

Regulatory Investment Test for Distribution



Non-Network Options Report

South West Toowoomba Reinforcement

This document describes the *identified need* for investment in the South West Toowoomba area. It includes description of the likely network options and to the extent possible, the characteristics of non-network options which may, either alone or in combination with network or other non-network options, represent a feasible solution for addressing the identified need.

Consultation starts: **04 May 2018**

Consultation ends: **04 August 2018**

Disclaimer

While care was taken in preparation of the information in this **Non Network Options Report**, and it is provided in good faith, Ergon Energy Corporation Limited accepts no responsibility or liability for any loss or damage that may be incurred by any person acting in reliance on this information or assumptions drawn from it. This document has been prepared for the purpose of inviting information, comment and discussion from interested parties. The document has been prepared using information provided by a number of third parties. It contains assumptions regarding, among other things, economic growth and load forecasts which may or may not prove to be correct. All information should be independently verified to the extent possible before assessing any investment proposal.

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 being the 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 their 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. Based on this approach, Ergon Energy is seeking market responses to resolve these network constraints.

This is a Non-Network Options Report, where Ergon Energy is seeking information about possible alternate solutions to address the identified need, which may be able to be provided by parties other than Ergon Energy. Submissions in writing (electronic preferably) are due by **04 August 2018** and should be lodged to Ergon Energy's "Regulatory Investment Test for Distribution (RIT-D) Partner Portal". 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".

Table of Contents

Executive Summary	1
1. Introduction.....	5
2. Background.....	6
3. Technical requirements of solution.....	8
3.1. Safety	8
3.2. Network Protection Requirements.....	8
3.3. Reliability Requirements	8
3.4. Harmonics	8
3.5. Audio Frequency Load Control	9
3.6. Voltage Fluctuations	9
4. Feasible vs Non Feasible Options.....	9
4.1. Potentially Feasible Options.....	9
4.2. Options that are unlikely to be feasible	10
5. Internal Options Identified	10
6. Submission and Next Steps	12
6.1. Submissions from Solution Providers.....	12
6.2. Next Steps	13
7. Appendix A: Feeder Loading Details.....	14
8. Appendix B: Westbrook Area Planning and Development Details	15
9. Appendix C: Propose New Feeder Works.....	18

List of Figures and Tables

Figure 1 – Existing Network highlighting Eiser St and Westbrook Feeders	7
Figure 2 Propose Internal Option – New feeder (green) out of Kearney Springs Zone Substation	11
Table 1 – Ergon Energy's Internal Cost for the Preferred Option.....	10
Table 2 – Future timetable for this RIT-D	13

1. Introduction

This Non Network Options Report has been prepared by Ergon Energy in accordance with the requirements of clause 5.17.4(e) of the National Electricity Rules (NER).

This report represents the first 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 South West Toowoomba Area.

This report:

- Provides background information on the network capability limitations of the distribution network supplying the South West Toowoomba area.
- Identifies the need which Ergon Energy is seeking to address, together with the assumptions used in identifying and quantifying that need.
- Describes the credible options that Ergon Energy currently considers may address the identified need, including for each:
 - o Its technical definitions;
 - o The estimated commissioning date; and
 - o The total indicative cost
- Sets out the technical characteristics that a non-network option would be required to deliver in order to address the identified need.
- Is an invitation to registered participants and interested parties to make submissions on credible options to address the identified need.

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 **04 August 2018** and should be lodged to Ergon Energy's "Regulatory Investment Test for Distribution (RIT-D) Partner Portal". The portal is available at:

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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.

Existing Network Feeder Arrangement

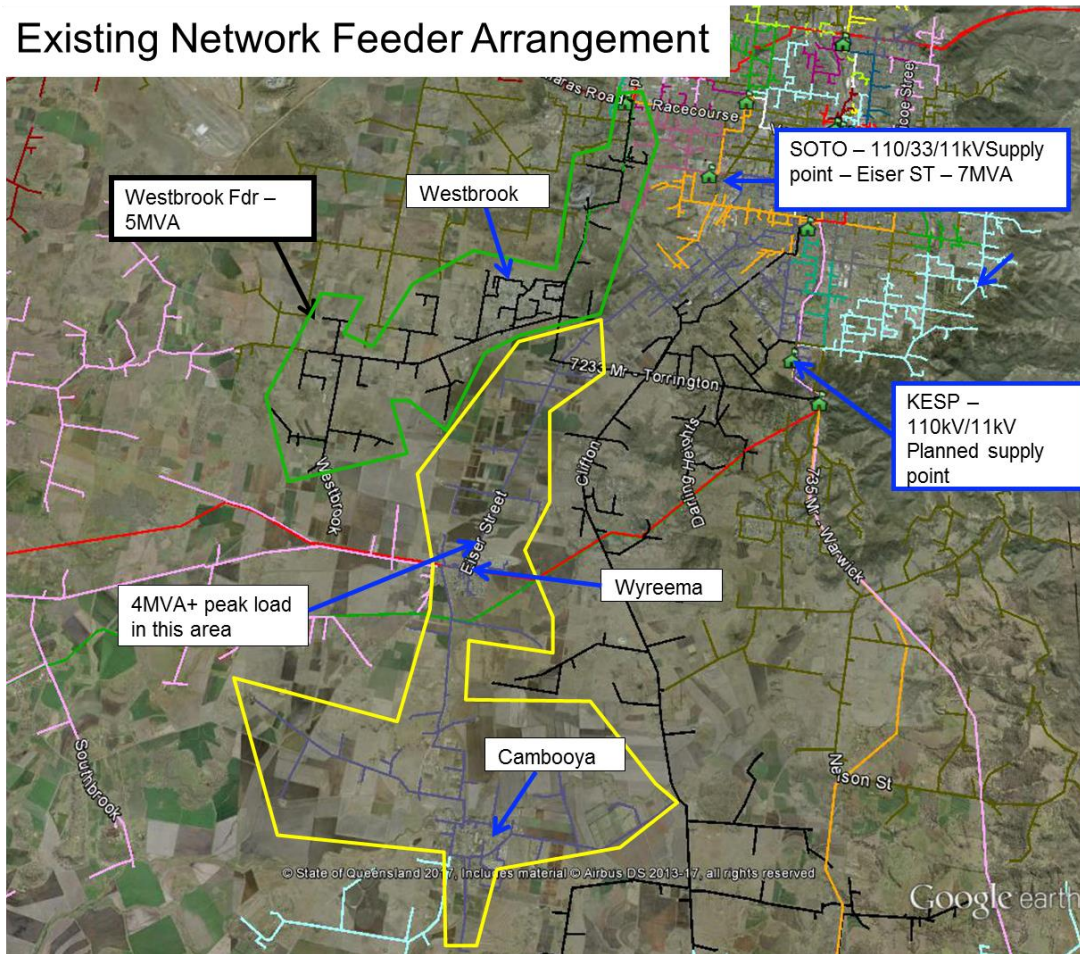


Figure 1 – Existing Network highlighting Eiser St and Westbrook Feeders

3. Technical requirements of solution

To meet Ergon Energy's ongoing operational needs it is expected that any alternate 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 alternate 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.

The following are some general parameters to which a non-network option must comply with.

3.1. Safety

Any proposed solution must comply with and not in any way compromise Ergon Energy or Queensland Electricity Regulation safety standards. Ergon Energy considers safety of staff, contractors and the public to be of paramount importance, and any solution must not compromise these expectations.

3.2. Network Protection Requirements

Any proposed solution will need to meet Ergon Energy Network Protection Requirements. Depending on the proposed solution, it is expected that these requirements will be discussed and determined at the project development stage with Ergon Energy's Network Protection Team.

3.3. Reliability Requirements

It is fundamentally expected that any proposed alternative solution must deliver appropriate network reliability performance. 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.

3.4. Harmonics

The alternative 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.

3.5. Audio Frequency Load Control

The alternative 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.

3.6. 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.

It is particularly noted that given the physical lengths of Eiser St and Westbrook feeders, meeting voltage fluctuations limits may be more challenging than for shorter more urban feeders.

4. Feasible vs Non Feasible Options

4.1. Potentially Feasible Options

The identified need presented in this Non-Network Options Report is driven by loading, reliability performance and emerging voltage constraints on Eiser and Westbrook feeders. As such, solutions that prudently and efficiently address these constraints will be considered.

A non-exhaustive list of potentially feasible options includes:

- Embedded dispatchable network generation
- Embedded energy storage systems
- Embedded energy storage systems combined with Generation (possibly dispatchable or non dispatchable)

Ergon Energy is also willing to consider other possible solutions which may be identified as part of this process.

It is noted that the above options may be split over a number of locations. For example placing embedded solutions near both Westbrook and Cambooya may provide additional benefit in terms of reliability performance and redundancy.

As detailed in Section 5 of this report, Ergon Energy has identified an internal option to resolve the existing and emerging constraints in the SW Toowoomba area. It is noted that this option includes both refurbishment and augmentation works. It is not expected that an alternate solution will address the refurbishment requirements. In such a situation, the proposed solution will be financially assessed/compared against the approximate augmentation costs only.

4.2. Options that are unlikely to be feasible

Without attempting to limit a potential proponent's ability to innovate when considering opportunities, some technologies/approaches are unlikely to represent a technically or financially feasible solution. Unproven, experimental or undemonstrated technologies are unlikely to be feasible options.

Furthermore, options that may require completion beyond November 2019 are also unlikely to be considered feasible.

5. Internal Options Identified

Ergon Energy's preferred internal option at this stage is to develop a new feeder out of Kearney Springs Zone Substation as detailed in Figure 2. Appendix C: Propose New Feeder Works details the scope of the internal option. 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. Given this, any alternate solution at a minimum must address the augmentation requirements with it being optional that refurbishment requirements are also addressed. When evaluating alternate proposals against the internal solution, Table 1 will be used. For example if an alternative solution can meet augmentation and refurbishment requirements, then it will be assessed against the total \$4,704,974. If it can only deliver against the augmentation requirements then it will be assessed against \$3,069,282.49 which is the estimated cost for the purely augmentation component.

Internal option	Develop a new feeder out of Kearney Springs Substation
Estimated Augmentation Component cost	\$3,069,282.49
Estimated Repex/Refurbishment 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.

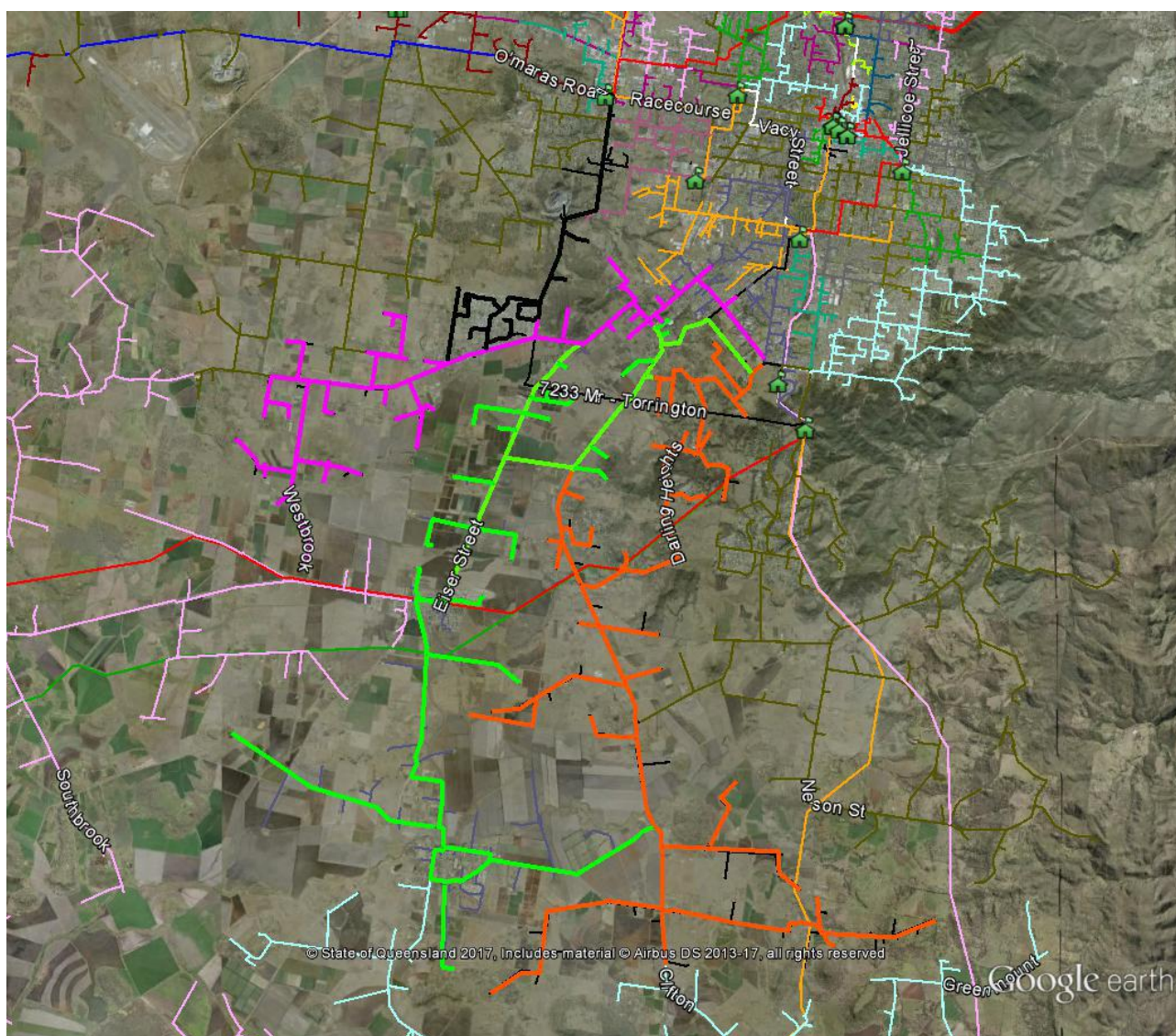


Figure 2 Propose Internal Option – New feeder (green) out of Kearney Springs Zone Substation

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.

All submissions should include sufficient technical and financial information to enable Ergon Energy to undertake comparative analysis of the proposed solution against other options. The proposals should include, but are not limited to:

- Full costs of completed works including delivery and installation where applicable.
- Whole of life costs including operational costs.
- Project execution strategy including design, testing and commissioning plans.
- Engineering network system studies and study reports.
- Verified and approved engineering designs if available.

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.

Submissions in writing are due by **4 August 2018** and should be lodged to Ergon Energy's "Regulatory Investment Test for Distribution (RIT-D) Partner Portal" The portal is available at: <https://www.ergon.com.au/network/network-management/network-infrastructure/regulatory-test-consultations> .

6.2. Next Steps

Ergon Energy intends to carry out the following process to assess what action should be taken to address the identified need in the south west Toowoomba area:

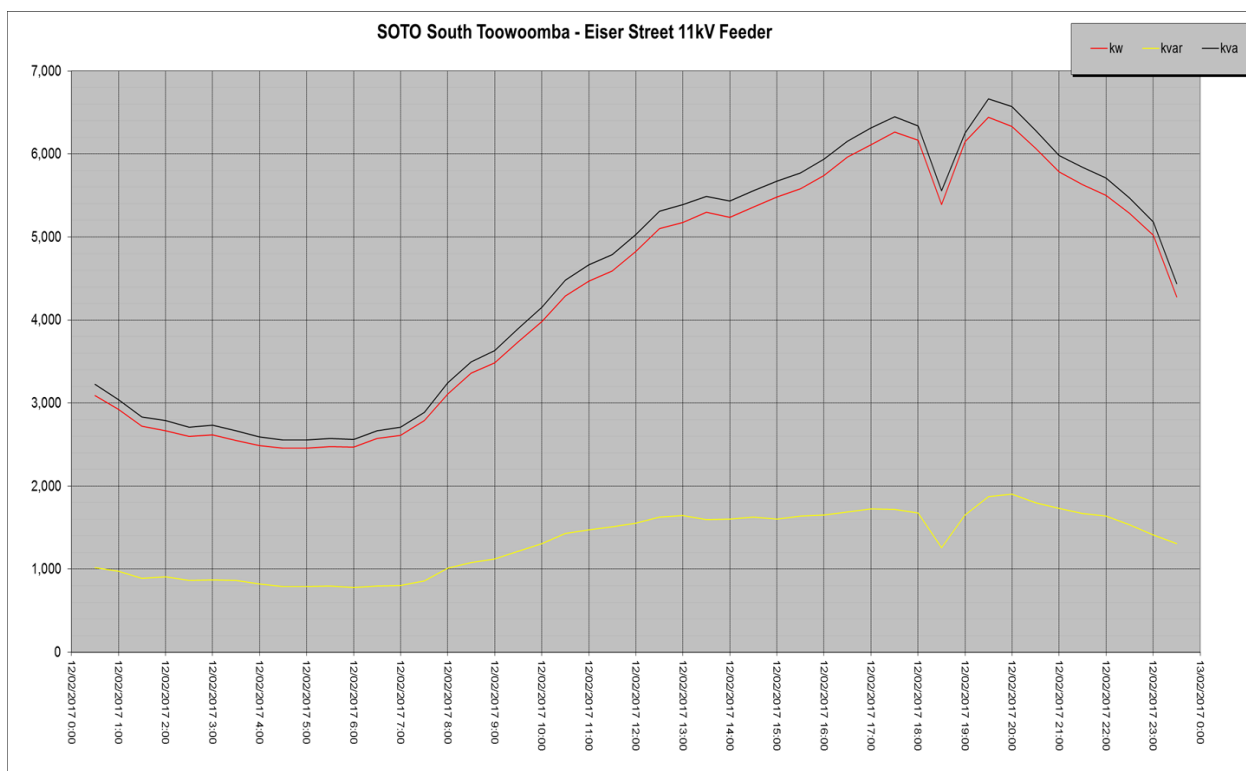
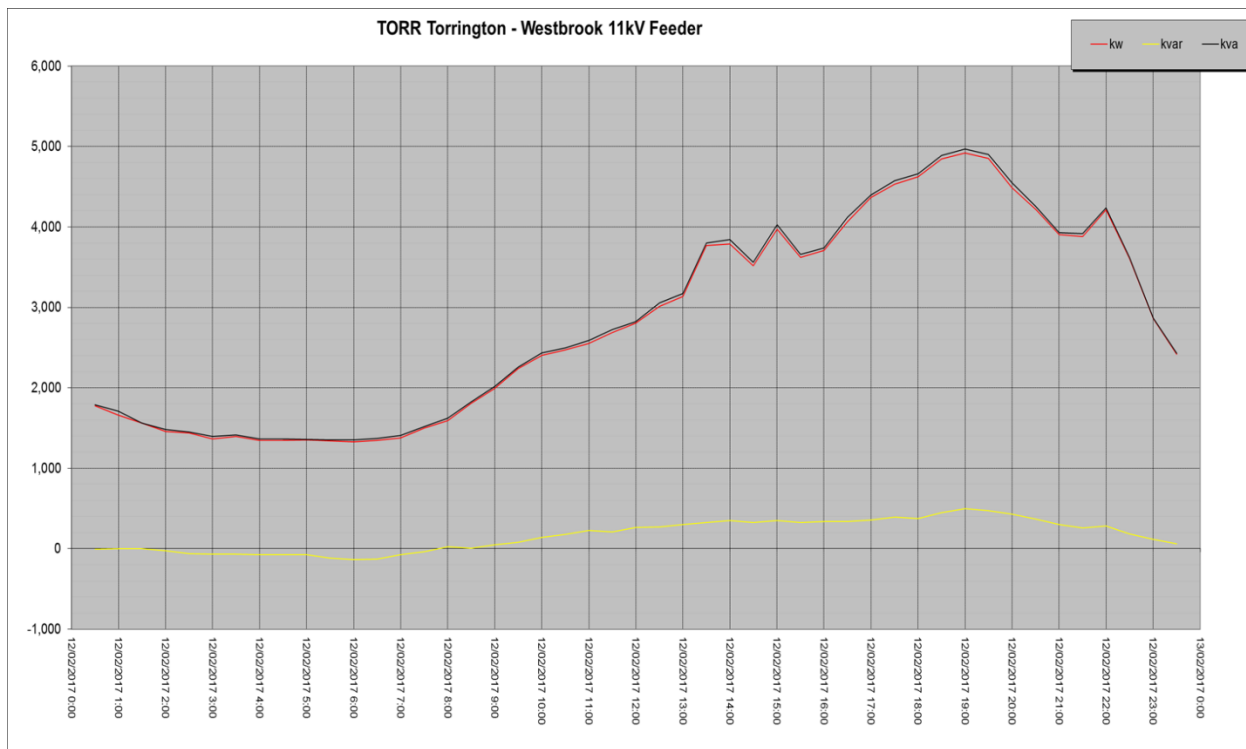
Step 1	Publish Non Network Options Report (this report) inviting non-network options from interested participants	Date Released: 4 May 2018
Step 2	Submissions in response to the Non Network Options Report and consultation period	04 May 2018 – 04 August 2018
Step 3	Review and analysis of proposals by Ergon Energy	Anticipated to be completed by: approximately the end of August 2018
Step 4	Release of Draft Project Assessment Report (DPAR)	Anticipated to be released by: Approximately mid September
Step 5	Consultations in response to the Draft Project Assessment Report	Finalised by: Approximately end of October
Step 6	Publish the Final Project Assessment Report (FPAR)	Approximately mid November
Ergon Energy reserves the right to revise this timetable at any time. The revised timetable will be made available on the Ergon Energy website.		

Table 2 – Future timetable for this RIT-D

Ergon Energy will take all reasonable efforts to maintain the consultation schedule listed above. Due to various circumstances the schedule may change. However, up-to-date information will be available on the Partner Portal.

During the consultation period, Ergon Energy will review, compare and analyse all internal and external solutions. At the end of the consultation and review process Ergon Energy will publish a final report which will detail the most feasible option and proceed to implement that option.

7. Appendix A: Feeder Loading Details



8. 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.

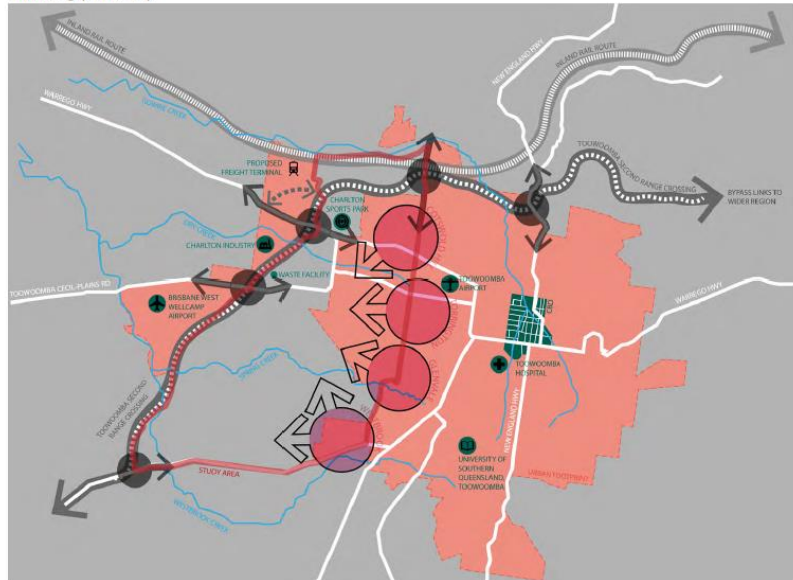
Population Projections for West Toowoomba

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 (RPS 2014)
3. West Toowoomba Local Plan – Demographic and Market Profile (MacroPlan, 2015)

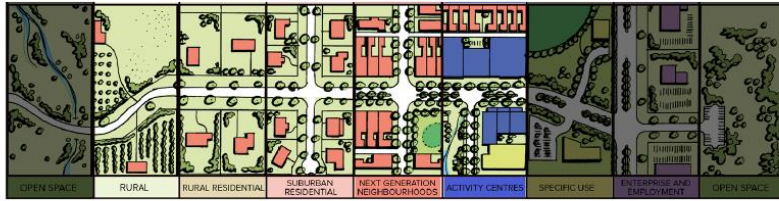
DRIVERS OF CHANGE

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.

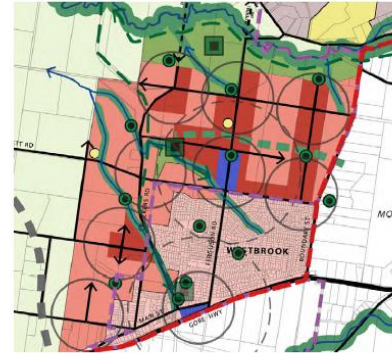
While the existing suburban area will remain largely unchanged in the foreseeable future, overall the existing character of Westbrook will change over time. It will evolve into a vibrant and green community through the establishment of interconnected greenspace and a grid network of tree streets, with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

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 Shoemith 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.

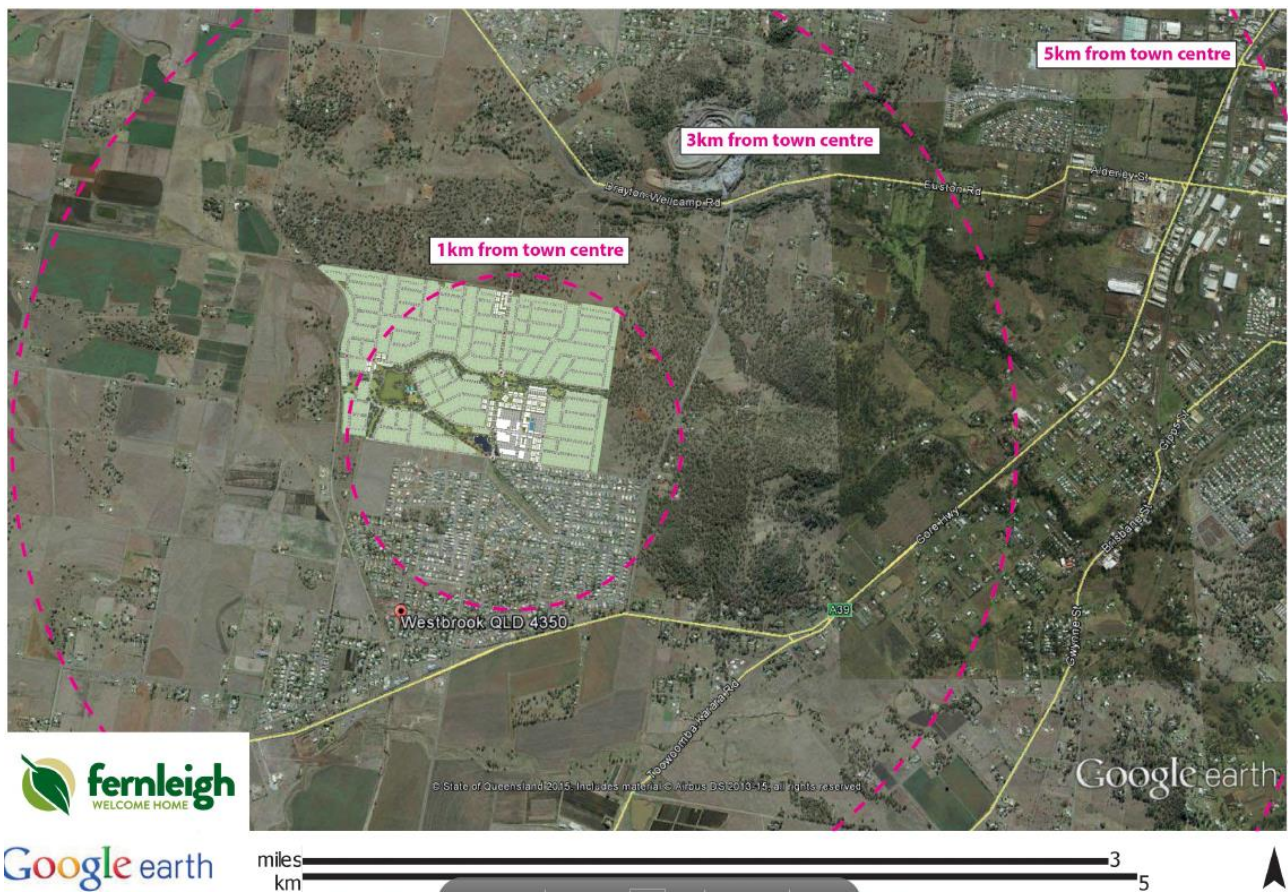
In addition, the Westbrook town centre integrates the following attributes that underpin its layout and structure:

- 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/>

9. 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°C from pole 3337793 to 3337788 (280m).
- 1.4. New 11kV OH 19/3.75 AAC Pluto @ 75°C from pole 3337788 to 3120474. (1200m)
- 1.5. Underbuild Clifton 33kV with 19/3.75AAAC Neon @ 75°C from pole 3120474 to pole 3120488. (560m)
- 1.6. Re-conductor Apple/Banana/ old HDBC OH 19/3.75 AAAC Neon @ 75°C from pole 3120488 to 10245123 (4400m)
- 1.7. New 800m OH 19/3.75 AAAC Neon @ 75°C 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. Re-conductor 1 span from pole 3100795 to pole 3120498 using 19/3.75 AAAC Neon @ 75°C.
- 1.11. Re-conductor Apple to 19/3.75 AAC Pluto @ 75°C 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°C from pole 2140498 to 2140395 (3400m).
- 2.3. New OH 19/3.75 AAAC Neon @ 75°C from pole 2140395 to 3318658. (1000m)
- 2.4. Re-conductor Raisin OH to 19/3.75 AAAC Neon @ 75°C from pole 3318658 to 3100850. (1500m)