Regulatory Investment Test for Distribution

Draft Project Assessment Report (DPAR)

South West Toowoomba Reinforcement

12 October 2018

Executive Summary

Ergon Energy Corporation Limited (Ergon Energy) is responsible (under its Distribution Authority) for electricity supply to the Toowoomba Region in Southern Queensland.

The South Western edge of Toowoomba is experiencing strong population and load growth in the communities of Westbrook, Drayton, Wyreema, Cambooya and Vale View. The existing Westbrook and Eiser St feeders predominantly supply these areas.

The Eiser St Feeder which extends from South Toowoomba 110/33/11kV Zone Substation, is heavily loaded and has voltage issues emerging towards the extremities of the feeder. Eiser St Feeder supplies approximately 2730 customers and during high load periods is approaching its rating. There is also a lack of transfer capacity which impacts the ability to operationally manage loads during contingency scenarios. Eiser St Feeder's reliability performance has historically been challenging given the long radial nature of this feeder comprised of approximately 80km of line length. On average over the last three years there has been approximately 300 000 customer minutes lost each year.

Westbrook Feeder extends from Torrington 110/33/11kV Zone Substation and predominately supplies approximately 1630 customers in the immediate Westbrook area. Westbrook Feeder is also heavily loaded and strong growth in the area is predicted with 2 applications totalling 700kVA being connected before the end of 2018, and an additional 1500 lot development planned which is expected to drive further block load type connections. Given Toowoomba is geologically constrained due to the Eastern boundary of Toowoomba range, the Toowoomba Regional Council sees the Western area of Toowoomba including Westbrook as key areas for development to meet future population growth.

In order to address these constraints Ergon Energy has proposed to develop a new feeder from Kearney Springs 110/11kV Zone Substation. As part of this feeder development, significant aged assets approaching end of life will be replaced. This includes approximately 5 km of line where the majority of poles have an age profile of approximately 60 years. By incorporating this replacement into a single project Ergon gains not only construction efficiencies, but also the required extra capacity to meet the load growth occurring in this area.

It is noted that whilst the estimated project value does not exceed the Regulatory Investment Test for Distribution (RIT-D) financial threshold of $5 Million, Ergon Energy is focussed on ensuring investments are both prudent and efficient, irrespective of this threshold. **Ergon Energy published a Non-Network Options Report relating to the above described network constraints on 4th May 2018. No submissions were received by the closing date of 4th August 2018. Ergon Energy's preferred solution as detailed in the Non-Network Options Report is to construct a new feeder from Kearney Springs Substation.**

For further information and inquiries please refer to the "Regulatory Investment Test for Distribution (RIT-D) Partner Portal".
https://www.ergon.com.au/network/network-management/

Table of Contents

List of Figures and Tables

1. Introduction

This Draft Project Assessment Report has been prepared by Ergon Energy in accordance with the requirements of clause 5.17.4(i) of the National Electricity Rules (NER).

This report represents the second stage of the consultation process in relation to the application of the Regulatory Investment Test for Distribution (RIT-D) on potential credible options to address the identified need in the distribution network that supplies the SW area of Toowoomba.

On 4th May 2018, Ergon Energy published the first stage of the RIT-D, which was the release of the Non-Network Options Report. This report sought information from Registered Participants and Interested Parties regarding alternative potential credible options, or variants to the potential credible options presented in that report. In response to the Non-Network Options Report, Ergon Energy received no submissions.

This report:

- Provides background information on the network capability limitations of the distribution network supplying the South West Area of Toowoomba
- Identifies the need which Ergon Energy is seeking to address, together with the assumptions used in identifying and quantifying that need.
- Summarises and provides commentary that no submission(s) were received on the Non-Network Options Report.
- Describes the credible and preferred option that is considered in this RIT-D assessment.
- Quantify costs and classes of material market benefits of the credible option.
- Describes the methods used in quantifying each class of market benefit where relevant.
- Provides details of classes of market benefits that are not considered material to this RIT-D assessment, and provides explanations to why these classes of market benefits are not considered material.
- Provides the results of Net Present Value (NPV) analysis of the credible option and accompanying explanatory statements regarding the results.
- Identifies the proposed preferred option, including detailed characteristics, estimated commissioning date, indicative costs, and noting that it satisfies the RIT-D.
- Provides contact details for queries on this RIT-D.

In preparing this RIT-D, Ergon Energy is required to consider reasonable future scenarios. With respect to possible future loads and development, Ergon Energy has, in good faith, included as much detail as possible while maintaining necessary customer confidentiality. At the time of writing, Ergon Energy considers the most probable future scenario is there will be significant future development in the Westbrook and South West Toowoomba area. This is supported by Toowoomba Regional Council planning studies and known planned developments. It is noted that customer activity can occur over the consultation period and may change the timing and/or scope of any proposed solutions.

Submissions in writing (electronic preferably) are due by **26 November 2018** and should be lodged to Ergon Energy's "Regulatory Investment Test for Distribution (RIT-D) Partner Portal". Ergon Energy is not obliged to consider submissions after this date. The portal is available at:

https://www.ergon.com.au/network/network-management/network-infrastructure/regulatory-test-consultations

For further information and inquiries please refer to the “Regulatory Investment Test for Distribution (RIT-D) Partner Portal” or contact Russell Christ (07) 4121 9557.

2. Background

Ergon Energy's network in the South West area of Toowoomba is constrained due to strong population and commercial growth in recent years. The primary constraints are due to resultant heavy load on Eiser St Feeder from South Toowoomba 110/33/11kV Zone Substation and Westbrook Feeder from Torrington 110/33/11kV Zone Substation. The combined load on these two feeders has peaked at close to 12MVA concurrently, and certainly during high load periods if supply is lost on one feeder there are insufficient supply restoration options. Peak load details of these feeders can be found in "Appendix A: Feeder Loading Details" of this report.

Over recent years approximately 200 new customers (combined) are being added to Eiser St and Westbrook feeders on an annual basis and this is projected to continue. Assuming a quite conservative After Diversity Maximum Demand (ADMA) of 2kVA per customer (4kVA is normally used when assessing new connections) it is estimated that load growth across these feeders will continue at a minimum of 400kVA per year. Additionally approximately 700kVA of commercial load is in the process of being connected to Westbrook Feeder. In order to manage the existing load and anticipated growth for the next 2-5 years, Ergon Energy has determined that approximately an additional 6MVA of capacity needs to be supplied into this area. This capacity is also expected to be available to ensure suitable reliability, provide backup capacity during contingencies as well as addressing emerging voltage constraints. To achieve this capacity Ergon Energy is looking to extend a new feeder into the area from Kearney Springs Zone Substation. As part of developing this feeder approximately 5km of aged poles and conductor will also be replaced. This solution will also help to ensure suitable reliability to the approximately 4300 customers connected to these feeders, by removing aged asset risk and providing additional capacity during contingency situations.

As detailed in "Appendix B: Westbrook Area Planning and Development Details" of this report significant growth is expected particularly in the Westbrook area. The specific timing and magnitude of this growth is somewhat uncertain, however it is expected that any solution will be able to meet supply requirements at least for the initial stages of development in this area.

The following diagram (Figure 1) provides an overview of the distribution network in the south west Toowoomba region.

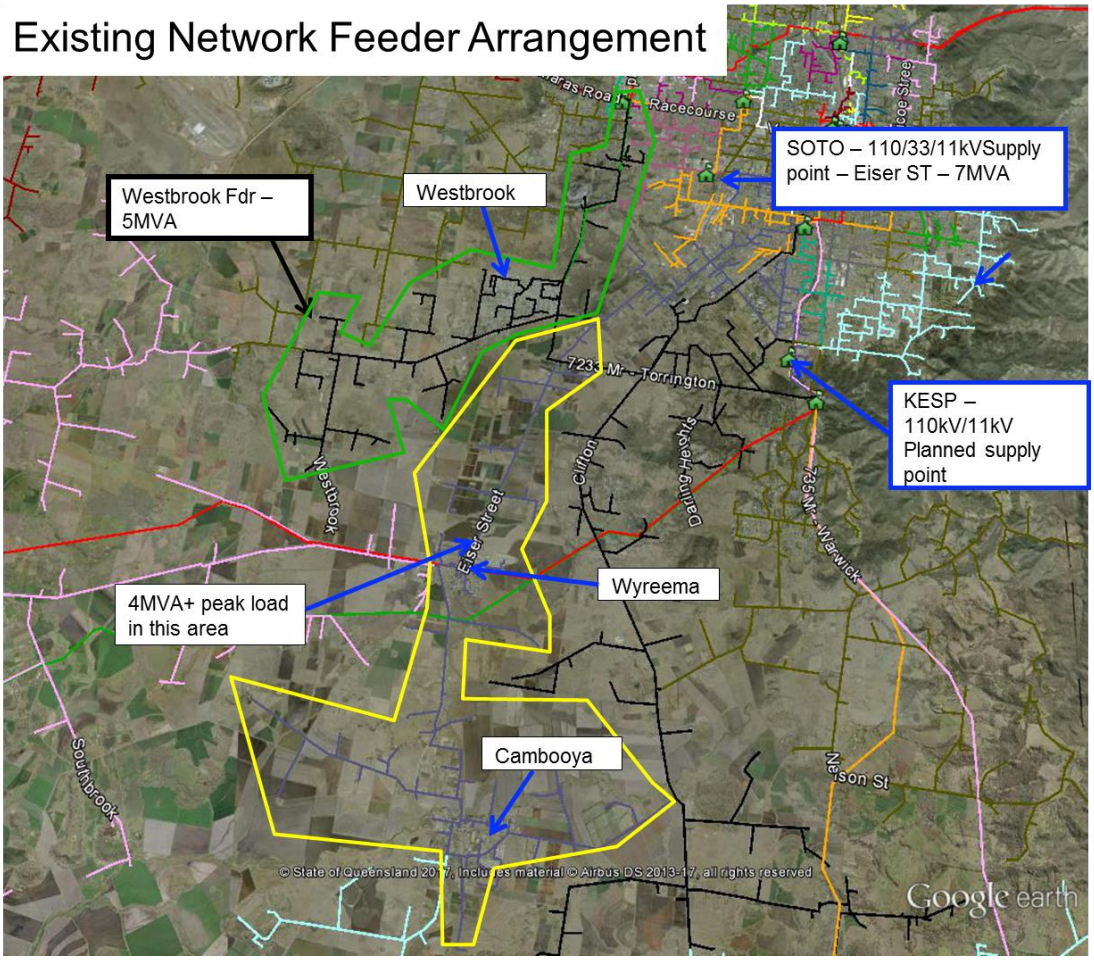


Figure 1 – Existing Network highlighting Eiser St and Westbrook Feeders

3. Key Assumptions in Relation to the Identified Need

Below is a summary of key assumptions that have been made when the identified need has been analysed and quantified.

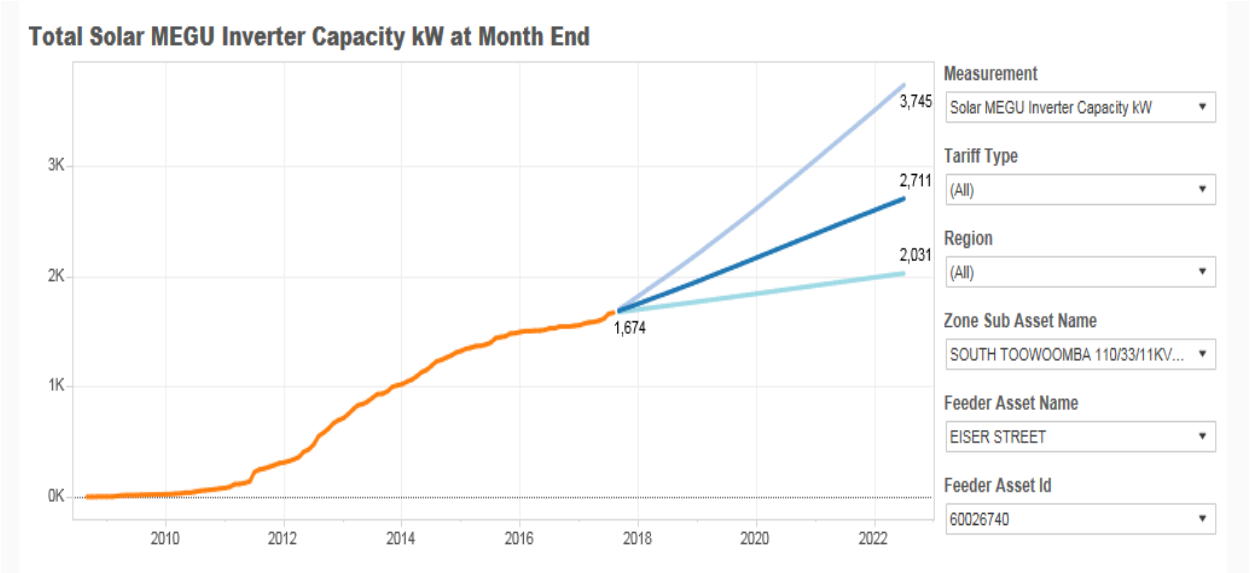
It is recognised that the below assumptions may prove to have various levels of correctness, and they merely represent a 'best endeavours' approach to predict the future identified need.

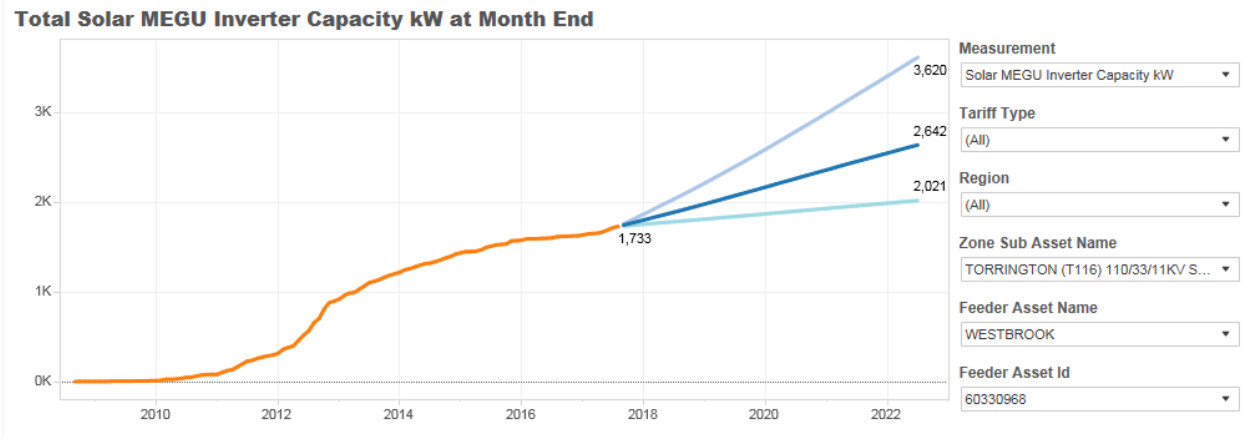
3.1. Forecast Load Requirement and Growth

To meet Ergon Energy's ongoing operational needs it is expected that any solution must deliver at least 4MVA of additional capacity or load reduction by November 2019 and address constraints on both Eiser St and Westbrook Feeders. It is expected that any solution will need to be scalable such that it can be increased to 6MVA as the need arises. The timing for this increase is dependent on load growth which at times can be unpredictable. At this point however based on approximately 200 customers being connected across Eiser and Westbrook feeders (combined) per annum, it is likely that the full 6MVA of capacity will be needed in 2-5 years. Please note that unforeseen commercial or industrial customer load may drive this full 6MVA capacity being required in a much shorter timeframe.

3.2. Forecast Load Degradation

Unrestricted growth in Micro Embedded Generation Units (MEGU), such as residential Photovoltaics (PV), within the substation distribution areas may lead to an erosion of network demand during the day. It is noted however that the peak demand applicable to this network occurs during the evening and will not be impacted by increases in Photovoltaic System growth. Approximate MEGU forecast values are detailed in the following figures.





3.3. Aged Asset Details

It has been identified that approximately 5km of aged poles and conductor needs to be replaced.

3.4. Reliability Requirements

In terms of reliability it is expected that any solution will be of “utility grade” such that:

1. During unplanned network outages it will be available and can be relied upon to improve restoration times to Ergon Energy customers.
2. It will provide the flexibility to assist with Ergon Energy planned works on the network if and when needed.

3.5. Harmonics

The solution must not cause harmonic problems on Ergon Energy’s network. It is expected that the alternative solution will meet the automatic access standard detail in S5.3.8 of the National Electricity Rules. Harmonic voltages must not exceed the levels determined in accordance with AS/NZS 61000.3.6.2001.

3.6. Audio Frequency Load Control

The solution and associated equipment must not cause attenuation or excessive magnification of the Audio Frequency Load Control signal. Studies may need to be completed to ensure no problems are introduced.

3.7. Voltage Fluctuations

Under normal operation of the alternative solution, voltage fluctuations must not exceed limits of the Threshold of Perceptibility as defined in AS 2279.

4. Credible Options Included in this RIT-D

Ergon Energy has not received any submissions as a result of the publication of the Non-Network Options Report. Based on this, Ergon Energy does not believe there are credible Non-Network Options to address the identified need. Ergon Energy's Channels partnership team have previously investigated demand management options in the area, and given the predominant residential nature of supply, found that there were no cost effective opportunities at this level. Based on Ergon Energy's own high level internal assessment, Ergon Energy also does not believe that there are any credible Non Network Options to address the identified need. Given this the only credible option identified in this report is the proposed internal option which is detailed in the following section.

5. Proposed Preferred Option

The proposed preferred option is to develop a new feeder out of Kearney Springs Zone Substation as detailed in Figure 2. and in Appendix C: Propose New Feeder Works. It is proposed that this new feeder would need to be built by approximately November 2019. Please note this proposed internal option also addresses some existing aged asset challenges. It is recognised that it may be difficult for an alternative solution to also address these aged asset issues.

Internal option	Develop a new feeder out of Kearney Springs Substation
Estimated Augmentation Component cost	$3,069,282.49
Estimated Repex/Refubishment Component cost	$1,635,690.61
Total value	$4,704,974

Table 1 – Ergon Energy's Internal Cost for the Preferred Option

It is noted that whilst the estimated project value does not exceed the RIT-D financial threshold of $5 Million, Ergon Energy is focussed on ensuring that investments are both prudent and efficient, irrespective of this threshold. Based on this approach Ergon Energy is seeking market responses to resolve these network constraints.

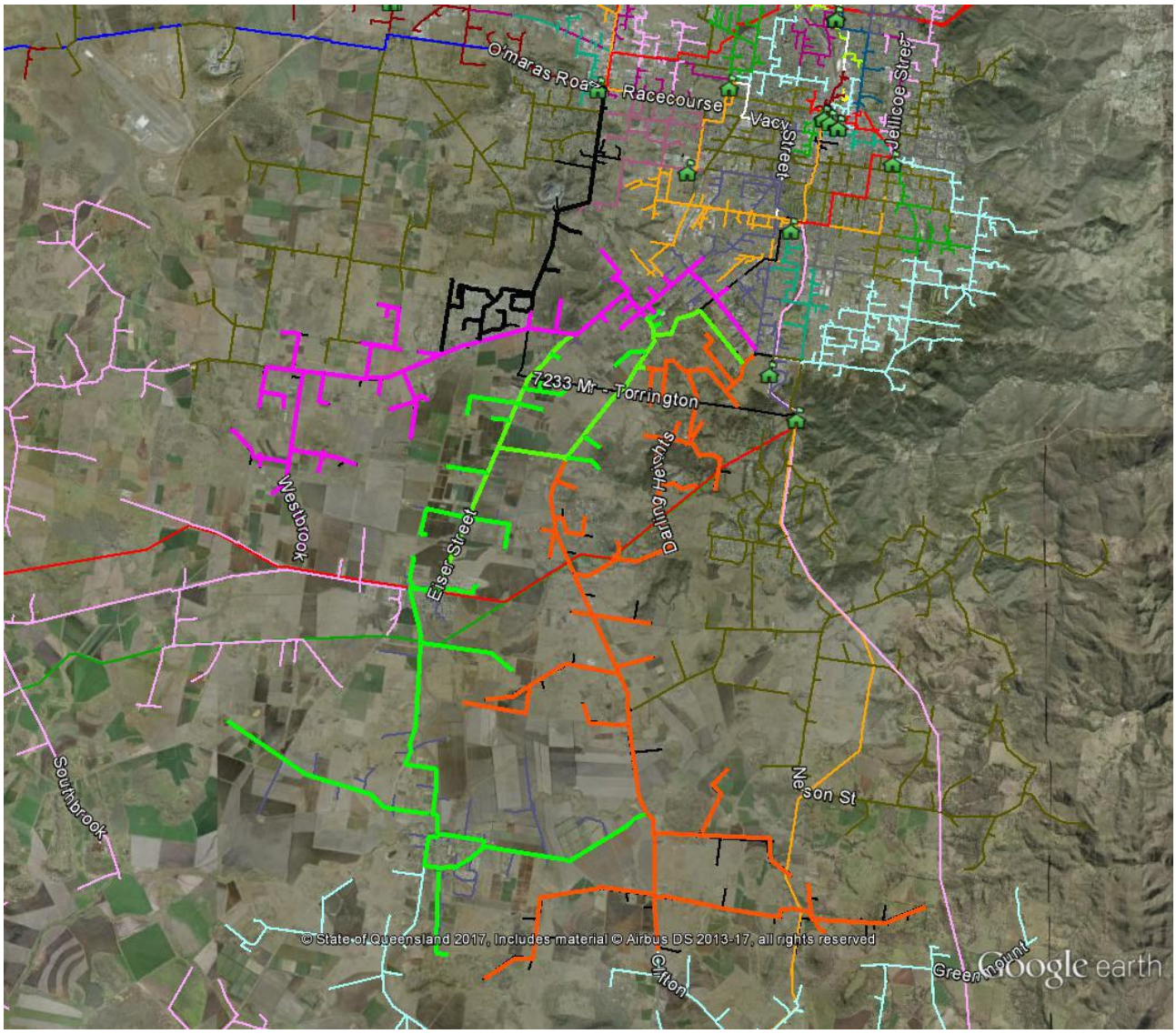


Figure 2 - Proposed Internal Option – New feeder (green) out of Kearney Springs Zone Substation

6. Submission and Next Steps

6.1. Submissions from Solution Providers

Ergon Energy invites written submissions on this report from registered participants and interested parties.

Ergon Energy will not be legally bound in any way or otherwise obligated to any person who may receive this RIT-D report or to any person who may submit a proposal. At no time will Ergon Energy be liable for any costs incurred by a proponent in the assessment of this RIT-D report, any site visits, obtainment of further information from Ergon Energy or the preparation by a proponent of a proposal to address the identified need specified in this RIT-D report.

All submissions and queries should be lodged to Ergon Energy's "Regulatory Investment Test for Distribution (RIT-D) Partner Portal". Submissions in writing are due by **26 November 2018**. Ergon Energy is not obliged to consider submissions after this date without prior agreement. The portal is available at:

https://www.ergon.com.au/network/network-management/network-infrastructure/regulatory-test-consultations .

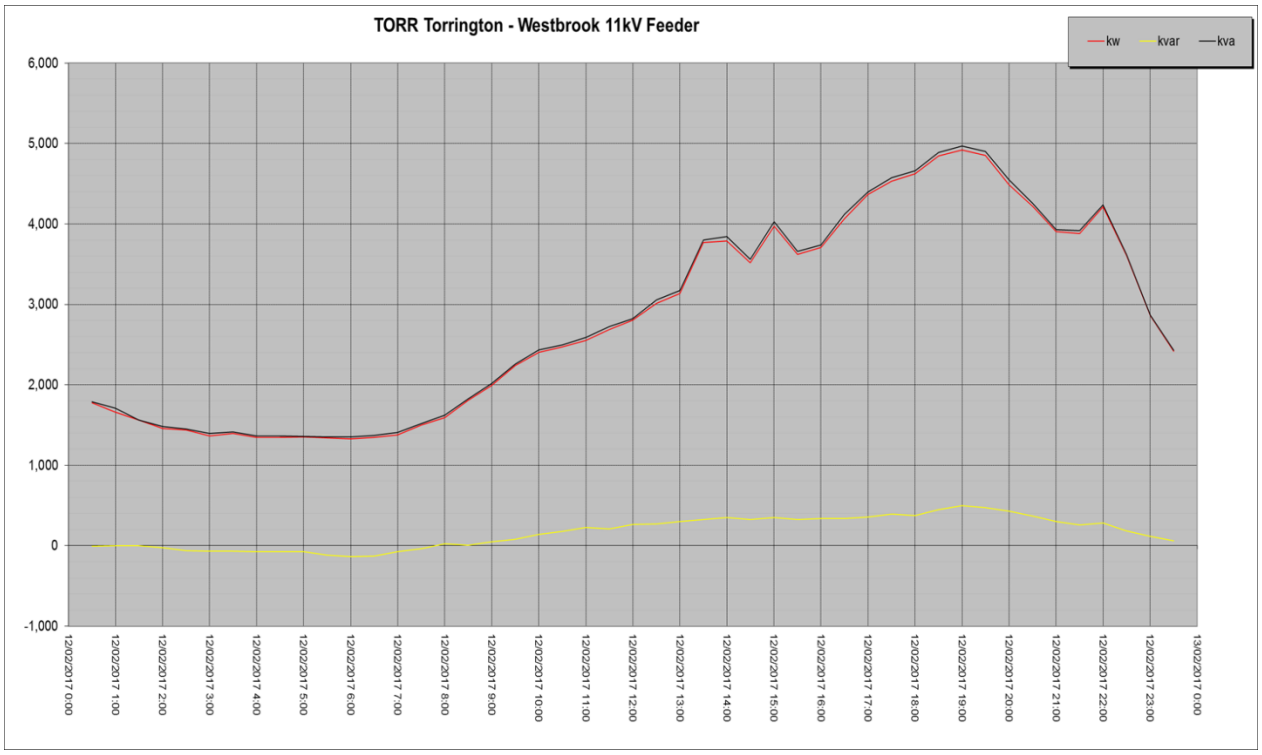
6.2. Next Steps

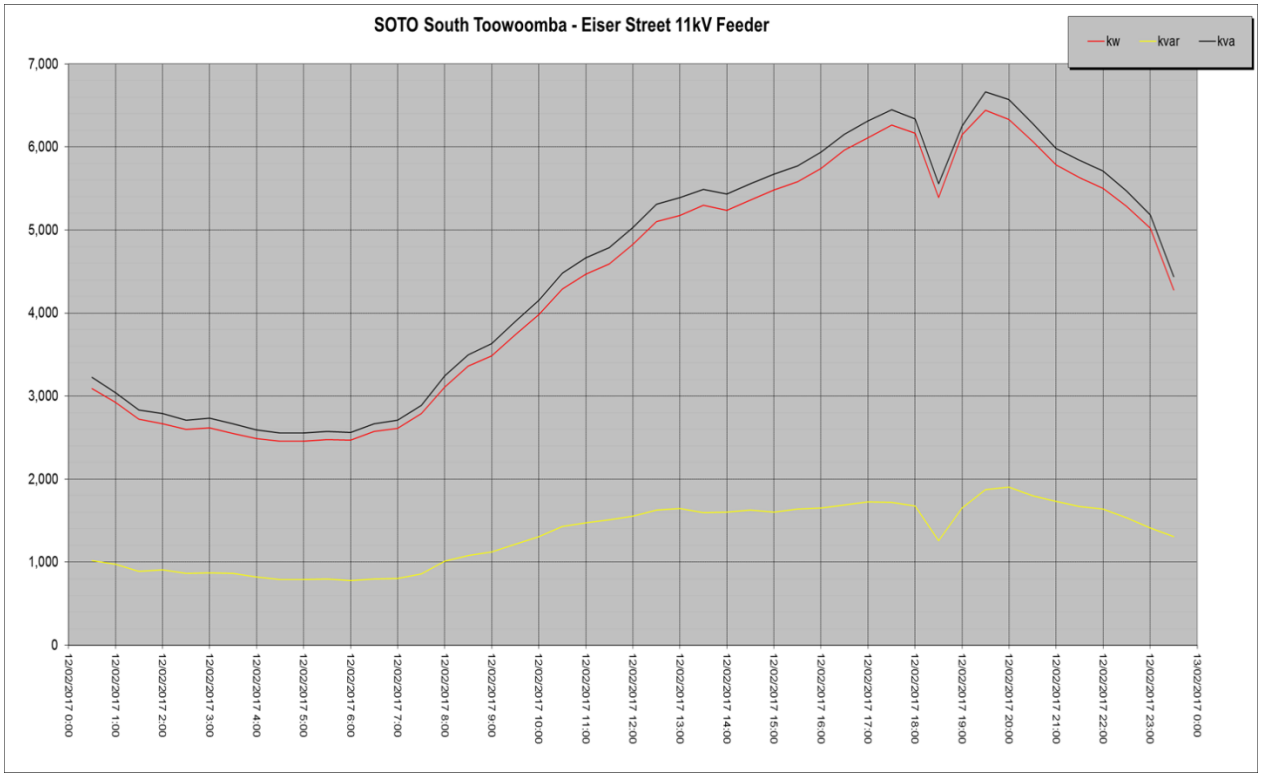
Following Ergon Energy's consideration of the submissions, the preferred option, and a summary of and commentary on any submissions received in response to this report, will be included as part of the Final Project Assessment Report. The Final Project Assessment Report represents the final stage of the consultation process in relation to the application of the RIT-D.

Ergon Energy intends to publish the Final Project Assessment Report no later than 3 December 2018. Ergon Energy will use its reasonable endeavours to publish the Final Project Assessment Report by the above date. This may however not be achievable due to changing power system conditions or other circumstances beyond the control of Ergon Energy.

At the conclusion of the consultation process, Ergon Energy intends to take steps to progress the recommended solution(s) to ensure any statutory non-compliance is addressed and undertake appropriately justified network reliability improvement(s), as necessary.

Appendix A: Feeder Loading Details





Appendix B: Westbrook Area Planning and Development Details

GROWTH DIRECTIONS

The West Toowoomba Land Use Investigation study area is a key greenfield growth area for Toowoomba City.

By 2050, West Toowoomba will be home to more than 30,000 people living in 12,700+ homes, and will become Toowoomba's second largest employment area. The area will experience major growth over the next 30 years, with rapid growth occurring post-2026.

This growth brings pressure to provide homes, employment, services and recreational opportunities that cater for the community's needs. A long-term plan is required to ensure that this future growth and development is managed appropriately to create quality places, provide affordable housing options, and supply infrastructure and services to meet the needs of current and future residents.

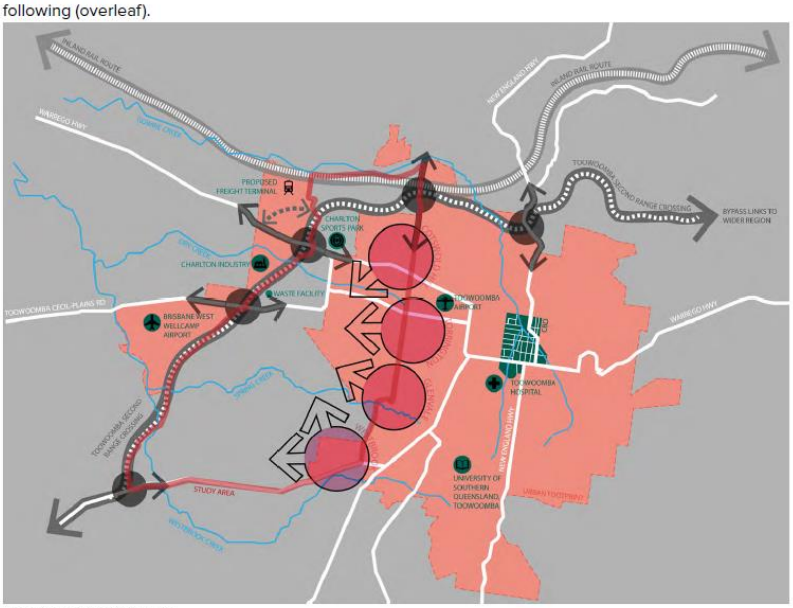
Population Projections for West Toowoomba

Area	Population 2015[1]	Population 2036[2]	Population 2050[3]
Toowoomba Region[1]	163,232	216,269	
West Toowoomba land use investigation area[2]	8,256	20,472	30,068

Source: 1. ABS Estimated Resident Population 2015
2. Toowoomba Regional Council Demographic Projections (IRPS 2014)
3. West Toowoomba Local Plan – Demographic and Market Profile (MacroPlan, 2013)

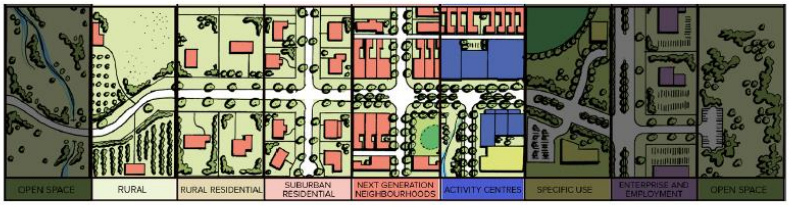
DRIVERS OF CHANGE

West Toowoomba faces a number of challenges and opportunities that are driving change which include the following (overleaf).



WEST TOOWOOMBA'S DRIVERS OF CHANGE

WESTBROOK



EXISTING WESTBROOK SHOPPING CENTRE

RURAL SCENE JUST WEST OF WESTBROOK

Westbrook is envisioned to become the major growth area in West Toowoomba and it entails a significant expansion of the current urban footprint.

The major residential growth area to the north and west of the existing community of Westbrook will be made up of a series of compact, well defined and walkable new residential neighbourhoods.

The Westbrook expansion area will introduce the Next Generation Suburban Neighbourhood place type to West Toowoomba.

The *Next Generation Suburban Neighbourhoods* are connected and clustered around a new town centre that provides a local community focus and supports greater self-containment of the Westbrook community.

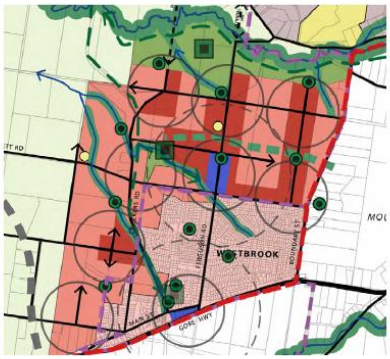
While the existing suburban area will remain largely unchanged in the foreseeable future, overall the existing character of Westbrook will change over time. It will evolve into a vibrant and green community through the establishment of interconnected greenspace and a grid network of treed streets, with expansive views and vistas to the surrounding rural countryside.

Westbrook is envisioned to be made up of the following:

- Rural
- Suburban Residential
- *Next Generation Suburban Neighbourhoods*
- Activity Centre
- Open Space.

Specific Urban Design Responses

The Next Generation Neighbourhood planning and design principles have been applied to Westbrook as follows.



WESTBROOK OVERALL STRUCTURE

WESTBROOK TRANSPORT STRUCTURE

WESTBROOK TOWN CENTRE STRUCTURE

between the town centre and the park, which will become a central focus of the community in the future.

The proximity of the greenspace network to the proposed town centre provides a significant opportunity to integrate and link the town centre with greenspace corridors and other parks and open space. The greenspace network will provide active transport links to neighbourhoods throughout the urban area.

The tree lined ridge to the north of Shoesmith Road provides an opportunity for a greenspace corridor that establishes a connection with Mount Peel, a significant bushland park just beyond the study area. This will enhance the passive recreation opportunities in the local area.

The retention of vegetation within these linkages will provide wildlife corridors and enhance ecosystem services, as well as link back into the wider trails network and Spring Creek corridor.

Street trees, public realm landscape works and vegetation will reinforce the greenspace network and contribute to the amenity and character of Westbrook. Streets will be considered as places, with increased planting and treatments creating 'country boulevards' that complement the character of the area and create identifiable entry statements.

PROPOSED WESTBROOK TOWN CENTRE

The structure plan proposes the establishment of a new town centre in Westbrook. It will provide retail, commercial and community services and enable a more self-contained community.

The Role of the Town Centre

The town centre is to be the civic heart of the Westbrook community, located on a key local street with connection north to a large future park adjacent to Spring Creek.

It is envisioned to be a street based centre with a focus on pedestrians, and a true mixed use activity centre which includes residential and non-residential uses. It provides a mix of retail, commercial, administrative, community, cultural and entertainment activities capable of servicing the convenience and weekly retail, community and commercial needs of the district.

The town centre is to be a district level activity centre which provides services and facilities for the local community and a district catchment. The centre is highly accessible and well connected, and will be a focus of transport networks, including public transport and local pedestrian and cycling systems.

Medium density housing will be located within and immediately around the centre. This will provide residents in these areas with ready access to a range of uses and employment offered by the centre. It is a place of mixed uses and mixed ownerships, where a competitive sector supports business and employment activity.

Structure and Urban Design Framework

The Westbrook town centre features the following structural elements:

- centre core with active frontages
- main street (approx. 200m) with pedestrian focus
- adjoining open space
- medium-density residential/ mixed use surrounding centre core
- main public transport route
- cycle route and pedestrian links
- boulevard treatment along main street and key secondary streets
- key vistas – Spring Creek and east-west
- entry points and landmark elements
- community facilities.

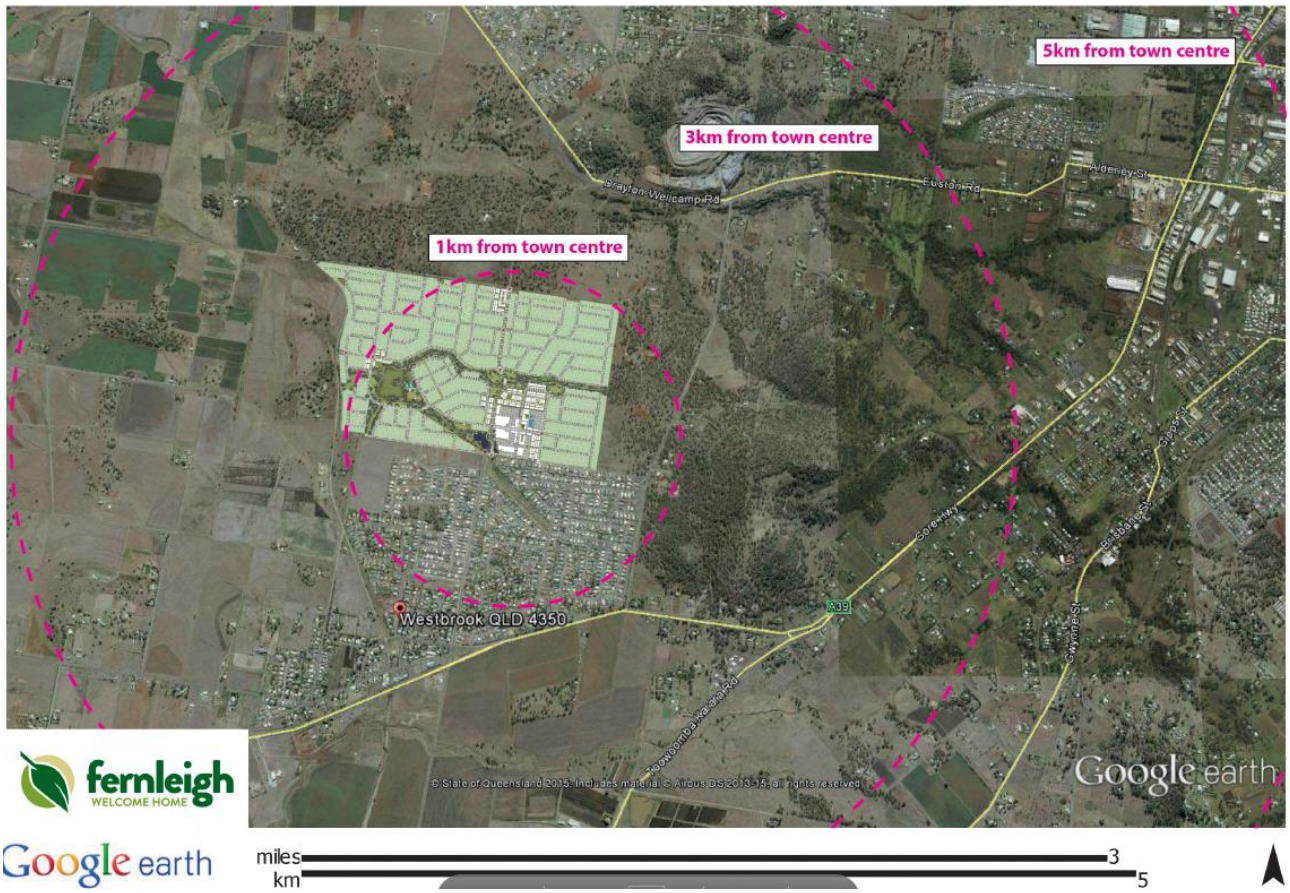
In addition, the Westbrook town centre integrates the following attributes that underpin its layout and structure:

- sense of enclosure to the main street – a human scale
- low speed environment (40km) zone.
- bus stops within 400m catchment.
- a linear bus stop on the main street.

Built Form and Public Realm

The Westbrook town centre will be a 'street based' centre, where all uses and activities at ground level address the street. The centre will maintain a 2-3 storey height limit. It will create a vibrant and comfortable environment for people and will be characterised by the following features:

- Buildings within the town centre should have a zero set back to create well defined urban streets, and active frontages to establish a vibrant commercial activity centre.
- There is a priority for pedestrian movement and a preference for the establishment of premises that generate a vibrant and active street-front at ground floor level, and with premises designed and orientated to address the street.
- Strong pedestrian linkages from building to building are facilitated by the provision of continuous active frontages along pedestrian routes, continuous awnings to provide climatic comfort for pedestrians and shelter from the rain, sun and wind.
- Street trees are a main streetscape feature, they frame the pedestrian realm and improve the ground level micro-climate.
- Landscaping, street furniture and building articulation are utilised to create comfortable public realm spaces.
- Active frontages on the ground floor and residential uses above ground provide opportunities for passive surveillance.
- A range of diverse uses that are available throughout day and night create a safer public environment.
- There are adequate spaces and furniture for people to rest and meet along the street.



http://www.fernleigh.com.au/

Appendix C: Propose New Feeder Works

The following is the propose scope of work for the internal option.

Scope Summary - Details in Planning report

Carry out 11kV Overhead and Underground distribution works that allow the creation of a new 'Cambooya' Feeder and reconfiguration of the 'Darling Heights' Feeder to form the 'Drayton' Feeder.

1. **Cambooya Feeder -**
   - 1.1. Install approximately (1120m) of UG cable for the feeder exit from KESP ZSS to cnr West and Nelson ST and on to pole 3337792. Section from KESP to the corner of West and Nelson ST should be installed using existing conduit. New conduits to be installed along West ST to the termination point (420m).
   - 1.2. Install new Gas Switch on pole 3337793 (Normally Open point between the Cambooya and Darling Heights feeders)
   - 1.3. Re-conductor existing 11kV Fluorine to 19/3.75 AAC Pluto @ 75^0C from pole 3337793 to 3337788 (280m).
   - 1.4. New 11kV OH 19/3.75 AAC Pluto @ 750C from pole 3337788 to 3120474. (1200m)
   - 1.5. Underbuild Clifton 33kV with 19/3.75AAAC Neon @ 75^0C from pole 3120474 to pole 3120488. (560m)
   - 1.6. Re-conductor Apple/Banana/ old HDBC OH 19/3.75 AAAC Neon @ 75^0C from pole 3120488 to 10245123 (4400m)
   - 1.7. New 800m OH 19/3.75 AAAC Neon @ 750C from pole 10245123 to 2051094 with new Gas switch included at the Western end of the new line (Closed).
   - 1.8. Recover DL3188.
   - 1.9. New Gas Switch on pole 3120498 (Open).
   - 1.10. Reconductor 1 span from pole 3100795 to pole 3120498 using 19/3.75 AAAC Neon @ 75^0C.
   - 1.11. Re-conductor Apple to 19/3.75 AAC Pluto @ 75^0C from pole 3100810 to 3233968. (240m)

2. **Darling Heights Feeder**
   - 2.1. Install 2 x new RMU's at location on the Corner of Nelson and West ST's. RMU's to be established so that the Drayton and the reconfigured Darling Heights Feeder both tie into the RMU. Diagram below.
   - 2.2. Re-conductor Raisin OH to 19/3.75 AAAC Neon @ 75^0C from pole 2140498 to 2140395 (3400m).
   - 2.3. New OH 19/3.75 AAAC Neon @ 75^0C from pole 2140395 to 3318658. (1000m)
   - 2.4. Re-conductor Raisin OH to 19/3.75 AAAC Neon @ 75^0C from pole 3318658 to 3100850. (1500m)