Australia's National
Science Agency

Communities in Transition

Central Highlands: A Living Transitions Roadmap

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THE ECO EFFICIENCY GROUP

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The Clean Growth Choices Consortium is comprised of experienced practitioners and researchers from the University of Southern Queensland, James Cook University, CSIRO and The Ecoefficiency Group. The consortium team would like to acknowledge the strong support we received from the Queensland Department of Environment and Science, especially from Georgine Roodenrys, Matthew Arthur, Sandra Avendano and Rosanna Virzi.

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The Clean Growth Choices Consortium is delivering the Communities in Transition pilot project with the support of the Queensland Government.

Contents

Summary

This report is a living roadmap designed to support the Central Highlands Region in securing a prosperous and sustainable future. The roadmap is developed as part of the Clean Growth Choices: Communities in Transition (CiT) project through active participation of the Central Highlands Regional Council, community members and a local coordinator. This project is supported by a consortium from the University of Southern Queensland, James Cook University, CSIRO and The Ecoefficiency Group. The Clean Growth Choices project has been funded by the Queensland Government as part of its CiT pilot program.

A three-stage process was implemented in this project:

1. Assessing the current state, risks, challenges and opportunities for the region and identifying broad pathways for the future.
2. Generation and rapid evaluation of innovative ideas and options that enable the development of broad pathways.
3. Putting options and pathways into a transition roadmap and for developing business cases.

Key challenges and opportunities identified for the region relate to: a) climate change and extreme weather events and the implications for water availability, b) a slowing economy and the need for economic diversification, c) balancing the benefits of resource development with environmental and social impacts, d) consumer pressures, e) access to reliable communications and the disruptions and benefits from digital technology, f) access to reliable and affordable energy, g) waste processing and h) transport connectivity.

The workshop community articulated their values, visions, and goals for the future of the region with the intention of building a diversified, sustainable economy built around the region's resources and human capital that also fosters integrated community wellbeing and resilience. Important to this is maintaining the strong community spirit, relaxed rural lifestyle, heritage and culture, and scenic landscapes.

Three broad pathways were identified with a set of interventions, mechanisms and outcomes by which the vision and goals could be achieved:

1. Advancing sustainable world-class agriculture through agtech and cleantech innovation and leadership for the region.
2. Strengthening existing and creating new governance systems and value chains that support development of a circular economy in the region.
3. Strengthening economic resilience by building regional human capacity through skilling, attracting, and retaining people with technical and professional service skills and experience.

These pathways are complementary and have phases that can be implemented to maintain, modify and transform parts of the region to achieve the community's vision and goals (Figure 1). Key interventions that relate to all three pathways are: feasibility studies and research, digital connectivity, transport connectivity and renewable energy and water.

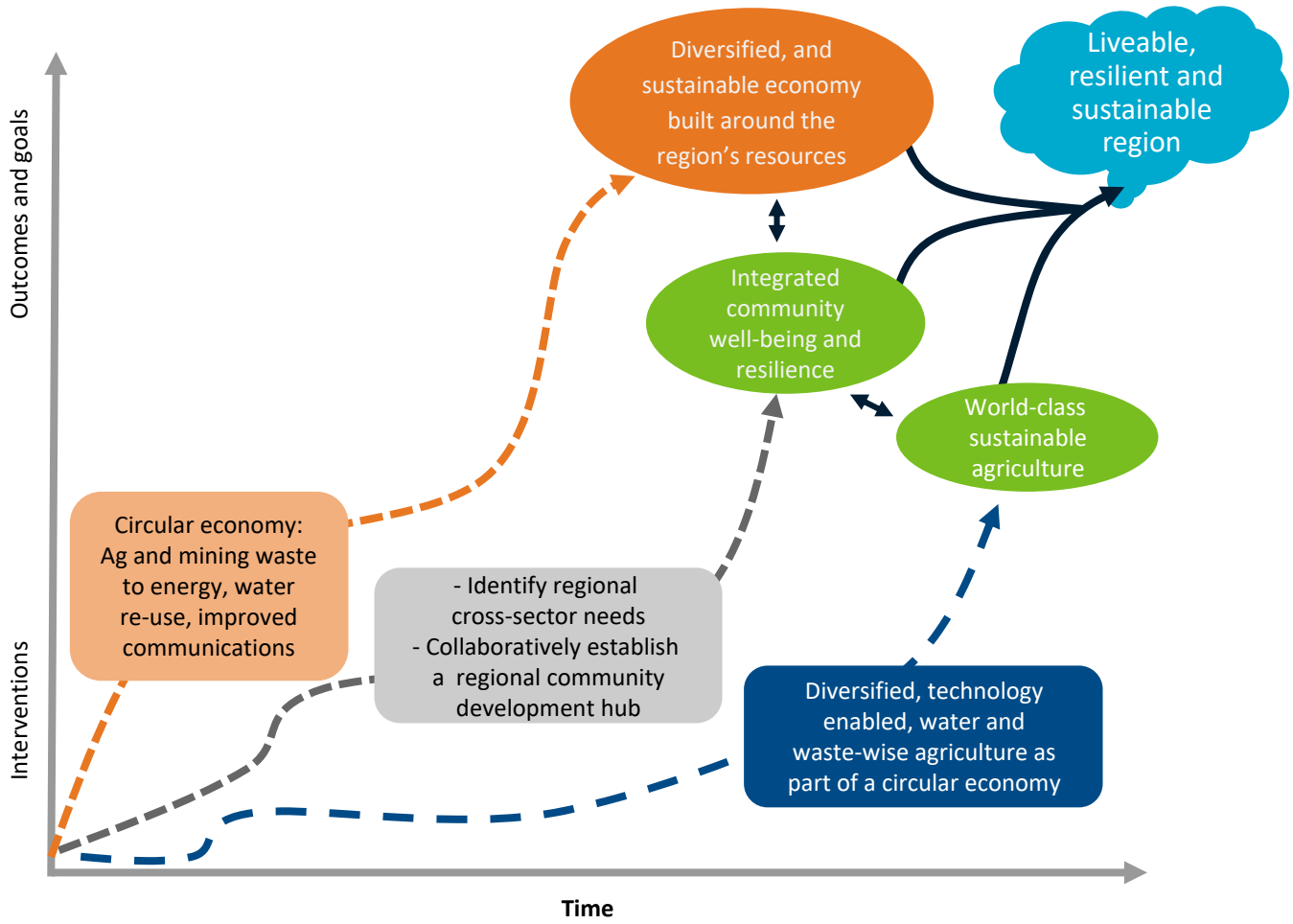

Figure 1. Three complementary pathways towards achieving the vision for the future of Central Highlands.

Three options were selected for preliminary business case development to set the living roadmap in motion:

1. Connectivity requirements for enhancing sustainable economic development of the region.
2. A Central Highlands Wellbeing organisation.
3. Identifying potential business opportunities arising from the application of circular economy principles to existing waste streams..

This report is an initial step in developing a dynamic and living roadmap for regional communities in transition. It will require further work to test and refine the details of the proposed pathways. It will also require monitoring and reviewing at least every two years to ensure that the set of pathways remain appropriate and sufficient to achieve the vision and goals and are robust enough to changes in global and domestic drivers.

1 Background

A team from James Cook University (JCU), University of Southern Queensland (USQ), Commonwealth Scientific and Industrial Research Organisation (CSIRO), and The Ecoefficiency Group (TEG) designed a program of work in response to a Queensland Government tender for the delivery of a pathways approach to its Queensland Climate Transition Strategy, '*Pathways to a clean growth economy*', a strategy that focuses on the risks associated with environmental, social and economic changes. The Queensland Government anticipates that the economy will need to keep adjusting to stay in step with the changing global economy. It assumes that Queensland has a competitive advantage that will assist with the transition, and while the transition will likely occur over decades, it should start right away to be most cost-effective. The State government has said that it will assist and guide these processes by:

- Creating an environment for investment shift and innovation.
- Facilitating existing Queensland industries to transition.
- Working with Queensland's regional communities to transition.

The dynamics of transition is complex and challenging. Transition needs to be led by the communities themselves in ways that are socially acceptable and build collective agency in shaping the future.

This report focuses on the development of an initial living transition roadmap for the Central Highlands Region as part of the *Clean Growth Choices: Communities in Transition* (CiT) pilot program. The program is an active community capacity building process for strengthening regional leadership and resilience in dealing with economic, social and environmental change. It is helping Queensland regional communities to organise and process what is involved in transitioning over the intermediate to long term to achieve a more sustainable economy by:

- Referring to values, visions and plans to guide each community.
- Drawing on existing networks, knowledge, skills and capabilities.
- Canvassing current pressures, opportunities and future scenarios and visions.
- Identifying broad pathways and multiple options for transitioning and achieving the goals.
- Developing dynamic and future-focused roadmaps and identifying an initial set of business cases that set the roadmap in motion.

The project team is drawn from a collaborative consortium comprised of experts who help communities, businesses and governments develop community resilience strategies. The project team includes, The Institute for Resilient Regions at USQ, The Cairns Institute at JCU, CSIRO Sustainability Pathways Program and The Ecoefficiency Group.

With advice from the Central Highlands Regional Council, the project team worked closely with community members to develop an initial transition roadmap and a few business case proposals. With more detailed work, a fully developed roadmap will assist the community with navigating future uncertainties and changes.

2 Developing transition roadmaps

The Communities in Transition (CiT) program provides a framework for communities to create roadmaps, set their own directions, navigate their own pathways, and design interventions conceived and implemented by the participants themselves. The roadmap development process was informed by the Resilience Adaptation Pathways and Transformation Approach (RAPTA) (O'Connell et al. 2016) and was modified to suit this context (Maru et al. 2018). RAPTA is a design approach to bring best practice in the formulation of programs, projects and other interventions so that they achieve the desired outcomes. The three-stages of the transition planning process is summarised below.

Stage 1: (Sep – Dec 2018) Assessing the broad pathways to the future

The process started with an assessment of each region's current state, reflecting on community values, heritage and aspirations, and tabling future opportunities and risks. This phase ended with the Broad Pathways Workshop which discussed the region's past, present and future. Participants examined the regional profile as well as key challenges and opportunities prepared by the project team and identified possible broad pathways for the future..

Stage 2: (Jan – Jun 2019) Focused working groups for innovative ideas and options

Working groups were formed around the domains of focus that were identified in the broad pathways in Stage 1. As part of this stage, the consortium helped the teams draw on some of the new techniques to rapidly evaluate the real potential of the ideas as well as the enablers needed to overcome barriers and increase chances of success. At the end of this stage, each team had scoped a range of new ideas, settled on the ones that were most likely to be successful, and planned a staged implementation (a 'pathway') including actions to address related enablers and barriers.

Stage 3: (Jun – Oct 2019) Creating transition roadmaps and building business cases

Results from the focused working groups were brought together into a single regional community 'roadmap' of projects. The consortium assisted the teams to identify pathways of interdependent actions, plan the timing of these actions and identify 'trigger points' – things to monitor over time that should stimulate a review of the roadmap and could potentially change an action. The consortium also supported the community teams to scope short-term priorities and prepare a few initial business cases to set the roadmap in motion.

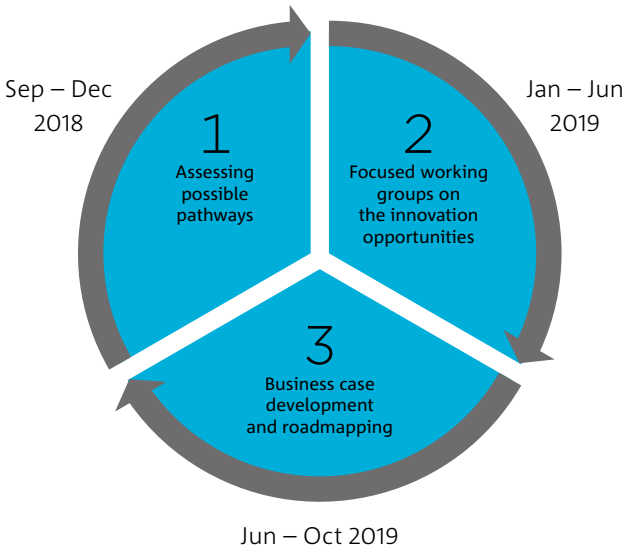

Figure 2. The three stages of the transition planning process.

The process was carried out through a series of meetings, workshops, webinars and other activities with Regional Council leaders and community members (Figure 3).

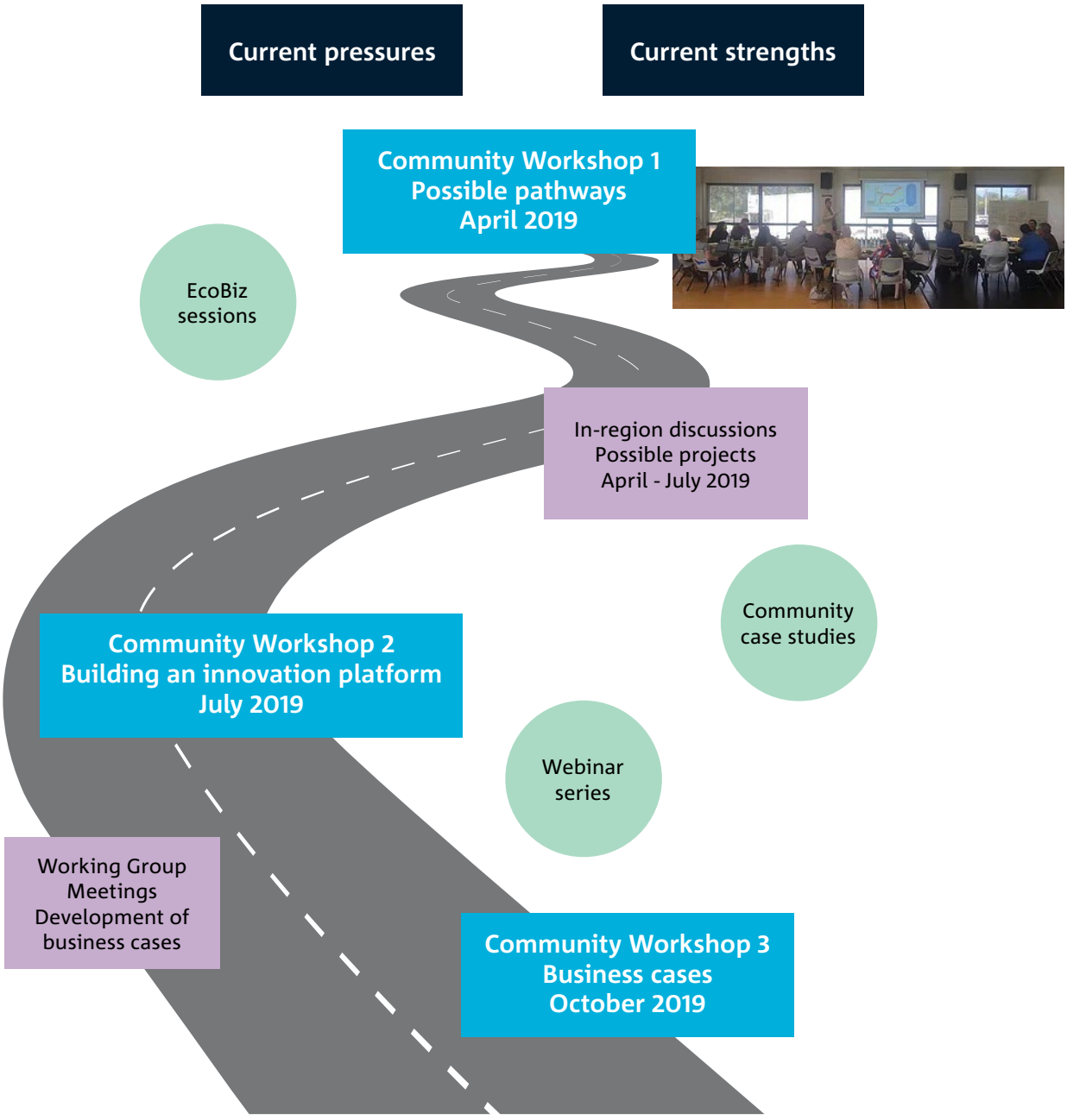

Figure 3. The Central Highlands transition road map was developed through a series of meetings, workshops, webinars and other activities.

3 Regional profile

Current state of the region

The Central Highlands Region is a Local Government Area in Central Queensland encompassing approximately 60,000 km² (Figure 4). The region incorporates the former Emerald, Duaringa, Bauhinia and Peak Downs Shires and includes the communities and surrounding rural areas of Arcadia Valley, Bauhinia, Blackwater, Bluff, Capella, Comet, Dingo, Duaringa, Emerald, Rolleston, Sapphire Gemfields (Anakie, Sapphire, Rubyvale and Willows Gemfields), Springsure and Tieri. Emerald, approximately 270 km west of Rockhampton, is the administrative centre of the region. The region is a gateway to western Queensland, is near the coast and has good connectivity to other regions in Queensland and more broadly (CHDC 2017).

Population composition and dynamics

The 2018 estimated resident population for the Central Highlands Region was 28,645 (QGSO 2018). This represents a -0.8% annual decrease since 2013. By 2041, the population is projected to achieve a modest increase to 30,133 (QGSO 2018). In the 2016 census, more than three-quarters of the population stated they were born in Australia and 4.3% were Indigenous (ABS 2016). The population is relatively young with a higher proportion of people under 15 years (26.1%) than the Queensland average (20.7%). The region is also home to a lower proportion of seniors 65 years and older (7.6%) than the Queensland average (15.3%). Nevertheless, the trend of an ageing population across Australia and implications for access to health, social, accommodation services and the requisite workforce, needs to be accounted for (CHRC 2019).

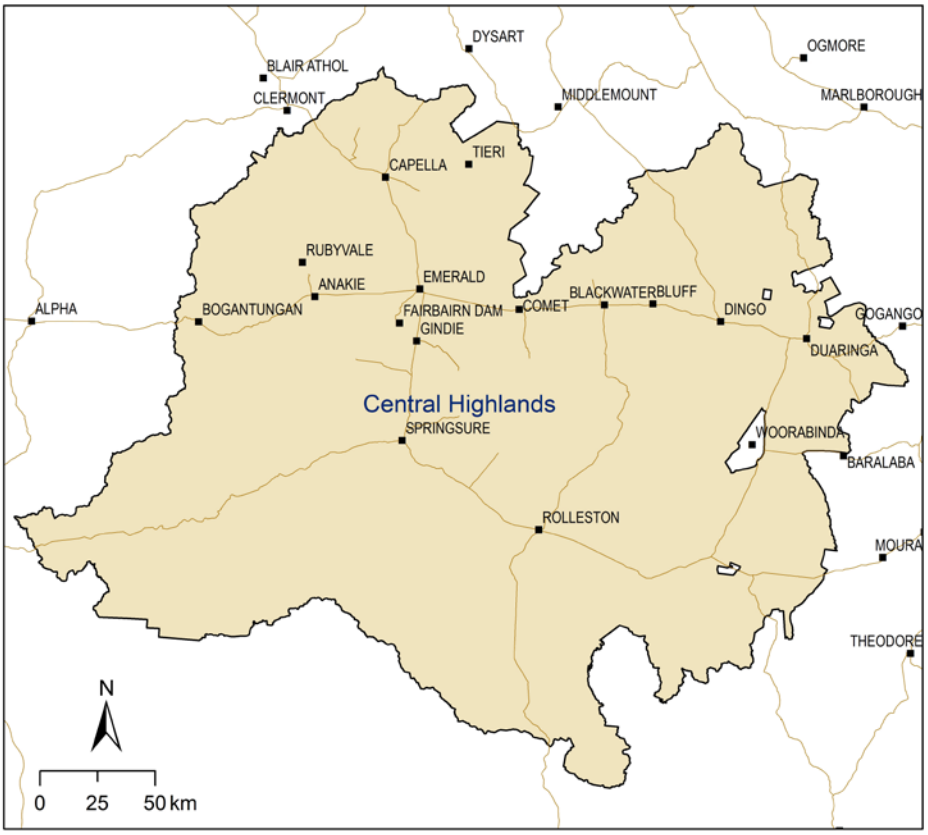

Figure 4. Central Highlands Region (Source: Central Highlands Regional Council).

Landscapes and livelihoods

Emerald is a hub for many government facilities including council, education and health as well as industries including mining, beef cattle, cotton, cropping, sunflowers, gemstones, tourism and citrus (CHQ 2019). The region has an average daily temperature range of 14.6–28.8 °C and an average annual rainfall of 636 mm.

The area includes one of Australia's largest coal reserves, the Bowen Basin, and is adjacent to the Galilee Basin, also of interest for its mining potential, and contains the largest sapphire-producing fields in the Southern Hemisphere. The Central Highlands supports a significant agriculture industry, with irrigation from water storage in the Nogoa and Comet Rivers. The region's wealth of natural resources and agricultural value has seen it attract significant investment over an extended period which has benefited the local communities and the economy.

However, by 2017, regional gross domestic product was at the lower end of its 10-year range (ABS 2018). The Community Plan (CHRC 2019a) identifies the need for specific communities to diversify their economy, attract more tourists and improve economic development. The Economic Master Plan (2017) notes that 59% of all jobs in the region (compared with 21.8% for Queensland) are linked to drivers of the export-oriented industries including mining, agriculture, construction and tourism. The mining industry employs more than three times the agricultural industry which is the second largest employer at the 2016 census after employment in construction halved between census periods (ABS 2016).

Building approvals during 2017–2018 increased over the previous year but remain significantly below the peak of 2012–2013. The number of businesses has remained steady with the number of small and microbusinesses (turnover up to $200 000) decreasing slightly (ABS 2018). Unemployment remained steady at around 4.5% between June 2016 and September 2018 after reaching 5.7% in September 2015.

4 Challenges and opportunities

To develop a transition roadmap, it is important to consider the challenges and opportunities that the region could face now and into the future. There is inherent uncertainty around some of these challenges and opportunities, how they interact, and how they may change over time. This uncertainty requires that transition pathways that are developed are robust yet flexible in order to build a prosperous, sustainable and equitable region into the future.

In conversations held with workshop participants, a number of challenges and opportunities facing the region were identified. These are outlined below in the context of current literature.

Governance, social and economic challenges and opportunities

As an export-oriented region, the Central Highlands is exposed to the effects of several global disruptors (Littleboy et al. 2012). These include changes in international markets and economic cycles, in part associated with the rise of Asia, particularly China and India (CHDC 2017), and the increasing demand for quality products to supply the fast-growing middle classes (Littleboy et al. 2012). A diverse economy with ongoing investment and strategic decision-making is seen as a help for managing these impacts (CHRC 2019b).

At the same time, the resource sector has driven up demand for land and accommodation, in turn affecting their affordability. High prices for housing and increased village-style accommodation have also undermined community unity and quality of lifestyle (CHRC 2019a).

Resources-driven, regional population growth without investment in infrastructure, services and coordination also places strain on critical infrastructure (CHDC 2017) while the cost to build, service and maintain quality public infrastructure continues to rise. The Community Plan calls for increased partnering and effective future planning to maintain and expand transport networks, community facilities and green spaces (CHRC 2019a).

Meeting the needs of an ageing population also presents challenges and opportunities. As older members of the population often tend to live in urban areas (Littleboy et al. 2012), the unique characteristics of ageing in regions may need better understanding, including how to support 'healthy ageing' through the development of lifelong learning and opportunities to contribute to the community (CHDC 2017).

Protecting the region's natural advantages in resources, biosecurity and the environment (CHDC 2017) is also a recognised priority. This objective sits alongside the potential to leverage natural resources and the environment to accommodate a growing demand for resources, materials and luxury ecotourism experiences, and recognising the opportunity for greater value-adding in the region (Littleboy et al. 2012).

Climate and extreme weather events

The Community Plan identifies a changing climate as a challenge for the region due to increased extreme weather events (CHRC 2019a). Planning for disasters such as fires and floods will help to minimise the long-term impacts on the agricultural sector and natural environment. Drought, in particular, has been challenging for the region; in June 2019, the Central Highlands was fully drought declared.

By 2030, Australia will most likely experience more summer days above 35 °C, and drought conditions are expected to worsen across inland Australia, bringing water security problems (Brumby et al. 2014). In recent years, Queensland summers have brought an increase in severe storms and floods, droughts, heatwaves and bushfires across the state. Climate change is likely to exacerbate the frequency and severity of these events (QDEHP 2016). In the future, the Central Highlands Region can expect higher temperatures, more frequent hot days, fewer frosts and reduced rainfall, although there will be more intense rain events (QDEHP 2016). In 2030, the climate in Emerald is projected to be like the current climate in Charters Towers, Blackall, Hughenden and Barcaldine (CCIA 2018).

Evidence suggests that climate stresses can impact on physical and mental wellbeing and strain limited social support services and key infrastructure in regional, rural and remote Australia (Hossain et al. 2014). The most vulnerable members of these communities, especially the elderly, the very young and sick people will be most at risk, placing more stress on health services and infrastructure (Brumby et al. 2014; Carroll and Loughnan 2014;QDEHP 2016).

Higher temperatures and longer dry seasons leading to bushfires may place communities in danger. Drought and other extreme weather events such as floods and cyclones also place financial burdens on communities and individuals (Brumby et al. 2014).

Tourism and recreation

Tourism provides a strong contribution to the regional economy based around attractions in the region such as its National and State Parks, including Carnarvon Gorge and the Sapphire Gemfields. Growth in tourism spending and overnight stays in the region over recent years suggests that tourism has the potential to provide a buffer to lower growth in other sectors of the economy (CHDC 2017).

Carbon farming and ecosystem services

Carbon farming includes land management activities that reduce greenhouse gas emissions or store carbon dioxide in the landscape. The Carbon Market Institute and the Queensland Government developed a National Carbon Farming Industry Roadmap for carbon farming to reach its full economic, environmental and social potential. Demand for verifiable carbon credits is expected to grow in the future, providing new opportunities for land managers. By 2030, Queensland may generate between $1.4 billion and $4.7 billion in land and agricultural offsets, abating 32–104 million tonnes of carbon through regeneration, managed native forest, avoided land clearing, savanna burning and reforestation (CMI 2018).

Communications and technology

The Central Highlands Economic Master Plan (CHEMP) recognises that new digital and knowledge economies including infrastructure and resources services, ICT services, and urban and environmental services will present challenges and opportunities for the region (CHDC 2017). The CHEMP also identifies high-quality digital connectivity as a precondition to the success of the region and the opportunities that may be harnessed, including automation and robotics and a workforce of the future. The Central Highlands Regional Council, through its Smart Community Framework commits to take advantage of digital technology for providing better services, employment and sustainability (CHRC 2019c).

Digital technology has the potential to create new opportunities in food, education, energy, minerals, tourism and health (Naughtin et al. 2017). New telecommunications services emerging across Australia provide access to services previously unavailable to rural and remote communities. For example, telehealth can assist in the long-distance diagnosis, treatment and prevention of disease and injuries by providing clinical support and improving health outcomes by connecting patients and clinicians who are not in the same physical location (Bradford et al. 2015). However, communication technologies rely on certain levels of infrastructure and equipment such as the internet, computer and videoconferencing systems, and these can be expensive and poorly maintained in remote locations. In 2015, an AgForce survey showed only 39% of its members had reliable mobile phone connections and just under 20% had no mobile connection at all. For those with a connection, almost half relied on satellite internet connection and only 11% were on the NBN (AgForce 2018).

Consumer pressures

Queensland is generally well positioned given its geographical location and capacity in areas such as tourism, health, education and food (Naughtin et al. 2017). Opportunities include the potential for increased exports to overseas consumers wanting access to healthy food year-round, with Queensland well placed due to its counter-seasonality to northern hemisphere producers. There is also increased overseas consumer demand for protein-rich products (e.g. beef, seafood, chickpeas), horticultural products (including exotic fruits), and healthy food products from a ‘clean green’ environment (Australian Organic Ltd. 2017).

Digital technologies, as noted above, have the potential to enable consumers to precisely track the provenance of food, from the field to the pantry. At the same time, commodity crop farmers will be able to match consumer demand for products and produce to create a more valuable crop. The connection between agricultural practice and consumer preference is expected to dramatically accelerate the adoption of new sustainable technologies in agriculture (Perry 2017).

This is significant for the Central Highlands Region as a key beef-producing area. Australians tend to prefer

lean, pasture grown beef, but many overseas consumers, particularly in northern Asia, prefer marbled, grain-fed beef produced through long periods (up to 120 days) of feed-lotting (Greenwood et al. 2018). Forty per cent of Australia's total beef supply and 80% of beef sold in major domestic supermarkets is sourced from the cattle feedlot sector (ALFA 2018). Maintaining Australia's preferred status as a quality assured supplier of high-value beef produced under environmentally sustainable systems from 'disease-free' cattle is increasingly competitive and expensive (Greenwood et al. 2018).

Energy

In Queensland, the price of electricity networks contributes about 50% of the final cost of electricity for small customers, which is expensive (Macdonald-Smith 2018; Agnew et al. 2018). According to a new Australian Industry Group report, the electricity price improvements experienced since 2017 have been 'strictly relative' and gas supply costs are likely to remain high as exports have permanently transformed the market (Agnew et al. 2018).

Access to cheap, reliable energy is critical to sustain many industries, including agriculture and retail (Naughtin et al. 2017). Until recently almost all electricity in the nation was generated from coal, gas and hydropower but there are fundamental changes occurring in the energy sector providing opportunities to reduce the cost of energy and shift sources of energy from non-renewable to renewable. Over the next 20 years, several existing coal-fired power stations will be approaching the end of their technical lives. Costs of new renewable energy continues to fall, and availability of storage technologies is increasing (AEMO 2018).

Solar energy has particular potential for the region. Consumer demand for cheaper electricity is driving demand for residential photovoltaic systems with battery energy storage (Agnew et al. 2018). In 2017, 24% of South East Queensland and 19% of regional Queensland households had installed a rooftop solar photovoltaic system (Colmar Brunton 2017) and these figures continue to grow rapidly (Colmar Brunton 2017). The federal electorate of Flynn, in which the Central Highlands Region sits, ranks 22 out of 150 for rooftop solar panel installations (Solar Citizens 2018). As of September 2018, there were 5,992 small scale (<100 kW) solar generation installations, 1,051 heat pump installations and 3,848 solar hot water installations in the region (AGCER 2018).

Water

Central Highlands water is sourced from several locations and treated locally (CHRC 2018). Emerald is supplied by Nogoa Mackenzie Water Supply Scheme sourcing water from Fairbairn Dam (Lake Maraboon). According to the regional water supply security assessment for Emerald by the Queensland Department of Energy and Water Supply, groundwater in and around this locality is too saline for urban or agricultural use without significant treatment (DEWS 2017). Approximately one-quarter of the urban water used in Emerald is recycled from a wastewater treatment plant and used for agriculture (DEWS 2017). Emerald has a water conservation framework in place to meet water needs during periods of drought. However, Emerald is likely to exceed its current urban water allocation in the next 10 years (DEWS 2017) and is also under pressure from competition with other users (e.g. agriculture and mining). Population growth and per capita water demand will influence timing of the shortfall supply (DEWS 2017).

Waste

Central Highlands has a Waste Reduction and Recycling Plan 2016–2026 with targets aimed at reducing waste to landfill. Central Highlands Regional Council manages 18 waste management sites including three landfill, transfer stations and bulk bin sites. A waste audit in 2013 indicated that 37% of household waste going to landfill was organic and approximately 28% of other waste (glass, plastic and metal) could have been put into the recycling stream (Pitt et al., 2016). The Queensland Government's waste management strategy aims to increase recycling and create new jobs, new products, new industries and new markets. A waste disposal levy underpinning the strategy will apply to the Central Highlands, which intends to reduce the incentive to dispose of waste to landfill and provide opportunities to create new industries based on recycled materials. The Waste Reduction and Recycling Amendment Bill (2017) enabled a container refund scheme that provides an opportunity for community organisations to make money from collecting bottles and cans while reducing litter. The program also encourages social enterprises and potentially creates new jobs and regional business opportunities (Boomerang Alliance 2018).

5 Values, vision and goals

Values

Core values articulated by workshop participants and expressed in the *Central Highlands 2022 Community Plan* are:

- community – inclusive and welcoming, engaged – strong community spirit, quality community facilities
- people – safe, supportive, family friendly
- rural and regional character, relaxed lifestyle
- heritage and culture
- economically diverse, innovative, energetic and enterprising, prosperous
- scenic landscapes and natural resources.

Vision

The Regional Council vision for the region is, 'A progressive region creating opportunities for all' with priorities of:

- strong vibrant communities
- building and maintaining quality infrastructure
- supporting the local economy
- protecting people and the environment
- leadership and governance
- our organisation.

The Central Highlands 30-year economic vision is outlined in Table 1.

Goals

Combining the community values with the Regional Council's visions, appropriate goals for the region might be expressed as:

- A diversified, sustainable economy built around the region's resources and human capital.
- Integrated community wellbeing and resilience.

Table 1. The Central Highlands 30-year economic vision. (Source: CHDC 2017)

The Central Highlands 30-year economic vision
Emerald is a self-sustaining regional inland hub supporting successful and thriving communities.
A diversified economy with several mature and thriving local industries.
A highly skilled, local workforce that supports our industries to adapt and grow in a changing environment.
An established international reputation as a reliable source of clean, safe and quality agricultural production. A sustainable key food source supplying global markets.
High-quality connectivity, both physically and digitally, to domestic and international markets, services and information.
Celebration, protection and promotion of the region's natural assets.
Partnering with public and private sectors to implement governance structures that will promote the region being open for business and investment.

6 Priorities and pathways

Drawing on the pressures and opportunities for the Central Highlands Region, workshop participants explored plausible future scenarios for the region as a basis for identifying robust options and pathways to pursue (Figure 5). They considered strengths, weaknesses, opportunities and threats for each of the scenarios discussed, as well as identifying possible 'wild card' external factors that could affect their future and 'gateway keys,' actions that could start them in that direction.

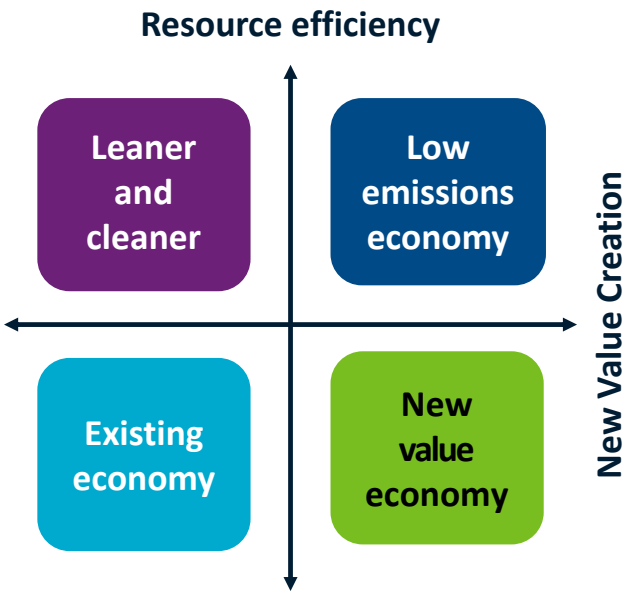

Figure 5. Future scenarios explored for the Central Highlands Region.

The **Existing Economy** or BAU which incorporates some improvement in efficiency of resource use and process and encourages innovation. The remaining three are based on targeted effort either on substantially increasing new value creation or resource use and input efficiency, or both.

The **New Value Economy** scenario was about incorporating new value creation without any emphasis on resource efficiency or reducing emissions under this scenario, agribusiness would be more data driven, with data creating new sources of value. Resource market volatility was identified as an issue as it flows onto population volatility and reduced social cohesion. Climate change uncertainty was also seen as a challenge. Thriving in this scenario would require upgrades in road and rail and telecommunications and greater availability and affordability of power.

The **Leaner Cleaner** scenario targeted resource efficiency without emphasising creation of new value: using less energy, water and materials. A discussion around what this might be like and what would be required to move here from BAU included:

- Becoming a world leader in mine site rehabilitation.
- Having 'green'-certified production to attract investment.
- Accessing improved transport via new types, e.g. bots, light rail, drones.
- Access to clean and affordable energy, e.g. solar and waste to energy, which also creates new jobs.
- Integrating economic, environmental and social aspects to create social change around people's thinking, not just within their communities, but as businesspeople and global citizens.
- Needing to build social capital for community to own and drive the process and needing to lobby and attract investment and skills to move in this direction.
- Developing indicators to track integrated performance as evidence to support lobbying efforts and attract big business, e.g. carbon footprint.

The **Low Emissions Economy** scenario combined improvements in resource efficiency with creating new value for the economy. It encompassed new transportation modes, jobs, skills and sources of energy. The conversation was around drawing on existing strengths such as:

- diversity of agriculture and amount of agricultural land and sunshine
- existing organisational strength and capacity
- already an industry and education hub.

To develop:

- new industries – recycling, including mining industry waste, renewable energy generation, carbon sequestration
- niche agricultural products.

By focusing on:

- Attracting and building skills locally, starting with a skills audit and identifying other incentives to attract skills to the region. Existing local agtech is an established starting point and consistent with the trend to increasing automation. While this reduces jobs in some areas it also creates new business opportunities.
- Lobbying all levels of government and marketing the region internationally to attract investment.
- Transport access, access to affordable energy and government regulation were limitations to moving forward in all the scenarios.

Focal areas

The ideas developed at the workshop were summarised into three broad focus areas for developing project ideas at the next workshop:

1. Advancing sustainable world-class agriculture through agtech and cleantech innovation and leadership for the region with relevance to the national and global economies.
2. Strengthening existing and creating new governance systems and value chains supporting development of a circular economy in the region.
3. Strengthening economic resilience by building regional human capacity through skilling and attraction and retention of a broader range of skilled technical and professional services people as well as projects supporting regionally based entrepreneurs and projects extending community capacity to consider, deliberate and innovate as a community.

Pathways and options to maintain, modify or transform the region

To transition the region towards the desired future, each focus area will need an ensemble of intervention options (investment, policies, programs, projects and practice change) that are prioritised, sequenced and implemented. The pathways will also require mechanisms by which the challenges and opportunities can be addressed. The pathways need to be broad, alternative and complementary to allow for flexibility in addressing the uncertainty around how the challenges and opportunities may unfold in the future.

Working groups were formed around each of the three themes identified above. Each group developed potential project ideas for progressing towards the desired outcome as well as connections to some existing projects (see Table 2).

Table 2. Broad pathways and initial project ideas for the three focal areas.

Advancing sustainable world-class agriculture	Strengthening economic resilience by building human capacity	Development of a circular economy
Improved communications infrastructure to meet requirements of existing large Central Highlands Development Corporation projects being planned e.g. beef processing plant, Agfrontier incubator, Paddock to Fine Dining, Paddock to Port A digital communications audit is under way	Develop a scope and business case for a community organisation that can understand, advocate, monitor measure aspects of community wellbeing services provided locally Consider placement of people into the workforce in the longer term Already have a constitution and business name and about to register with ASIC. Innovation audit about to be released	Channelling water from the Fairbairn Dam channel to enable development of the existing Inland Port and to facilitate new agricultural production near the channel, i.e. creating an industrial ecology channel Could also consider connecting Rookwood and Fairbairn to promote new agriculture between Rookwood and Emerald
Water route value analysis for developing an Inland Port • Compare a point-to-point pipeline from the Fairbairn Dam by the shortest possible route with a pipeline from Weemah Channel down the existing road/railway corridor easement • Analyse the area between Dam and Port for soil types/suitability for high-value agriculture/other uses to inform pipeline route to maximise benefits to water users	A new model for community transport, building accessibility for people in regional areas. A past business case exists	Waste to • Biofuels and other products, using same feedstock used in existing compost facility CQ Compost (e.g. gin ash, hay, sorghum stubble, liquid waste from transporters) as well as exploring new sources (e.g. hemp, citrus) • Energy through incineration of waste (including plastic) or biomass opportunities and creation of a microgrid for distribution (CQIP site)
Meatworks – another hub	'Where there's a will' – positive psychology project in schools	Gem tourism
Medicinal cannabis	Social Wellness Indicators	Recreation tourism
Compost	Regional Skills Investment strategy	Cultural tourism
Biogas		Innovation audit
Involve University of Central Queensland in research for local development, e.g. sample testing, accessing information	Swarm Farm – robotic technology developed locally	Regional approach to Waste and Waste2Energy Rookwood weir
Use of Ag College facilities		Advanced Manufacturing hub in CQ

7 Development of prefeasibility business cases

Of the projects proposed by the Central Highlands workshop participants, three were selected for development of prefeasibility business cases. These are designed to provide a sound basis for a decision to proceed to full business case development. Figure 6 shows the pathway from developing the broad pathways, to project ideas/options and to prefeasibility business cases.

The set of prefeasibility business cases proposed for Central Highlands identify not only low emission opportunities but offer the tools and structures to build resilience in regional economies.

Prefeasibility business cases

Central Highlands Connections: Enabling greater connectivity between the region and its industries, and the national and global economies

This project has been prioritised under Advancing World-Class Agriculture. The project objective is to identify constraints on sustainable economic development of the region due to lack of connectivity in order to identify how to improve connectivity between the region and national and international markets and grow the region's capacity to feed the world.

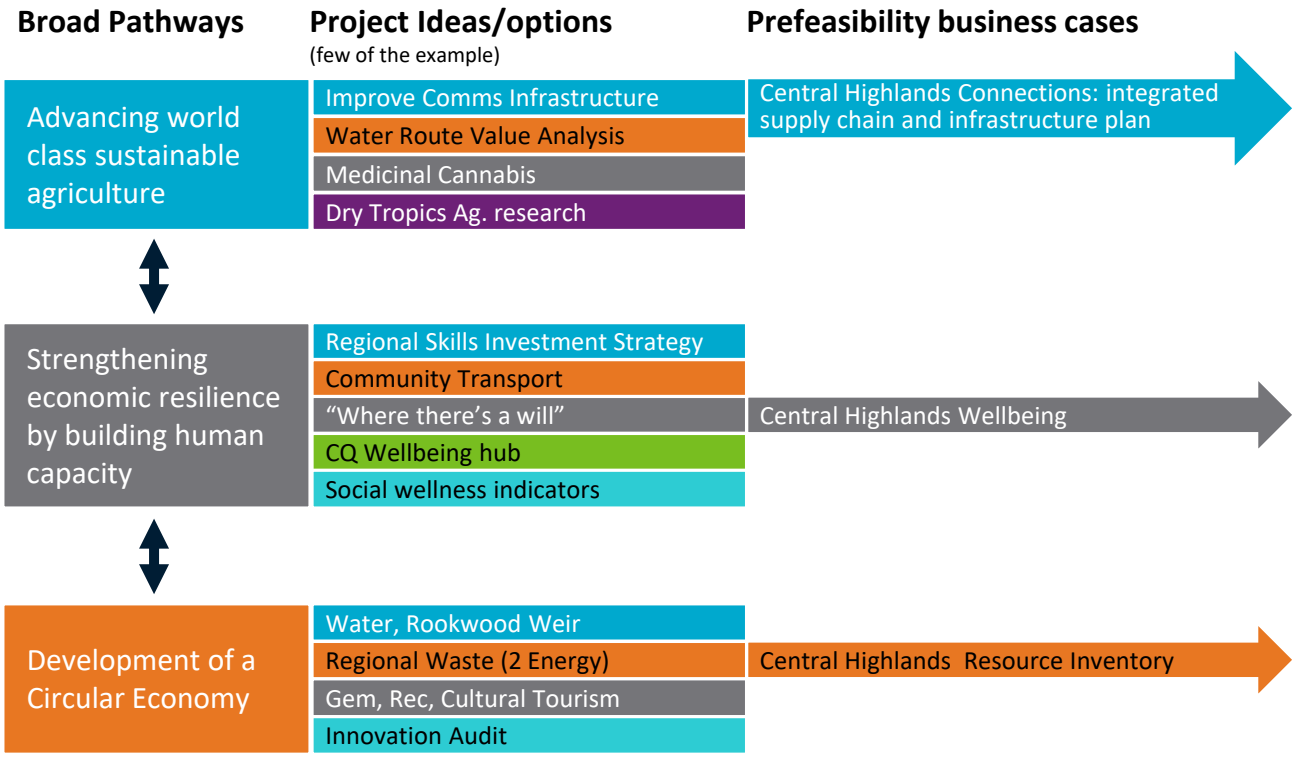

Figure 6. The process for the creation of broad pathways, to project ideas/options and the prefeasibility business cases.

The working group considered two options:

1. Develop an Integrated Supply Chain Map and an Infrastructure Plan.
2. Do nothing – no change to planning methodology; infrastructure planning continues to be conducted modally.

Option 1 is recommended as it provides the framework for integrated regional infrastructure planning to best take advantage of supply chain opportunities.

This project will examine where the Central Highlands fits in the various industry supply chains, identify opportunities for value-adding in the region and identify infrastructure priorities to capitalise on those opportunities.

The product will be a prioritised infrastructure plan and strategy to allow infrastructure investment decisions to be made based on what investments will have the most positive impact on the region. It provides the basis for whole of region investment planning which may see an internet connectivity investment prioritised over a particular road connection once a source of funding has been identified.

Central Highlands Wellbeing

This project considers establishing a vehicle to monitor and improve community wellbeing in order to deal with significant change anticipated in the coming decades, focusing on the community and human services sector.

Options to be explored include:

1. Conducting a community wellbeing gap analysis, bringing diverse regional voices together to get a regional perspective.
2. Developing metrics and accessing data to identify suitable Community Wellbeing Indicators to enable social wellbeing projects and programs to be prioritised and coordinated.
3. Attracting social investment into the region.

Central Highlands Circular Economy

The goal of this project is to identify potential business opportunities arising from application of circular economy principles to creating value from waste resources in the region.

Options to be explored include:

1. Central Highlands Resource Inventory – conduct waste audit with a view to create new reprocessing industries in the Central Highlands.
2. Do Nothing Option – a continuation of BAU.
3. The recommended option is to proceed with the resources inventory project.

For further details see the business cases (separate documents).

8 Dynamic transition roadmap for the future

Types of change pathways

Each of the broad pathways will build and enhance existing resource use and livelihood systems in the region in the short term, modifying some aspects gradually and even transforming other aspects by radically changing and/or adding some significant new components into the regional economy. Therefore, it is possible to envisage each proposed pathway as having different stages or aspects to maintain, modify and transform the region that will require different types of interventions. Table 3 is an example of how possible interventions for each of the three focus areas could be implemented to maintain, modify or transform aspects of the region without precluding work that could be initiated for the other stages as part of the broad and dynamic roadmap.

Table 3. Three proposed pathways and potential intervention options that would maintain, modify and transform aspects of the region to realise the vision and goals.

BROAD PATHWAY	MAINTAIN	MODIFY	TRANSFORM
Advancing sustainable world-class agriculture	Explore soil, water, climate, energy, communications and land use improvement options to maintain aspects of current regional agriculture	Develop and implement innovative strategies for agriculture to be regenerative and part of a circular economy, e.g. composting, energy, water reuse	Enabled by technology, local innovation and a circular economy, transform agriculture to be climate proof, low emission and low waste, high-value agribusiness
Development of a circular economy	Continue with current renewable energy trajectory and exploration of waste processing and use options	Develop and implement innovative strategies to create regional circular economy value chains	Develop integrated regional waste, energy, water, transport and communications infrastructure and services to enable a circular economy
Strengthening economic resilience by building human capacity	Work with existing services providers and businesses to explore human services needs and integrated approaches to addressing them	Establish a Community Development Hub and collectively develop a regional ecosystem for learning and sustaining regional wellbeing	Attract, build and maintain skilled, digitally enabled and entrepreneurial technical and human services workforces adapted to future job requirements

To aid visualisation of the broad pathways, Figure 7 shows sets of strategic intervention options that would maintain, modify and transform aspects of the region to realise the vision and goals.

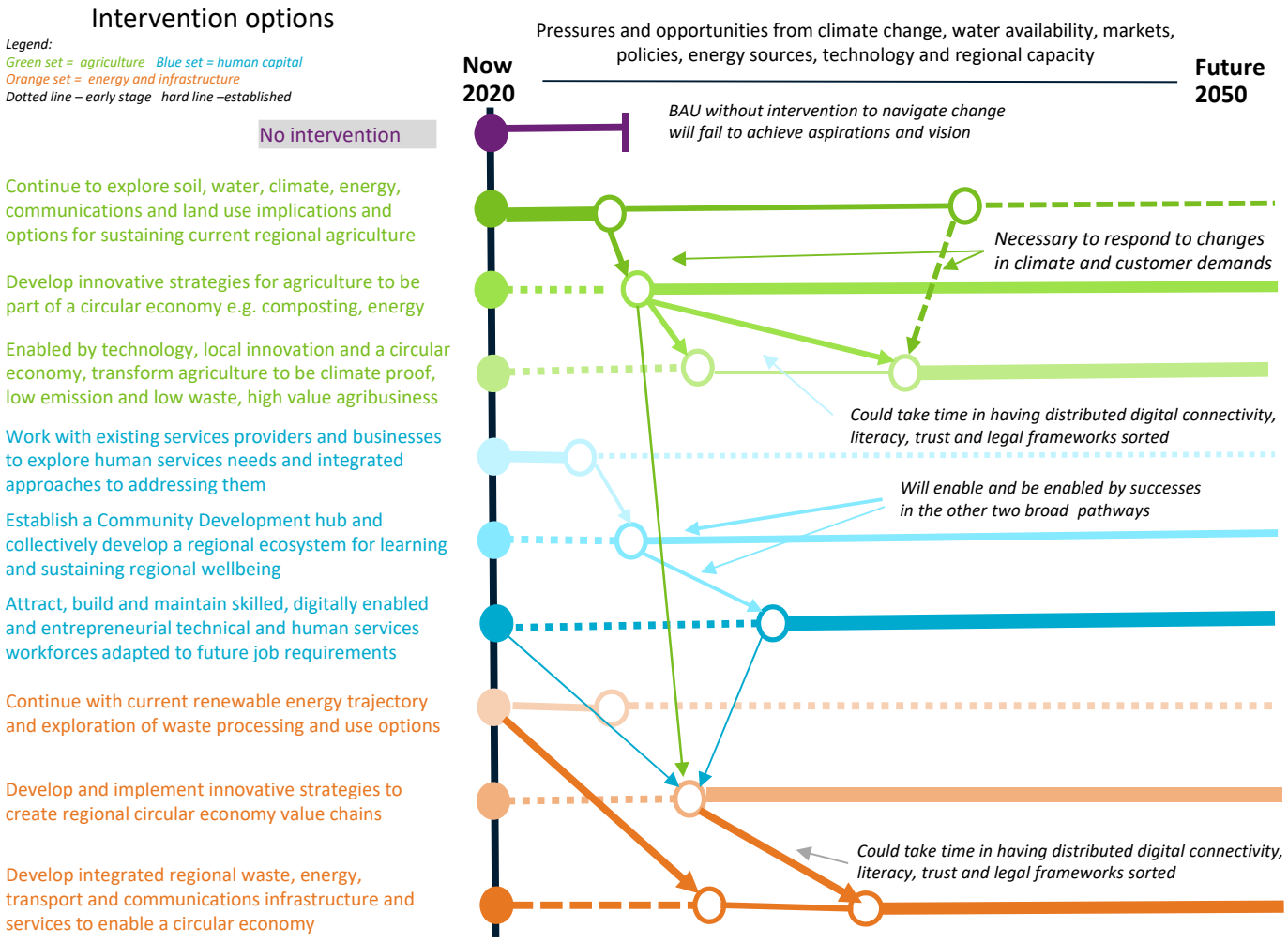

Figure 7. Sets of intervention options and their interdependencies, to 'maintain', 'modify' and 'transform' aspects of the region.

Interventions across pathways

There are five cross-cutting intervention domains identified in participant workshops and working group discussions that could enable the realisation of the three broad pathways. These are:

1. Feasibility studies and research

Prefeasibility studies have been prepared for selected project ideas that will form the basis of business case proposals. Building on these prefeasibility studies, it will be essential to undertake thorough feasibility studies to develop business cases for investment that sets the foundations of this roadmap in motion. This roadmap is a living and dynamic document to allow for learning from trials and innovation. As more information is gathered, more developed feasibility studies can be prepared that include new innovative ideas and robust options for achieving the vison and goals of the region.

2. Digital connectivity

Digital connection and capacity that is well distributed to the towns, farms and other businesses in the region will be a key driver and enabler of change across the three pathways. The Central Highlands Regional Council's Draft Smart Community Framework (CHRC Draft Smart Community Framework 2019) identifies actions for the Regional Council to work with community, other governments and private companies to further develop this connectivity platform.

3. Physical (transport) connectivity

A well-connected region is essential for efficient and effective provision of health, education, social and administrative services for residents, transporting agricultural inputs and high-value produce, as well as access and service for tourism and a diversified regional economy. The Regional Council has objectives to a) develop a roads and transport strategy, including continued collaboration on essential needs with local road user groups and b) to work with governments and industry to investigate transport and water infrastructure requirements as part of the infrastructure investigations for the Central Queensland Inland Port and feeder roads (CHRC 2019 a, b).

4. Renewable energy

The pathways require renewable energy to establish world-class sustainable agriculture with low emissions, to reinforce the clean green image of agricultural produce and agribusinesses to promote rural lifestyle experiences and tourism and for providing a region attractive for learning, working and living.

5. Water

As identified in discussions around moving towards sustainable world-class agriculture, water availability into the future will be key. With rainfall in the region projected to decrease and evaporation to increase, developing innovative approaches to reducing water use and reusing water will be essential.

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