minutes

23217 SMEC Haughton BESS PHA Rev2.docx | Final

RISK ASSESSMENT DETAILS AND CONTEXT

Client:

SMEC Australia

Project:

Haughton 2 BESS

Job Number:

AV-J-231373

Folder Number:

F23217

Date:

Wednesday, 15 November 2023

Author:

Patrick McGaw

Risk Context:

Haughton 2 BESS Preliminary Hazard Analysis

Key Stakeholders:

SMEC, Pacific Blue, XYZ Storage, Advitech

Note:

It should be noted that Advitech Pty Limited prepared these risk assessment workshop results for the client in accordance with the scope of work and specific requirements agreed between Advitech and the customer. These notes were prepared with background information, terms of reference and assumptions agreed with the customer. The results of the workshop are not intended for use by any other individual or organisation and as such, Advitech will not accept liability for use of the information contained in these results, other than that which was intended at the time of writing.

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Page 1 of 6

23217 SMEC Haughton BESS RA Rev0.xlsx

RISK ASSESSMENT METHODOLOGY

Risk Context:

Haughton 2 BESS Preliminary Hazard Analysis

Risk Classification:

Hazard scenarios were classified (scored) according to Advitech's Risk Classification System.

Hazards:

Hazards were defined as "sources of potential harm or situations with the potential to cause a loss". The hazard guidewords used to assist in risk identification were ... (refer to standard list, or list individual guidewords here)

Assets were defined as "tangible and intangible items of value or processes, procedures or tasks performing as intended". The system(s) studied were broken down into assets on the basis of ...

Other Definitions:

Results:

ALARP (As Low As Reasonably Practicable) may signify one or more of the following:

- All practical barriers and controls are in place to minimise the risk.
- Likelihood is so remote that risk is tolerable without further action.
- The level of risk is considered tolerable by the community.
- Further risk reduction is either impracticable or the cost is grossly disproportionate to the improvement gained.

The results of the risk assessment workshop are given in the following spreadsheet.

MEETING ATTENDANCE

Date

Attendee Name

15-Nov-23
15-Nov-23
15-Nov-23
15-Nov-23
15-Nov-23
15-Nov-23
15-Nov-23
15-Nov-23
15-Nov-23
15-Nov-23

Patrick McGaw
Martin Belk
Oleg Fina
Alwyn Ramshaw
Jason Gao
Stuart Miles
Caitlin Barnes
Mark Rathbone
Niluksha Herath
Nora Fahr

Part Session (x)

Position

Process Engineer (Facilitator) - Advitech
Senior Environmental Engineer - Advitech
Undergraduate Renewables Engineer - Advitech
Experienced Engineer – Power & Energy - SMEC
Project Manager - Power & Energy - SMEC
SMEC
Pacific Blue
Pacific Blue
Pacific Blue
Pacific Blue

Page 3 of 6

23217 SMEC Haughton BESS RA Rev0.xlsx

Context:

Haughton 2 BESS Preliminary Hazard Analysis

Section:

Haughton BESS

Date:

Ref

Asset

Hazard

Scenario

Cause

Consequence

1

Switchyard

Electrical Safety

Exposure to voltage

Short circuit

Equipment fault

Possible for injury or fatality • Restricted site access

- Design and installation according to AS 2067:2016 Substation and high voltage installations exceeding 1kV a.c.

Damage to on-site

- Minimum separation distance according to AS structures and equipment 2067:2016.

Potential for spark/arcing
(fire hazard)

LOW

Possible for injury or fatality • Restricted access to site/Unit.

- Lockout tagout procedure.

Damage to on-site

- Emergency STOP button.

structures and equipment

- Software to monitor the functionality of the Unit
- BMS architecture to control and manage the battery

Potential for spark/arcing
status

(fire hazard)

- Each Unit can be disconnected and isolated in case of emergency (i.e. fire, short circuit, etc.)

- Each Unit is grounded.

- Each Unit has an IP rating of IP55.

- Each module has an IP rating of IP67.

LOW

Possible for injury or fatality • Compliance with UL 9540, thus UL 9540 A fire

testing

requirements.

Damage to on-site

- BMS to control the charge and discharge of the structures and equipment battery.

- Ventilation system to maintain a safe operating

Propagation to adjacent

temperature for the unit's module.

BESS containers or

- Each Unit is equipped with a three-stage fire-fighting transformers

protection system comprising of an explosion-proof exhaust system, perfluorohexane fire extinguishing

Contamination to local

system, temperature, smoke, and combustible gas (i.e. watercourse / local

CO, H₂, VOC) detection system and water sprinklers.

environment (fire fighting

- 1st: real-time temperature monitoring - fire water).

extinguishing of battery module.

- 2nd: heat, smoke and combustible gas detectors are linked to explosion-proof exhaust ventilation and gasspraying fire extinguishers.

- 3rd: water sprinklers in the unit are activated.

- Each Unit has a liquid cooling temperature control system.

- Each Unit are have an IP rating of IP55

LOW

Possible injury or fatality

- 20 m buffer zone from any adjacent vegetation

- Vegetation maintenance (i.e. sheep, mechanical machinery).

- Each Unit has a fire-fighting protection system - as above.

- Batteries selected are Lithium Iron Phosphate (LFP), regarded as more fire-resistant among others, such as Lithium-ion batteries.

- Compliance with UL 9540, thus UL 9540 A fire testing requirements.

LOW

Yes

Bushfire mitigation management
plan for BESS Unit.

- Fire protection system

- Each Unit is equipped with a fire-fighting protection system, which comprises heat, smoke and combustible gas detectors.

- Ventilation and exhaust systems are also installed.

LOW

Yes

Provide the air quality impact
assessment for the Solar farm

development

2

3

4

BESS Unit

BESS Unit

BESS Unit

Electrical Safety

Fire

Fire

Exposure to voltage

BESS fire

BESS fire

Short circuit

Equipment fault

Battery thermal runaway
leading to fire due to
equipment fault

Battery thermal runaway
leading to fire due to
bushfire encroachment

Damage to structures and
equipment
Propagation across
adjacent BESS containers
and/or transformers

5

BESS Unit

Toxic Fumes

BESS fire resulting in toxic Battery thermal runaway
fume emissions
leading to large-scale fire

Possible injury or fatality
Damage to structures and
equipment

Current Barriers

R

15/11/2023

Off-site Impact? Action

No

Comments

Fire water containment - to be determined.
Site close to waterways development of strategy to protect waterways in case of emergency.

No

Fire water containment - as above.
Develop an emergency management plan.

Yes

Specialised water supply
+
equipment(s) - Fire response 45 min.
Strategy development of water usage from nearby waterways in case of emergency.
Develop an emergency management plan.

The nearest receptor is 2.7 km away.

Contamination to site and local environment
Smoke and/or visual pollution offsite

Context:

Haughton 2 BESS Preliminary Hazard Analysis

Section:

Haughton BESS

Date:

Ref

Asset

Hazard

Scenario

Cause

6

Transformers / Switchgear

Fire

Transformer fire / electrical Transformer oil fire
fire
Electrical fire

Consequence

Current Barriers

Possible injury or fatality

- Restricted access to personnel only.
- 30 m separation fire break non-combustible services.
- Oil containment.
- Separation distance design as of AS 2067:2016.
- Transformers are sealed and contained within a bunded area.

LOW

Yes

Develop a strategy/protocol for deenergisation of the substation in case of emergency (i.e. oil fire).
Details of fire management plan to be provided by SMEC.

- Compression of soil around the BESS facility concrete floor.
- The BESS unit is to be disconnected from the rest of the system in case of a hazardous event (i.e. fire, short circuit, malfunction).
- The BMS will signal if anomaly within a module will appear, isolating the entire Unit/module.

LOW

No

Develop a stormwater

management plan.

- HVAC coolant - 50% ethylene glycol
- The BESS unit is to be disconnected from the rest of the system in a hazardous event (i.e., fire, short-circuit, etc).
- BMS will isolate all modules within a container in the event of hazardous conditions (i.e., fire).
- Once detected, the system will shutdown.
- Each Unit can be disconnected and isolated in case of emergency.

LOW

Yes

Develop a stormwater management plan.

- Each Unit is equipped with a fire-fighting protection system comprising heat, smoke and combustible gas detectors and a gas-spraying fire extinguisher function. AND a fire water sprinkler pipeline on the ceiling of the Unit compartment.
- The ventilation system is explosion-proof.
- The ventilation system includes a set of exhaust fans and a set of air inlet louvers, which are connected to the combustible gas detector through the control unit.
- Each Unit can be disconnected and isolated in case of emergency.
- BMS architecture to control and manage the battery status

LOW

Possible injury or fatality

- IEC code for EMF - IEC 62479:2010 (TBC)
- Underground cabling
- Synchronous condenser
- Compliance to exposure standards - inverters and transformers.
- Restricted access to qualified personell only.

LOW

No

Possible injury or fatality

- Lightning masts.
- Fence line.
- Earthing.

LOW

No

Damage to structures and equipment
Contamination to site and local environment

BESS Unit

Loss of Containment

Release of battery
electrolyte

Damage to battery casing
Battery thermal runaway

Possible injury or fatality
Damage to structures and
equipment
Potential for spark / arcing
(causing potential fire
hazard)

R

15/11/2023

Off-site Impact? Action

Comments

Propagation to adjacent
BESS containers or
transformers
Contamination to site and
local environment
8

BESS Unit

Loss of Containment

Release of HVAC coolant

Damage to coolant piping
Incorrect installation

Possible injury or fatality
Damage to structures and
equipment
Potential for spark / arcing
(causing potential fire
hazard)

Develop an environmental
management procedure including
appropriate response.

Propagation to adjacent
BESS containers or
transformers
Contamination to site and
local environment
9

BESS Unit

Explosion

Release of hydrogen from
battery cells

Thermal runaway
Bushfire
Adjacent battery fire

Possible injury or fatality
Damage to structures and
equipment
Propagation to adjacent
BESS containers or
transformers
Contamination to site and
local environment
Smoke and/or visual
pollution offsite

10

BESS / Switchyard

EMF

Exposure to magnetic fields High voltage equipment
operation

11

BESS Unit

Natural Hazards - Lightning BESS fire

Lightning strike

Damage to structures and
equipment
Propagation to adjacent
BESS containers

Yes

Fire water containment - to be
determined.
Water storm management facility.
Confirm design parameters of
ventilation fans.

Ensuring the earthing
requirements are adequate for
lightning.
Scoring based on confirmation of
earthing stakes are adequate for
required protection.

Context:

Haughton 2 BESS Preliminary Hazard Analysis

Section:

Haughton BESS

Ref

Asset

Hazard

Scenario

12

Switchyard

Natural Hazards - Lightning Substation fire

Date:

15/11/2023

Cause

Consequence

Current Barriers

R

Lightning strike

Possible injury or fatality

- Lightning masts.
- Fence line.
- Earthing.

LOW

No

Ensuring the earthing requirements are adequate for lightning.

- Earthworks to raise 1% BESS above flood level

LOW

No

Develop a stormwater management plan.

LOW

No

Provide the noise impact

assessment for the Solar farm
development

- Project risk register.
- Control measures in place.
- Energised checks undertaken by OEM (due diligence before bringing systems online).

LOW

No

Develop commissioning
procedure

- Fence surrounding the facility.
- Road speed limit.
- Vehicle(s) to pull over if necessary to allow other vehicles to pass.
- BESS and switchyard are away from the immediate boundary.
- No unauthorised access to the site.

LOW

No

Enforce traffic management within
the internal roads e.g. signage,
speed limit on site, etc.

- Restricted access to the site.
- Fencing surrounding the site.
- CCTV cameras on the premises.

LOW

No

Provide site security details for the
proposed battery farm and
infrastructure

Damage to structures and
equipment

Off-site Impact? Action

Comments

Propagation to adjacent
transformers

13

BESS / Switchyard

Flood Water

Damage to structures and
equipment
Possible injury or fatality
Potential for spark/arcing
(fire hazard)

14

BESS / Switchyard

Noise

Nuisance to neighbouring
N/A - remote area
land users, complaints from
neighbours
(Closest receptor - 2.7 km)

15

BESS Unit

Fire / Electrical Safety

BESS Fire / Exposure to
voltage

Incorrect installation during Damage to structures and
construction
equipment
Possible injury or fatality
Potential for spark/arcing
(fire hazard)

16

BESS Unit / Switchyard

Vehicular Accident /
Collision

BESS Fire / transformer fire Vehicle collision with BESS Damage to equipment and
unit / switchyard, significant structures
damage to site assets
Possible injury or fatality
Potential for spark/ignition
source developing a
greater hazard scenario

17

BESS Unit / Switchyard

Unauthorised access

Sabotage of BESS units /
transformers

Damage to equipment and
Damage to unit causing
potential thermal runaway / structures
fire event
Possible injury or fatality
Potential for spark/ignition
source developing a
greater hazard scenario

Appendix D

Ecological Due Diligence Assessment

Prepared for
Pacific Hydro Australia Developments Pty Ltd trading as Pacific Blue
Australia Developments
ABN: 56 161 024 755

Ecological Due Diligence
Assessment
07-Jun-2024
Haughton Solar Farm
Doc No. 60728483

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Farm Ecological Due Diligence.docx
Revision A - 07-Jun-2024
Prepared for - Pacific Hydro Australia Developments Pty Ltd trading as Pacific
Blue Australia Developments - ABN: 56 161 024 755

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Haughton Solar Farm
Ecological Due Diligence Assessment

Ecological Due Diligence Assessment

Client: Pacific Hydro Australia Developments Pty Ltd trading as Pacific Blue
Australia Developments
ABN: 56 161 024 755

Prepared by
AECOM Australia Pty Ltd
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07-Jun-2024

Job No.: 60728483

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Haughton Solar Farm
Ecological Due Diligence Assessment

Quality Information
Document

Ecological Due Diligence Assessment

Ref

60728483

Date

07-Jun-2024

Originator

Kate Brodie

Checkers

Emily Bright-Brady

Verifier/s

Rouven Lau

Revision History
Approved
Rev

Revision Date

Details
Name/Position

0

28-May-2024

Draft for review

A

07-Jun-2024

Final Issue

Signature

Rouven Lau
NQNT Environment
Lead
Rouven Lau
NQNT Environment
Lead

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Haughton Solar Farm
Ecological Due Diligence Assessment

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Appendix A
Ecology Report (2017)

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Haughton Solar Farm
Ecological Due Diligence Assessment

1.0

Introduction

1.1

Background

Pacific Blue Australia Developments (Pacific Blue) engaged AECOM Australia Pty Ltd (AECOM) to undertake a due diligence assessment of the Project site to consider potential changes which may affect the approval status of the Project under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), for continuing construction of the Haughton Solar Farm (the Project). The Project is located approximately 60 km south of Townsville near the Haughton River, at Keith Venables Road, Upper Haughton.

1.2

Scope

This environmental due diligence assessment details the methodology and results of a site visit aimed at verifying environmental values. It compares the current condition of the site to the information provided in the EPBC Referral. Additionally, it offers advice and recommendations regarding approval under the EPBC Act.

1.3

Limitations

This report does not form a legal opinion or advice. This report aims to review the Project's approval requirement under the EPBC Act given the natural growth since the project was referred. This report does not review state or local approvals relevant to the Project.

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Haughton Solar Farm
Ecological Due Diligence Assessment

2.0

EPBC Referral 2017/8000

2.1

Proposed action

2

The Haughton Solar Farm Project was referred in 2017 (EPBC Referral 2017/8000). The proposed action included the construction and operation of a large scale solar photovoltaic facility, with a generation capacity of up to 500MW and battery storage capabilities. The development area is 1,181 ha of rural land within two lots (originally Lot 4 GS602 and Lot 30 SP100842, now Lot 1 SP313057 and Lot 2 SP 313057). The facility would be connected to the Powerlink Ross to Strathmore 275kV electrical transmission line which runs along the eastern boundary of the development area. A site office/warehouse, electrical substation, car parks and temporary lay down area and an area for future battery energy storage opportunities formed part of the proposed action. Access to the development area is via Keith Venables Road, which would be upgraded to allow provision for greater widths at turning points. During operation, maintenance work will include the management of vegetation within the development footprint. The start and end date for the proposed action was from September 2017 until September 2047, for a period of 30 years. The action is not part of a staged development, or a component of a larger project.

2.2

Referral information

The Project was referred on 6 September 2017. The referral package included:



EPBC Referral form



Ecological assessment documents, including the main report, appendices, addendum memorandum and addition of Keith Venables Road memorandum



Black-throated finch grassland condition assessment memorandum



Bat roost survey report



Hydraulic impact assessment report



Burdekin Shire Council Material Change of Use for Renewable Energy Facility
(Solar Farm)
(CONS17/0002)



Haughton Solar Farm map identifying the development area for referral and the investigation area



Pacific Hydro Health, Safety and Environment Policy.

The proposed action was considered unlikely to impact on Matters of National Environmental Significance (MNES) or Commonwealth land, which was supported by the information presented within the referral package. The Project development area was refined from the initial investigation area, resulting in complete avoidance of suitable habitat for MNES threatened species. The resulting development area would affect only non-remnant vegetation with no conservation significant species, no vegetation communities, and as such was considered unlikely to have a significant impact on MNES. Further information on the ecological values presented within the referral is provided in Section 3.0. Due to the avoidance of MNES values and remnant vegetation, no further mitigation measures were proposed, other than the development and implementation of an Environmental Management Plan/s that will apply to the construction and operation of the development.

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2.3

Haughton Solar Farm Ecological Due Diligence Assessment

3

EPBC Referral Decision

The Project was determined to be not a controlled action (NCA) on 13 October 2017, and the development area is henceforth considered the Referral Area (Figure 1). The following extract

describes a NCA decision outcome (Department of Climate Change, Energy, the Environment and Water, 2023):

This decision means [the] proposed action is unlikely to have a significant impact on protected matters, no matter how you propose to undertake it. This in turn means [the] proposed action needs no further assessment [under the EPBC Act], but you must undertake it as described in your referral. If the minister decides that your proposal is not a 'controlled action', you can't be prosecuted under the EPBC Act for carrying out the work. This is the case even if it ends up having a significant impact on a protected matter or Commonwealth land (Department of Climate Change, Energy, the Environment and Water, 2023). The project can go ahead in the way [it was] referred, subject to approvals from other levels of government.

2.4

Project actions since NCA decision

Following the NCA decision, the Project commenced construction within the Referral Area under a Construction Environmental Management Plan. The lots within the Referral Area were changed from Lot 4 GS602 and Lot 30 SP100842, to Lot 1 SP313057 and Lot 2 SP 313057. Keith Venables Road was upgraded to support additional vehicular traffic and turning, and a site office/warehouse, electrical substation, car parks and temporary lay down area were constructed on Lot 1 SP313057. Solar panels have also been installed on Lot 1 SP313057 of the Referral Area (Figure 1). Construction is planned to continue in late 2024 on Lot 2 SP313057, including the installation of solar panels in the remaining Referral Area.

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Project Site
EPBC Referral Area (2017/8000)

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Figure 1
EPBC Referral Area and
Project Site

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Haughton Solar Farm

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Kate.Brodie on 23/05/2024

Haughton Solar Farm
Ecological Due Diligence Assessment

3.0

Ecological values

3.1

MNES values present at time of referral

The ecology report that supported the EPBC referral is provided in Appendix A. A desktop assessment reviewed available databases and references, including the EPBC Protected Matters Search Tool, Queensland Herbarium Regional Ecosystem mapping version 8, species data from Atlas of Living Australia and Queensland's WildNet, and other state mapping information. A species likelihood of occurrence assessment was undertaken to determine species with potential to occur within the investigation area that may require focused survey effort. Field surveys were conducted by a suitably qualified ecologist. These occurred during the dry season and the wet season to ground-truth ecological values, conduct targeted surveys for the black-throated finch (southern) and threatened microbats, and delineate wetlands within and adjacent to the investigation area. Several species were considered possible to occur such as red goshawk, black-throated finch (southern), masked own (northern), bare-rumped sheath-tail bat, oriental cuckoo, white-throated needletail, black-faced monarch, satin flycatcher, Latham's snipe, fork-tailed swift, cattle egret and saltwater crocodile. All other threatened flora and fauna and/or migratory species were considered unlikely to occur within the investigation area. The ecological values present within the investigation area included:

remnant vegetation (Table 1; Figure 2)

potential habitat for the bare-rumped sheath-tail bat within RE 11.3.35, and potential (marginal) habitat for the black-throated finch (southern) within the temporary water sources.

As discussed in Section 2.2, the Referral Area was reconfigured to avoid impacts to ecological values including remnant vegetation and MNES threatened species habitat. Due to the avoidance of clearing remnant vegetation, the project was considered unlikely to result in a significant impact to the bare-rumped sheath-tail bat. Due to the lack of nesting habitat, low availability of foraging grasses for the species, and limited seasonal water availability, the project was considered unlikely to result in a significant impact to the black-throated finch (southern).

Table 1

Ground-truthed Regional Ecosystems (AECOM, 2017)

RE ID

RE Description

11.3.7

Corymbia spp. woodland on alluvial plains

0

11.3.10

Eucalyptus brownii woodland on alluvial plains

0

11.3.12

Melaleuca viridiflora *M. argentea* +/- *M. dealbata* woodland on alluvial plains

0

11.3.35

Eucalyptus platyphylla, *Corymbia clarksoniana* woodland on alluvial plains

0

-

Regrowth

0

-

Non-remnant vegetation

3.2

MNES values present in 2024

Area within the Referral Area
(ha)

1,181

A brief site visit was conducted in 2024 by a suitably qualified ecologist. The ecological values present within the investigation area in 2024 were fundamentally the same as 2017. The following changes were found (Table 2; Figure 3):

■

Small areas of regrowth vegetation were identified within the Referral Area, however this vegetation does not form a regional ecosystem. Species were found to include *Eucalyptus platyphylla*, *Corymbia dallachiana* and *Corymbia tessellaris* from 1 to 5 metres

tall and 1-10%
cover.

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A small area of disturbed remnant vegetation was identified within the Referral Area that is likely to have been present during 2017, but was not mapped at the time. Assessment of vegetation has become more stringent since 2017, and it is likely this was not considered to sufficiently meet remnant status at the time. In 2024, two polygons were mapped as RE 11.3.4a and one polygon mapped as 11.3.35.



Clearing has occurred within the investigation area, located outside the Referral Area. This clearing was not conducted by the proponent (Pacific Blue) and is understood to be unrelated to the Project.

Table 2

Ground-truthed Regional Ecosystems (AECOM, 2024)

RE ID

RE Description

11.3.7

Corymbia spp. woodland on alluvial plains

0

11.3.10

Eucalyptus brownii woodland on alluvial plains

0

11.3.12

Melaleuca viridiflora M. argentea +/- M. dealbata woodland on alluvial plains

0

11.3.35

Eucalyptus platyphylla, Corymbia clarksoniana woodland on alluvial plains

3.1

11.3.4a

Corymbia tessellaris woodland on alluvial plains and terraces

1.6

-

Regrowth

5.1

-

Non-remnant

Area within the Referral Area
(ha)

1,171

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Project Site
EPBC Referral Area (2017/8000)
Ground-truthed Regional
Ecosystems (AECOM, 2017)
11.3.12/11.3.10/11.3.35
11.3.35

11.3.12/11.3.10/11.3.35

11.3.35/11.3.12

11.3.12/11.3.10/11.3.35

11.3.35/11.3.7
11.3.35a/ 11.3.10
11.3.35a/11.3.10

11.3.35/11.3.12
11.3.35a/
11.3.10

11.3.35a/11.3.7/11.3.10
11.3.7/11.3.10

11.3.7/11.3.35

11.3.7/11.3.35
Non remnant

11.3.35a/11.3.10
11.3.35a/11.3.10

11.3.7/11.3.35

er

11.3.35/11.3.7

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Figure 2
Ground-truthed Regional
Ecosystems (AECOM, 2017)

11.3.35a/11.3.7/11.3.10

11.3.35

Non remnant

11.3.35/11.3.7

11.3.7/11.3.10

Haughton Solar Farm

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Project Site
EPBC Referral Area (2017/8000)
Ground-truthed Regional
Ecosystems (AECOM, 2024)
11.3.12/11.3.10/11.3.35
Remnant
11.3.35 Remnant

11.3.12/11.3.10/11.3.35

11.3.35/11.3.12 Remnant

11.3.12/11.3.10/11.3.35

11.3.35/11.3.7 Remnant
11.3.35a Remnant

11.3.35a/
11.3.10

11.3.35/11.3.12

11.3.35a/ 11.3.10 Remnant

11.3.7/11.3.35

11.3.35a/11.3.7/11.3.10
Remnant
11.3.4a Remnant (disturbed)
11.3.7/11.3.10 Remnant
11.3.7/11.3.35 Remnant
Regrowth
Non-remnant

11.3.7/11.3.35

er

11.3.35/11.3.7

nR

iv

11.3.4a

11.3.35a

11.3.4a

11.3.35

11.3.35a/11.3.7/11.3.10

11.3.35a/11.3.7/11.3.10

Figure 3
Ground-truthed Regional
Ecosystems (AECOM, 2024)
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11.3.35/11.3.7

11.3.7/11.3.10

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4.0

Haughton Solar Farm Ecological Due Diligence Assessment

9

Due diligence assessment and recommendations

This section is based on the EPBC referral information presented in Section 1.3, and the MNES values presented in Section 3.0.

4.1

Project continuation

The proponent (Pacific Blue) plans to continue Project construction as per the proposed action description, wholly within the Referral Area and Project timeframe. The ecological values within the Referral Area have fundamentally remained the same, with a small area assessed differently.

Under the EPBC Act, a NCA decision allows the proponent to undertake the Project as described in the EPBC referral, without being prosecuted under the EPBC Act, “even if it ends up having a significant impact on a protected matter or Commonwealth land” (Department of Climate Change, Energy, the Environment and Water, 2023).

The NCA decision therefore allows the proponent to clear within the Referral Area regardless of this small vegetation change, so long as the proposed action and commitments are implemented as per the EPBC Referral 2017/8000. It is recommended that additional mitigations and management measures are applied to the small areas of regrowth and disturbed remnant vegetation within the Referral Area, such as presence of a suitably qualified fauna spotter-catcher during clearing activities to manage the potential presence of fauna individuals.

4.2

EPBC Act changes and reform

It is recognised that the EPBC Act has been subject to updates since this Project was referred, and future changes are also impending. This includes uplisting and delisting of threatened species and migratory species, changes to the intensity of survey effort and quantity of data presented within the referral process, and most notably for this project that non-remnant vegetation is not dismissed as having no habitat value for MNES species. Furthermore, mitigation and management measures are becoming increasingly rigorous. These changes do not impact the NCA decision of the Project, or the ability for the proponent to conduct the proposed action as per the referral. The EPBC Act Reform has highlighted an inadequate number of compliance and audits of Projects that were referred under the EPBC Act. As a result, the federal government is

establishing an independent national environmental protection agency, to be known as Environment Protection Australia (EPA). EPA will be responsible for compliance and enforcement, which may result in this Project being audited. It is recommended that an annual internal audit is conducted and recorded to demonstrate compliance with the EPBC Referral 2017/8000 including commitments within the Referral documentation, and the NCA decision. This will involve implementation of the mitigation and management measures with an Environmental Management Plan during construction and operation phases.

4.3

Conclusion

It is recommended that the Project may continue as described within the EPBC Referral 2017/8000 without further assessment or consultation with the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

It is recommended that additional mitigations and management measures are applied to the small areas of regrowth and disturbed remnant vegetation within the Referral Area, such as presence of a suitably qualified fauna spotter-catcher during clearing activities to manage the potential presence of fauna individuals.

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5.0

Haughton Solar Farm
Ecological Due Diligence Assessment

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<https://www.dcceew.gov.au/environment/epbc/advice/decisions-on-referred-actions>

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Ecological Due Diligence Assessment

Appendix

A

Ecology Report
(AECOM, 2017)

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08-Mar-2017
Doc No. 60535495

Technical Report
Ecological Assessment

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Australia Developments Pty LtdPacific Hydro Developments Pty Ltd -
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Haughton Solar Farm
Technical Report

Technical Report
Ecological Assessment

Client: Pacific Hydro Australia Developments Pty Ltd
ABN: N/A

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Technical Report

Ref

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Date

08-Mar-2017

Prepared by

Kristina Ihme

Reviewed by

Rouven Lau, Greg Calvert

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Authorised
Rev

Revision Date

Details
Name/Position

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For Client Review

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17-Feb-2017

For Client Review

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08-Mar-2017

Revised Final Issue

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Executive Summary

A terrestrial ecology assessment was undertaken for Pacific Hydro Australia Developments Pty Ltd

(Pacific Hydro thereafter) by AECOM Australia Pty Ltd (AECOM) on the 7th of December 2016. The

aim of the ecological assessment was to document the terrestrial biodiversity values present within the

Project Site, with particular reference to the occurrence of conservation significant species and

vegetation communities, and to identify any significant environmental constraints that might influence

either the Project timeline or proposed Project Development Area.

The assessment was a two stage process, involving a literature review, followed by a field survey. The

literature review stage incorporated the review of databases to generate a list of conservation

significant vegetation communities and species that were potentially present within the Project Site.

The field survey was subsequently undertaken to ground truth the results of the literature review.

The Project Site consists mostly of non-remnant vegetation with remnant vegetation pockets

remaining in some areas. The field survey identified and mapped Regional Ecosystem (RE) 11.3.7,

11.3.10, 11.3.12, and 11.3.35; all occurring as heterogeneous REs and listed as least concern under

the Vegetation Management Act (1999). These REs are not analogous with any threatened ecological

communities (TECs) listed under the Environment Protection and Biodiversity Conservation Act 1999

(EPBC Act). No TECs were identified within the Project Site. The remainder of the Project Site was

comprised of non-remnant modified grassland primarily used for cattle grazing. No essential habitat

was mapped within the Project Site.

The ecological field survey did not record any flora or fauna species of conservation significance.

No conservation significant flora species were considered as possible to occur within the Project Site.

Nine fauna species of conservation significance were considered as possible to occur within the

Project Site:



Red Goshawk (*Erythrotriorchis radiates*) (Endangered under NC Act, Vulnerable under EPBC Act)



Black-throated Finch (southern) (*Poephila cincta cincta*) (Endangered under NC Act, Endangered under EPBC Act)



Masked Owl (northern) (*Tyto novaehollandiae kimberli*) (Vulnerable under NC Act,

Vulnerable
under EPBC Act)



Bare-rumped Sheath-tail Bat (*Saccolaimus saccolaimus nudiclunatus*) (Endangered
under NC
Act, Vulnerable under EPBC Act)



Oriental Cuckoo (*Cuculus optatus*) (Special Least Concern under NC Act, Migratory
and Marine
under EPBC Act)



White-throated Needletail (*Hirundapus caudacutus*) (Migratory and Marine under
EPBC Act)



Black-faced Monarch (*Monarcha melanopsis*) (Special Least Concern under NC Act,
Migratory
and Marine under EPBC Act)



Satin Flycatcher (*Myiagra cyanoleuca*) (Migratory and Marine under EPBC Act)



Latham's Snipe (*Gallinago hardwickii*) (Migratory Wetland and Marine under EPBC
Act).

Suitable habitat for a range of fauna species is available within areas of
remnant vegetation. Stags,
hollows, large mature trees, decorticating bark, woody debris and habitat logs
were identified in
patches of remnant vegetation. This included habitat suitable for roosting micro
bats, and possible
habitat for Black throated finches (BTF) close to water sources.
A range of additional studies have been recommended in order to quantify habitat
for species or
species habitat potentially occurring within the Project Site.
The proposed Project Development Area has been reduced following the initial
ecological assessment
to avoid the remnant vegetation areas and mapped wetlands thereby reducing the
potential impact of
the Project. These changes have been considered in this revised report.
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The resulting proposed Project Development Area was found to affect only non-remnant vegetation, with no conservation significant species, no vegetation communities, and (based on the information currently available) is unlikely to include significant environmental constraints.

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Technical Report

1.0

Introduction

1.1

Background

1

Pacific Hydro Australia Developments Pty Ltd (Pacific Hydro thereafter) engaged AECOM Australia Pty Ltd (AECOM) to undertake an ecological assessment at a Project Site located approximately 60km south of Townsville close to the Haughton River. The Project Site is divided into two lots on private land- Lot 4 GS602 and 30 SP100843 making up an area of 3200 ha (1600 ha each). Pacific Hydro is proposing to develop a solar farm, with the provision for battery storage, within the Project Development Area.

1.2

Prevailing Environment within the Project Site

The Project and its position within the region are presented in Figure 1. The Project Site used in this report refers to the two land parcels and features that are located within the area depicted in Figure 1. The Project Site is currently used for cattle grazing. The majority of the site is relatively flat, and most of the area has been cleared. A few pockets of remnant vegetation exist across the site. The site is located in the Brigalow belt bioregion, approximately 60km south of Townsville and 48km south west of Ayr (Figure 1). The Project Site is located south of the high banks of the Haughton River.

1.3

Study Aim and Objective

The study aim was to investigate environmental constraints across the Project Site based on an ecological assessment. The survey aims to ground truth a number of elements of the desk top review. As the study does not include survey methods outlined in the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al 2012) or any of the EPBC minimum survey guidelines, the results of this survey are unable to be used to exclude any of those species for which there is suitable habitat.

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WOODHOUSE

Data sources:

CLAREDALE

KIRKNIE

Aecom Field Surveyed RE's - AECOM 2016
Imagery, Watercourse, Roads, Property Boundary, Wetlands - QLD Gov 2017

HAUGHTON SOLAR FARM
Project Site Location

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Technical Report

2.0

Legislative Context

2.1

Environmental Protection and Biodiversity Conservation Act, 1999

3

The Commonwealth Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act) provides for the protection of the environment, especially Matters of National Environmental Significance (MNES). The EPBC Act is administered by the Commonwealth Department of the Environment and Energy (DoEE). The Act is designed to provide for the conservation of biodiversity through the protection of threatened species and ecological communities, migratory, marine and other protected species listed under the Act. In general, the Act aims to streamline national environmental assessment and approvals processes, protect Australian biodiversity and integrate management of MNES and heritage places. The EPBC Act provides minimum survey guidelines for a range of threatened fauna species. If the proposed action is at risk of impacting on a MNES significantly, a referral under EPBC is recommended.

2.2

Nature Conservation Act, 1992

The Queensland Nature Conservation Act, 1992 (NC Act) is administered by the Department of Environment and Heritage Protection (EHP) and is the principal legislation for the conservation and management of the State's native flora and fauna. The primary objective of the NC Act is the conservation of biodiversity, namely the preservation of Endangered, Vulnerable and Near Threatened species of flora and fauna, as listed under the Nature Conservation (Wildlife) Regulation 2006. Several species protected under the NC Act may potentially occur within the Project Site.

2.3

Vegetation Management Act, 1999

The Queensland Vegetation Management Act, 1999 (VM Act) regulates the clearing of native vegetation within Queensland. It also aims to maintain ecological processes and reduce greenhouse gas emissions. Additionally, areas of remnant vegetation specific to conservation significant species (listed under the NC Act) are further classified as essential habitat. The Department of Natural Resources and Mines (DNRM) uses certified mapping of

remnant vegetation and essential habitat to administer the VM Act. DNRM uses a state vegetation management codes to assess applications for clearing of native vegetation. Vegetation is mapped as remnant where the dominant canopy has greater than 70 % of the height and greater than 50 % of the cover, relative to the undisturbed height and cover of that stratum (Queensland Government, 2016). The vegetation community must also be dominated by species characteristic of the vegetation's undisturbed canopy. Several areas of remnant vegetation exist throughout the Project Site; however there is no remnant vegetation within the Project Development Area. Therefore a vegetation clearing permit is not required for works within the Project Development Area. If development were to occur within the wider Project Site, a vegetation clearing permit may be required for clearing these areas.

2.4

The Biosecurity Act, 2014

The Biosecurity Act 2014 commenced on 1 July 2016. It ensures a consistent, modern, risk-based and less prescriptive approach to biosecurity in Queensland. The Act provides comprehensive biosecurity measures to safeguard our economy, agricultural and tourism industries, environment and way of life, from:



pests (e.g. wild dogs and weeds)



diseases (e.g. foot-and-mouth disease)



contaminants (e.g. lead on grazing land).

The Act replaced the many separate pieces of legislation that were previously used to manage biosecurity, including the Land Protection (Pest and Stock Route Management) Act 2002. Decisions

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made under the Act will depend on the likelihood and consequences of the risk.
This means risks can
be managed more appropriately.
The General Biosecurity Obligation requires everyone to:



manage biosecurity risks under their control



take all reasonable and practical steps to prevent or minimise each biosecurity
risk



minimise the likelihood of causing a biosecurity event, and limit the
consequences if such an
event is caused



minimise the adverse effects on a biosecurity consideration of dealing with a
biosecurity matter or
carrier, and



not do anything that exacerbates the biosecurity risk; and not omitting to do
something if omitting
to do that thing would exacerbate the risk.

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3.0

Methodology

3.1

Desktop Assessment

3.1.1

Review of Databases

5

The following key databases and references were reviewed in undertaking the revised ecology desktop assessment:



Department of the Environment and Energy online EPBC Protected Matters Search Tool (EPBC PMST)



Queensland Herbarium Regional Ecosystem (RE) mapping (Version 8)



Species data from Wild Net (Wildlife Online) and Atlas of Living Australia



Department of Natural Resources and Mines Essential Habitat mapping



Protected Plants, Flora survey Trigger Map (Department of Environment and Heritage Protection, 2016)



Matters of State Environmental Significance mapping found online in SPP Interactive Mapping System (Environment & Heritage, Biodiversity layer).

All database searches and buffer areas used can be viewed in Appendix A.
3.1.2

Species Likelihood Assessment

As a result of the database review, a new species likelihood assessment was undertaken in order to focus survey effort on protected species likely to occur on site. The methodology included describing individual species habitat and distributional range and assessing the likelihood of the species to occur within the project assessment area based on the following descriptors:



unlikely - not in distributional range, or no suitable habitat present, no records in the closer study area



possible - within distributional range and habitat present



likely - within distributional range, habitat present and past record from a nearby locality.

3.2

Field Survey Effort and Timing

Two field surveys were undertaken, one in the dry season (7th December 2016) and a second field survey in the wet season (14th February 2017).

A Principal Ecologist and Senior Environmental Scientist undertook a dry season field survey on 7th December 2016. A total of approximately 10 hours was taken to complete the survey. The field survey included:



Preliminary Black-throated finch (BTF) habitat assessments



Ground truthing Regional Ecosystem (RE)



Inspection of two areas mapped as High Ecological Significant (HES) wetlands, in addition to incidental observations of flora and fauna.

The wet season field survey was undertaken by two qualified ecologists on the 14th of February 2017.

A total of approximately 10 hours was used to investigate:



Wetland conditions in the wet season



Deployment of Song Meters for analysis of micro bat calls.

Micro bat call findings will be reported on in a separate document.

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3.3

Flora Assessment

3.3.1

Survey Approach

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A desktop review of flora was undertaken as part of the present study. The desktop assessment was based on existing RE mapping which then guided field survey and ground truthing of vegetation.

This survey employed an assessment of floral taxa and vegetation communities in keeping with the methodology employed by the Queensland Herbarium for the survey of REs and vegetation

communities (Neldner, V. J., Wilson, B.A, Thompson, E.J. & Dilewaard, H.A., 2012). Preliminary

identification of the vegetation communities and target field sites was conducted prior to the commencement of fieldwork via interpretation of colour aerial photography and 1:100,000 RE mapping of the region.

Field surveys involved a botanical assessment at a total of nine sites within remnant communities as identified from desktop searches. The survey consisted of random meander search areas due to the large size of the Project Site and time constraints.

These surveys allowed to:



Identify species that are dominant, common, uncommon and rare



Identify abundant and less abundant species, not recorded within survey site



Confirm the representativeness of selected survey site locations



Confirm boundaries and ecotone areas between vegetation communities.

3.3.2

Nomenclature

Taxonomic nomenclature used for the description of floral species is according to Bostock and Holland (2013). Exotic flora species are signified in all text and tables by an asterisk (*).

3.3.3

Limitations

Data acquisition during flora surveys has inherent limitations associated with variability of vegetation communities across a survey location, and changes to the detectability and presence of species with time. Survey locations were strategically located to capture representative samples of communities, and the seasonal conditions during which these surveys were undertaken were below average due to dry conditions which made grasses, sedges and herbs difficult to identify. Especially annual species were difficult to identify, due to a scarcity in reproductive material and poor condition of vegetative material. It is likely that the list of species in the ground layer represents only a small fraction of actual species present. However, it is recognised that field studies with a temporal limitation cannot always account for 100% of potential floral diversity present across a survey location.

3.4

Fauna Assessments

3.4.1

Survey Approach

The assessment of fauna habitat values within the Project Site was limited to observations of terrestrial vertebrate fauna assemblages (birds, mammals, reptiles and amphibians) and habitat present while traversing the site. All fauna observations recorded during site traverses were also recorded, along with the habitat type in which they were observed. Survey tasks undertaken included:



Targeted Black-throated finch (BTF) survey



Birds were recorded concurrently with the flora surveys



Incidental observations were noted throughout the Project Site.

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Targeted BTF Survey

A site assessment datasheet was developed following survey guidelines in order to assess essential habitat factors for BTF (DEWHA, 2009), (Buosi, 2011). The datasheet was based on BTF essential habitat factors and included the following aspects:



Grassland condition: composition of estimated % perennial and annual, native and exotic %, % of leaf litter, % of bare ground



Food species present: e.g. *Urochloa mosambicensis*, *Enteropogon acicularis*, *Panicum decompositum*, *Panicum effusum*, *Dichanthium sericeum*, *Alloteropsis semialata*, *Eragrostis sororia*, *Themeda triandra*



Nesting habitat: known nesting trees present, potential nesting trees present, tree height, hollows present, tree species



Water resources: within 5 km, within 1 km, within 400 m of nesting habitat type: wetlands, creek lines, dams, stock troughs



Other notes.

In addition, two infra-red motion sensitive- game cameras were set up at a permanent water source from the 7/12/2016 to 19/12/2016 and resulting images were analysed.

3.4.3

Nomenclature

Taxonomic nomenclature used for describing fauna species follows that outlined by Clayton et al. (2006), with the exception of recently published taxonomic revisions. Feral species are denoted by an asterisk (*).

3.4.4

Limitations

The survey timing was undertaken toward the end of the dry season, which if following the survey

guidelines for BTF (DEWHA, 2009) would dictate waterhole counts. However, only a high level survey was undertaken not including waterhole counts. These were substituted with a 12 day camera survey at the only permanent water source present within the Project Site. Moreover, the timing of the survey fell into the late dry season which made grass identification difficult. Further studies will be undertaken towards the end of the wet season to characterise grassland condition.

3.5

Wetland and Watercourses

Wetlands, wetland buffer zones, and watercourses were investigated during the site inspection. Wetland condition was assessed recording present biota such as plant assemblages and notes on soil condition. Photographic references and GPS points were taken at each of the wetlands and watercourses.

3.5.1

Limitations

No assessment of soil condition, hydrology, stream bank, riparian condition, water quality etc, was undertaken as part of this survey. Results however, should be indicative of the condition of features on site.

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4.0

Results

4.1

Desktop Assessment

4.1.1

Regional Context and Bioregion

Queensland's bioregions are based on landscape patterns that reflect geology, climate, floral and faunal assemblages at a broad scale, and are used as the fundamental framework for the planning and conservation of biodiversity (Sattler, P. & R. William, 1999). The Project Site occurs within the Brigalow Belt bioregion and land zone 3; classified as alluvium (river and creek flats). The region has a semiarid to tropical climate with predominantly summer rainfall. Spatially averaged median (1890–2005) rainfall is 590 mm (Sattler, P. & R. William, 1999).

4.2

Flora

4.2.1

Regional Ecosystems

State Regional Ecosystem (RE) mapping shows three REs occurring (mapped as a heterogeneous polygon and homogenous polygons) within the Project Site. All REs are listed as 'Least Concern' under the VM Act. The REs are detailed below in Table 1.
Table 1

State RE mapping

RE

RE Description

VM Act Status

11.3.7

Corymbia clarksoniana, *C. tessellaris* and *C. dallachiana* tall woodland to open woodland (12-17m high). There is usually a low open woodland tree layer (7-11m high) dominated by species such as *Acacia salicina*, *Lysiphyllum hookeri* or *Grevillea striata*. Occurs on levees and plains formed from Quaternary alluvial deposits. Soils are usually deep uniform sands with minor areas of sandy red earths.

Least concern

11.3.25

Eucalyptus tereticornis or *E. camaldulensis* woodland fringing drainage lines *Eucalyptus camaldulensis* or *E. tereticornis* open forest to woodland. Other tree species such as *Casuarina cunninghamiana*, *E. coolabah*, *Melaleuca bracteata*, *Melaleuca viminalis*, *Livistona* spp. (in north), *Melaleuca* spp. and *Angophora floribunda* are commonly present and may be locally dominant. An open to sparse, tall shrub layer is frequently present dominated by species including *Acacia salicina*, *A. stenophylla* or *Lysiphyllum carronii*. Low shrubs are present, but rarely form a conspicuous layer. The ground layer is open to sparse and dominated by perennial grasses, sedges or forbs such as *Imperata cylindrica*, *Bothriochloa bladhii*, *B. ewartiana*, *Chrysopogon fallax*, *Cyperus dactylotes*, *C. difformis*, *C. exaltatus*, *C. gracilis*, *C. iria*, *C. rigidellus*, *C. victoriensis*, *Dichanthium sericeum*, *Leptochloa digitata*, *Lomandra longifolia* or *Panicum* spp. Occurs on fringing levees and banks of major rivers and drainage lines of alluvial plains throughout the region. Soils are very deep, alluvial, grey and brown cracking clays with or without some texture contrast. These are usually moderately deep to deep, soft or firm, acid, neutral or alkaline brown sands, loams or black cracking or non-cracking clays, and may be sodic at depth (Burgess 2003).

11.3.25b Riverine wetland or fringing riverine wetland.

Least concern

11.3.7/11.3.25/11.3.25b

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RE Description

VM Act Status

Melaleuca leucadendra and/or M. fluviatilis, Nauclea orientalis open forest. A range of other canopy or subcanopy tree species also occur including Pandanus

tectorius, Livistona spp., Eucalyptus tereticornis, Corymbia tessellaris, Millettia pinnata, Casuarina cunninghamiana, Livistona decora, Lophostemon suaveolens or L.

grandiflorus, rainforest species and, along drainage lines, Eucalyptus camaldulensis or E. tereticornis. A ground layer of tall grasses such as Chionachne cyathopoda, Mnesithea rottboellioides or Heteropogon triticeus may be present. Often occurs on coarse sand spits and levees within larger river channels.

11.3.35a/11.3.10

11.3.35a

Eucalyptus platyphylla, Corymbia clarksoniana woodland.

This association usually occurs as woodland of Eucalyptus platyphylla and Corymbia clarksoniana with Corymbia tessellaris occurring in some areas. A low tree layer of species such as Planchonia careya, Pandanus spiralis, Melaleuca viridiflora or M. nervosa and Petalostigma pubescens is often present. The ground layer is usually grassy with common species including Themeda triandra, Heteropogon contortus, Mnesithea rottboellioides and Bothriochloa decipiens, together with herbs or forbs such as Glycine tabacina, Galactia tenuiflora or Sida hackettiana. Occurs on Cainozoic alluvial plains. Older floodplain complexes, major stream levees and lighter deltaic deposits.

Least concern

11.3.10

Eucalyptus brownii grassy woodland. This unit usually occurs as a woodland of Eucalyptus brownii. There is usually a grassy ground layer of Aristida spp., Chloris spp., Fimbristylis dichotoma, Eriachne spp., Eragrostis spp. and Chrysopogon fallax. Areas subject to less intensive grazing or on better soils contain Heteropogon contortus, Bothriochloa bladhii and Chrysopogon fallax. Occurs on Cainozoic alluvial plains.

11.3.10a: Palustrine wetland (e.g. vegetated swamp).

Eucalyptus brownii woodlands on closed depressions.

Occurs on closed depressions.

11.3.10b: Floodplain (other than floodplain wetlands).

Eucalyptus brownii woodlands on floodplains.

Least concern

11.3.7

Corymbia clarksoniana, *C. tessellaris* and *C. dallachiana* tall woodland to open woodland (12-17m high). There is usually a low open woodland tree layer (7-11m high) dominated by species such as *Acacia salicina*, *Lysiphyllum hookeri* or *Grevillea striata*. Occurs on levees and plains formed from Quaternary alluvial deposits. Soils are usually deep uniform sands with minor areas of sandy red earths.

Least concern

11.3.9

Eucalyptus platyphylla +/- *Corymbia clarksoniana* +/- *C. intermedia* +/- *E. tereticornis* +/- *Lophostemon suaveolens* woodland. This association has a grassy ground layer, with species including *Heteropogon contortus*, *Sorghum nitidum*,

Least concern

11.3.7/11.3.9/11.3.12

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Chrysopogon fallax, *Alloteropsis semialata* and *Aristida holathera* var. *holathera*, or with heavier grazing short grasses such as *Chloris* spp., *Fimbristylis dichotoma*, *Cyperus* spp., *Schizachyrium fragile* and *Ectrosia leporina*. Occurs on Cainozoic alluvial plains, on sandy surface with clay subsoil. Usually with "wet" influence, either closely adjacent to major river, or undergoes inundation relatively frequently. May occur in wet depressions.
11.3.9a: *Eucalyptus acmenoides* +/- *E. drepanophylla*, +/- *E. platyphylla* woodland.
11.3.12

Melaleuca viridiflora with occasional *M. argentea* +/- *M. dealbata* woodland to open woodland. Occasional midstratum of *Grevillea pteridifolia* and *Acacia leptocarpa*. Ground layer of perennial grasses such as *Themeda triandra*, *Elionurus citreus*, *Ectrosia leporina*, *Eriachne rara*, *Eremochloa bimaculata*, *Thaumastochloa pubescens*, *Eragrostis brownii* and *Ischaemum australe*. Occurs on older alluvial plains on strongly duplex clay soils with restricted drainage.

Least concern

11.3.25a

Riverine wetland or fringing riverine wetland. *Eucalyptus raveretiana* (sometimes emergent), *Melaleuca fluviatilis* woodland. A range of other species may be present including *Melaleuca leucadendra*, *Corymbia clarksoniana*, *Casuarina cunninghamiana*, *Melaleuca viminalis* and *Nauclea orientalis*. There is often a dense low tree layer dominated by species such as *Acacia salicina*, *Geijera salicifolia*, *Diospyros humilis* and *Mallotus philippensis*.

Least concern

The field survey identified four REs occurring within the Project Site (Figure 2). The remaining areas have been historically cleared and consisted of non-remnant vegetation. It should be noted that the survey was timed at the end of the dry season and prevailing dry conditions made plant identification (e.g. herbs and grasses) challenging. All of the identified REs occurring as heterogeneous vegetation communities, and all REs are classified as Least Concern under the VM Act. The composition of each RE is discussed below and a summary provided in Table 2.
Table 2

Ground- truthed REs

RE ID

RE Description

VM Act Status

Biodiversity
Status

11.3.7

Corymbia spp. woodland
on alluvial plains

Least Concern

Of Concern

RE1, RE3, RE4,
RE5, RE6, RE8

11.3.10

Eucalyptus brownii
woodland on alluvial plains

Least Concern

No concern at
present

RE2, RE4, RE5,
RE9

11.3.12

Melaleuca viridiflora M.
argentea +/- M. dealbata
woodland on alluvial plains

Least Concern

No concern at
present

RE1, RE2

11.3.35

Eucalyptus platyphylla,
Corymbia clarksoniana
woodland on alluvial plains

Least Concern

No concern at
present

RE2, RE3, RE5,
RE6, RE7, RE8,
RE9

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Survey Sites

2
84
38

4SP146640

AG

13SP181729

P1

PS

S6
73

S6
0G
01

2
60
GS
0
1

012GS815

20
431

8SP123168

12GS815

8SP123168

DATUM GDA 1994, PROJECTION MGA ZONE 55

WL1

02

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11.

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12

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3.

10

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11

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35

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RE2

30SP100843

12SP221591

3

11.

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11

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11

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F

G

11.3.35a/11.3.10

4GS602

RE3

1,200

Metres

F

G

10

/

600

1:30,000 (when printed at A3)

BTF2

72

S6

RE9

3.

300

7GS947

AG

5SP107479

KEITH

VENABLES

ROAD

LEGEND

F Survey Site

G

Watercourse

Roads

Property Boundary

Wetland Protection Area

Project Site

Project Development Area

Wetland Protection Area Trigger

Ground-Truthed Regional Ecosystem

11.3.12/11.3.10/11.3.35

11.3.35

11.3.35/11.3.12

11.3.35/11.3.7

11.3.35a/ 11.3.10

11.3.35a/11.3.10

11.3.35a/11.3.7/11.3.10

11.3.7/11.3.10

11.3.7/11.3.35

Non remnant

F

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Non remnant

5

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83

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11.3.3

5/11.3

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F

G

WL2

11.3 .35

RE7

F

G

11.3.35/ 11.3.7

F RE6

G

.3

5a/11

11.3.3

RE5

F

G

.3.10

.7/11

11.3.7/11.3.10

RE8

3GS603

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RE1/BTF1

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www.aecom.com

2SP119480

P7

95SP143120

102SP105230

AD

41CP903751

BR

3SP146640

RO
BLACK

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No

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Data sources:

F
G

Aecom Field Surveyed RE's - AECOM 2016
Watercourse, Roads, Property Boundary, Wetlands - QLD Gov 2016

HAUGHTON SOLAR FARM
Ground-Truthed
Regional Ecosystems

RE4 G
F

1AP3570

Filename:

\\Autsv1fp001\Projects\605X\60530885\4. Tech Work Area\4.99 GIS\GIS\02_MXDs\
G002_60530885_RegionalEcosystem_v2_A3L.mxd

PROJECT ID

CREATED BY

60530885
CFS

VERSION

2

LAST MODIFIED

CFS - 15/02/2017

Figure

2

A3 size

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A detailed description and photographic reference of each RE surveyed are provided below and a comprehensive survey flora species list is provided in Appendix B.

Regional Ecosystem 11.3.7

RE 11.3.7 was identified across several sites (RE 1, 3, 4, 5, 6 and 8) as part of heterogeneous vegetation communities. There was a low open woodland tree layer (7-11m high) dominated by species such as *Corymbia dallachiana*, *Melaleuca viridiflora*, *Eucalyptus platyphylla*, *Corymbia tessellaris* and *Cryptostegia grandiflora**, while *Corymbia clarksoniana*, *Eucalyptus brownii*, *Grevillea striata*, were often observed as uncommon species. A typical example of RE 11.3.7 is shown in Figure 3 below.

Figure 3

Example of RE 11.3.7 (Site RE1)

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Regional Ecosystem 11.3.10

RE 11.3.10 was identified across site RE2, 4, 5 and 9 as part of heterogeneous vegetation communities. Dominant species recorded were *Eucalyptus brownii*, *Eucalyptus platyphylla*, *Corymbia dallachiana* and *Corymbia tessellaris*. Some commonly observed species were *Planchonia careya*, *Ficus opposita*, *Melaleuca nervosa* and *Cryptostegia grandiflora**. Uncommon species observed were *Pandanus whitei*, *Panicum queenslandicum* and *Stylosanthes scabra**. A grassy ground layer existed including *Chloris inflata**, *Heteropogon contortus* and *Ocimum basilicum**. A species list is provided in Appendix A and Figure 4.

Figure 4

Example of RE 11.3.10 (Site RE4)

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Regional Ecosystem 11.3.12

RE11.3.12 was identified at site RE1 and 2 as part of heterogenous vegetation assemblages.

Dominant species recorded were *M. viridiflora*, *E. platyphylla*, *Lantana camara** and *E. brownii*.

Common species observed were *Planchonia careya*, *Ficus opposita*, *M. nervosa* and *C. tessellaris*.

Rare species detected were *Lomandra longifolia*. *Ziziphus mauritiana** was also recorded but as an

uncommon species. An example of RE 11.3.12 can be seen in Figure 5.

Figure 5

Example of RE 11.3.12 (Site RE5)

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Regional Ecosystem 11.3.35

This RE was observed across most sites as part of heterogeneous vegetation assemblages with the most dominant species being *E. platyphylla*. Other dominant species included *C. dallachiana*, *C. tessellaris*, *Cryptostegia grandiflora**, *Stylosanthes scabra** and *Dicanthium* spp. The ground layer predominantly consisted of common species including *Themeda triandra*, *Heteropogon contortus*, together with herbs such as *Sida* spp.. An example of RE 11.3.35 is shown in Figure 6 below.

Figure 6

4.2.2

Example of RE 11.3.35 (Site RE7)

Conservation Significant Species

No Black Ironbox (*E.reveretiana*) species were observed within the Project Site even though a known population exists along the nearby Haughton River riparian zone. No protected flora species were recorded within the Project Site.

4.2.3

Essential Habitat

Essential habitat mapping is produced by DNRM to identify locations considered to include important habitat values for the survival of conservation significant flora and fauna species. These localities are mapped over remnant or regrowth vegetation that is considered important for the preservation of biodiversity values. No mapped essential habitat exists within the Project Site. One area mapped as essential habitat for BTF exists 1.4km north of the Project Site across the Haughton River, and another area of essential habitat for BTF is located 5.1km south west of the Project Site.

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4.2.4

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Incidental Observations

In addition to several invasive plants detected throughout the study area (Attachment A, flora species list), Bellyache Bush (*Jatropha gossypifolia**) was detected close to the Haughton River riparian zone and the potential of spread was considered to be very high. Bellyache Bush is a restricted invasive plant under the Biosecurity Act 2014.

4.3

Fauna

4.3.1

Black-throated Finches (BTF)

Site BTF 1

BTF 1 was a non-remnant grazing site with remainders of RE 11.3.35 and exotic species (Figure 7).

Cattle were on site at the time of the survey since the site represented a permanent dam and the only available water for stock in that area. The grassland condition was poor with low percentage of ground cover, with 100% of the grasses identifiable as introduced. Known BTF food species were not

observed during the survey with *Urochloa mutica**, *Dicanthium* spp* and *Chloris inflata** present.

Potential nesting habitat trees were present such as *Eucalyptus platyphylla*, *Corymbia dallachiana*,

Eucalyptus brownii, *Corymbia tessellaris*. No nests of finches were observed. At the time of the

survey conditions were very dry, no typical foraging species present, but permanent water and suitable nesting habitat were present.

Figure 7

Vegetation assemblage at BTF1

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Figure 8

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BTF Site 1 Camera location and setup

Camera results for BTF1 returned no records of BTF or any other finches. Other bird species recorded were added to the incidental species list in Appendix C.

Site BTF2

This site was located just outside the project boundary (Figure 9). The predominant land use was grazing and the site was located at a large artificial wetland. The grassland condition was poor with mostly exotic species present. The timing of the survey fell into the late dry season which made grass identification difficult. At the time of the survey, none of the BTF food species were observed. Other species identified were *Cynodon dactylon* *, *Hymenachne amplexicaulis** and *Paspalum scrobiculatum*. No known nesting trees were on site, but potential nesting trees were present such as *E. brownii*, *E. platyphylla*, *M. nervosa* and *C. dallachiana*. A permanent water source was present, and other granivorous birds were present, including zebra finches observed in a nearby Chinese apple tree (*Ziziphus mauritiana**). No species were observed foraging at the time of the survey.

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Figure 9

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Vegetation assemblage at BTF2

Detailed BTF habitat assessments is provided in Appendix B.

4.4

Species Likelihood and Incidental Records

Species likelihood results can be viewed in Appendix C. Several Species may possibly occur such as:

Red Goshawk, Black-throated Finch, Masked Owl (northern), Bare-rumped Sheath-tail Bat, Oriental

Cuckoo, White-throated Needletail, Black-faced Monarch, Satin Flycatcher, Latham's Snipe, Forktailed Swift, Cattle Egret and Salt-water Crocodile. Their conservation status is provided in Appendix

C. All other threatened and/or migratory species identified in the desk top review are considered

unlikely to occur within the Project Site.

All areas with remnant RE11.3.35 have the potential to be habitat for the Bare-rumped Sheath-tail Bat.

Suitable sites with mature hollow trees were identified at sites RE1, RE2, RE3, RE5, RE6, RE7, RE8

and RE9 (Figure 10 and Figure 11).

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Figure 10 Examples of tree hollows detected at RE1

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Figure 11 Examples of tree hollows detected at RE8

Incidental observations of fauna included 23 birds, one reptile and two mammals; none of which are considered to be of conservation significance.

4.5

Wetland and Watercourses

Two High Ecological Significant (HES) wetland areas including their buffer zones were inspected during this study as either the wetland or the wetland buffer zone falls within the Project Site.

Wetland 1 (Site WL1)

This wetland is located within the northern section of the Project Site and could not be identified during

the first field inspection in the dry season (Figure 2). Under Wetland Info (Queensland Government,

2017) it is classified as a palustrine wetland with a habitat type of "coastal/subcoastal non-floodplain

grass, sedge and herb, freshwater", based on data sources of multi-temporal satellite data 1988-2001

(MT2001). Historical Google Earth imagery was reviewed with evidence for the presence of a wetland

being established in 2004 imagery (Figure 8, Figure 7). Wetland boundaries on the imagery from

2004 appeared to be smaller than the currently mapped HES wetland (Figure 12 and Figure 13).

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Figure 12 Google earth Imagery 2004, showing Wetland Site 1

Dominant species recorded were *Alternanthera ficoidea** with common species such as *Petalostigma pubescens*, *Sida acuta**, *Sida cordifolia*, *Stachytarpheta jamaicensis**, *Stylosanthes scabra**, and a perennial grass species that was unidentifiable due to prevailing dry conditions. Uncommon species recorded were *Triumfetta rhomboidea**, *Ziziphus mauritiana**, and *Eclipta prostrata*; the latter being a common wetland species. A species list is provided in Appendix B and the wetland site can be viewed in Figure 13.

Figure 13 Wetland Site 1

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Due to the difficulty of identifying wetland flora during the dry season, another wetland inspection was undertaken during the wet season (14 February 2017) after heavy rainfall events. The second site inspection revealed the presence of five sedge species as well as several forbs and grasses that are known to be wetland species (Appendix B). Moreover the soil was wet and showed small depressions throughout the wetland area. Fauna observed were Black-necked stork (jabiru), emus and finches. The entire wetland boundary was surveyed and vegetation composition was found to be consistent with the mapped boundaries of the wetland. Refer to Figure 14 for site photo.

Figure 14 Typical wetland species observed in the wet season (Wetland Site 1)

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Wetland 2 (Site WL 2)

Wetland 2 was located just outside the Project Site boundary, in the south eastern corner. However, the wetland buffer zone is mapped within the Project Site.

The wetland is mapped as a palustrine wetland under Wetland Info (Queensland Government, 2017) it

is classified as a palustrine wetland with a habitat type of "coastal/subcoastal non-floodplain grass, sedge and herb, freshwater", based on data sources of multi-temporal satellite data 1988-2001

(MT2001). This wetland was found to have wetland characteristics such as evidence of former water

intrusion (cow hoof prints indicated the presence of water in previous wet conditions), wetland

vegetation such as sedges and wetland forbs were present. Dominant species recorded were E.

platyphylla, with species such as *C. tessellaris*, *Cryptostegia grandiflora**, and *Cyperus* spp. * being

common. Rare species observed were *Hygrophila angustifolia*, *Eclipta prostrata* and *Ludwigia* spp. A

species list is provided in Appendix B and the wetland site can be viewed in Figure 15.

Figure 15 Wetland Site 2

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Watercourse 1

Watercourse 1 mapped as a stream order (S0) 1 watercourse under the VM Act (1999) in the south eastern corner of the Project Site (Figure 2). It was dry at the time of survey and is shown in Figure 16.

Figure 16 Dry creek bed of Watercourse 1

Watercourse 2

Watercourse 2 is located just south of watercourse 1. It is also mapped as a S01 stream and was dry at the time of survey. It is shown in Figure 17.

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Figure 17 Dry creek bed showing Watercourse 2

The proposed Project Site will not impact on the riparian zone of the Haughton River.

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Discussion

The desktop assessment followed by a field survey allowed a broad characterisation of the Project Site biodiversity values. The study also highlighted the need for further investigations particularly on BTF habitat and microchiropteran bat habitat, and an investigation into wetland delineation processes.

5.1

Flora

Current investigations resulted in the characterisation of vegetation communities across the entire Project Site. Therefore, no further studies are deemed necessary.

5.2

Fauna

5.2.1

Black-throated Finches

As a result of very dry site conditions at the time of the survey (late dry season, December 2016), identification of grassland floristic composition was difficult. Therefore an assessment of BTF food species should be viewed as preliminary only. A late wet season survey would be necessary to identify grassland characteristics in order to assess foraging habitat quality for BTF. Any grassland however is only suitable to BTF if it is within close proximity to water. It can be concluded that the proposed Project Site would only provide marginal habitat for BTF within 400 m of the two water sources (artificial dams identified). Water sources are scarce within the Project Site and only two artificial dams had permanent water at the time of the survey. In order to characterise grassland condition, it is suggested to undertake another study at the end of the wet season within those two areas.

5.2.2

Microchiropteran bats

The survey identified a number of potential roost areas for microchiropteran bats, however as the Project Development Area does not contain any remnant vegetation, no further investigations are required at this time. If development were to occur within the wider Project Site, roost survey and microchiropteran bat call detection is recommended as part of future investigations. This will fulfil

requirements under the survey guidelines for Australia's threatened bats (Department of the Environment, Water, Heritage and the Arts , 2010).

5.3

Wetland and Watercourses

Wetlands were investigated in the dry and wet season. Wetland boundaries were identified based on soil type and biota present and were found to be consistent with mapping. The wetlands are located outside of the Project Development Area.

5.4

Conclusion

The proposed Project Development Area has been reduced following the initial ecological assessment to avoid the remnant vegetation areas and mapped wetlands thereby reducing the potential impact of the Project. These changes have been considered in this revised report. The resulting proposed Project Development Area was found to affect only non-remnant vegetation, with no conservation significant species, no vegetation communities, and (based on the information currently available) is unlikely to include significant environmental constraints.

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Appendix

A

Desktop Searches

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters

protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/11/16 14:16:04

Summary

Details

Matters of NES

Other Matters Protected by the EPBC Act

Extra Information

Caveat

Acknowledgements

This map may contain data which are

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Coordinates

Buffer: 5.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:

None

National Heritage Places:

None

Wetlands of International Importance:

1

Great Barrier Reef Marine Park:

None

Commonwealth Marine Area:

None

Listed Threatened Ecological Communities:

None

Listed Threatened Species:

17

Listed Migratory Species:

14

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated.

Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at

<http://www.environment.gov.au/heritage>

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:

None

Commonwealth Heritage Places:

None

Listed Marine Species:

19

Whales and Other Cetaceans:

None

Critical Habitats:

None

Commonwealth Reserves Terrestrial:

None

Commonwealth Reserves Marine:

None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:

None

Regional Forest Agreements:

None

Invasive Species:

27

Nationally Important Wetlands:
Key Ecological Features (Marine)

1

None

Details

Matters of National Environmental Significance
Wetlands of International Importance (Ramsar)

[Resource Information]

Name

Bowling green bay

Proximity

20 - 30km upstream

Listed Threatened Species

[Resource Information]

Name

Birds

Calidris ferruginea

Curlew Sandpiper [856]

Status

Type of Presence

Critically Endangered

Species or species habitat
may occur within area

Erythrotriorchis radiatus

Red Goshawk [942]

Vulnerable

Species or species habitat
likely to occur within area

Neochmia ruficauda ruficauda

Star Finch (eastern), Star Finch (southern) [26027]

Endangered

Species or species habitat
likely to occur within area

Numenius madagascariensis

Eastern Curlew, Far Eastern Curlew [847]

Critically Endangered

Species or species habitat
may occur within area

Poephila cincta cincta

Southern Black-throated Finch [64447]

Endangered

Species or species habitat
likely to occur within area

Rostratula australis

Australian Painted Snipe [77037]

Endangered

Species or species habitat
likely to occur within area

Tyto novaehollandiae kimberli
Masked Owl (northern) [26048]

Vulnerable

Species or species habitat
likely to occur within area

Mammals
Dasyurus hallucatus
Northern Quoll, Digul [331]

Endangered

Species or species habitat
likely to occur within area

Macroderma gigas
Ghost Bat [174]

Vulnerable

Species or species habitat
likely to occur within area

Petauroides volans
Greater Glider [254]

Vulnerable

Species or species habitat
may occur within area

Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)
Koala (combined populations of Queensland, New

Vulnerable
South Wales and the Australian Capital Territory)
[85104]

Saccolaimus saccolaimus nudicluniatus
Bare-rumped Sheath-tailed Bat, Bare-rumped
Critically Endangered
Sheath-tail Bat [66889]

Species or species habitat
may occur within area

Species or species habitat
likely to occur

Name

Status

Type of Presence
within area

Plants

Eucalyptus raveretiana
Black Ironbox [16344]

Vulnerable

Species or species habitat
likely to occur within area

Marsdenia brevifolia
[64585]

Vulnerable

Species or species habitat
may occur within area

Reptiles

Denisonia maculata
Ornamental Snake [1193]

Vulnerable

Species or species habitat
may occur within area

Egernia rugosa
Yakka Skink [1420]

Vulnerable

Species or species habitat
likely to occur within area

Vulnerable

Species or species habitat
likely to occur within area

Sharks

Pristis pristis
Largetooth Sawfish, Freshwater Sawfish, River
Sawfish, Leichhardt's Sawfish, Northern Sawfish
[60756]

Listed Migratory Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act -
Threatened Species list.

Name

Threatened

Type of Presence

Migratory Marine Birds

Apus pacificus
Fork-tailed Swift [678]

Species or species habitat
likely to occur within area
Migratory Marine Species
Crocodylus porosus
Salt-water Crocodile, Estuarine Crocodile [1774]

Pristis pristis
Largetooth Sawfish, Freshwater Sawfish, River
Sawfish, Leichhardt's Sawfish, Northern Sawfish
[60756]
Migratory Terrestrial Species
Cuculus optatus
Oriental Cuckoo, Horsfield's Cuckoo [86651]

Hirundapus caudacutus
White-throated Needletail [682]

Monarcha melanopsis
Black-faced Monarch [609]

Monarcha trivirgatus
Spectacled Monarch [610]

Motacilla flava
Yellow Wagtail [644]

Myiagra cyanoleuca
Satin Flycatcher [612]

Rhipidura rufifrons
Rufous Fantail [592]

Migratory Wetlands Species

Species or species habitat
likely to occur within area

Vulnerable

Species or species habitat
likely to occur within area

Species or species habitat
may occur within area

Species or species habitat
may occur within area

Species or species habitat
likely to occur within area

Species or species habitat
may occur within area

Species or species habitat
may occur within area

Species or species habitat
known to occur within area

Species or species habitat
likely to occur within area

Name
Calidris ferruginea
Curlew Sandpiper [856]

Threatened

Type of Presence

Critically Endangered

Species or species habitat
may occur within area

Gallinago hardwickii
Latham's Snipe, Japanese Snipe [863]

Numenius madagascariensis
Eastern Curlew, Far Eastern Curlew [847]

Species or species habitat
may occur within area

Critically Endangered

Pandion haliaetus
Osprey [952]

Species or species habitat
may occur within area

Species or species habitat
likely to occur within area

Other Matters Protected by the EPBC Act
Listed Marine Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act -
Threatened Species list.

Name
Threatened
Type of Presence
Birds

Anseranas semipalmata
Magpie Goose [978]
Species or species habitat
may occur within area

Apus pacificus
Fork-tailed Swift [678]

Species or species habitat
likely to occur within area

Ardea alba
Great Egret, White Egret [59541]

Species or species habitat
likely to occur within area

Ardea ibis
Cattle Egret [59542]

Calidris ferruginea

Curlew Sandpiper [856]

Cuculus saturatus

Oriental Cuckoo, Himalayan Cuckoo [710]

Gallinago hardwickii

Latham's Snipe, Japanese Snipe [863]

Haliaeetus leucogaster

White-bellied Sea-Eagle [943]

Hirundapus caudacutus

White-throated Needletail [682]

Merops ornatus

Rainbow Bee-eater [670]

Species or species habitat
may occur within area

Critically Endangered

Species or species habitat
may occur within area

Species or species habitat
may occur within area

Species or species habitat
may occur within area

Species or species habitat
likely to occur within area

Species or species habitat
may occur within area

Species or species habitat
may occur within area

Name

Monarcha melanopsis
Black-faced Monarch [609]

Threatened

Species or species habitat
likely to occur within area

Monarcha trivirgatus
Spectacled Monarch [610]

Species or species habitat
may occur within area

Motacilla flava
Yellow Wagtail [644]

Species or species habitat
may occur within area

Myiagra cyanoleuca
Satin Flycatcher [612]

Numenius madagascariensis
Eastern Curlew, Far Eastern Curlew [847]

Species or species habitat
known to occur within area

Critically Endangered

Pandion haliaetus
Osprey [952]

Species or species habitat
may occur within area

Species or species habitat
likely to occur within area

Rhipidura rufifrons
Rufous Fantail [592]

Rostratula benghalensis (sensu lato)
Painted Snipe [889]

Type of Presence

Species or species habitat
likely to occur within area

Endangered*

Reptiles
Crocodylus porosus
Salt-water Crocodile, Estuarine Crocodile [1774]

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Extra Information
Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name

Birds

Acridotheres tristis

Common Myna, Indian Myna [387]

Anas platyrhynchos

Mallard [974]

Columba livia

Rock Pigeon, Rock Dove, Domestic Pigeon [803]

Status

Type of Presence

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur

Name

Lonchura punctulata
Nutmeg Mannikin [399]

Passer domesticus
House Sparrow [405]

Streptopelia chinensis
Spotted Turtle-Dove [780]

Sturnus vulgaris
Common Starling [389]

Frogs
Rhinella marina
Cane Toad [83218]

Mammals
Bos taurus
Domestic Cattle [16]

Capra hircus
Goat [2]

Felis catus
Cat, House Cat, Domestic Cat [19]

Feral deer
Feral deer species in Australia [85733]

Mus musculus
House Mouse [120]

Oryctolagus cuniculus
Rabbit, European Rabbit [128]

Rattus rattus
Black Rat, Ship Rat [84]

Sus scrofa
Pig [6]

Vulpes vulpes
Red Fox, Fox [18]

Plants
Acacia nilotica subsp. *indica*
Prickly Acacia [6196]

Cabomba caroliniana
Cabomba, Fanwort, Carolina Watershield, Fish Grass,
Washington Grass, Watershield, Carolina Fanwort,
Common Cabomba [5171]
Cryptostegia grandiflora
Rubber Vine, Rubbervine, India Rubber Vine, India
Rubbervine, Palay Rubbervine, Purple Allamanda
[18913]

Status

Type of Presence
within area
Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
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Species or species habitat
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Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
may occur within area

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Name

Hymenachne amplexicaulis
Hymenachne, Olive Hymenachne, Water Stargrass,
West Indian Grass, West Indian Marsh Grass [31754]
Jatropha gossypifolia
Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf
Physic Nut, Cotton-leaf Jatropha, Black Physic Nut
[7507]
Lantana camara
Lantana, Common Lantana, Kamara Lantana, Largeleaf Lantana, Pink Flowered
Lantana, Red Flowered
Lantana, Red-Flowered Sage, White Sage, Wild Sage
[10892]
Parkinsonia aculeata
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse
Bean [12301]

Status

Type of Presence

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Species or species habitat
likely to occur within area

Parthenium hysterophorus
Parthenium Weed, Bitter Weed, Carrot Grass, False
Ragweed [19566]

Species or species habitat
likely to occur within area

Salvinia molesta
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba
Weed [13665]

Species or species habitat
likely to occur within area

Vachellia nilotica
Prickly Acacia, Blackthorn, Prickly Mimosa, Black
Piquant, Babul [84351]

Species or species habitat
likely to occur within area

Nationally Important Wetlands

[Resource Information]

Name

Haughton Balancing Storage Aggregation

State

QLD

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-19.74548 147.03474

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following

custodians who have contributed valuable data and advice:

- Office of Environment and Heritage, New South Wales
- Department of Environment and Primary Industries, Victoria
- Department of Primary Industries, Parks, Water and Environment, Tasmania
- Department of Environment, Water and Natural Resources, South Australia
- Department of Land and Resource Management, Northern Territory
- Department of Environmental and Heritage Protection, Queensland
- Department of Parks and Wildlife, Western Australia
- Environment and Planning Directorate, ACT
- Birdlife Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Museum Victoria
- Australian Museum
- South Australian Museum
- Queensland Museum
- Online Zoological Collections of Australian Museums
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Canberra
- University of New England
- Ocean Biogeographic Information System
- Australian Government, Department of Defence
- Forestry Corporation, NSW
- Geoscience Australia
- CSIRO
- Australian Tropical Herbarium, Cairns
- eBird Australia
- Australian Government - Australian Antarctic Data Centre
- Museum and Art Gallery of the Northern Territory
- Australian Government National Environmental Science Program
- Australian Institute of Marine Science
- Reef Life Survey Australia
- American Museum of Natural History
- Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
- Tasmanian Museum and Art Gallery, Hobart, Tasmania
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Search Criteria:

wildlife_online20161123132002.txt
Species List for a Specified Point

Species:

All

Type:

Native

Status:

Rare and threatened species

Records:

All

Date:

Since 1980

Latitude:

-19.7538

Longitude:

147.0450

Distance:

5

Email: kristina.ihme@aeacom.com

Date submitted:

Wednesday 23 Nov 2016 13:12:59

Date extracted:

Wednesday 23 Nov 2016 13:20:02

There were no records retrieved for your selection

Disclaimer

-----As the DSITIA is still in a process of collating and vetting data, it is

possible the information given is not complete. The information provided should only be used

for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

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Feedback about Wildlife Online should be emailed to

wildlife.online@science.dsitia.qld.gov.au

Description of the CODES

-----I Y indicates that the taxon is introduced to Queensland and has naturalised.

Q Indicates the Queensland conservation status of each taxon under the Nature Conservation Act 1992. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ().

A Indicates the Australian conservation status of each taxon under the Environment Protection and Biodiversity Conservation Act 1999. The values of EPBC are

Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records -

The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

The second number located after the / indicates the number of

specimen records for the taxon.
Kingdom Class
Family
Sighting Records

Scientific Name Common Name
Specimen Records

Page 1

I

Q

A

23/11/2016 13:20:16

Longitude: 147.03474 Latitude: -19.74548

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Haughton Solar FarmHaughton Solar FarmHaughton River Solar Farm
Technical Report

Appendix

B

Field Work Data

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Appendix B
Table 1

B-1

Haughton Solar Farm
Technical Report

Field Work Data

Flora Species List
Survey Site and Location

Scientific name

WL1

RE1

RE2

RE3

WL2

RE4

RE5

RE6

RE7

RE8

RE9

7819653,
0505411

0503550,
7818851

0502323,
7816803

0506084,
7816255

0506239,
7814536

0504074,
7813878

0503403,
7813980

0402192,
7814218

0401765,

7814268

0501112,
7814383

0400932,
7817853

U

C

U

C

C

D

D

*Alternanthera ficoidea**

D

*Sida acuta**

C

Sida cardiophylla

C

*Stachytarpheta jamaicensis**

C

Neptunia gracilis

R

*Triumfetta rhomboidea**

U

*Ziziphus mauritiana**

U

Melaleuca viridiflora

U

Eclipta spp.

U

*Stylosanthes scabra**

C

Perennial grass spp.

C

Corymbia clarksoniana

D

D

Eucalyptus platyphylla

U

D

U

*Lantana camara**

D

Planchonia careya

U

C

Ficus opposita

U

C

Melaleuca nervosa

U

C

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C

D

U

C

D

D

D

D

U

D

C

C

U

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B-2

Haughton Solar Farm
Technical Report

Survey Site and Location
Scientific name

WL1

RE1

RE2

RE3

WL2

RE4

RE5

RE6

RE7

RE8

RE9

7819653,
0505411

0503550,
7818851

0502323,
7816803

0506084,
7816255

0506239,
7814536

0504074,
7813878

0503403,
7813980

0402192,
7814218

0401765,
7814268

0501112,
7814383

0400932,
7817853

D

C

C

U

C

C

Corymbia tessellaris

C

C

C

*Cryptostegia grandiflora**

C

C

C

Fimbristylis spp.

U

Lomandra longifolia

R

Petalostigma pubescens

C

U

C

C

Pandanus whitei

U

Eucalyptus brownii

D

U

D

C

R

Sporobolus jacquemontii

Alphitonia excelsa

C

R

C

Grewia retusifolia

C

Dicanthium spp.

C

Grevillea striata

U

Corymbia dallachiana

C

*Vachellia farnesiana**

R

Themeda triandra

C

*Chloris inflata**

U

C

C

D

R

C

C

C

C

Cyperus spp. *

C

Hygrophila angustifolia

R

Eclipta prostrata

R

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C

C

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B-3

Haughton Solar Farm
Technical Report

Survey Site and Location
Scientific name

WL1

RE1

RE2

RE3

WL2

RE4

RE5

RE6

RE7

RE8

RE9

7819653,
0505411

0503550,
7818851

0502323,
7816803

0506084,
7816255

0506239,
7814536

0504074,
7813878

0503403,
7813980

0402192,
7814218

0401765,
7814268

0501112,
7814383

0400932,
7817853

U

U

D

C

C

D

D

Ludwigia spp.

Panicum queenslandicum

R

U

Alternanthera ficoidea

Heteropogon contortus

C

C

Sida hackettiana

Basil

Atalaya hemiglauca

C

C

C

U

U

Corymbia erythrophloia

U

Pleiogynium timorense

U

Imperata cylindrica

U

*Introduced species

D= dominant

C= common

U= uncommon

R= rare

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Table 3

Haughton Solar Farm
Technical Report

Species list additional wet season survey (Wetland Site 1)

Scientific name

Wetland Site 1 (WL1)

Cyperus javanicus

C

Cyperus aquatilis

C

Cyperus polystachyos

U

Cyperus spp.

U

Cyperaceae spp.

U

Panicum paludosum

U

*Aeschynomene indica**

C

*Stachytarpheta jamaicensis**

C

*Chloris inflata**

C

*Passiflora foetida**

C

Stylosanthes spp.*

U

Gomphrena spp.

U

*Ziziphus mauritiana**

U

Cryptostegia grandiflora

U

Asteraceae spp.

R

*Introduced species

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B-5

Haughton Solar Farm
Technical Report

BTF Habitat Assessments
Black-Throated Finch Habitat Assessment
7/12/2016 12:00 AM Assessor
BTF 1
503550
grazing
non remnant- RE 11.3.35 + weeds

Date:
Site ID:
Waypoint:
Landuse/Vegetation Type
RE ID
Photos

Kristina Ihme
7818851

Grassland Condition
Native
estimated % perennial
estimated % annual
% litter
% bare ground
Urochloa mosambicensis absent
Enteropogon acicularis absent
Panicum decompositum absent
Panicum effusum absent
Additional Species:
Para grass (Urochloa mutica *)
present
Dicanthium spp.*
present
Chloris inflata*
present
known nesting trees present
tree height
Cryptostegia grandiflora*
Ziziphus mauritiana*

non
2-8m

Greg Calvert

Exotic
0%
100%
% late dry season, unable to identify % late dry season, unable to identify

15%
80%
Grass Species
Dichanthium sericeum absent
Alloteropsis semialata absent
Eragrostis sororia absent
Themeda triandra absent

Nesting Habitat
Potential nesting trees present
Hollows present
Tree species
Eucalyptus platyphylla
Corymbia dallachiana
Eucalyptus brownii
Corymbia tessellaris
Acacia nilotica

Water Resources
Seasonal
Water sources within 5 km
yes
water sources within 1 km
yes
Water resource within 400 m of nesting habitat?
yes
wetlands
creek lines
Other

yes
no

Permanent
yes
yes
yes
dams yes
stock troughs

Other Notes
very dry conditions at time of survey, no typical foraging species present
suitable nesting habitat present

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Haughton Solar Farm
Technical Report

Date:
Site ID:
Waypoint:
Landuse/Vegetation Type
RE ID
Photos

Black-Throated Finch Habitat Assessment
7/12/2016 12:00 AM Assessor
BTF 2
508036
grazing
non remnant- artificial wetland

Kristina Ihme
7818873

Grassland Condition
Native
estimated % perennial
estimated % annual
% litter
% bare ground
Urochloa mosambicensis absent
Enteropogon acicularis absent
Panicum decompositum absent
Panicum effusum absent
Additional Species:
Cynadum dactidum*
present
Hymenachne amplexicaulis*
present
Paspalum spp.
present
known nesting trees present
tree height

C. dallachiana
E. platyphylla

no
2-8m

Greg Calvert

Exotic
0%
100%
% late dry season, unable to identify % late dry season, unable to identify

Grass Species
Dichanthium sericeum absent
Alloteropsis semialata absent
Eragrostis sororia absent
Themeda triandra absent

Nesting Habitat

Potential nesting trees present
Hollows present
Tree species
Cryptostegia grandiflora*
Ziziphus mauritiana*
M. nervosa
E. b rownii

Water Resources

Seasonal
Water sources within 5 km
yes
water sources within 1 km
yes
Water resource withing 400 m of nesting habitat?
yes
wetlands
creek lines
Other

yes
no

Permanent

yes
yes
yes
dams yes
stock troughs

large artificial dam/ wetland, water lily, hymenachne, water birds present.

Other Notes

suitable nesting habitat present (zebra finches nesting in Chinee apple),
Within 300m of site boundary, habitat only of marhinal importance.
very dry conditions at the end of dry season, no foraging grass species present
and/ or identifiable

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Haughton Solar FarmHaughton Solar FarmHaughton River Solar Farm
Technical Report

Appendix

C

Species Likelihood
Assessment and
Incidental Species

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Appendix C

C-1

Haughton Solar Farm
Technical Report

Species Likelihood Assessment

Scientific Name

Common Name

Q

A

Sighting
Records

Habitat

Distribution

Likelihood

Calidris ferruginea

Curlew Sandpiper

V

CE, Mw

Species or
species habitat
may occur within
area

The eastern curlew is found on sheltered coasts, mangrove swamps, bays, harbours and lagoons that contain mudflats and sandflats, often with beds of seagrass. At high tide, when their feeding habitat becomes inundated, they move to saltpans, sand dunes and other open areas where they roost above the high water. For this reason, the eastern curlew needs two types of habitat in order to survive, one within the tidal zone, and one above it (DEHP, Species Profile and Threats Database-*Calidris ferruginea* – Curlew Sandpiper, 2017a).

The eastern curlew is found in coastal regions in the north-east and south of Australia, including Tasmania, and is scattered in other coastal areas. On route from their Northern Hemisphere breeding grounds, they are commonly seen in Japan, Korea and Borneo with small numbers visiting New Zealand (DEHP, Species Profile and Threats Database-*Calidris ferruginea* – Curlew Sandpiper, 2017a)

Unlikely

Erythrotriorchis
radiatus

Red Goshawk

E

V

Species or
species habitat
known to occur
within area

This species prefers forest and woodland with a mosaic of vegetation types, large prey populations (birds), and permanent water. The vegetation types include eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins.

The Red Goshawk is endemic to Australia. It is very sparsely dispersed across approximately 15% of coastal and sub-coastal Australia, from western Kimberley Division (north of 19°S) to north-eastern NSW (north of 33°), and occasionally on continental islands (Marchant, S. & Higgins, P.J., 1993).

Possible

Neochmia ruficauda
ruficauda

Star
Finch(eastern),
Star Finch
(southern)

E

E

Species or
species habitat
known to occur
within area

The Star Finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water (Garnett 1993; Gould 1865; Holmes 1996). It also occurs in cleared or suburban areas such as along roadsides and in towns (DEHP, Species Profile and Threats Database-Star Finch (eastern), Star Finch (southern), 2017b)

The distribution of the Star Finch (eastern) is very poorly known. The Star Finch (eastern) occurs only in central Queensland. Based on the small number of accepted records, the distribution of the Star Finch (eastern) is believed to extend north to Bowen, west to beyond Winton and, based on recent records, south to near Wowan. It is possible that the distribution extends farther north to Mount Surprise and the Cloncurry-Mount Isa region, but records from these locations could relate to the subspecies *N. r. sub clarescens* (DEHP, Species Profile and Threats Database-Star Finch (eastern), Star Finch (southern), 2017b).

Unlikely

*Numenius
madagascariensis*

Eastern Curlew

V

CE, Mw, Ma

Species or
species habitat
known to occur
within area

The eastern curlew is found on sheltered coasts, mangrove swamps, bays, harbours and lagoons that contain mudflats and sandflats, often with beds of seagrass. At high tide, when their feeding habitat becomes inundated, they move to saltpans, sand dunes and other open areas where they roost above the high water. For this reason, the eastern curlew needs two types of habitat in order to survive, one within the tidal zone, and one above it (DEHP, Eastern curlew, 2017c).

The eastern curlew is found in coastal regions in the north-east and south of Australia, including Tasmania, and is scattered in other coastal areas. On route from their Northern Hemisphere breeding grounds, they are commonly seen in Japan, Korea and Borneo with small numbers visiting New Zealand (DEHP, Eastern curlew, 2017c).

Unlikely

Poephila cincta cincta

Black-throated
Finch (southern)

E

E

Species or
species habitat
known to occur
within area

The Black-throated Finch (southern) occurs mainly in grassy, open woodlands and forests, typically dominated by Eucalyptus, Corymbia and Melaleuca, and occasionally in tussock grasslands or other habitats (for example freshwater wetlands), often along or near watercourses, or in the vicinity of water (Black-throated Finch Recovery Team, Department of Environment and Climate Change (NSW), 2007) (NRA, 2005).

Essential habitat is mapped north and south of the Project Site. Two permanent water sources exist within and close to the Study area.

Grassland condition and suitability for foraging needs to be further investigated.

Possible

Rostratula australis

Australian
Painted Snipe

V

E, Ma

Species or
species habitat
known to occur
within area

The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and clay pans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains

The Australian Painted Snipe has been recorded at wetlands in all states of Australia (Rogers, D., Hance, I., Paton, S., Tzaros, C., Griffioen, P., Herring, M., Jaensch, R., Oring, L., Silcocks A. & Weston M., 2005). It is most common in eastern Australia, where it has been recorded at scattered locations throughout much of Queensland, NSW, Victoria and south-eastern South Australia.

Unlikely

Tyto novaehollandiae
kimberli

Masked Owl
(northern)

V

V

Species or
species habitat
known to occur
within area

In northern Australia, the Masked Owl has been recorded from riparian forest, rainforest, open forest, Melaleuca swamps and the edges of mangroves, as well as along the margins of sugar cane fields (DEE, 2017c)

In Queensland, there are historical records from the Normanton region, and from Pascoe, Archer, Chester and Watson Rivers on Cape York Peninsula (DEE, 2017c). It occurs along the southern rim of the Gulf of Carpentaria, Cape York Peninsula and south to Atherton Tablelands and the Einasleigh-Burdekin divide. There is some confusion about where the Queensland southern limit of the subspecies is, with authorities suggesting Mackay or

Coomooboolaroo Station (west of Rockhampton).

Possible

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AECOM

C-2

Haughton Solar Farm
Technical Report

Scientific Name

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Q

A

Sighting
Records

Habitat

Distribution

Likelihood

Dasyurus hallucatus

Northern Quoll

LC

E

Species or
species habitat
known to occur
within area

The Northern Quoll occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert (DEE, Species Profile and Threats Database, 2017a).

The Northern Quoll is known to occur as far south as Gracemere and Mt Morgan, south of Rockhampton, as far north as Weipa in Queensland and extends as far west into central Queensland to the vicinity of Carnarvon Range National Park (DEE, Species Profile and Threats Database, 2017a). There are occasionally records as far south in Queensland as Maleny on the sunshine coast hinterland (Qld DERM 2009a). The species is highly fragmented in the state and surveys Woinarski and colleagues (Woinarski, J.C.Z., Oakwood, M., Winter, J., Burnett, S., Milne, D., Foster, P., Myles, H. & Holmes, B., 2008) indicated severe reductions from the species' former distribution.

Unlikely

Macroderma gigas

Ghost bat

V

V

Species or
species habitat
known to occur
within area

This species is endemic to Australia. Its current range is discontinuous with geographically disjunct colonies distributed across northern tropical and subtropical coastal and inland regions (J. Worthington-Wilmer pers. comm.). There are scattered historical records through arid Western Australia, southern Northern Territory, northern South Australia, and western and south-western Queensland.

Although it occurs in rainforest areas, the Ghost Bat is mainly found in the arid zone near rock outcrops, and roosts in caves, mines, and rock clefts. The species also occurs throughout the tropical savanna, in savanna woodlands, and in mangroves (N. McKenzie pers. comm.). It generally forages within 1-2 km of the roost site. Most of the prey are large invertebrates such as beetles, but it is also known to take small vertebrates including other bats, birds, lizards, and snakes (DEE, Species Profile and Threats Database, 2017b). In captive feeding experiments some fruit will be eaten only when no animal food is available (Douglas 1967). Most prey is taken to a feeding perch in trees, rock overhangs, or cave entrances. Ghost bats move between a number of caves seasonally or as dictated by weather conditions. Thus they require a range of cave sites (Hutson et al. 2001). Most maternity sites appear to require multiple entranced caves (L. Hall pers. comm.). Maternity colonies are limited within the range of this species, and include mines, especially in the Pilbara. Generation length is probably around four years and recruitment is very low (DEE, Species Profile and Threats Database, 2017b).

Unlikely

Petauroides volan

Greater Glider

LC

V

Species or
species habitat
known to occur
within area

Wide range of habitats including tall open woodland, eucalypt forests and low woodlands. They do not occur in rainforests. They prefer habitats that are in older forests and have large number of hollows.

Generally the home range for the greater glider is between 0.7-3 hectares and tends to have a population density of 0.01-5 individuals per hectare. The home ranges of females can overlap with males and females however for the males the home ranges never overlap (DEE, 2017e).

Unlikely

Phascolarctos
cinereus

Koala

V

V

Species or
species habitat
known to occur
within area

Koalas naturally inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by Eucalyptus species (DEE, 2017f).

Natural predators in their range are large owl species, spotted tail quolls, goannas, and carpet pythons.

Unlikely

Saccolaimus
saccolaimus
nudicluniatus

Bare-rumped
Sheathtail Bat

E

V

Species or
species habitat
known to occur
within area

The Bare-rumped Sheathtail Bat occurs mostly in lowland areas, typically in a range of woodland, forest and open environments (Schulz, M. & Thomson, B., 2007a).

The Bare-rumped Sheathtail Bat occurs mostly in lowland areas, typically in a range of woodland, forest and open environments (Schulz, M. & Thomson, B., 2007a).

Possible

Eucalyptus
raveretiana

Black ironbox

LC

V

Species or
species habitat
likely to occur
within the area

Eucalyptus raveretiana grows along watercourses and occasionally on river flats. It occurs in open forest or woodland communities. The species prefers sites with moderately fertile

soil and adequate sub-soil moisture. The alluvial soils in which it grows are sands, loams, light clays or cracking clays (DEE, 2017g).

Its distribution ranges from Cairns to Rockhampton (The Atlas of Living Australia, 2016).

Unlikely

Marsdenia brevifolia

Shrubby Bush
Pear

V

V

Species or
species habitat
known to occur
within area

Marsdenia brevifolia occurs in north and central Queensland where it is known from near Townsville, Springsure and north of Rockhampton (Forster 1995a). A single population also occurs at West Point on Magnetic Island (Forster, 1995).

North of Rockhampton, *M. brevifolia* grows on serpentine rock outcrops or crumbly black soils derived from serpentine in eucalypt woodland, often with Broad-leaved Ironbark (*Eucalyptus fibrosa*) and *Corymbia xanthope*. At Hidden Valley near Paluma, plants grow in woodland on granite soils dominated by Granite Ironbark (*E. granitica*), Rustyjacket (*C. leichhardtii*) and White Mahogany (*E. acmenoides*). On Magnetic Island the species occurs in open forest on dark acid agglomerate soils dominated by Narrowleafed Ironbark (*E. drepanophylla*) (Forster, 1995). In the Springsure area *M. brevifolia* grows in eucalypt woodland (BRI collection records n.d.).

Unlikely

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Sighting
Records

Habitat

Distribution

Likelihood

Denisonia maculata

Ornamental
Snake

V

V

Species or
species habitat
known to occur
within area

The Ornamental Snake's preferred habitat is within, or close to, habitat that is favoured by its prey - frogs. The species is known to prefer woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions in Queensland Regional Ecosystem Land Zone 4, but also lake margins and wetlands. Gilgai formations are found where deep-cracking alluvial soils with high clay contents occur (Brigalow Belt Reptiles Workshop, 2010).

The species is known only from the Brigalow Belt North and parts of the Brigalow Belt South biogeographical regions. The core of the species' distribution occurs within the drainage system of the Fitzroy and Dawson Rivers (Cogger, 2014)

Unlikely

Egernia rugosa

Yakka Skink

V

V

Species or
species habitat
known to occur
within area

The Yakka Skink is known to occur in open dry sclerophyll forest, woodland and scrub

(Cogger, 2014).

The core habitat of this species is within the Mulga Lands and Brigalow Belt South

Bioregions (TSN 2008b).

It occurs in a wide variety of vegetation types within Queensland Regional Ecosystem Land

Zones (LZ) (Brigalow Belt Reptiles Workshop 2010):



LZ 3 - Alluvium (river and creek flats)



LZ 4 - Clay plains not associated with current alluvium



LZ 5 - Old loamy and sandy plains



LZ 7 - Ironstone jump-ups



LZ 9 - Undulating country on fine grained sedimentary rocks



• LZ 10 - Sandstone ranges.

The known distribution of the Yakka Skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the Brigalow Belt (North and South), Mulga Lands, Southeast Queensland, Einasleigh Uplands, Wet Tropics and Cape York Peninsula Biogeographical Regions.

Unlikely

Pristis pristis

Large-toothed
Sawfish

—

V

Species or
species habitat
likely to occur
within area

Large freshwater rivers and billabongs, muddy estuaries and the sea.

Western Pacific: northern Australia, from Western Australia to Queensland (Atlas of Living Australia, 2017).

Unlikely

Cuculus optatus

Oriental Cuckoo

SLC

Mt, Ma

Species or
species habitat
likely to occur
within area

Inland, low bushes to dry forests

Across Australia excluding Western Australia.

Possible

Hirundapus
caudacutus

White-throated
Needletail

—

MT, Ma

Species or
species habitat
known to occur
within area

The White-throated Needletail is widespread in eastern and south-eastern Australia (Higgins, 1999). In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. Further south on the mainland, it is widespread in Victoria, though more so on and south of the Great Divide, and there are few records in western Victoria outside the Grampians and the South West. The species occurs in adjacent areas of southeastern South Australia, where it extends west to the York Peninsula and the Mount Lofty Ranges. It is widespread in Tasmania (Higgins, 1999). White-throated Needletails only occur as vagrants in the Northern Territory (recorded in the Top End, including around Darwin, Katherine and Mataranka and Tennant Creek; and further south around Alice Springs) and in Western Australia (at disparate sites from the Mitchell Plateau in the Kimberley, south to the Nullarbor Plain and Augusta in the South West, and west to Barrow Island, the Houman Abrolhos and the Swan River Plain). The species is also a vagrant to various outlying islands, including Norfolk, Lord Howe, Macquarie, Christmas and Cocos/Keeling Islands (Higgins, 1999).

In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground, because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland (Higgins, 1999). They also commonly occur over heathland, but less often

over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (Higgins, 1999).

Possible

Monarcha
melanopsis

Black-faced
Monarch

SL

MT, Ma

Species or
species habitat
known to occur
within area

The Black-faced Monarch is widespread in eastern Australia. It is vagrant to Western Australia; a single bird was detected 16 km east-north-east of Mt Brookes, June 1987. In Queensland, it is widespread from the islands of the Torres Strait and on Cape York Peninsula, south along the coasts (occasionally including offshore islands) and the eastern slopes of the Great Divide, to the New South Wales border. The species also occasionally occurs further inland, for example, at Forty Mile Scrub in April 1976, and Eight Mile Plain in October 1991; a single vagrant was recorded at Windorah, south-western Queensland in March 1989 (DEE, 2017h).

The Black-faced Monarch mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest (DEE, 2017h).

Possible

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Q

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Sighting
Records

Habitat

Distribution

Likelihood

Monarcha trivirgatus

Spectacled
Monarch

—

MT, Ma

Species or
species habitat
known to occur
within area

The Spectacled Monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. It is much less common in the south. It is also found in Papua New Guinea, the Moluccas and Timor.

The Spectacled Monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves Resident in Queensland to Rockhampton, summer breeding migrant further south.

Unlikely

Motacilla flava

Yellow Wagtail

—

MT, Ma

Species or
species habitat
known to occur
within area

Saltworks, paddocks, marshes, grassy wetlands.

Variety of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pasture

Unlikely

Myiagra cyanoleuca

Satin Flycatcher

—

MT, Ma

Species or
species habitat
known to occur
within area

Satin Flycatchers are migratory, moving north in autumn to spend winter in northern Australia and New Guinea. They return south in spring to spend summer in south-eastern Australia. On the south-eastern mainland of Australia and Tasmania, they appear to be almost entirely deserted in winter, with reporting rates of 7.8% and 13.6%, respectively, in summer, and 0.3% in both in winter. They are inconspicuous when on passage, possibly because movements are made singly or in pairs or small loose groups through the treetops and possibly at night (DEE, 2017i).

Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests (DEE, 2017i).

Possible

Rhipidura rufifrons

Rufous Fantail

—

MT, Ma

Species or
species habitat
known to occur
within area

The Rufous Fantail occurs in coastal and near coastal districts of northern and eastern Australia. *Rhipidura rufifrons rufifrons* has breeding populations occurring from about the South Australia-Victoria border, through south and central Victoria, on and east of the Great Divide in New South Wales (NSW), and north to about the NSW-Queensland border; and *R. r. intermedia* has breeding populations occurring on and east of the Great Divide, from about the NSW-Queensland border, north to the Cairns-Atherton region,

Queensland. Both subspecies winter farther north from Cape York Peninsula in Queensland to Torres Strait and southern Papua New Guinea. The two subspecies intergrade in a zone between the Queensland-NSW border ranges and the Clarence-Orara rivers in NSW (Higgins, 1999).

In north and north-east Australia, they often occur in tropical rainforest and monsoon rainforests, including semi-evergreen mesophyll vine forests, semi-deciduous vine thickets or thickets of Paperbarks (*Melaleuca* spp.) (Higgins, 1999).

Unlikely

Gallinago hardwickii

Latham's Snipe

—

MW, Ma

Species or
species habitat
known to occur
within area

In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. The species usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.

Latham's Snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia (i.e. it travels through northern Australia to reach non-breeding areas located further south). The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia (including the Adelaide plains and Mount Lofty Ranges, and the Eyre Peninsula). The range extends inland over the eastern tablelands in south-eastern Queensland (and occasionally from Rockhampton in the north), and to west of the Great Dividing Range in New South Wales (Naarding, 1981).

Possible

Pandion haliaetus

Osprey

—

MW, Ma

Species or
species habitat
known to occur
within area

The breeding range of the Eastern Osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in NSW; with a second isolated breeding population on the coast of South Australia, extending from Head of Bight east to Cape Spencer and Kangaroo Island. The total range (breeding plus non-breeding) around the northern coast is more widespread, extending from Esperance in Western Australia to NSW, where records become scarcer towards the south, and into Victoria and Tasmania, where the species is a rare vagrant. The distribution of the species around the northern coast (south-western Western Australia to south-eastern NSW) appears continuous except for a possible (Birdlife International, 2017).

Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging (Higgins, 1999). They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes.

Unlikely

Anseranas
semipalmata

Magpie Goose

—

Ma

Species or
species habitat
known to occur
within area

The Magpie Goose is seen in floodplains and wet grasslands. Some individuals, mostly younger birds, may be seen at quite long distances inland. - Magpie geese move in flocks over great distances especially in the wet season. Their diet is primarily herbivorous (plants) but young geese also consume invertebrates. Magpie geese breed primarily late in the wet season in large breeding colonies. There is a population bias in mature geese for more females with each breeding male often having two females to breed with. Each female lays egg, but where there are two females in one nest, fewer eggs are laid per female than if it is only a male-female pair. Incubation is shared by all parents (Australia, 2016).

The Magpie Goose is widespread throughout coastal northern and eastern Australia. It can be seen from Fitzroy River, Western Australia, through northern Australia to Rockhampton, Queensland, and has been extending its range into coastal New South Wales to the Clarence River and further

south (Australia, 2016).

Confirmed

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A

Sighting
Records

Habitat

Distribution

Likelihood

Apus pacificus

Fork-tailed Swift

—

M, Ma

Species or
species habitat
known to occur
within area

The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. The Fork-tailed Swift is a non-breeding migrant to Australia (DEE, 2016a).

There are scattered records of the Fork-tailed Swift in the Gulf Country, and a few records on Cape York Peninsula. In the north-east region there are many records east of the Great Divide from near Cooktown and south to Townsville. They are also widespread but scattered in coastal areas from 20° S, south to Brisbane and in much of the south south-eastern region. They are more widespread west of the Great Divide, and are commonly found west of the line joining Chinchilla and Hughenden. They are found to the west between Richmond and Winton, Longreach, Gowan Range, Maraila National Park and Dirranbandi. They are rarely found further west to Windorah and Thargomindah.

Possible

Ardea alba

Great Egret

—

MW, Ma

Species or
species habitat
known to occur
within area

The species inhabits all kinds of inland and coastal wetlands although it is mainly found along the coast in the winter (e.g. in the Palearctic Region) or during droughts (e.g. in Australia). It frequents river margins, lakes shores, marshes, flood-plains, oxbows, streams, damp meadows, rice-fields, drainage ditches, aquaculture ponds, reservoirs (Higgins, 1999) and sewage works, inland, and the shallows of salt-lakes, saltpans, mudflats, coastal swamps, mangroves, saltmarshes, seagrass flats, offshore coral reefs, lagoons and estuaries when in coastal locations (Higgins, 1999).

This species has an extremely large range, and hence does not approach the thresholds for Vulnerable under the range size criterion (Extent of Occurrence <20,000 km² combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation). The population trend is not known, but the population is not believed to be decreasing sufficiently rapidly to approach the thresholds under the population trend criterion (>30% decline over ten years or three generations) (Higgins, 1999).

Unlikely

Ardea ibis

Cattle Egret

SL

MW, Ma

Species or
species habitat
known to occur
within area

The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. The Cattle Egret often forages away from water on low lying grasslands, improved pastures and croplands. It is commonly found in cattle fields and other farm areas that contain livestock. The Cattle Egret roosts in trees or amongst ground vegetation in or near lakes and swamps (DEE, 2017j).

In Australia the Cattle Egret is a partial migrant; some of the population migrates to New Zealand, while the remainder migrates locally. The birds migrate from breeding colonies in south-east Queensland and north-east NSW to spend winter in either south-east Australia or New Zealand. In north and west Australia the movement is not as well-known as that of the east and south. The birds are recorded during all months in the Northern Territory; however, they are less abundant from February to May, immediately after breeding. Some are believed to migrate to south-west Western Australia, arriving from April. Surveys indicate the Cattle Egret is a

migrant to New Guinea during the dry season. It is believed to depart from both the Northern Territory and north-east Queensland. The bird is also known to move east from the Northern Territory to Queensland (DEE, 2017j).

Possible

Haliaeetus
leucogaster

white-bellied seaeagle

C

Ma

1

The White-bellied Sea-Eagle is distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. It also extends inland along some of the larger waterways, especially in eastern Australia. The inland limits of the species are most restricted in south-central and south-western Australia, where it is confined to a narrow band along the coast. Recent analysis indicates that the distribution of the sea-eagle may shift in response to climatic conditions, with an apparent decreased occupancy of inland sites (and increased occupancy of coastal sites) during drought conditions (DEE, 2017k).

The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats (Higgins, 1999). The species is mostly recorded in coastal lowlands, but can occupy habitats up to 1400 m above sea level on the Northern Tablelands of NSW and up to 800 m above sea level in Tasmania and South Australia. Birds have been recorded at or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs, and saltmarsh and sewage ponds. They also occur at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves (DEE, 2017k).

Possible

Merops ornatus

rainbow bee-eater

SL

Ma

1

The Rainbow Bee-eater is distributed across much of mainland Australia, and occurs on several near-shore islands. It is not found in Tasmania, and is thinly distributed in the most arid regions of central and Western Australia (DEE, 2016b).

The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrub lands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water (DEE, 2016b).

Possible

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AECOM

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Haughton Solar Farm
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Scientific Name

Common Name

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A

Sighting
Records

Habitat

Distribution

Likelihood

Crocodylus porosus

Salt-water
Crocodile,
Estuarine
Crocodile

V

MM, Ma

Species or
species habitat
known to occur
within area

Studies from Arnhem Land (Northern Territory) indicated that the Salt-water Crocodile mostly occurs in tidal rivers, coastal floodplains and channels, billabongs and swamps up to 150 km inland from the coast (Webb et al. 1983f). It has been noted that evaporation in isolated channels may lead to salinity levels that are twice that of seawater. The Salt-water Crocodile usually inhabits the lower (estuarine) reaches of rivers, while the upper reaches are inhabited by *Crocodylus johnstoni* (Fresh-water Crocodile); although, areas of overlap occur in some rivers. In Queensland, the species is usually restricted to coastal waterways and floodplain wetlands. Populations may also be found hundreds of kilometres upstream, such as in the Fitzroy River and the waterways of the southern Gulf of Carpentaria (DEE, 2017l).

The Salt-water Crocodile is found in Australian coastal waters, estuaries, lakes, inland swamps and marshes. Despite the species' common name, the Salt-water Crocodile can persist in freshwater bodies. The species' distribution ranges from Rockhampton in Queensland throughout coastal

Northern Territory to King Sound (near Broome) in Western Australia (DEE, 2017l).

Possible



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Revision B - 08-Mar-2017

Prepared for - Pacific Hydro Australia Developments Pty Ltd - ABN: N/A

unlikely= not in distributional range, or right habitat present, no records in the closer study area

possible= within distributional range and habitat present

likely= within distributional range, habitat present and past record

AECOM

Haughton Solar Farm
Technical Report

Incidental Species List
Scientific Name

Common Name

Birds

Haliastur sphenurus

Whistling Kite

Scythrops novaehollandiae

Channel-billed cuckoo

Todiramphus sanctus

Sacred Kingfisher

Calyptorhynchus banksii

Red-tailed Black-cockatoo

Coracina novaehollandiae

Black-faced Cuckoo-shrike

Falco berigora

Brown Falcon

Grallina cyanoleuca

Magpie-lark

Cracticus tibicen

Australian Magpie

Artamus personatus

Masked Woodswallow

Lalage sueurii

White-winged Triller

Rhipidura leucophrys

Willie wagtail

Anseranas semipalmata

Magpie goose

Grus rubicunda

Brolga

Phalacrocorax varius

Pied cormorant

Phalacrocorax sulcirostris

Little black cormorant

Corvus coronoides

Australian raven

Taeniopygia guttata

Zebra finch

Vanellus miles

Masked lapwing

Threskiornis molucca

Australian white ibis

Artamus leucorhynchus

White-breasted Woodswallow

Cygnus atratus

Black swan

Dacelo leachii

Blue-winged kookaburra

Falco cenchroides

Nankeen kestrel

Reptile

Morethia ruficauda

Firetail skink

Mammals

Macropus agilis

Agile wallaby

Macropus giganteus

Eastern grey kangaroo

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Revision B – 08-Mar-2017

Prepared for – Pacific Hydro Australia Developments Pty Ltd – ABN: N/A

Appendix E

Acoustic Assessment

Technical Memorandum

To:

Mariah Stellato

From:

Jenq Sim

Company: Pacific Blue

SLR Consulting Australia

cc:

Date:

22 March 2024

Project No. 640.031109.00001

RE: Haughton BESS

Noise Assessment

Confidentiality

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1.0

Introduction

SLR Consulting Pty Ltd (SLR) was engaged by Pacific Blue to provide a preliminary assessment of noise from the proposed 200 MW / 400 MWh Haughton Solar Farm Stage 2 and associated Battery Energy Storage System, BESS (the Project), located on Keith Venables Rd, Upper Haughton QLD, as part of their site due diligence.

2.0

Site Description

The proposed site is located adjacent Haughton Solar Farm 1 west of the existing HAU1 substation, approximately 56 km south east of Townsville, QLD. The proposed BESS layout is shown in Figure 1.

All sensitive receptors identified by the Client are shown Figure 2 and their approximate distance to the BESS footprint is listed in Table 1.

Table 1

Close Sensitive Receptors

Approximate distance to BESS site

Receiver ID

R1

4400 m

R2

3310 m

R3

3320 m

R4

3300 m

R5

4200 m

R6

7400 m

1

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Figure 1 BESS Layout

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Figure 2 Receivers Location

3

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3.0

Project Criteria

The Environmental Protection (Noise) Policy 2019 (EPP(Noise)) is subordinate legislation under the EP Act and the environmental values to be enhanced or protected under the EPP(Noise) are:

-

The qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems.

-

The qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following: sleep, study or learn or be involved in recreation, including relaxation and conversation.

-

The qualities of the acoustic environment which are conducive to protecting the amenity of the community.

The EPP(Noise) contains Acoustic Quality Objectives (AQO) for receptors potentially sensitive to noise. Where the overall level of noise at the receptors, from all sources but excluding road and rail transport noise, are within the AQO, the environmental values are considered to be achieved. The relevant AQO for the noise sensitive receptors and land use surrounding the Project are presented in Table 2. It is anticipated that Project operations may require continuous operation of plant and equipment, and that noise emissions will be relatively uniform and constant (no sudden changes in level or character) as such this preliminary assessment has referenced the 1-hour LAeq AQO to assess the noise emissions from Project noise sources.

Table 2

EPP(Noise) Acoustic Quality Objectives
Acoustic Quality Objective (dBA)

Receptor Type

Time of Day

Residential dwelling
(outdoors)

Day time (7am to
6pm) and evening
(6pm to 10pm)

50

55

65

Residential dwelling
(indoors)

Day time (7am to
6pm) and evening
(6pm to 10pm)

35

40

45

Night-time (10pm to
7am)

30

35

40

L_{Aeq,adj,1hr}

L_{A10,adj,1hr}

L_{A1,adj,1hr}

To assess noise levels to the internal (indoor) AQO at residential dwellings, the external noise levels predicted by the noise modelling are adjusted by a façade correction, which accounts for the reduction of noise achieved by the building (with windows open). For this assessment, a conservative 7 dB façade noise reduction has been applied in line with the DES guideline titled 'Noise and Vibration EIS Information Guideline', where, at page 3, it states:

When assessing outdoor to indoor noise attenuation at sensitive receptors ... use an outdoor to indoor attenuation value of 7dB, which is appropriate for typical Queensland buildings with open windows. Accordingly, internal residential noise levels would be expected to be within the indoor AQO where external noise levels are not more than:

-

L_{Aeq,adj,1hr} 42 dB during the evening.

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-

L_{Aeq,adj,1hr} 37 dB during the night-time.

In consideration of the above the resulting external screening criteria for the Project are

L_{Aeq,adj,1hr}:

-

Day = 50 dBA

-

Evening = 42 dBA

-

Night-time = 37 dBA

4.0

Noise Modelling

4.1

Methodology

A 3D noise model was constructed within the modelling software SoundPLAN 8.2 to predict noise levels at the nearby sensitive receivers. Noise modelling was conducted using the the ISO 9613-21 algorithm incorporated in the noise modelling software. The ISO 9613-2 algorithm predicts the A-weighted sound pressure levels under meteorological conditions favourable to propagation from sources of known sound power levels. This enhanced propagation is equivalent to downwind propagation or a moderate ground-based temperature inversion. The model also includes attenuation due to air absorption, ground attenuation and shielding.

4.2

General Modelling Assumptions

The following general assumptions are made based on best-practice modelling methods to suit the project:

-

The reflection-order of other buildings was set to three (3), indicating that the noise model allowed for three (3) reflections off façades.

-

Source heights were set according to the source item, being the following heights above ground level:
0

Battery enclosure chiller – 1.5 m

0

Inverter – 2.4 m

0

Transformer – 3.0 m

•

Receivers were set 1.5 m above ground level.

•

All equipment are assumed to be in operation for the entire 1 hour assessment period.

•

Ground topography within 8 km of the proposed site was sourced from publicly available 5 metre elevation models published by the QLD Government Spatial Services.

•

Ground absorption is modelled by a single number parameter between 0 (hard reflective) and 1 (soft – absorptive). The BESS and substation hardstands were modelled as hard ground (0), all other ground surfaces were modelled with a ground absorption of 0.6, suitable for rural farmland.

•

One scenario was modelled representing full power night-time operation of the BESS facility.

1 ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

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4.3

Noise Sources

Sound power levels of noise producing equipment are shown in Table 3 and are based on noise measurement data provided by the original equipment manufacturers (OEMs). All equipment items are assumed to be in operation for the entire 1-hour assessment period, thus 15-minutes and 1-hour noise data are identical. The BESS site is assumed to operate 24 hours, 7 days a week. Regarding the SWL for the transformers shown in Table 3, the overall SWL has been derived based on the rated MVA for this BESS site and reference to Australian Standard 60076.1:2014 Power transformers General (AS60076.1), and the spectrum for the transformers were adopted from reference data by Bies and Hanson (11.16).
Table 3

Modelled Sound Power Levels and Spectra
Maximum Sound Power Level dB re 10⁻¹² W per
Octave Band Centre Frequency, Hz
Item

Overall
Sound
Power Level
(SWL)
LAeq, dBA

63

125

250

500

1k

2k

4k

8k

Battery Enclosure Chiller

84

90

91

98

98

95

91

82

102

Inverter

91

92

92

87

85

83

88

82

93

Transformer (240 MVA
rating, derived from
AS60076.1)

102

104

99

99

93

88

83

76

99

Transformer (165 MVA
rating, derived from
AS60076.1)

100

1-2

97

97

91

86

81

74

97

Transformer (70 MVA
rating, derived from
AS60076.1)

94

96

91

91

85

80

75

68

92

SLR has developed an operational noise model such that each BESS unit is modelled as a separate solid structure with the inverter and battery enclosure fan modelled as external noise sources on each structure. This setup has been repeated for the total number of units for the proposed BESS site. The total number of noise sources modelled for the proposed BESS site are presented in Table 4. The existing HAU1 substation and the proposed HAU2 and BESS substations were included in the model.

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Table 4

Total Number of Modelled Operational Noise Sources
Total Number Modelled

Item
Battery Enclosure Chiller

144

Inverter

72

HAU2 and BESS Transformers (240 MVA rating)

3

HAU1 Transformer (165 MVA rating)

1

HAU 1 Transformer (70 MVA rating)

1

5.0

Results

Table 5 shows the predicted source contributions of the BESS including substation noise sources at each receptor.
Night-time compliance is achieved at all receptors without any noise mitigation.
Table 5

Modelling Results

Receiver ID

Predicted Noise
Levels from BESS
Operations, LAeq, 1h
(dBA)

Night Time Noise
Criterion, dBA

Margin of
Compliance, dBA

R1

22

37

15

R2

29

37

8

R3

28

37

9

R4

28

37

9

R5

22

37

15

R6

< 20

37

26

Figure 3 presents the predicted operational noise contours from the proposed BESS facility.

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Figure 3 Operational Noise Contour Map

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6.0

Conclusion

Noise modelling shows that worst-case full operation of the proposed BESS facility can achieve night-time compliance at all sensitive receptors without additional noise mitigation.

Yours sincerely
SLR Consulting Australia

Jenq Sim

Benjamin French

Project Consultant
jsim@slrconsulting.com

Senior Project Consultant
bfrench@slrconsulting.com

Technical Memorandum

To:

Mariah Stellato

From:

Kris Stone

Company: Pacific Blue

SLR Consulting Australia

cc:

Date:

1 May 2024

Project No. 640.031109

RE: Haughton, Renewable Energy Facility – Lot 1 SP313057
Traffic Engineering Consideration of Battery Energy Storage System

1.0

Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Pacific Blue to provide traffic engineering input in relation to the above development matter. Specifically, this technical memorandum documents the traffic engineering evaluation of a Battery Energy Storage System (BESS) component planned for the site.

2.0

Purpose and Scope

The purpose of this assessment is to evaluate the traffic engineering 'impact' of the BESS in isolation of the already assessed and approved solar generation component. SLR has been informed that the original development application made reference to a BESS and the stamped approved plan PH-1313(A) (Appendix A) makes reference to "battery storage". The traffic assessment prepared at the time, and Council's Decision Notice only reference the solar generation component. This assessment considers the incremental traffic 'impact' associated with the BESS during construction, operation and decommissioning stages. Additionally, the appropriateness and validity of the prior traffic assessment has been reviewed with respect to Stage 2 of the solar generation component. The technical scope of the SLR assessment is consistent with that completed by Northern Consulting Engineers (NCE) in 2017 which informed the original application.

3.0

BESS Description

The BESS will function as an enhancement to the already assessed and approved solar generation component. The BESS is utility scale infrastructure, comprising a maximum

200MW rate of discharge and a maximum 400MWh of stored energy.

Vehicular access to/from the BESS component is via Keith Venables Road and is unchanged compared to that already assessed and approved.

Construction of the BESS is planned to occur over a period of 14 months between July 2026

and October 2027 (inclusive). Based on the current programme, BESS construction will

overlap construction of the already approved, but not yet constructed solar generation component.

4.0

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Background

The following background relevant to SLR's consideration of the site and the subject BESS component is summarised in the following sections.

4.1

Prior Traffic Assessment

The originating development application was accompanied by a Traffic Impact Assessment (TIA) prepared by Northern Consulting Engineering in 2017 (Appendix B). The 2017 TIA has been reviewed by SLR and the key assumptions and findings are summarised as follows:

-

The TIA assessed a solar development with a generation capacity of 500MW with associated infrastructure.

-

The TIA evaluated Background and With Development scenarios including the incremental traffic generation forecast during construction.

-

The TIA assumed a seven-month construction programme and considered elements like solar panels, inverters, civil works (i.e. roads), transformers and substations.

-

The TIA concluded that:

"...a revised peak hour (construction) is expected to be generated as a result of an increase of light vehicles accessing site. The anticipated increase in traffic volume during the construction of the proposed solar farm has been shown to be successfully accommodated within the existing road networks without adversely impacting existing infrastructure based on the large capacity of Upper Haughton Road (1400veh/hr/lane direction). Furthermore, an assessment of the SunWater irrigation channel crossover structure is required to establish operational requirements and determine suitability for heavy vehicle haulage. A carriageway easement along an existing private road will also be sought to enable access to site from the above channel crossover."(NCE 2017, pg10)

4.2

Council Decision Notice

Burdekin Shire Council issued a Decision Notice (Change Application – Minor) for a Renewable Energy Facility (Solar Farm) on 9 March 2020 (Appendix A). The Decision

Notice included the following traffic and access related conditions that were partially informed by the 2017 TIA.

"Road/Access

6.1 Prior to commencement of construction upgrade the existing formed pavement of

Keith Venables Road for a distance of 275 metres easterly from the property boundary of Lot 30 on SP100843. The upgrade is to provide a minimum 5 metre wide, 150mm thick compacted gravel pavement.

6.2 Prior to the commencement of construction, the developer must undertake a dilapidation audit of the existing Council road network of Keith Venables Road from

the property boundary of Lot 30 on SP100843 for the entire gravel section of Keith Venables Road.

6.3 Prior to the commencement of the use, the developer must undertake a second dilapidation audit of the road sections addressed in the pre-construction report above. This audit must clearly quantify and damage that has been caused as a result

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Gateway Conditions – Traffic and Transport Consideration

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of this construction traffic. Any damage created by this development must be rectified by a contractor approved by Council.
6.4 Provide evidence that the irrigation channel crossing on Keith Venables Road in close proximity to the property boundary has sufficient structural capacity to support the type and volume of proposed construction traffic.”
6.5 The construction of any crossovers to give access to the land is to be the owner’s responsibility and to the satisfaction of the Chief Executive Officer.
SLR understands that Conditions 6.1-6.5 have been completed and/or satisfied with Council.

5.0

Technical Consideration of BESS

5.1

Background Traffic

The 2017 TIA adopted the Table 1 background traffic flows and growth rates based on census data collected by the Department of Transport and Main Roads (DTMR) between 2005-2015.
Table 1

2017 TIA Adopted Background Growth Rates

Road

Bruce
Highway

Direction

AADT

5-Year Growth
Rate

Gazettal Townsville to Ayr –

2,612

0.19%

Against Gazettal Ayr to Townsville

2,549

0.78%

Bi-Directional

5,161

0.49%

The Table 1 data is plotted at Figure 1 with additional data collected by DTMR since 2015

for the same Bruce Highway segment.

2005-2022 Bruce Highway DTMR Traffic Data

7,000

3

6,000

2.5

5,000

2

4,000

1.5

3,000

1

2,000

0.5

1,000

0

0

-0.5

Census Year

5-Yr Growth Rate (%)

3

AADT (vpd)

5-Yr Growth Rate (%)

Average Annual Daily Traffic (vpd)

Figure 1

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Based on the Figure 1 data, Since the 2017 TIA was prepared, the Bruce Highway annual traffic growth at this location has approximated 1.5%. The most recent AADT in 2022 was 5,741vpd. Whilst the recent growth rate is approximately three-times that adopted as part of the 2017 TIA, SLR considers the effect is not consequential given it applies to a relatively low AADT, and only over a relatively short construction period. The recent 5,741vpd AADT recorded in 2022 is still sufficiently consistent with the 5,211vpd adopted as part of the 2017 TIA, specifically regarding the Section 3 lane capacity findings.

5.2

Site Access

Vehicular site access via Keith Venables Road is unchanged from that previously assessed and approved.

5.3

External Vehicle Routes

The Upper Haughton Road, Barratta Road and Keith Venables Road route previously assumed to facilitate vehicle movement to/from the site is unchanged from that previously assessed and approved.

5.4

Crash History

The 2017 TIA did not include an assessment of the historic road crashes surrounding the site. To highlight any safety deficiencies on the surrounding road network, crash data has been extracted from DTMR's Open Data Portal website¹. Crashes for the most recent five-year period between 2017-2021 (inclusive) were evaluated. A single incident was noted as summarised in Table 2.

Table 2

Reported Crashes on External Vehicle Route (2017 – 2021)

Crash
Ref

Year

Location

335946

2018

Upper Houghton
Road

Crash
Severity

DCA
Code

Hospitalisation

705

DCA Description
Off-path Straight: Out of
control on straight

Based on the desktop evaluation of the single reported crash, there appears to be no singular or recurring road safety issue that, subject to a suitable Construction Traffic Management Plan (CTMP), would preclude the BESS development or be materially exacerbated by the BESS development.

5.5

Parking

The 2017 TIA noted that "on-site parking provision will be provided for all workers and visitors during the construction and operational phases of the solar farm." The CTMP should quantify the number of parking spaces required to accommodate the maximum demand during construction. The car parking area should be in accordance with AS2890.1 and suitably surfaced to ensure it is fit-for-use regardless of weather.

1

<https://www.data.qld.gov.au/dataset/road-crash-locations-queensland>

4

5.6

Incremental Traffic Impact

5.6.1

Background

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The 2017 TIA evaluated the incremental traffic impact of a 500MW solar generation development. A seven-month construction period was assumed with no staging. SLR understands that only Stage 1 (100MW) was delivered in/around 2019. SLR also understands that only 300MW of the remaining 400MW will be delivered as Stage 2 given site constraints with construction planned to commence in October 2025. Based on SLR's review of the 2017 TIA, there appears to have been no technical consideration of traffic associated with the BESS component.

5.6.2

Seasonality

Planning for the project assumes that the region does not experience significant wet seasons and therefore construction is assumed to occur over the full calendar year.

5.6.3

Vehicle Fleet

The anticipated vehicle fleet associated with the BESS component is outlined in Table 3.
Table 3

BESS Project Vehicle Fleet

Vehicle Type

Typical Vehicle Profile

Passenger
Vehicle

Workforce Travel/
Haulage Material and
Equipment
Workforce travel

8.4m³ Concrete
Mixer Truck (5axle)

Concrete

Articulated
Vehicle (20m, 6axle)

Fuel delivery, road base,
contractor supplies, steel,
pipes, ,miscellaneous

Truck (3-axle)
and Dog Trailer
(3-axle)

Quarry products,
aggregate

B-Double
(26m long)

Battery and Power
Conversion Units

Crane

Construction mobilisation

Heavy Rigid
Vehicle
(3-axle)

Waste removal

Medium Rigid
Vehicle (2-axle)

Water

Over Size Over
Mass (OSOM)
Vehicle

Large Power Transformer

5.6.4

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Construction Phase Traffic Demands

Heavy Vehicles

The Table 4 estimate of construction material and equipment trips to/from the site for the total BESS construction period has been developed based on the site-specific characteristics and SLR's significant experience with other comparable sites.
Table 4

Trip Generation – Construction Material and Equipment

Construction Material/
Equipment

Vehicle Type

Origin/
Destination

No. Trucks

Trip
Movements

Concrete
[Site access road, footings and
foundations, substation bench]

Concrete Mixer
Truck

Townsville

848

1,696

Aggregates
[Internal Roads, hardstand/
laydown areas, substation

Truck (3-axle) and
Dog (3-axle)

Townsville

1,200

2,400

B-Double

(26m long)

via Port of
Townsville

162

324

Ancillary Equipment 1
[Fencing, inverter delivery and
installation, substation electrical
equipment]

Articulated Vehicle
(20m long)

Townsville

148

296

Ancillary Equipment 2
[Site establishment, plant
mobilisation, material delivery,
Construction demobilisation]

Low Loader or
Crane

Townsville

130

260

Large Power Transformer
[162.5 tonnes]

Class 1 Over Size
Over Mass
(OSOM) Vehicle

Townsville

1

2

Waste

Heavy Rigid
Vehicle (12.5m
long)

Townsville

52

104

Water

Medium Rigid
Vehicle
(8.8m long)

Assumed to
be sourced
on-site

96

192

Total

2,637

5,274

Battery Units

SLR understands that the BESS construction programme is approx. 14 months. To ensure a conservative analysis, a shorter 12-month period has been adopted as part of this analysis.

The construction movements may occur across all days of the week; however, for the purposes of calculating daily movements, it has been assumed that there are six construction

days per week. This assumption is consistent with that adopted as part of the 2017 TIA.

There would be approximately 303 workdays in the one-year period after accounting for public holidays. Accordingly, the Table 4 forecasts would equate to the following average daily traffic:

-

8.7 (9) one-way vehicle trips per day

-

17.4 (18) two-way vehicle movements per day.

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Obviously, construction intensity will not be flat and there will be variable periods of greater/lesser site activities. Based on SLR's experience of other similar BESS construction, a maximum weekly heavy vehicle demand of approximately 230 trips (460 movements) is likely over a one-month period while internal roads and substation construction are occurring in tandem. This maximum demand equates to approximately 76 two-way movements per day. Given the continuous nature of concrete and materials deliveries throughout the day, only approximately 10% of heavy vehicle movements are forecast to occur during peak hour periods. Accordingly, heavy vehicle traffic generation during the peak hour periods is forecast to be 7-8vph. The truck fleet type is comparable to that previously assessed as part of the solar generation component. No route assessment has been conducted as it is assumed that the truck fleet required to construct Stage one solar was accommodated.

Light Vehicles

To provide maximum flexibility to the future construction workforce transport strategy and provide road authorities confidence that a worst-case scenario has been considered, all construction workers were assumed to drive to/from site in their own single-occupant vehicles. The resulting traffic demand for the construction workforce is summarised in Table 5.

Trip Generation – Construction Workforce Traffic Volumes

Vehicle Type
Short (Car, Utility, Light Van, Motorcycle)

Peak Hour

Daily

20vph

40vpd

Summary

Based on the preceding discussion, the construction of the BESS component would generate an average 58vpd and 22vph with shorter more intensive periods of higher maximum demands approaching 116vpd and 28vph. It is SLR's view that this incremental traffic demand can be accommodated on the surrounding external road network with no upgrading or engineering modifications. No

engineering upgrades or mitigations beyond those already completed are warranted. This finding is consistent with that reported by NCE as part of the 2017 TIA. The prior Decision Notice conditions 6.1-6.5 are still considered sufficient and could be modified to reference the BESS component. The CTMP, if not already prepared, should be modified to consider the cumulative Stage 2 solar and BESS construction requirements.

5.6.5

Operational Phase Traffic Demands

For the operational phase, the forecast staff arrangements have been forecast by SLR based on our experience with similar BESS development sites, as described in Table 6.

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Response to Department of Planning and Environment
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Table 6

Operational Workforce and Travel Assumptions

Operational Workforce

Assumption

Permanent Workforce

2 persons (per day)

Contractor Workforce

5 persons maximum (per day)

Anticipated Fleet

Light vehicles, Disposal trucks (Small and Medium Rigid Vehicles)

Operational Period

30 years

SLR is of the view that this incremental traffic demand is minor and consistent with that which was anticipated as part of the already assessed and approved solar generation component. Furthermore, Council's conditions 6.1-6.5 are still considered sufficient and could be modified to also refer to the BESS component.

5.6.6

Decommissioning Phase Traffic Demands

The operational phase of the project is forecast to be 30 years and therefore the decommissioning activities will ultimately occur well beyond the typical 10-year design horizon specified in industry guidance like the DTMR Guide to Traffic Impact Assessment. Accordingly, detailed traffic forecasts have not been prepared for this phase of the project. Nevertheless, it is noted that the traffic demands associated with decommissioning activities are anticipated to be less than those associated with construction activity and therefore any recommendations to mitigate construction traffic demands is also expected to be sufficient for any decommissioning works.

6.0

Summary and Conclusion

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Pacific Blue to provide traffic engineering input in relation to the previously approved Renewable Energy Facility (Solar Farm) and planned Battery Energy Storage System (BESS).

-

The purpose of this assessment is two-fold 1) to evaluate the traffic engineering 'impact' of the BESS in isolation of the already assessed and approved solar generation component; and 2) to evaluate the validity of the prior 2017 TIA regarding the planned Stage 2 solar component.

BESS evaluation

-

This assessment considers the incremental traffic 'impact' associated with the BESS during the construction, operation and decommissioning stages of development.

-

Construction Phase – the proposed development will generate additional traffic of approximately 18-76vpd (average-maximum) or 2-8vph (average maximum) during the construction phase (12 months).

-

Operational Phase – once operational, the project is anticipated to result two (2) full time equivalent (FTE) staff on site, with potential for up to five (5) FTE ad-hoc contractors. The small increase in staff plus an additional truck would generate up to 16 traffic movements per day which is not forecast to have a material impact on the road network.

-

Decommissioning Phase – The operational phase of the project is predicted to be 30 years and therefore the decommissioning activities will ultimately occur well beyond the typical 10-year design horizon specified in the GTIA, and therefore detailed traffic volume forecasts have not been prepared.

Pacific Blue
Response to Department of Planning and Environment
Gateway Conditions – Traffic and Transport Consideration

-
-

1 May 2024
SLR Project No.: 640.031109
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Advice-20240501.docx

No additional traffic analysis is warranted for the BESS component based on:

-

The previously assessed and approved 2017 TIA assumed a seven-month construction period for the solar generation component which is now understood to be 14-months. Furthermore, the solar component was delivered in two stages whereas the 2017 TIA only assumed one. Accordingly, the 2017 TIA should overestimate daily and peak hour construction traffic demands.

-

The incremental demand associated with the BESS component can be accommodated by the existing road network and any short-term construction effects managed by a CTMP which should consider the cumulative BESS and Stage 2 solar development.

No engineering upgrades or mitigations beyond those already conditioned and completed as part of the solar generation component are warranted.
Stage 2 solar evaluation

-

The methodology and findings presented in the 2017 TIA prepared by Northern Consulting Engineers are still valid despite assuming the solar generation component would be constructed in/around 2017.

-

No additional or updated traffic analysis is warranted for the Stage 2 solar component based on:

-

The 2017 TIA assumed a 500MW solar generation capacity with associated construction intensity whereas the remaining Stage 2 is only 300MW. Accordingly, if all else is equal, construction traffic would be approx. 60% of that already assessed and approved.

-

The 2017 TIA assumed a seven-month construction period for the solar generation component. It is understood that Stage 2 construction is now forecast to be 14-months. Accordingly, if all else is equal, construction traffic would be approx. 50% of that already assessed and approved.

-

Traffic growth has been higher than forecast by the 2017 TIA; however, the

difference is not consequential given it applies to a relatively low AADT and would not alter the prior findings.

Please contact the undersigned if you have any queries in relation to this advice.

Regards,

SLR Consulting Australia

Kris Stone, BEng, CPEng, RPEQ (24687)

Principal Consultant – Transport Advisory

Pacific Blue
Response to Department of Planning and Environment
Gateway Conditions – Traffic and Transport Consideration

1 May 2024
SLR Project No.: 640.031109
SLR Ref No.: 640.031109-M01-v3.0-BESS Traffic
Advice-20240501.docx

Attachments

Appendix A – CONS17/0002 Decision Notice (Burdekin Shire Council)
Appendix B – Traffic Assessment Report (Northern Consulting Engineers, 2017)
Appendix C – Site Locations and Haughton BESS Site Layout

Pacific Blue
Response to Department of Planning and Environment
Gateway Conditions – Traffic and Transport Consideration

1 May 2024
SLR Project No.: 640.031109
SLR Ref No.: 640.031109-M01-v3.0-BESS Traffic
Advice-20240501.docx

Appendix A
CONS17/0002 Decision Notice (Burdekin Shire Council)

Decision Notice
(Change Application - Minor)
Planning Act 2016
9th March, 2020

Address all communications to
The Chief Executive Officer
PO Box 974, Ayr Qld 4807
T (07) 4783 9800 | F (07) 4783 9999
planning@burdekin.qld.gov.au
www.burdekin.qld.gov.au

Pacific Hydro Australia Developments Pty Ltd
Level 13, 700 Collins Street
Docklands
Victoria 3008
Attn: Meredith Anderson

Dear Sir/Madam,

I refer to your Change Application to amend conditions of your Development Approval issued on 15 June 2017 (Reference No CONS17/0002) (the Development Approval) submitted pursuant to Section 78 of the Planning Act 2016 (PA).
On 12th November, 2019 Council decided your Change Application pursuant to Section 78 of the PA.
Details of the decision are as follows:

Change Application Details
Change Application Number:

CONS17/0002

Street Address:

Keith Venables Road, Upper Haughton

Real Property Description:

Lot 1 on SP313057

Planning Scheme:

Burdekin Shire IPA Planning Scheme

Original Development Approval:

Development Permit for a Material Change of Use for
Renewable Energy Facility (Solar Farm)

Decision Details

In relation to the Change Application, Council decided to:
A.

Approve a change to conditions 5.2, 12.1 and 12.2; and

B.

Include additional conditions 12.1A and 12. 2A, in relation to the changes above.

Currency Period of Development Approval

The currency of the Development Approval is 8 years starting the day that the original Development Approval took effect. (Refer to Section 85 "Lapsing of approval at end of

currency period" of the Planning Act
2016.)

Infrastructure

Where conditions relate to the provision of infrastructure, these are non-trunk infrastructure conditions unless specifically nominated as a "necessary infrastructure condition" for the provision of trunk infrastructure as defined under Chapter 4 of the Planning Act 2016.

CONS17/0002

Burdekin

Shire C o u n c i l

Consolidated Assessment M a n a g e r Conditions

Approved Plans/Staging

1.1(a) The development and conduct of the approved use of the premises, the carrying out and maintenance of any works on the premises and construction and maintenance of any building on the premises must be generally in accordance with the applications supporting material including all drawings/documents identified in the Table below, except as otherwise specified by any condition of this approval.

Document/Title

Site Location Plan - Figure 1

Reference

PH - 1307

Revision

A

Date

09/03/17

Cadastral Plan - Figure 2

PH - 1308

A

09/03/17

Indicative Layout Plan - Figure 4

PH - 1313

A

09/03/17

(b) Where a discrepancy or conflict exists between the written condition(s) of the approval and the approved plans, the requirements of the written condition(s) will prevail.

(c) The proposed development must comply with all Planning Scheme requirements as applying at the date of this approval, except as otherwise specified by any condition.

1.2

The development may be staged in accordance with the timeframes and capacities located in

section 3.5, Staging; of the Planning Report submitted as part of the Development Application. If

staged, the development need not be completed in the stage order indicated in section 3.5

submitted provided that any road access and infrastructure services required to service the

particular stage are constructed with that stage.

1.3

Pursuant to s342 of the Sustainable Planning Act 2009, the uncompleted aspects

of this
development approval lapse if the whole of the approved use has not happened by
20th June, 2025.
(8 years)

Compliance with conditions
2.

The proposed development must comply with all conditions of this development
permit prior to the
commencement of the use.

Outstanding charges
3.

All rates and charges (including regulated infrastructure charges), in arrears
in respect of the land,
subject of the application, are paid in full prior to the commencement of the
proposed use.

Notice of Intention to commence the use
4.

Prior to the commencement of the use on the site, written notice must be given
to Council that the
use (development and/or works) fully complies with the decision notice issued in
respect of the use.

Public Utility Services/Damage
5.1

The developer must at its own cost undertake all necessary alterations to public
utility mains and
services as are rendered necessary by the carrying out of any required external
works or other
works associated with the approved development.

5.2

Any damage which is caused to Council's infrastructure as a result of the
proposed development
must be repaired immediately, or as otherwise agreed with Council.

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CONS17/0002

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Page 2 of 8

Burdekin

Shire Council

Road/Access

6.1

Prior to commencement of construction upgrade the existing formed pavement of Keith Venables Road for a distance of 275 metres easterly from the property boundary of Lot 30 on SP100843. The upgrade is to provide a minimum 5 metre wide, 150mm thick compacted gravel pavement.

6.2

Prior to the commencement of construction, the developer must undertake a dilapidation audit of the existing Council road network of Keith Venables Road from the property boundary of Lot 30 on SP100843 for the entire gravel section of Keith Venables Road.

6.3

Prior to the commencement of the use, the developer must undertake a second dilapidation audit of the road sections addressed in the pre-construction report above. This audit must clearly quantify and damage that has been caused as a result of this construction traffic. Any damage created by this development must be rectified by a contractor approved by Council.

6.4

Provide evidence that the irrigation channel crossing on Keith Venables Road in close proximity to the property boundary has sufficient structural capacity to support the type and volume of proposed construction traffic.

6.5

The construction of any crossovers to give access to the land is to be the owner's responsibility and to the satisfaction of the Chief Executive Officer.

Stormwater

7.1

The approved development and use(s) must not interfere with the natural flow of stormwater in the locality in such a manner as to cause ponding or concentration of stormwater on adjoining land or roads.

7.2

Any external catchments discharging to the premises must be accepted and accommodated within the development's stormwater drainage system.

Operational Works

8.

Where operational works are required to be carried out for the proposed solar farm, the developer must, within the timeframe required by the Sustainable Planning Act 2009 and prior to the commencement of any work, lodge with Council an application for a development permit for operational works. As part of such application, the developer must submit:(a)

detailed and complete engineering drawings and specifications of the proposed works prepared by a civil engineer, who is both registered under the Professional Engineer's Act 2002 and is current Registered Professional Engineer of Queensland; and

(b)

a certificate from the engineer who prepared the drawings stating that the design and specifications have been prepared in accordance with these conditions, relevant Council Codes and Planning Scheme Policies and the relevant Australian Standard Codes of Practice;

Amenity
9.

The use of the development must not cause an unreasonable nuisance to the surrounding rural area.

On-site Sewerage Disposal
10.

Prior to commencement of construction the development must be serviced by an appropriate sewerage disposal system.

CONS17/0002

Page 3 of 8

Refuse Facilities

11.

All waste generated as a result of the construction activities is to be effectively controlled and contained entirely within the boundaries of the site before disposal, unless otherwise approved by Council.

Management Plans

12.1

Implement and maintain Construction Management Plan Revision 2 Project QC68 dated 6 July

2018 (CMP) for the subject site.

Any proposed change to the CMP or subsequent versions during operation of the use must be

prepared and certified by a Registered Professional Engineer of Queensland (RPEQ), submitted to

Council for assessment and be approved in writing by Council before use.

The CMP must include, but not be limited to, the following details for the approved development:

a)

a description of all relevant activities to be undertaken on the site during construction

(including and staged maintenance works or reconstruction works) including the anticipated staging for bulk earthworks and the construction works program

b)

a description of the roles and responsibilities for all relevant employees involved in the

construction of the project including relevant training and induction provisions for ensuring

that all employees, contractors and sub-contractors are aware of their environmental and

compliance obligations under these conditions of approval

c)

details of any construction sites and mitigation, monitoring, management and rehabilitation

measures specific to the site that would be implemented

e)

statutory and other obligations that the applicant is required to fulfil during construction

including all relevant approvals, consultations and agreements required from authorities

and other stakeholders, and key legislation and policies

f)

details of how the environmental performance of construction will be monitored, and what

actions will be taken to address identified potential adverse environmental impacts

including soil and water impacts and dust emissions

g)

emergency management measures including measures to control bushfires.

12.1A The approved CMP must be complied with at all times and a copy maintained on site.

12.2

The applicant must implement and maintain Traffic Management Plan Revision 8 Project QC08, dated 19 June 2019 (TMP) for the subject site.

Any proposed change to this TMP or subsequent versions must be prepared and certified by a

Registered Professional Engineer of Queensland (RPEQ) submitted to Council for assessment

and be approved in writing by Council. The TMP must include, but is not limited to:

i)

details of how construction or operation (including any staged maintenance works or reconstruction works) of the project will be managed in proximity to local and regional roads

ii)

details of traffic routes for heavy vehicles, including any necessary route for oversized loads

iii)

details of how any potential safety hazards resulting from the increased vehicle movements will be mitigated during the construction phase

CONS17/0002

Burdekin

Shire Council

iv)

procedures for informing the public where any road access will be restricted as a result of the project.

12.2A The approved TMP must be complied with at all times and a copy maintained on site.

12.3 No later than one month prior to the decommissioning of the project, or otherwise agreed to by the Chief Executive Officer, the applicant is to submit to the Council a Decommissioning and Rehabilitation Management Plan prepared and certified by a suitably qualified person. The plan must include but is not limited to:

i)

identification of structures, including but not limited to all solar panels, the substation, the control and facility building and electrical infrastructure, including underground infrastructure to be removed, except where the substation, control room or overhead electricity lines are transferred to or in control of the local electricity network operator, and how they will be removed

ii)

measures to reduce impacts of the development on the environment and surrounding land uses

iii)

details of how the land will be rehabilitated back to its predevelopment condition, including slope and soil profile.

Decommissioning/Post Operations

13.1 If the solar farm is not used for the generation of electricity for a continuous period of 12 months, the use shall be considered decommissioned, and the site shall be returned as far as practical, to its condition prior to the commencement of the use, unless otherwise agreed by the Chief Executive Officer.

13.2 Within 18 months of the site being decommissioned the site shall be returned as far as practicable to its condition prior to the commencement of construction. All solar panels and associated above ground structures including but not necessarily limited to, the substation, the control and facilities building and electrical infrastructure, including underground infrastructure shall be removed from the site unless otherwise agreed by the Chief Executive Officer, except where the substation, control room or overhead electricity lines are transferred to or in the control of the local electricity network operator.

Referral Agencies
Not Applicable.

Approved Plans

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

Approved Plans

Plan/Document Name

Plan Number

Dated

Site Location Plan - Figure 1

PH - 1307 REV A

09/03/17

Cadastral Plan - Figure 2

PH - 1308 REV A

09/03/17

Indicative Layout Plan - Figure 4

PH - 1313 REV A

09/03/17

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Burdekin

Shire Council

Advisory Notes

-

Given that the site is located in a cyclonic region defined as C2, it will be necessary for all buildings and for the solar panel supporting framework (Special structures) to be designed assessed and constructed in accordance with relevant Building Regulations.

-

All waste is to be disposed of in accordance with the Environmental Protection (Waste Management) Regulation 2000.

Property Notes
Not Applicable.

Variation Approval
Not Applicable.

Further Development Permits Required
Development Permit for Operational Work
Development Permit for Building Work

Submissions
Not Applicable

Rights of Appeal
You are entitled to appeal against this decision. A copy of the relevant appeal provisions from the Planning Act 2016 is attached.

Assessment Manager Signature:
Enc:

Date:

9, March, 2020

Approved Plans/Documents
Appeal Rights

CONS17/0002

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Burdekin

Shire Council

Appeal Rights

Planning Act 2016 & The Planning Regulation 2017

Chapter 6 Dispute resolution

Part 1 Appeal rights

229 Appeals to tribunal or P&E Court

(1)

Schedule 1 of the Planning Act 2016 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 a n 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 a n appeal of the matter.

(Refer to Schedule 1 of the Planning Act 2016)

(2)

(3)

An appellant may start an appeal within the appeal period.

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 a n 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 a n 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)

(5)

(6)

Each respondent and co-respondent for an appeal may be heard in the appeal.

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.

To remove any doubt. It is declared that an appeal against a n infrastructure charges notice must not be about(a) the adopted charge itself; or

(b) for a decision about a n offset or refundfl)

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.

230 Notice of appeal

(1)

(2)

(3)

An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that (a) is in the approved form; and
(b) succinctly states the grounds of the appeal.

The notice of appeal must be accompanied by the required fee.

The appellant or, for an appeal to a tribunal, the registrar must, within the service period, give a copy of the notice of appeal to

(a)

(b)

(c)

(d)

(e)

(f)

(g)

the respondent for the appeal ; and

each co-respondent for the appeal; and

for an appeal about a development application under schedule 1, table 1, item 1

- each principal submitter for the

development application; and

for an appeal about a change application under schedule 1, table 1, item 2 -

each principal submitter for the change

application; and

each person who may elect to become a co-respondent for the appeal, other than an eligible submitter who is not a principal

submitter in an appeal under paragraph (c) or (d); and

for an appeal to the P&E Court - the chief executive; and

for an appeal to a tribunal under another Act - any other person who the registrar considers appropriate.

CONS17/0002

S'J
(4)

(5)
(6)

Burdekin
Shire Council

The service period is (a) if a submitter or advice agency started the appeal in the P&E Court - 2 business days after the appeal has started; or
(b) otherwise - 10 business days after the appeal is started.
A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).
A person elects to be a co-respondent by filing a notice of election, in the approved form, within 10 business days after the notice of appeal is given to the person.

231 Other appeals (1)

Subject to this chapter, schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.

(2) The Judicial Review Act 1991, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.

(3) A person who, but for subsection (1) could have made an application under the Judicial Review Act 1991 in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.

(4) In this section decision includes (a) conduct engaged in for the purpose of making a decision; and

(b) other conduct that relates to the making of a decision; and

(c) the making of a decision or failure to make a decision; and

(d) a purported decision ; and

(e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter (a)

(b)

(c)

is final and conclusive; and

may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the

Judicial Review Act 1991 or otherwise, whether by the Supreme Court, another court, a tribunal or another entity; and

is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, a tribunal or another entity

on any ground.

232 Rules of the P&E Court

(1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.

(2) However, the P&E Court may hear and decide an appeal even if the person has not complied with the rules of the P&E Court.

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PROJECT

Haughton, Australia

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I Development Area

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Landholder Land Titles

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Population Centre

----- Road

----- River

TITLE

Site Location Plan - Figure 1

FOR EXTERNAL DISTRIBUTION

CREATED

Maps marked "Internal Use Only" contain information that i s of a private and confidential nature These maps m a y only b e distributed to, and viewed by. current Pacific Hydro Employees

M.Yee

CLEARED

Maps marked For External Distribution' have been checked and approved for release for information purposes as of the date shown on the map. A Responsible Manager must approve release of these maps on any other date.

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M. Anderson

APPROVED

D. Walsh
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Haughton, Australia
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Cadastral Plan - Figure 2
----- Transmisison Line (275 kV)

FOR EXTERNAL DISTRIBUTION

Cadastral Boundary

CREATED

- - - - Distribution Line (132 kV)

----- Access Track

I

I Development Area

----- Public Road

Maps marked 'Internal Use Only' contain information that is of a private and confidential nature. These maps may only be distributed to, and viewed by current Pacific Hydro Employees.

M.Yee

CLEARED

Maps marked 'For External Distribution' have been checked and approved for release for information purposes as at the date shown on the map. A Responsible Manager must approve release of these maps on any other date.

Landholder

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M. Anderson

APPROVED

D. Walsh

DATE

09/03/17

SCALE

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PROJECT

Haughton, Australia

TITLE

Indicative Layout Plan - Figure 4

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I Development Area and Security Fencing

FOR EXTERNAL DISTRIBUTION

CREATED

Indicative Array Layout

----- Access Track

----- Transmisison Line (275 kV)

- - - Distribution Line (132 kV)

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Maps marked "For External Distribution" have been checked and approved for release for information purposes as at the date shown on the map. A Responsible Manager must approve release of these maps on any other date.

M. Yee
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M. Anderson
APPROVED

D. Walsh
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Pacific Blue
Response to Department of Planning and Environment
Gateway Conditions – Traffic and Transport Consideration

1 May 2024
SLR Project No.: 640.031109
SLR Ref No.: 640.031109-M01-v3.0-BESS Traffic
Advice-20240501.docx

Appendix B
Traffic Assessment Report (Northern Consulting Engineers, 2017)

TRAFFIC ASSESSMENT REPORT

HAUGHTON SOLAR FARM

Lot 4 on GS602 and Lot 30 on SP100843

FOR

PACIFIC HYDRO

JOB No:

MJ1767

REVISION:

B

COUNCIL REF:

Not Applicable

ISSUE

APPROVED FOR ISSUE

AUTHOR

A

Cosmin
Ghebosu

NAME

Derek Saw
(RPEQ 7363)

B

Cosmin
Ghebosu

Derek Saw
(RPEQ 7363)

SIGNATURE

ISSUED TO:

REASON

17/02/2017

Client

Draft issued for review
and comment

10/03/2017

Client

Final to support DA

DATE

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- Haughton Solar Farm.docx

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-------------------------------------	---

2.4

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Road 7

1.0

DEVELOPMENT CONTEXT

1.1

Executive Summary

The objective of this report is to assess at a high level the access requirements for a proposed solar farm located at Upper Haughton, Queensland. The site more specifically referred to as Lot 4 on GS602 and Lot 30 on SP100843 will host a large-scale solar photovoltaic (PV) generation facility and associated infrastructure. The project will occupy an area of approximately 1,182 ha on the site. Utilising recent traffic count data obtained from the Department of Transport and Main Roads (DTMR), Burdekin Shire Council (BSC) and utilising standard traffic generation data provided by the proponent for this type of facility a traffic impact assessment concluded that current road networks are suitably sized to accommodate the increased traffic demands.

1.2

Background

Pacific Hydro proposes to develop a large-scale solar photovoltaic (PV) generation facility, up to 500MWp, and associated infrastructure on Lot 4 on GS602 and Lot 30 on SP100843. Northern Consulting Engineers have been engaged to prepare a brief traffic impact assessment report for the increase in traffic volumes during the construction phase of the development.

1.3

Site details

The site, Lot 4 on GS602 and Lot 30 on SP100843 is located approximately 22km south of Giru and 40km south-west of Ayr and encompasses approximately 1,182 ha.

Figure 1 Proposed Solar Farm Location

1.4

Current Site Access

Access to the site can be obtained from Bruce Highway, along a network of sealed and unsealed roads consisting of Upper Haughton, Barratta and Keith Venables Roads. The intersection of Upper Haughton Road and Bruce Highway, the primary access to the road network, is located approximately 1km south of the Haughton River bridge crossing. The above intersection is located within a nominated 100km/h speed zone. The intersection also includes a dedicated turning lane onto Hodel Road which is located opposite Upper Haughton Road. Based on the geometry of the intersection and line of sight available for road users, it is recommended that this intersection should be maintained as the primary point of the access to the proposed solar farm property.

Figure 2 Turnoff onto Upper Haughton Road from Bruce Highway
1.5

Road Network Description

Bruce Highway

The Bruce Highway is the primary highway network connecting major cities and town centres along Eastern Queensland. A 4-way intersection provides the primary access to the rural road network leading to the proposed site through a right hand turn onto Upper Haughton Road. A rural road network, described in detail below, can then be followed from the Bruce Highway to the proposed site. Heavy vehicles will travel from the Townsville Port along the Bruce Highway and gain access to the rural road network through the above-mentioned intersection.

Rural Road Network

The rural road network consists of Upper Haughton, Barratta and Keith Venables Roads which provide access to the proposed site from the Bruce Highway. Traffic survey information provided by the Burdekin Shire Council (BSC) indicates that Upper Haughton Road is 7.6m wide with a nominated 100km/h speed zone. No information has been provided for the Barratta and Keith Venables Roads. A site inspection undertaken by Northern Consulting Engineers (NCE) indicated that Barratta Road presented a sealed road surface whilst Keith Venables Road presented a sealed road surface with an approximate 500m section of road unsealed prior to entry onto the proposed site. From our site inspection, NCE were able to note that the width of Barratta Road up until the turn off to Keith Venables Road is similar to the 7.6m width noted on the BSC surveys for Upper Haughton Road. The width of Keith Venables Road across the sealed and unsealed sections was noticeably narrower than the previous two roads however is still considered to be a two lane two-way roadway. The access path to the proposed development is deemed to have sufficient line of sight, providing ample time for all road users to navigate the road network safely even through the reduced width sections along Keith Venables Road. A number of bends are present within the network, however the horizontal geometry of all bends and intersections is deemed to be suitable for heavy vehicles. Based on the survey information provided by BSC, geometric road characteristics and line of sight observed on site, NCE believe that the capacity of the Upper Haughton road is 1,400veh/hr/lane direction based on Austroads, 1988. This value will be used in our analysis for comparison and determination of current road usage capacities and volumes.

1.6

Existing Traffic Volumes

Current traffic volume data for the Bruce Highway was obtained through the Townsville office of the Department of Transport and Main Roads. Traffic surveys for the Upper Haughton Road were provided by Burdekin Shire Council.

Figure 3 Bruce Highway, Area 408, road section 10L
All TARS data relied upon have been included within Appendix A. Traffic volumes were also collected for the Upper Haughton Road by BSC and summarised below.
Table 1 Burdekin Shire Council Traffic Survey Data
Chainage from Bruce Highway 1100m

3700m

7100m

Survey Duration

71 days

13 days

13 days

Total vehicles

15975

2031

1928

ADT (Single direction)

225

156

148

Highest peak hour time

3pm

8am

7am

15veh/hr

13veh/hr

Highest Peak hour movement 18veh/hr
(single direction)

All Burdekin Shire Council traffic survey data is provided within Appendix B.
1.7

Traffic Growth Trends and Anticipated Traffic Breakdown

Based on the advice provided by Pacific Hydro, the construction phase of the project is anticipated to last 7 months. As this is expected to last a short period of time, no changes have been made to include the extra traffic within the Department of Transport and Main Road traffic trends. Information regarding the anticipated vehicle movements during the 7 months construction phase have also been provided by Pacific Hydro and relied upon by Northern Consulting Engineers.

Table 2 Construction Traffic Movements provided by Pacific Hydro
CONSTRUCTION MONTH
TRANSPORT
COMPONENT

1

2

3

4

5

6

7

PV panels

-

-

-

-

263veh

263veh

-

Inverters

-

-

-

-

-

20veh

-

Supports and Fixings

-

-

250veh

250veh

-

Electrical Switchgear

-

-

-

Transformers

-

-

-

Miscellaneous

-

-

-

-

2veh

-

-

-

-

1veh

10veh

10veh

10veh

10veh

10veh

Construction of Roads

250veh 250veh

250veh

250veh

250veh

250veh

-

Total

250veh 250veh

510veh

510veh

523veh

545veh

11veh

19.6

19.6

20.1

21

0.4

Average vehicles per
12hr day

9.6

9.6

Table 3 Daily Light Vehicle Movements
CONSTRUCTION LABOUR

1.8

DAILY MOVEMENTS

Labourers

12veh

Administration

25veh

Road Workers

10veh

Total

47veh

Current Speed Environment / Speed Surveys

The regulated speed environment for the Bruce Highway is 100km/h. Based on the information obtained from the Burdekin Shire Council traffic study, the nominated speed along the Upper Haughton road is 100km/h. No survey information from Burdekin Shire Council (BSC) was provided regarding the Barratta and Keith Venables Roads; however as they are both located in a rural environment it is anticipated the nominated speed is 100km/h. Refer to Appendix B for all speed surveys provided by Burdekin Shire

Council.

1.9

Existing Parking Provision

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

2.0

Development Proposal

2.1

Proposed Uses and Scale

The proposed solar farm development is expected to occupy approximately 1,182 ha. Figure 4 shows the proposed development building envelope.

Figure 4 Proposed Development Envelope

2.2

Operating hours and peaks

During the construction phase of the development it is anticipated that all heavy vehicles will travel along the path discussed above, whilst tradesmen/workers light vehicles are anticipated to be broken up between Townsville and the local Burdekin region in a 50:50 split. 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 onsite Monday – Saturday between the hours of 6am and 6pm.

2.3

Number of Employees / Visitors

The proposed facility is anticipated to operate with 10 employees permanently based on site.

2.4

Travel demand management policies (N/A)

2.5

Site Layout

A site layout plan completed by RCR-O'Donnell Griffin Pty Ltd has been included in Appendix C.

2.6

Access Form and Location

Access to the proposed development will be via the current location detailed below:

Figure 5 Proposed Solar Farm Access from Keith Venables Road

Access to the proposed site along Keith Venables Road will be required to pass over an irrigation channel crossover structure. This structure is a SunWater asset and further liaison with the asset owner is required to determine heavy vehicle operating parameters. Site conditions currently indicate the structure is used by local haul out trucks. Operational limitations must be determined prior to commencement of constructions and any upgrade works required to be undertaken on the structure to ensure it is suitable for heavy vehicle haulage should also be completed before this time. Pacific Hydro will be seeking to secure access from the irrigation crossover to the site and it is likely that a carriageway easement will be sought along an existing private access between Keith Venables Road and the site access.

3.0 Impact Assessment

3.1

Peak Hour Impact Assessment

Based on the vehicle movement information provided by Pacific Hydro, it is anticipated that most of the traffic will occur during the 7 month construction period and will consist of 47 light vehicles and 19-21 heavy vehicles per day, 6 days per week. For the purpose of our assessment it was assumed that only half of the light vehicles will be travelling to and from Townsville, with the remaining vehicles attending site from the local Burdekin region. From the information provided by BSC and DTMR we were able to determine the existing peak hour and ADT traffic parameters as shown in Tables 4, 5 & 6 respectively.

Table 4 Assessment of DTMR Heavy Vehicle Data on Bruce Highway
Direction

Townsville to Ayr (Against
-Gazettal)

Ayr to Townsville (Gazettal)

2015 AADT

436veh

398veh

5-Year Growth Rate

0.19%

0.78%

2017 AADT

438veh

404veh

AADT % during Peak Hour

9.50%

9.25%

Peak Hour Movements

41.6veh/hr

37.4veh/hr

Additional Heavy Vehicles

1.7veh/hr

1.7veh/hr

New Peak Hour

43.3veh/hr

39.15veh/hr

Change in Peak Hour

4.1% increase

4.55% increase

Table 5 Assessment of BSC Light Vehicle Data on Upper Houghton Road
Study Location

Chainage: 1100m

Chainage: 3700m

Chainage: 7100m

225veh (North*)

156veh (North*)

148veh (North*)

204veh (South*)

150veh (South*)

140veh (South*)

Current Morning Peak
Hour

13veh/hr

11veh/hr

10veh/hr

Current Afternoon Peak
Hour

18veh/hr

13veh/hr

12veh/hr

Construction Traffic

24veh/hr

24veh/hr

24veh/hr

Revised Peak Hour
(Morning or Afternoon)

42veh/hr

37veh/hr

36veh/hr

Road Capacity

1400veh/hr/lane
direction

1400veh/hr/lane
direction

1400veh/hr/lane
direction

Peak Hour Volume vs.
Road Capacity (Morning
or Afternoon)

3%

2.64%

2.57%

ADT

*North indicates traffic direction from site, South indicates traffic direction to site.

8

Table 6 Assessment of BSC Heavy Vehicle Data on Upper Haughton Road
Study Location

Chainage: 1100m

Chainage: 3700m

Chainage: 7100m

23.65veh (North*)

16.4veh (North*)

15.55veh (North*)

21.4veh (South*)

15.75veh (South*)

14.7veh (South*)

Current Morning Peak
Hour

2.48veh/hr

1.72veh/hr

1.63veh/hr

Current Afternoon Peak
Hour

2.25veh/hr

1.65veh/hr

1.54veh/hr

Additional Heavy
Vehicles

1.7veh/hr

1.7veh/hr

1.7veh/hr

Construction Morning
Peak Hour

4.18veh/hr

3.42veh/hr

3.33veh/hr

Construction Afternoon
Peak Hour

3.94veh/hr

3.35veh/hr

3.24veh/hr

Percentage Increase
Morning

69%

99%

104%

Percentage Increase
Morning

76%

103%

110%

Road Capacity

1400veh/hr/lane
direction

1400veh/hr/lane
direction

1400veh/hr/lane
direction

Peak Hour Volume vs.
Road Capacity (Morning
or Afternoon)

0.3%

0.25%

0.24%

ADT

Based on the work hours provided by Pacific Hydro, 6am to 6pm, majority of the construction traffic will be generated before and after these respective start and finish times. Based on the traffic data provided by BSC, the construction peak hour is not anticipated to coincide with the existing peak hour traffic. However, due to the limited information within the traffic survey it was assumed that the construction traffic and existing traffic peak hours will coincide (this is considered to be a conservative approach). Using this assumption, we were able to determine a revised peak hour traffic volume that would be experienced on the road network based on the traffic information available.

The capacity of the road was determined as 1400veh/hr/lane direction in accordance with Austroads, 1988 based on the road parameters discussed earlier. Based on this road capacity it can be seen that the revised peak experienced along the Upper Haughton Road will be well within the limit of the roads capacity. The largest peak hour volume is approximately 3% of road capacity. Heavy vehicle traffic is expected to be approximately 1.7 vehicles per hour which is less than a 5% [4.55%] increase in heavy vehicle traffic movements along the Bruce Highway. No further changes are expected to be required to existing roads and intersections geometry to accommodate heavy vehicles. Heavy vehicle movements along the rural road network (1.7 vehicles per hour) shown in the above table, are also deemed to be comfortably accommodated within the road network based on the 1400veh/hr/lane direction road capacity described above, highest peak hour volume is 0.3% of road capacity. Combining the light vehicle and heavy vehicle peak hours will utilise approximately 3.3% of the 1400veh/hr/lane direction capacity of the Upper Haughton Road. No information was able to be obtained for the irrigation structure at the end of Keith Venables Road and an assessment will be required to be undertaken to determine suitability of heavy vehicle haulage and to establish operating parameters.

4.0 CONCLUSION

In conclusion, a revised peak hour (construction) is expected to be generated as a result of an increase of light vehicles accessing site. The anticipated increase in traffic volume during the construction of the proposed solar farm has been shown to be successfully accommodated within the existing road networks without adversely impacting existing infrastructure based on the large capacity of Upper Haughton Road (1400veh/hr/lane direction). Furthermore, an assessment of the SunWater irrigation channel crossover structure is required to establish operational requirements and determine suitability for heavy vehicle haulage. A carriageway easement along an existing private road will also be sought to enable access to site from the above channel crossover.

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

Dalbeg

Clare

Kenilworth

Bletchington Park

Charters Towers

Dotswood

Annandale

Croydon

Mackay

Carmila

Mount Elliot

Cromarty

Majors Creek

Shirbourne

Mount Surround

Clevedon

Cape Cleveland

Giru

Cungulla

-19.291610

-19.667715

91699

Barratta

Region 408 - Northern District
Road Section 10L - Bruce Highway (Ayr - Townsville)
Traffic Year 2015 - Data Collection Year 2015

AADT Segment Report

Traffic Analysis and Reporting System

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

Bauhinia

Mackay

Bloomsbury
Bowen
Nome
Alligator Creek
Blackwater
Blair Athol
Mount Coolon
Elphinstone
Blackall
Barcaldine
Highbury
Hughenden
Townsville
Ingham
Cardwell
Innisfail
Townsville
Charters Towers Bowen
Lyndhurst
Cardwell
Julago
Queensland
Regions
Cairns
Cooktown
Eveleigh
Middleton Winton
Kynuna
Julia Creek
Croydon
Stirling
Dunbar
16-Feb-2016 08:41

Summary

146.914244

Home

Jerona

Jardine

Lochinvar

Pioneer

Brandon

Page 7 of 12 (21 of 321)

TARS

147.392168

Summary

All Vehicles (00)

3-Axle
Articulated (2F)

G

A 163 6.39%

B 252 4.88%

G 2,125 81.36%

A 1,949 76.46%

B 4,074 78.94%

B 294 5.70%

A 167 6.55%

G 127 4.86%

B 70 1.36%

A 32 1.26%

G 38 1.45%

5 0.20%

5 0.19%

B 10 0.19%

A

G

6 0.24%

5 0.19%

B 11 0.21%

A

G

B 374 7.25%

B 4,326 83.82%

89 3.41%

A 204 8.00%

A 2,112 82.86%

4-Axle
Trucks (2E)

G 170 6.51%

G 2,214 84.76%

3-Axle Trucks
and Buses (2D)

Articulated Vehicles (1C)

Trucks and Buses (1B)

Short Vehicles (1A)

2-Axle Trucks
and Buses (2C)

B 834 16.16%

B 4,326 83.82%

Short Vehicles
Towing (2B)

A 436 17.10%

A 2,112 82.86%

Short 2-Axle
Vehicles (2A)

G 398 15.24%

G 2,214 84.76%

9 0.35%

8 0.31%

B 17 0.33%

A

G

4-Axle
Articulated (2G)

B 38 0.74%

A 19 0.75%

G 19 0.73%

5-Axle
Articulated (2H)

B 235 4.55%

A 120 4.71%

G 115 4.40%

Heavy Vehicles (0B)

B 5,161 100%

A 2,549 100%

G 2,612 100%

Light Vehicles (0A)

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.

86 3.37%

83 3.18%

B 169 3.27%

A

G

6-Axle Articulated (2I)

2.37%

2.97%

G

A

B

B 207 4.01%

A 100 3.92%

G 107 4.10%

B Double (2J)

Based on
1 year's data
3.57%

B 18 0.35%

A 12 0.47%

6 0.23%

Double Road Trains (2K)

B 225 4.36%

A 112 4.39%

G 113 4.33%

Road Trains (1D)

0.49%

0.19%

Based on
5 years' data

0.78%

G

TARS

Page 8 of 12 (22 of 321)

B 0 0%

A 0 0%

G 0 0%

Triple Road

Trains (2L)

1.01%

0.88%

Based on

10 years' data

1.14%

Annual Segment Growth

64.14 km

End Point 290000014. Bruce

Hwy 10L near Alligator Ck Rd.

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

6.44 km

20.64 km

Site 91699. Point 290001053.

WiM Site Greenacres.

Region 408 - Northern District

Road Section 10L - Bruce Highway (Ayr - Townsville)

Traffic Year 2015 - Data Collection Year 2015

AADT Segment Report

Traffic Analysis and Reporting System

Start Point 290000013. Bruce Hwy

10L @ OLC North Coast Railway.

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Home

Home

Summary

TARS

Traffic Analysis and Reporting System

Annual Volume Report

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Region 408 - Northern District
Road Section 10L - Bruce Highway (Ayr - Townsville)
Site
Thru Dist
Type
Stream

91699 - 10L WiM Site Greenacres
20.638
P - Permanent
T1 - Thru traffic in Lane 1 -in gazettal dirn

Year 2015

Growth last Year 3.57%

AADT 2,612

Growth last 5 Yrs 0.78%

Avg Week Day 2,690

Growth last 10 Yrs 1.14%

Avg Weekend Day 2,376

Year

AADT

1-Year
Growth

5-Year
Growth

10-Year
Growth

Year

1.14%

2000

2015

2,612

3.57%

0.78%

2014

2,522

-0.67%

0.08%

1999

2013

2,539

-2.87%

0.63%

1998

2012

2,614

1.83%

1.76%

1997

2011

2,567

3.72%

2.00%

1996

2010

2,475

0.12%

1.48%

1995

2009

2,472

1.64%

1994

2008

2,432

0.33%

1993

2007

2,424

6.22%

1992

2006

2,282

-0.39%

1991

2005

2,291

AADT

1-Year
Growth

5-Year
Growth

AADT

2015

2014

2013

2012

2011

2010

2009

2008

2007

2006

2005

2004

2003

2002

2001

2000

1999

0
1998

250

0
1997

500

250
1996

750

500

1995

1,000

750

1994

1,250

1,000

1993

1,500

1,250

1992

1,750

1,500

1991

2,000

1,750

1990

2,250

2,000

1989

2,500

2,250

1988

2,750

2,500

1987

3,000

2,750

1986

AADT

AADT History

3,000

10-Year
Growth

1990

2004

1989

2003

1988

2002

1987

2001

1986

9.0

8.0

8.0

7.0

7.0

6.0

6.0

5.0

5.0

4.0

4.0

3.0

3.0

2.0

2.0

1.0

1.0

0.0

0.0

Monday

Tuesday

Wednesday

Thursday

Hours of the Week

Friday

Saturday

Sunday

% AADT

10.0

9.0

01-02

03-04

05-06

07-08

09-10

11-12

13-14

15-16

17-18

19-20

21-22

23-00

01-02

03-04

05-06

07-08

09-10

11-12

13-14

15-16

17-18

19-20

21-22

23-00

01-02

03-04

05-06

07-08

09-10

11-12
13-14
15-16
17-18
19-20
21-22
23-00
01-02
03-04
05-06
07-08
09-10
11-12
13-14
15-16
17-18
19-20
21-22
23-00
01-02
03-04
05-06
07-08
09-10
11-12
13-14
15-16
17-18
19-20
21-22
23-00
01-02
03-04
05-06
07-08
09-10
11-12
13-14
15-16
17-18
19-20
21-22
23-00
01-02
03-04
05-06
07-08
09-10
11-12
13-14
15-16
17-18
19-20
21-22
23-00

% AADT

Hourly Averages
10.0

Home

Summary

TARS

Traffic Analysis and Reporting System

Annual Volume Report

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110

105

105

100

100

95

95

90

90

Sat

Thu

Tue

% AADT

110

Sun

115

Fri

115

Wed

120

Mon

% AADT

Daily Averages

120

Days of the Week

115

115

110

110

105

105

100

100

95

95

90

90

85

85

80

80

% AADT

120

01-Jan - 07-Jan

08-Jan - 14-Jan

15-Jan - 21-Jan

22-Jan - 28-Jan

29-Jan - 04-Feb

05-Feb - 11-Feb

12-Feb - 18-Feb

19-Feb - 25-Feb

26-Feb - 04-Mar

05-Mar - 11-Mar

12-Mar - 18-Mar

19-Mar - 25-Mar

26-Mar - 01-Apr

02-Apr - 08-Apr

09-Apr - 15-Apr

16-Apr - 22-Apr

23-Apr - 29-Apr

30-Apr - 06-May

07-May - 13-May

14-May - 20-May

21-May - 27-May

28-May - 03-Jun

04-Jun - 10-Jun

11-Jun - 17-Jun

18-Jun - 24-Jun

25-Jun - 01-Jul

02-Jul - 08-Jul

09-Jul - 15-Jul

16-Jul - 22-Jul

23-Jul - 29-Jul

30-Jul - 05-Aug

06-Aug - 12-Aug
13-Aug - 19-Aug
20-Aug - 26-Aug
27-Aug - 02-Sep
03-Sep - 09-Sep
10-Sep - 16-Sep
17-Sep - 23-Sep
24-Sep - 30-Sep
01-Oct - 07-Oct
08-Oct - 14-Oct
15-Oct - 21-Oct
22-Oct - 28-Oct
29-Oct - 04-Nov
05-Nov - 11-Nov
12-Nov - 18-Nov
19-Nov - 25-Nov
26-Nov - 02-Dec
03-Dec - 09-Dec
10-Dec - 16-Dec
17-Dec - 23-Dec
24-Dec - 30-Dec
31-Dec - 06-Jan

% AADT

Weekly Averages
120

2015 Calendar
February

January
M

T

W

T

F

S

S

1

2

3

4

M

T

W

T

F

March

S

S

M

T

1

30

31

W

T

April

F

S

S

M

T

1

W

T

F

S

S

1

2

3

4

5

5

6

7

8

9

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11

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May

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2

3

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6

September

October

W

November

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F

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December

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Days on which traffic data was collected.

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Summary

TARS

Traffic Analysis and Reporting System

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Region 408 - Northern District
Road Section 10L - Bruce Highway (Ayr - Townsville)
Site
Thru Dist
Type
Stream

91699 - 10L WiM Site Greenacres
20.638
P - Permanent
T2 - Thru traffic in Lane 2 -against gazettal

Year 2015

Growth last Year 2.37%

AADT 2,549

Growth last 5 Yrs 0.19%

Avg Week Day 2,625

Growth last 10 Yrs 0.88%

Avg Weekend Day 2,319

Year

AADT

1-Year
Growth

5-Year
Growth

10-Year
Growth

Year

0.88%

2000

2015

2,549

2.37%

0.19%

2014

2,490

-2.28%

-0.23%

1999

2013

2,548

-1.89%

0.78%

1998

2012

2,597

1.48%

1.65%

1997

2011

2,559

3.44%

2.03%

1996

2010

2,474

0.12%

1.71%

1995

2009

2,471

1.85%

1994

2008

2,426

0.54%

1993

2007

2,413

6.44%

1992

2006

2,267

0.58%

1991

2005

2,254

AADT

1-Year
Growth

5-Year
Growth

AADT

2015

2014

2013

2012

2011

2010

2009

2008

2007

2006

2005

2004

2003

2002

2001

2000

1999

0
1998

250

0
1997

500

250
1996

750

500

1995

1,000

750

1994

1,250

1,000

1993

1,500

1,250

1992

1,750

1,500

1991

2,000

1,750

1990

2,250

2,000

1989

2,500

2,250

1988

2,750

2,500

1987

3,000

2,750

1986

AADT

AADT History

3,000

10-Year
Growth

1990

2004

1989

2003

1988

2002

1987

2001

1986

9.0

8.0

8.0

7.0

7.0

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Monday

Tuesday

Wednesday

Thursday

Hours of the Week

Friday

Saturday

Sunday

% AADT

10.0

9.0

01-02

03-04

05-06

07-08

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19-20

21-22

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21-22
23-00

% AADT

Hourly Averages
10.0

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105

100

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95

95

90

90

85

85

80

80

Sat

Thu

Tue

% AADT

105

Sun

110

Fri

115

110

Wed

120

115

Mon

% AADT

Daily Averages

120

Days of the Week

115

115

110

110

105

105

100

100

95

95

90

90

85

85

80

80

% AADT

120

01-Jan - 07-Jan

08-Jan - 14-Jan

15-Jan - 21-Jan

22-Jan - 28-Jan

29-Jan - 04-Feb

05-Feb - 11-Feb

12-Feb - 18-Feb

19-Feb - 25-Feb

26-Feb - 04-Mar

05-Mar - 11-Mar

12-Mar - 18-Mar

19-Mar - 25-Mar

26-Mar - 01-Apr

02-Apr - 08-Apr

09-Apr - 15-Apr

16-Apr - 22-Apr

23-Apr - 29-Apr

30-Apr - 06-May

07-May - 13-May

14-May - 20-May

21-May - 27-May

28-May - 03-Jun

04-Jun - 10-Jun

11-Jun - 17-Jun
18-Jun - 24-Jun
25-Jun - 01-Jul
02-Jul - 08-Jul
09-Jul - 15-Jul
16-Jul - 22-Jul
23-Jul - 29-Jul
30-Jul - 05-Aug
06-Aug - 12-Aug
13-Aug - 19-Aug
20-Aug - 26-Aug
27-Aug - 02-Sep
03-Sep - 09-Sep
10-Sep - 16-Sep
17-Sep - 23-Sep
24-Sep - 30-Sep
01-Oct - 07-Oct
08-Oct - 14-Oct
15-Oct - 21-Oct
22-Oct - 28-Oct
29-Oct - 04-Nov
05-Nov - 11-Nov
12-Nov - 18-Nov
19-Nov - 25-Nov
26-Nov - 02-Dec
03-Dec - 09-Dec
10-Dec - 16-Dec
17-Dec - 23-Dec
24-Dec - 30-Dec
31-Dec - 06-Jan

% AADT

Weekly Averages
120

2015 Calendar
February

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May
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September

October

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November

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December

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Days on which traffic data was collected.

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Summary

TARS

Traffic Analysis and Reporting System

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Region 408 - Northern District
Road Section 10L - Bruce Highway (Ayr - Townsville)
Site
Thru Dist
Type
Stream

91699 - 10L WiM Site Greenacres
20.638
P - Permanent
TB - Bi-directional traffic flow

Year 2015

Growth last Year 2.97%

AADT 5,161

Growth last 5 Yrs 0.49%

Avg Week Day 5,315

Growth last 10 Yrs 1.01%

Avg Weekend Day 4,696

Year

AADT

1-Year
Growth

5-Year
Growth

10-Year
Growth

Year

1.01%

2000

2015

5,161

2.97%

0.49%

2014

5,012

-1.47%

-0.07%

1999

2013

5,087

-2.38%

0.71%

1998

2012

5,211

1.66%

1.71%

1997

2011

5,126

3.58%

2.02%

1996

2010

4,949

0.12%

1.59%

1995

2009

4,943

1.75%

1994

2008

4,858

0.43%

1993

2007

4,837

6.33%

1992

2006

4,549

0.09%

1991

2005

4,545

AADT

1-Year
Growth

5-Year
Growth

AADT

2015

2014

2013

2012

2011

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1996

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1992

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1991

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3,500

1990

4,500

4,000

1989

5,000

4,500

1988

5,500

5,000

1987

6,000

5,500

1986

AADT

AADT History

6,000

10-Year
Growth

1990

2004

1989

2003

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1987

2001

1986

9.0

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Monday

Tuesday

Wednesday

Thursday

Hours of the Week

Friday

Saturday

Sunday

% AADT

10.0

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01-02

03-04

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21-22
23-00

% AADT

Hourly Averages
10.0

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Summary

TARS

Traffic Analysis and Reporting System

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110

105

105

100

100

95

95

90

90

Sat

Thu

Tue

% AADT

110

Sun

115

Fri

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Wed

120

Mon

% AADT

Daily Averages

120

Days of the Week

115

115

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110

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% AADT

120

01-Jan - 07-Jan

08-Jan - 14-Jan

15-Jan - 21-Jan

22-Jan - 28-Jan

29-Jan - 04-Feb

05-Feb - 11-Feb

12-Feb - 18-Feb

19-Feb - 25-Feb

26-Feb - 04-Mar

05-Mar - 11-Mar

12-Mar - 18-Mar

19-Mar - 25-Mar

26-Mar - 01-Apr

02-Apr - 08-Apr

09-Apr - 15-Apr

16-Apr - 22-Apr

23-Apr - 29-Apr

30-Apr - 06-May

07-May - 13-May

14-May - 20-May

21-May - 27-May

28-May - 03-Jun

04-Jun - 10-Jun

11-Jun - 17-Jun

18-Jun - 24-Jun

25-Jun - 01-Jul

02-Jul - 08-Jul

09-Jul - 15-Jul

16-Jul - 22-Jul

23-Jul - 29-Jul

30-Jul - 05-Aug

06-Aug - 12-Aug
13-Aug - 19-Aug
20-Aug - 26-Aug
27-Aug - 02-Sep
03-Sep - 09-Sep
10-Sep - 16-Sep
17-Sep - 23-Sep
24-Sep - 30-Sep
01-Oct - 07-Oct
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15-Oct - 21-Oct
22-Oct - 28-Oct
29-Oct - 04-Nov
05-Nov - 11-Nov
12-Nov - 18-Nov
19-Nov - 25-Nov
26-Nov - 02-Dec
03-Dec - 09-Dec
10-Dec - 16-Dec
17-Dec - 23-Dec
24-Dec - 30-Dec
31-Dec - 06-Jan

% AADT

Weekly Averages
120

2015 Calendar
February

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September

October

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Days on which traffic data was collected.

Ayr

Dalbeg

Clare

Giru

Cromarty

Clevedon

Cape Cleveland

Mount Elliot

Alligator Creek

Julago

Bletchington Park

Nome

Calcium

Townsville

Mingela

Keelbottom

Dotswood

Charters Towers

Toonpan

Anthill Plains

Cluden

Barrington

Hillgrove

Battery

Bambaroo

Ingham

Queensland
Regions

Summary

16-Feb-2016 08:41

Home

146.927208

92216

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Bruce Highway

-19.373493

-19.396477

Region 408 - Northern District
Road Section 10L - Bruce Highway (Ayr - Townsville)
Traffic Year 2015 - Data Collection Year 2015

AADT Segment Report

Traffic Analysis and Reporting System

Bruce

Highway

Page 9 of 12 (23 of 321)

TARS

146.956413

Traffic Analysis and Reporting System

TARS

Weekly Volume Report
Area 408 - Northern District
Road Section 10L - BRUCE HIGHWAY (AYR - TOWNSVILLE)
Site 91699 - 10L WiM Site Greenacres
TDist 20.659km
Speed Limit 100

14-Feb-2017 13:17

Page 1 of 3 (1 of 5)

-19.558713

Rattle Snake Island
Saunders Beach Arcadia
Townsville

Alva Beach
Barratta
Ayr

Woodstock

Crimea

Glendale

Clare

Byrne Valley
Millaroo

Ravenswood

ay

hw

e
ruc

Hig

B
hway

e Hig

Bruc

Bruce Highway

i
eH

uc

Inkerman

Bruce

ay

Highw

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with the permission of Pitney Bowes Software Pty Ltd (current as of 12/08) and other state government datasets.

-19.571777

wa

gh

Br

Mingela

Glenell North

y

91699

147.234863

Cungulla

147.218262

Anthill Plains

Traffic Analysis and Reporting System

TARS

Weekly Volume Report

Weeks 2016-W01 - 2016-W26 (26 weeks)

14-Feb-2017 13:17

Area

Road Section

Site

Thru Dist

Type

Stream

Traffic Class

Weeks

Date Range

Page 2 of 3 (2 of 5)

408 - Northern District

10L - BRUCE HIGHWAY (AYR - TOWNSVILLE)

91699 - 10L WiM Site Greenacres

20.659

P - Permanent

TB - Bi-directional traffic flow

00 - All Vehicles

2016-W01 - 2016-W26 (26 weeks)

Monday 04-Jan-2016 - Sunday 03-Jul-2016

Data Profile

Mondays Tuesdays Wednesdays Thursdays Fridays Saturdays Sundays

Days in Date Range

26

26

26

26

26

26

26

Days Included

26

23

26

26

24

25

25

Calendar Events

3

1

0

0

1

1

1

Mean Traffic Flow by Hours of the Day

All Days

Hours of the Day

23-00

22-23

21-22

0
20-21

0
19-20

50

18-19

50

17-18

100

16-17

100

15-16

150

14-15

150

13-14

200

12-13

200

11-12

250

10-11

250

09-10

300

08-09

300

07-08

350

06-07

350

05-06

400

04-05

400

03-04

450

02-03

450

01-02

500

Mean Traffic Flow

Weekends

500

00-01

Mean Traffic Flow

Week Days

Traffic Analysis and Reporting System

TARS

Weekly Volume Report

Weeks 2016-W01 - 2016-W26 (26 weeks)

14-Feb-2017 13:17

Page 3 of 3 (3 of 5)

Saturday

Sunday

Average
Week Day

0.4%

24

0.5%

25

0.6%

18

0.3%

25

0.6%

20

0.4%

0.3%

18

0.4%

16

0.4%

15

0.3%

17

0.4%

16

0.3%

19

0.3%

16

0.3%

15

0.3%

18

0.3%

16

0.4%

17

0.3%

0.5%

24

0.4%

22

0.5%

17

0.4%

25

0.5%

20

0.4%

24

0.5%

47

0.9%

46

0.8%

35

0.7%

28

0.6%

49

0.9%

32

0.7%

44

0.9%

2.4%

119

2.3%

119

2.1%

77

1.6%

50

1.1%

123

2.3%

64

1.4%

106

2.1%

258

5.0%

241

4.6%

210

3.6%

116

2.5%

81

1.9%

241

4.6%

99

2.2%

200

4.0%

6.1%

311

6.0%

298

5.7%

287

5.0%

212

4.5%

131

3.0%

301

5.7%

172

3.8%

264

5.2%

372

7.4%

370

7.1%

369

7.0%

354

6.1%

321

6.8%

212

4.9%

361

6.9%

267

5.9%

334

6.6%

7.7%

391

7.8%

408

7.9%

394

7.5%

404

7.0%

405

8.6%

300

6.9%

396

7.5%

353

7.8%

384

7.6%

385

7.7%

355

7.0%

370

7.1%

369

7.0%

407

7.0%

423

9.0%

374

8.6%

377

7.2%

399

8.8%

383

7.6%

11-12

384

7.7%

363

7.2%

368

7.1%

374

7.1%

416

7.2%

419

8.9%

392

9.0%

381

7.3%

406

8.9%

388

7.7%

12-13

383

7.7%

362

7.2%

366

7.1%

370

7.0%

424

7.3%

383

8.2%

388

8.9%

381

7.3%

386

8.5%

382

7.6%

13-14

380

7.6%

363

7.2%

373

7.2%

385

7.3%

430

7.4%

380

8.1%

399

9.1%

386

7.3%

390

8.6%

387

7.7%

14-15

382

7.6%

379

7.5%

382

7.4%

404

7.7%

459

7.9%

364

7.8%

406

9.3%

401

7.6%

385

8.5%

397

7.9%

15-16

373

7.5%

384

7.6%

399

7.7%

408

7.7%

469

8.1%

334

7.1%

394

9.0%

407

7.7%

364

8.0%

394

7.8%

16-17

381

7.6%

399

7.9%

410

7.9%

426

8.1%

478

8.3%

316

6.7%

354

8.1%

419

8.0%

335

7.4%

395

7.8%

17-18

306

6.1%

322

6.4%

327

6.3%

350

6.6%

423

7.3%

268

5.7%

289

6.6%

346

6.6%

279

6.1%

326

6.5%

18-19

179

3.6%

194

3.8%

203

3.9%

221

4.2%

289

5.0%

170

3.6%

179

4.1%

217

4.1%

175

3.9%

205

4.1%

19-20

106

2.1%

111

2.2%

120

2.3%

130

2.5%

163

2.8%

104

2.2%

115

2.6%

126

2.4%

110

2.4%

121

2.4%

20-21

81

1.6%

91

1.8%

92

1.8%

103

2.0%

114

2.0%

87

1.9%

86

2.0%

96

1.8%

87

1.9%

93

1.8%

21-22

60

1.2%

70

1.4%

74

1.4%

83

1.6%

90

1.6%

82

1.7%

57

1.3%

75

1.4%

70

1.5%

74

1.5%

22-23

42

0.8%

52

1.0%

53

1.0%

59

1.1%

72

1.2%

66

1.4%

37

0.8%

56

1.1%

52

1.1%

54

1.1%

23-24

28

0.6%

38

0.8%

39

0.8%

40

0.8%

55

0.9%

46

1.0%

26

0.6%

40

0.8%

36

0.8%

39

0.8%

Hour

Monday

Tuesday

Thursday

Friday

00-01

17

0.3%

12

0.2%

21

01-02

13

0.3%

13

0.3%

17

0.4%

20

0.4%

22

0.3%

15

0.3%

17

02-03

16

0.3%

18

0.4%

18

0.3%

17

0.3%

03-04

25

0.5%

26

0.5%

27

0.5%

25

04-05

52

1.0%

50

1.0%

50

1.0%

05-06

131

2.6%

122

2.4%

125

06-07

248

5.0%

247

4.9%

07-08

299

6.0%

308

08-09

340

6.8%

09-10

383

10-11

Peaks

Hour End & Count

Wednesday

Hour End & Count

Hour End & Count

Hour End & Count

Hour End & Count

Hour End & Count

Hour End & Count

Hour End & Count

Average
Weekend Day

Hour End & Count

Average
Day

Hour End & Count

AM

10:15

388

09:45

391

10:00

408

09:45

394

12:00

417

11:30

429

11:45

395

10:00

396

11:30

410

11:45

386

PM

16:30

392

16:30

407

16:15

420

16:30

434

16:30

482

13:15

384

15:15

411

16:30

426

13:30

391

16:30

405

12-Hour

4,175

83.6%

4,192

83.1%

4,287

82.7%

4,368

82.9%

4,840

83.6%

3,995

85.2%

3,818

87.3%

4,373

83.2%

3,911

86.2%

4,239

84.0%

16-Hour

4,670

93.5%

4,711

93.4%

4,831

93.2%

4,925

93.5%

5,417

93.5%

4,384

93.5%

4,157

95.1%

4,911

93.5%

4,277

94.2%

4,727

93.7%

18-Hour

4,740

94.9%

4,801

95.2%

4,923

95.0%

5,024

95.4%

5,544

95.7%

4,496

95.9%

4,220

96.5%

5,007

95.3%

4,365

96.2%

4,820

95.5%

24-Hour

4,994 100.0%

Avg Week Day

95.0%

5,042 100.0%

5,181 100.0%

5,267 100.0%

5,791 100.0%

95.9%

98.6%

100.2%

110.2%

Avg Weekend Day
Avg Day

98.9%

99.9%

102.7%

104.4%

114.7%

4,688 100.0%

4,371 100.0%

5,255 100.0%

4,539 100.0%

5,047 100.0%

100.0%

86.4%

96.0%

103.3%

96.3%

115.8%

100.0%

111.2%

92.9%

86.6%

104.1%

89.9%

100.0%

TARS

Traffic Analysis and Reporting System

Report Notes for Weekly Volume Report
14-Feb-2017 13:17

Page 1 of 2 (4 of 5)

Weekly Volume Report

Road Section

Displays traffic volumes for a week or number of weeks at Stream level or combinations of Streams, for the hour of day for every week in the date range that data has been collected.

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.

Content includes:

- Volume data at Stream level, for every hour of the day for every week in 60 minute intervals.
- When more than one week is selected the report averages data across the selected date range.
- Average traffic flow per hour of the day across the date range.
- Data is displayed by 1, 12, 16, 18 and 24 hour time frames.
- AM and PM peak times are highlighted.

Site

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

The report can be run for specific Traffic Classes.

Stream or Site Stream

Important Information

The lane number in which the vehicles are travelling.

The figures in this report are an Average Daily Traffic (ADT) for the date range chosen and not an Annual Average Daily Traffic (AADT).

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.

TB

TG

TA

T1, T3, T5, T7...

T2, T4, T6, T8...

Traffic flow in both directions

Traffic flow in gazettal direction

Traffic flow against gazettal direction

Traffic flow in gazettal direction at lane level

Traffic flow against gazettal direction at lane level

Thru Dist or TDist

Average Daily Traffic (ADT)

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

Is determined by summing the total traffic flow, at Stream level, for the days within a date range, divided by the number of days collected. Missing days or incomplete days are excluded from the calculation.

Type

Calendar Events

Is an event that has a temporary effect on the traffic volumes at one or more sites in the Region.

For example:

Averages derived for such days will generally be different from the usual averages.

Date Range

The period for which the report was run.

Days in Range

Are the number of days for each day of the week across the date range selected.

Days Included

Days that do not have a value for every time interval or are incomplete are excluded from the calculations in this report. ie. when the data collected at lane/Stream level has missing values, those days are not included.

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.

Traffic flowing in Gazettal Direction

Traffic flowing against Gazettal Direction

The combined traffic flow in both Directions

No Data Found

Indicates that there is no data for the week or the data for each day of the week is incomplete. A report will only be produced when there is a record for each time interval of the day.

Time Periods

Four different time periods are defined.

12-hour

16-hour

18-hour

24-hour

Traffic flow time period from 0700 to 1900

Traffic flow time period from 0600 to 2200

Traffic flow time period from 0600 to 2400

Traffic flow time period from 0000 to 2400

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 of All Vehicles

00 = 0A + 0B

Light Vehicles

0A = 1A

1A = 2A + 2B

Heavy Vehicles

0B

1B

1C

1D

= 1B + 1C + 1D

= 2C + 2D + 2E

= 2F + 2G + 2H + 2I

= 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

Region

For administration purposes from 1 February 2015 the
Department of Transport and Main Roads has divided
Queensland into 12 Districts. The Region field in
TSDM reports displays the District Name and Number.

Central West District

Darling Downs District

Far North District

Fitzroy District

Mackay/Whitsunday District

Metropolitan District

North Coast District

North West District

Northern District

South Coast District

South West District

Wide Bay/Burnett District

Peak Hours

The time displayed for the AM and PM peak traffic flow is for the
previous hour. For example: AM 08:30 1227 Indicates the
morning peak of 1227 vehicles was between 7:30am and 8:30am.

- Public holidays
- Local shows
- Natural disasters
- Long term road closures

G

A

B

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.

401
402
403
404
405
406
407
409
408
410
411
412

4-Bin

1A
1B
1C
1D

Short vehicles

Truck or bus

Articulated vehicles

Road train

Traffic Analysis and Reporting System

Report Notes for Weekly Volume Report

14-Feb-2017 13:17

12-Bin

2A

2B

2C

2D

2E

2F

2G

2H

2I

2J

2K

2L

Short 2 axle vehicles

Short vehicles towing

2 axle truck or bus

3 axle truck or bus

4 axle truck

3 axle articulated vehicle

4 axle articulated vehicle

5 axle articulated vehicle

6 axle articulated vehicle

B double

Double road train

Triple road train

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TARS

Page 2 of 2 (5 of 5)

APPENDIX B
Burdekin Shire Council Traffic Survey Data

Traffic Report
Upper Haughton Road
Survey Location

1100m South of intersection with Bruce Highway

Survey Start to Finish

Wednesday, 20 September 2006 to Thursday, 30 November 2006

Duration

71 Days

Posted Speed Limit

100 km/h

Date of Report

Friday, 17 February 2017

Responsible Officer
N/A

AADT
Request
Reason for Survey

General

Notes

Legend
Traffic Counter

UPPER HAUGHT
1100m South of intersection with Bruce
Highway

Site Map

1

Summary
Volume Summary
Total
ADT

South
14517
204

North
15965
225

Total
30482
429

Peak Summary
Morning Peak Hour
Afternoon Peak Hour

South
13 (07:00)
14 (15:00)

North
17 (08:00)
18 (15:00)

Both Directions
30 (08:00)
33 (15:00)

Speed Summary
85th Percentile
Minimum Speed
Maximum Speed
Mean Speed
Standard Deviation
Variance
Mean Exceeding
Number of Vehicles Speeding
Percentage Speeding
Peak Speeding Hour
15 km/h Pace
Number of Vehicles in Pace

South
North
76.0 km/h
90.7 km/h
10.2 km/h
11.5 km/h
163.0 km/h
199.8 km/h
59.2 km/h
75.2 km/h
15.9
17.2
251.4
297.3
59.2 km/h
75.2 km/h
14517

15965
100.0%
100.0%
15 (15:00)
19 (15:00)
59 - 74
66 - 81
4741 (32.7 %)
6192 (38.8 %)
See Figure 1, Page 3 for Speed Histogram

Both Directions

85.0 km/h
10.2 km/h
199.8 km/h
67.6 km/h
18.4
338.9
67.6 km/h
30482
100.0%
34 (15:00)
63 - 78
10546 (34.6 %)

Classification Summary

South

North

Total

Total (%)

Short Vehicle (Class 1)
Short Vehicle Towing (Class 2)
Two Axle Truck (Class 3)
Three Axle Truck (Class 4)
Four Axle Truck (Class 5)
Three Axle Articulated Vehicle (Class 6)
Four Axle Articulated Vehicle (Class 7)
Five Axle Articulated Vehicle (Class 8)
Six Axle Articulated Vehicle (Class 9)
B Double (Class 10)
Double Road Train (Class 11)
Triple Road Train (Class 12)

10057
285
651
274
520
76
92
1176
719
654
12
1

11429
226
1711

265
392
90
99
789
527
428
9
0

21486
511
2362
539
912
166
191
1965
1246
1082
21
1

70.5 %
1.7 %
7.7 %
1.8 %
3.0 %
0.5 %
0.6 %
6.4 %
4.1 %
3.5 %
0.1 %
0.0 %

Speed Histogram

289 (Metric) Site:UPPER HAUGHT.0.0S

Description: BARRATTA

Filter time: 0:00 Wednesday, 20 September 2006 => 0:00 Thursday, 30 November 2006

Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,200) Headway(>0) Span(0 - 100)

Scheme: Vehicle classification (AustRoads94)

Figure 1 Speed Histogram

768

691

614

384

+Pace15=78

460

-Pace15=63

307

230

153

76

85%=85

Number of Vehicles(1 km/h)

537

0

0

20

40

60

80

100

Speed (km/h)

3

120

140

160

180

200

Traffic Report
Upper Haughton Rd
Survey Location

3700m south of intersection with Bruce Highway

Survey Start to Finish

Thursday, 19 May 2016 to Wednesday, 1 June 2016

Duration

13 Days

Posted Speed Limit

100 km/h

Date of Report

Friday, 17 February 2017

Responsible Officer

SJL

AADT

N/A

Request

CrTrfCnt16/0022

Reason for Survey

General

Notes

Legend
Traffic Counter

Upper Haughton Rd
3700m south of intersection with Bruce
Highway

Site Map

1

Summary
Volume Summary
Total
ADT

South
1947
150

North
2031
156

Total
3978
306

Peak Summary
Morning Peak Hour
Afternoon Peak Hour

South
11 (07:00)
13 (16:00)

North
15 (08:00)
13 (15:00)

Both Directions
25 (08:00)
26 (16:00)

Speed Summary
85th Percentile
Minimum Speed
Maximum Speed
Mean Speed
Standard Deviation
Variance
Mean Exceeding
Number of Vehicles Speeding
Percentage Speeding
Peak Speeding Hour
15 km/h Pace
Number of Vehicles in Pace

South
North
100.4 km/h
101.2 km/h
11.1 km/h
11.0 km/h
135.5 km/h
132.4 km/h
88.0 km/h
86.5 km/h
14.8
15.9
220.2
252.9
106.1 km/h
105.8 km/h
325

361
16.7%
17.8%
3 (16:00)
3 (08:00)
86 - 101
84 - 99
959 (49.3 %)
882 (43.4 %)
See Figure 1, Page 3 for Speed Histogram

Both Directions

100.8 km/h
11.0 km/h
135.5 km/h
87.2 km/h
15.4
237.4
106.0 km/h
686
17.2%
5 (15:00)
86 - 101
1839 (46.2 %)

Classification Summary

South

North

Total

Total (%)

Short Vehicle (Class 1)
Short Vehicle Towing (Class 2)
Two Axle Truck (Class 3)
Three Axle Truck (Class 4)
Four Axle Truck (Class 5)
Three Axle Articulated Vehicle (Class 6)
Four Axle Articulated Vehicle (Class 7)
Five Axle Articulated Vehicle (Class 8)
Six Axle Articulated Vehicle (Class 9)
B Double (Class 10)
Double Road Train (Class 11)
Triple Road Train (Class 12)

1381
51
183
91
9
2
16
17
113
83
1
0

1313
49
335

89
17
6
9
2
128
80
3
0

2694
100
518
180
26
8
25
19
241
163
4
0

67.7 %
2.5 %
13.0 %
4.5 %
0.7 %
0.2 %
0.6 %
0.5 %
6.1 %
4.1 %
0.1 %
0.0 %

2

Speed Histogram

287 (Metric) Site:Upper Haughton Rd.2.0S

Description: 3700m south of int with Bruce Highway <100 km/h>

Filter time: 0:00 Thursday, 19 May 2016 => 0:00 Wednesday, 1 June 2016

Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,200) Headway(>0) Span(0 - 100)

Scheme: Vehicle classification (AustRoads94)

Figure 1 Speed Histogram

Posted speed limit=100

135

121

108

+Pace15=101

81

-Pace15=86

67

54

40

27

13

85%=101

Number of Vehicles(1 km/h)

94

0

0

20

40

60

80

100

Speed (km/h)

3

120

140

160

180

Traffic Report
Upper Haughton Road
Survey Location

7100m from intersection with Bruce Highway

Survey Start to Finish

Thursday, 19 May 2016 to Wednesday, 1 June 2016

Duration

13 Days

Posted Speed Limit

100 km/h

Date of Report

Friday, 17 February 2017

Responsible Officer

SJL

AADT

N/A

Request

CrTrfCnt16/0022

Reason for Survey

General

Notes

Legend

Upper Haughton Road
7100m from intersection with Bruce Highway
Traffic Counter

Site Map

1

Summary
Volume Summary
Total
ADT

South
1826
140

North
1928
148

Total
3754
289

Peak Summary
Morning Peak Hour
Afternoon Peak Hour

South
10 (07:00)
11 (16:00)

North
13 (10:00)
12 (14:00)

Both Directions
22 (07:00)
23 (16:00)

Speed Summary
85th Percentile
Minimum Speed
Maximum Speed
Mean Speed
Standard Deviation
Variance
Mean Exceeding
Number of Vehicles Speeding
Percentage Speeding
Peak Speeding Hour
15 km/h Pace
Number of Vehicles in Pace

South
North
107.3 km/h
104.4 km/h
18.9 km/h
13.5 km/h
140.9 km/h
130.0 km/h
92.8 km/h
88.1 km/h
17.5
18.2
307.6
330.3
107.7 km/h
106.6 km/h
684

510
37.5%
26.5%
6 (16:00)
4 (10:00)
91 - 106
90 - 105
869 (47.6 %)
825 (42.8 %)
See Figure 1, Page 3 for Speed Histogram

Both Directions

105.8 km/h
13.5 km/h
140.9 km/h
90.4 km/h
18.0
324.8
107.2 km/h
1194
31.8%
9 (16:00)
91 - 106
1688 (45.0 %)

Classification Summary

South

North

Total

Total (%)

Short Vehicle (Class 1)
Short Vehicle Towing (Class 2)
Two Axle Truck (Class 3)
Three Axle Truck (Class 4)
Four Axle Truck (Class 5)
Three Axle Articulated Vehicle (Class 6)
Four Axle Articulated Vehicle (Class 7)
Five Axle Articulated Vehicle (Class 8)
Six Axle Articulated Vehicle (Class 9)
B Double (Class 10)
Double Road Train (Class 11)
Triple Road Train (Class 12)

1185
46
318
85
5
7
16
13
92
57
2
0

1385
49
214

82
16
8
7
3
107
52
4
1

2570
95
532
167
21
15
23
16
199
109
6
1

68.5 %
2.5 %
14.2 %
4.4 %
0.6 %
0.4 %
0.6 %
0.4 %
5.3 %
2.9 %
0.2 %
0.0 %

Speed Histogram

285 (Metric) Site:Upper Haughton Road.2.0S

Description: 7100m from intersection with Bruce Highway <100kmh>

Filter time: 0:00 Thursday, 19 May 2016 => 0:00 Wednesday, 1 June 2016

Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,200) Headway(>0) Span(0 - 100)

Scheme: Vehicle classification (AustRoads94)

Figure 1 Speed Histogram

Posted speed limit=100

138

124

110

+Pace15=106

82

-Pace15=91

69

55

41

27

13

85%=106

Number of Vehicles(1 km/h)

96

0

0

20

40

60

80

100

Speed (km/h)

3

120

140

160

180

APPENDIX C
Site Layout Plan – Prepared by RCR O'Donnell
Griffin Pty Ltd

N

PRELIMINARY - Not For Construction
RCR-O'Donnell Griffin Pty Ltd
Level 39
50 Bridge Street
Sydney, NSW, 2000
Tel: +61 2 8413 3000

Pacific Blue
Response to Department of Planning and Environment
Gateway Conditions – Traffic and Transport Consideration

1 May 2024
SLR Project No.: 640.031109
SLR Ref No.: 640.031109-M01-v3.0-BESS Traffic
Advice-20240501.docx

Appendix C
Site Locations and Haughton BESS Site Layout

500000

502000

504000

506000

508000

510000

7820000

Black R
d

Townsville

512000

Ayr

7820000

498000

Keith Venables Rd

496000

7818000

ha

m

Rd

7812000

7812000

7814000

ck

7814000

St
o

7816000

7816000

7818000

Haughton Solar

0

500

1,000
m
496000

498000

500000

502000

Haughton 1 Solar Farm (Operating)
Haughton 2 Solar Farm (Development)

FOR EXTERNAL DISTRIBUTION

504000

506000

508000

510000

CREATED

M.Yee

PROJECT

CLEARED

TITLE

APPROVED

SCALE

D.Tolliday

M Stellato

DRAWING NO

512000

Haughton Solar Farms, Australia
Site Locations
1:70,000

COORDINATE SYSTEM

A4 MGA94 (55S)

AU-3012-ENG-PHA-GN-MAP-00006

DATE

29/03/23

REV

A

10
5
2, 18

5

3, 39

3, 49

13, 42

5

2, 54

7, 9

10
3, 2

5

3, 09

37, 59

10

5

37, 59

12

CONTROL/

AMENITIES

BUILDING

WT

5

, 8
7

Fan
1
Fan

Fan

2

10

Fan
Fan

3
9

4

Fan

Fan

8

5

Fan

Fan

7

10

Fan

5

C

6

z

c2

bar

b2

EB2

EB2

B

Earthing

EB2

EB1

a2

EB1

EB1

NB

c1

b1

a1

A

N

37.184

Fan

1

2

Fan

Fan
10

Fan
3

Fan
9

Fan
4

Fan
8

Fan
5

Fan
7

C
Fan
6

Z
Earthing
EB2

B

c2

bar
EB2

b2

EB2
EB1

a2

EB1
NB

EB1

c1
b1
a1

A
N
36.824

N

EB

EB

M

Fan
1

2

Fan

Fan
10

3

Fan

Fan
9

4

Fan

Fan

8

5

Fan

Fan

7

C
Fan
36.691

6

c2

e

b2

EB2
EB1
EB1

Gat

EB2

a2

EB2

B

bar

37.231

Z
Earthing

EB1
NB

Gat

e

37.231

36.658

35.555

c1
a1

36.653

b1

A
36.157

36.705

N

5

36.573

36.909

35.554

36.924

36.936

2.2m

35.823

ce
en
hF
Hig

35.541

35.399

36.738

37.005

A
B
35.383
35.814

C

n

a

bc

36.705

35.655

35.970

36.906

35.729

35.380

35.630

36.641

10

35.770

36.651

36.632

35.693

35.634

35.689

35.539

36.679

35.616

35.446

10

35.482

10

35.377

35.404

13,82

3,89

5

547,7

5

44,83

C ABN 47 065 475 149

LEVEL 6, 480 ST PAULS TERRACE
FORTITUDE VALLEY QLD 4006

SMEC PROJECT No 30032699

