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Building a Better Queensland – State Infrastructure Strategy and Regional Plans

Engineers Australia Response and
Recommendations

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Queensland State Infrastructure Strategy and Regional Infrastructure Plans

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Contents

Building a Better Queensland – State Infrastructure Strategy and Regional Plans	1
1. Introduction	4
1.1 Engineers Australia	4
1.2 Queensland Division Committee.....	4
1.3 Purpose.....	4
1.4 Contact details.....	5
2. Recommendations	5
3. Decade long gaps in strategic planning	6
4. Essential issues for assessment and analysis.....	7
4.1 Disconnect between Urban and Regional Queensland Plans	7
4.2 Population Imbalance	7
4.3 Maintenance Considerations.....	8
4.4 Governance.....	8
4.5 Engineering Standards.....	8
5. Responses to Questions	9
5.1 Planning for Infrastructure Priority Area.....	9
5.2 Planning of Growth Area	10
5.3 Adapting Infrastructure for Modern Needs.....	10
5.3.1 Supporting economic recovery.....	11
5.3.2 Attracting Private Sector Investment	11
5.3.3 Boosting Job Growth.....	12
5.4 Updating of SIP	13
5.5 Building Thriving Communities & Successful Precincts	13
5.6 Infrastructure Sustainability and Resilience	14
5.7.1 Sustainable Infrastructure	15
5.6.1 Commercially Sustainable Infrastructure	15
5.6.2 Resilient Infrastructure	16
5.6.3 Supporting Economic Resilience.....	16
5.7 Infrastructure Practices and Innovations	16

1. Introduction

1.1 Engineers Australia

Engineers Australia is the peak body for the engineering profession in Australia. With approximately 100,000 individual members across Australia, we represent individuals from a wide range of disciplines and branches of engineering. Engineers Australia is constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community.

This response is guided by our Charter and Code of Ethics which states engineers act in the interest of the community, ahead of sectional or personal interests, towards a sustainable future.

1.2 Queensland Division Committee

This submission has been informed by members of Engineers Australia's Queensland Division. The Queensland Division within the Brisbane office serves the engineering community in Queensland and is led collaboratively by a General Manager and a Division Committee comprised of local volunteer members. The Division Committee is comprised of members with multidisciplinary technical and engineering expertise, who have thoroughly addressed the questions from *State Infrastructure Strategy and Regional Infrastructure Plans - Building an even better Queensland (SIS and RIP)*.

1.3 Purpose

Engineers Australia welcomes the opportunity to provide this submission to the Queensland Government in response to the SIS & RIP. The main purpose of this submission is to answer all the questions raised by the Queensland government for the successful development of the strategy. Engineers Australia broadly supports the principles and objectives defined in the Strategy and has provided responses, recommendations, and identified omissions for further consideration and development.

Infrastructure Australia has decided to change the Strategy from the traditional 'predict and provide' model to a more forward-thinking model of 'vision and validate.' Engineers Australia supports this and considers it appropriate to review the existing strategic and associated infrastructure planning requirements. Infrastructure planning requires reassessment of previous planning parameters due to unprecedented changes in population, climate change, current and future pandemics, and rapid technological advancements, as well as the potential hosting of the Olympics in 2032.

Engineers Australia advocates strongly for continuous improvement in strategic planning processes and recommends integration of community infrastructure projects financed and funded through the private sector, as well as those which have been publicly financed into the State Infrastructure Plans. Furthermore, independent risk-based prioritisation of projects, independent risk-based assurance of projects, independent risk-based analysis of market and procurement strategies, transparent sharing of information and data for the benefit of the community is recommended.

The significant diversity of Queensland (particularly compared to other states of Australia) is reflected in the existing designation of the seven regional areas comprising the State: Far North Queensland; Northern & Western Queensland; Mackay, Isaac & Whitsunday; Central & Western Queensland; Wide Bay Burnett; Darling Downs & South West Queensland; South East Queensland. These regions have significant differences in geography, population, climatic conditions, economic drivers, and accessibility. These differences affect the strategic regional planning for their respective communities and the infrastructure necessary to enable desired outcomes. All our responses have been provided keeping all these considerations in mind.

1.4 Contact details

For a discussion about the issues raised in this submission, please contact Stacey Rawlings, General Manager for Queensland Division, at SRawlings@engineersaustralia.org.au.

2. Recommendations

Engineers Australia recommends that the Queensland government works to:

1. Strengthen the planning framework by recognising the essential hierarchy of Regional plans, Infrastructure plans and Implementation plans specific to the requirements of all seven regions comprising Queensland.
2. Determine the priority and resource for the nine foundation areas (Education, Community, Regions, Economy, Health and Wellbeing, Environment, People, Infrastructure and Governance) identified in the Queensland Plan, ensuring a robust and transparent process involving engineers in the decision making process.
3. Ensure that the committed consultation and periodic review process is adhered to, with progressive rolling development, rather than starting again after five years. This will enable communities and industries alike to plan and invest with confidence.
4. Continue strengthening the planning and infrastructure delivery programs integrating cooperation across all three levels of Government and in continued consultation with industry bodies and private sector organisations.
5. Promote cross sectoral collaboration involving land, transport, utilities, energy, information technologies, artificial intelligence agencies, to deliver innovative and sustainable infrastructure solutions. The current Infrastructure Plan is segmented and does not promote collaboration among sectors. The use of transport corridors to accommodate utilities services should be encouraged.
6. Review existing funding models and provide sufficient financial resources for investment in both new and existing infrastructure assets, so that declining levels of service can be addressed and so that those assets can continue to be fit for purpose.
7. Increase the engagement with the engineering community regarding infrastructure and technology by including development of the vision, development of the governance processes, development of the SIS and RIP, and development of workforce plans for engineering capability within government. The Economics and Governance Committee Report 2021 supports this.¹
8. Incorporate increased levels of engagement across government agencies involved in strategic planning and infrastructure delivery. This would be assisted by the establishment of a Chief Engineer position within government.
9. Incorporate guidelines for sustainability into the Strategy, drawing on Engineers Australia's publication *Implementing Sustainability: Principles and Practice*² and Infrastructure Australia's publication *Sustainability Principles: Infrastructure Australia's approach to sustainability*.³

¹'Debt Reduction and Savings Bill 2021' *Economic and Governance Committee Report 2021*

<https://www.parliament.qld.gov.au/documents/tableOffice/TabledPapers/2021/5721T652.pdf>

²'Implementing Sustainability: Principles and Practice' *Engineers Australia* <https://az659834.vo.msecnd.net/eventsairaeuprod/production-engineersaust-public/6497eadea9a24836941a49a2759ae9ae>

³'Sustainability Principles: Infrastructure Australia's approach to sustainability' *Infrastructure Australia* https://www.infrastructureaustralia.gov.au/publications/sustainability_principles

3. Decade long gaps in strategic planning

Over the last 10 years, it is noted there have been several changes leading to gaps in the approach to strategic planning in Queensland:

1. The frequency of Regional Planning and respective reviews across the seven designated regions of Queensland appears to be adhoc, resulting in varying degrees of uncertainty within respective communities and industries.
2. Regional Infrastructure planning has been consolidated into a single State Infrastructure Plan (SIP), which in turn has been subdivided into a Part A (Strategy) and a Part B (Program), thereby somewhat diluting the degree of focus on the specific aspirations and requirements of the different regions comprising Queensland.
3. There has been an ever-increasing backlog of unfunded infrastructure requirements that inhibit realisation of various regionally planned outcomes.
4. Diminishing budget allocations for some asset maintenance programs has resulted in a decline in overall Level of Service (LoS) ratings for some existing infrastructure assets, with some regional infrastructure assets in danger of losing their Fit for Purpose functionality.
5. Delayed, limited and often non existent, commitment to major infrastructure programs identified through Regional Plans has led to a significant shift of finite skilled resources to other eastern Australian states that potentially render Queensland less competitive relative to those states.
6. Focussing solely on the short-term job creation associated with specific infrastructure commitments has often precluded strategic and essential funding, such as investment in future transport corridors and utility infrastructure in densely populated and developing precincts.
7. The following issues were identified under the Integrated Transport Planning Report 4: 2017-18 by Queensland Audit Office⁴ *When DILGP was not able to address gaps agencies identified for the State Infrastructure Plan and ShapingSEQ⁵, it was because agencies requested changes that:*
 - *ran contrary to the government's position (e.g., to be more precise and committed about projects in the five- to fifteen-year timeframe); or*
 - *would require a public policy position to be developed first (e.g., on demand management and pricing policies).*

⁴'Integrated transport planning report 4: 2018' Queensland Audit Office <https://www.qao.qld.gov.au/reports-resources/integrated-transport-planning>

⁵'Shaping SEQ - South East Queensland Regional Plan 2017' QLD Department of Infrastructure, Local Government and Planning <https://dsdmipprd.blob.core.windows.net/general/shapingseq.pdf>

4. Essential issues for assessment and analysis

Engineers Australia recommends consideration of the following items in the development of a State Infrastructure Strategy.

4.1 Disconnect between Urban and Regional Queensland Plans

Engineers Australia produced a policy paper in 2015 focussed on the critical role of state infrastructure planning authorities.⁶ This paper identified and discussed the critical inter-relationships of the strategic planning hierarchy of Regional Plans, supported by their respective Infrastructure Plans, which in turn are underpinned by detailed Project Implementation Plans for specific projects within those Infrastructure Plans.

It is acknowledged that the Regional Plans identify specific strategic community outcomes desired, and future visions for their respective communities over 25-to-50-year planning horizons. Those outcomes will create thriving communities and successful precincts across respective regions. Accordingly, these draft Regional Plans are generated through harnessing a diverse range of professional skill sets. Communities are widely consulted during their preparation to establish ongoing community and industry ownership. There is a legislative requirement for 5 yearly review of these plans to incorporate any shifts in their basic planning parameters.

Once the respective regional outcomes have been identified and widely agreed upon through the Regional Planning processes, the necessary infrastructure to enable and support those outcomes can be identified and documented within the respective Regional Infrastructure Plans. These specific infrastructure plans also need to incorporate significant upgrade and maintenance programs for existing infrastructure assets as well as any new infrastructure that may be required.

Once specific projects identified within the Regional Infrastructure Plans are prioritised and committed for financing through either state budgets, forward estimates, or business case assessments (depending on their respective delivery prioritisation), then their specific Project Implementation Plans should be developed.

4.2 Population Imbalance

Due to the COVID-19 pandemic, population growth is in decline. This is relevant because population growth underpins the business cases of most, if not all transport and utilities infrastructure projects. Population growth exacerbates urban congestion and creates pressure to upgrade ports, airports, and other facilities.

But the COVID-19 crisis has caused rapid decline in population growth. Net overseas migration fell from 239,600 in 2018-19 to minus 72,000 in 2020-21.⁷ Natural population growth is also contracting, with Australia's fertility rate, currently at 1.69 babies per woman, expected to fall to 1.62 by the next decade⁸.

⁶Unclogging the Pipeline: The critical role of State Infrastructure Planning Authorities (October 2015)

⁷'Migration, Australia, 2019-20 financial year' *Australian Bureau of Statistics* <https://www.abs.gov.au/statistics/people/population/migration-australia/latest-release>

⁸McDonald, P. (2020). 'A projection of Australia's future fertility rates' *Analysis by Peter McDonald for the Centre for Population* <https://population.gov.au/downloads/McDonaldFertilityProjections.pdf>

The population growth decline may only be temporary and not continue once the borders reopen. Infrastructure is a long-term investment, and Infrastructure Australia is continuing to take a 30-year view of projects, even during COVID-19. Engineers Australia feels that this current fluctuation in population should not be a deciding factor for the state infrastructure needs.

4.3 Maintenance Considerations

Under-investment in the maintenance of existing infrastructure assets is particularly prevalent in Queensland, where, due to our dispersed and decentralised population centres, our regional areas are reliant on their infrastructure, and our assets are regularly subjected to extreme weather events. Without a focus on maintenance of that infrastructure, there will be a declining Level of Service (LoS), often to the point where it is regarded as no longer Fit for Purpose.

In any review of strategic infrastructure planning frameworks, it is vital to invest in maintenance and upgrades to existing infrastructure, which can only occur if assets remain Fit for Purpose and continue to meet their designated Level of Service performance parameters. This can only occur if the existing infrastructure is appropriately maintained on a continuous basis and subjected to an ongoing risk management framework.

The increase in electric vehicles on our roads will demand a change in the current road maintenance funding policies, which are currently based on fuel excise generated solely from the use of fossil-based fuels. Without such a change, the transition to road vehicles using electric traction will see a significant erosion in available road maintenance funding. This provides an example of applicability of appropriate risk management frameworks.

4.4 Governance

Consistent criteria should be used to assess asset risk profiles based on Queensland Government's risk tolerances. This would help to inform priorities for the future across all sectors. Discount rates must be updated to support the current market, as they are presently too high and have the effect of making short-term projects appear more attractive than long-term projects, which has a negative impact on our long-term sustainability, efficiency, and value. The rates should change and evolve, and the method for determining rates should be transparent.⁹

4.5 Engineering Standards

As we transition towards an increasingly connected and digitally driven future, most of the infrastructure to be introduced in next 20 to 30 years will be different to that used in past. Electric vehicles, emerging energy system technologies and greater digital interdependencies are some of the expected changes for the future of infrastructure.

A review of policies and standards is required to develop and adapt, in order to support, balance and prepare for these new infrastructure requirements.

Engineers Australia also strongly recommends creating the role of Chief Engineer within the government to lead the administration of standards (which have not been recently reviewed) with respect to infrastructure along with administering infrastructure, from design and construction, to implementation, maintenance and decommissioning. Inclusion of Asset Managers in all project stages is also recommended.

Engineers Australia strongly recommends that the government develops a resilience standard, with key performance indicators to guide planning, investment, and maintenance of critical infrastructure.

⁹ 'Unfreezing discount rates: transport infrastructure for tomorrow' Grattan Institute <https://grattan.edu.au/wp-content/uploads/2018/02/900-unfreezing-discount-rates.pdf>

5. Responses to Questions

5.1 Planning for Infrastructure Priority Area

Which infrastructure is the greatest priority for your region?

The vast geography of Queensland presents complex challenges in deciding the greatest priority of the region. Queensland is one of the largest states consisting of seven different regions, and each region has its own needs. Engineers Australia supports a collaborative approach to regional and urban development, engaging political and community leaders, and technical experts working in close consultation with the local representatives.

*Shaping SEQ (South East Queensland Regional Plan 2017), a 50-year vision*¹⁰ was prepared in 2017 jointly by the state and local governments and informed by wide-ranging consultation is due for review in 2022-2024. The vision was focussed on the next 50 years (2017-2067), with target initiatives identified for progression on the next 25 years (2017–2041). The document addressed SEQ demography, economic growth and the infrastructure required to support productivity. Engineers Australia requests a similar approach for all regions, including the five key themes that underpin the 50-year vision for SEQ: Grow, Prosper, Connect, Sustain and Live, to avoid a two-speed economy.

Engineers Australia believes that the development and 5-yearly review of regional plans for all seven regions will set the priorities for the State infrastructure plans. Therefore, Engineers Australia considers it appropriate to determine regional infrastructure priorities after the respective regional planning has been reviewed and established.

Some priority areas for Queensland have also been identified. A holistic approach and vision for Health, Energy, Water, Waste and Climate is essential and there is a need to consider developing improved models for water costing and pricing. There should be a state-wide vision and plan for decentralisation and microgrids versus centralisation.

Queensland government and its relevant departments must develop water security and drought response plans (like the regional transport plans as developed by the Department of Transport and Main Roads) for all the entities across the state. Water security has been historically underrepresented in infrastructure planning and prioritisation.

In the context of Transport Infrastructure (hard infrastructure), Digital Infrastructure (soft infrastructure) supports the backbone for Smart Highways and Signals to enable connected vehicles by providing Internet of Things (IoT) solutions. Engineers Australia recommends that this is an appropriate time for cross-sectoral studies and long-term planning for potential opportunities such as connecting EV batteries to the grid.

The Department of Transport and Main Roads have developed Regional Transport Plans that cover the entire state. While these plans will guide the planning of an efficient and responsive transport system in Queensland over the next 15 years, there are 10 plans or regions¹¹ in terms of transport plans which do not align with the SIP.¹²

The SIP program updated in 2019 identified the following infrastructure priority projects in the Energy sector:

High priority initiatives

- *National Electricity Market- future connectivity and reliability*: National focus, medium to long term timeframe, in the concept phase.

¹⁰ Shaping SEQ: South East Queensland Regional Plan 2017 QLD Department of Infrastructure, Local Government and Planning <https://dilgpprd.blob.core.windows.net/general/shapingseq.pdf>

¹¹ 'Regional Transport Plans' QLD Department of Transport and Main Roads <https://www.tmr.qld.gov.au/About-us/Corporate-information/Publications/Regional-Transport-Plans>

¹² 'State Infrastructure Strategy' IPWEAQ <https://ipweaq.intersearch.com.au/ipweaqjsui/bitstream/1/2521/1/sip-part-a.pdf>

- *National electric vehicle fast-charging network*: National focus, near term timeframe, in the concept phase.

Priority initiatives

- *National electricity market – near-term optimisation*: National focus, near term timeframe, in the concept phase.

Prioritisation of infrastructure elements must include climate change mitigation and adaptation measures in planning and design, construction, and operation/maintenance programs to deliver environmentally sound and sustainable infrastructure outcomes.

5.2 Planning of Growth Area

5b. What is important for your region – now and into the future?

9a, 9b. What would you like your region and its infrastructure to look like over the longer term?

The value of various regional infrastructure fluctuates from region to region. Engineers Australia supports the following points explaining the importance of and future infrastructure in the SEQ region which is already outlined in existing regional planning (Sharing SEQ). Engineers Australia believes the following points are relevant to Queensland's infrastructure needs:

1. Water security across the state is desperately needed. Government must assist the delegated regional entities to develop water security and drought plans across the state. Plans for water infrastructure should focus on a minimum 50 year horizon, incorporating consideration of climate change mitigation strategies, population growth impacts and the effects of rapid technological change.
2. Support for alternative renewable energy projects is essential to a futureproof and productive Queensland.
3. Passenger Rail and Freight Rail development needs to be planned and designed in parallel rather than as two separate systems. Greater connections between transport modes state wide is required in relation to trains, buses, roads and parking.
4. Two areas of regional interest are identified, which are Priority agricultural areas (PAAs) and Priority living areas (PLAs). Where highly productive agricultural areas support local markets and the regional economy, the regional and rural landscapes contribute to the region's liveability, health, lifestyle and economy. Areas that contain rural production, major biodiversity and conservation areas, regional landscapes, waterways and beaches, agriculture, natural resources, and tourism and recreation opportunities must be considered on the whole to ensure the success of the region.

All seven regional centres in Queensland warrant more detailed planning by local government to figure out the best outcomes for these localities.

5.3 Adapting Infrastructure for Modern Needs

5a. How can infrastructure support economic recovery, attract private sector investment and boost job growth in your region?

8b. How can the update of the SIP attract greater private sector investment and boost job growth?

Engineers Australia believes that there is a need to achieve better value from procurement. Best practice procurement requires thorough understanding of the technical requirements and consideration of whole-of-life, circular economy, human-centred approaches, costs (financial and non-financial) and benefits that accrue to relevant stakeholders, such

as departments, governing bodies, and end-users. This will guarantee that what is being secured is needed, meets requirements, and aligns with the relevant department's objectives, programs, and values.

Engineers Australia advocates that a 5-yearly review and progress report of the plan is required. The report should include a breakdown of programs and projects like the 2015-16 establishment of funds by QLD as described in the State Infrastructure Fund¹³. This must also outline government priorities, which can boost business confidence and attract suitable private investment. Maturing the Infrastructure Pipeline Program (MIPP) and the Significant Regional Infrastructure Projects Program (SRIPP) will also require regular review.

5.3.1 Supporting economic recovery

Economic Recovery is reliant on business activity, employment, investment, maintenance, and community confidence. Fit for Purpose Infrastructure, which can provide an appropriate level of service, is required to enable these recovery activities. This includes considerations of accessibility, connectivity, technology, services, operations, and employment generated across the lifecycle of the asset.

Government funding for infrastructure is a quick and effective way to increase business confidence in the region if business cases are subject to rigorous evaluation and funding is appropriately allocated for maximum benefit. Confidence leads to increased employment opportunities and increased wages. In turn, this perpetuates business confidence in a positive feedback cycle. Appropriate business cases should always underpin specific infrastructure proposals to maximise their influence on economic recovery. To cater for the population growth, it is wise to invest in infrastructure earlier rather than later to provide economic stimulus at a lower cost.

5.3.2 Attracting Private Sector Investment

Engineers Australia acknowledges that the private sector and Government currently have entirely different perspectives. The private sector is primarily interested in 'financial benefits' rather than 'economic benefits,' i.e., asset-life revenue stream exceeding the cost stream. Whereas Government is interested primarily in 'economic benefits'. Private sector is motivated by fundamental business principles such as risk and return ratios which will seek to expand project scopes to investigate more significant opportunities and manage risks to levels perceived as tolerable.

More integrated project scopes will assist in diversifying and incorporating longer-term revenue stream opportunities, such as Land Use & Transport (ToD – Transit Oriented Development that includes property and land use, value capture business models, or commercial procurement structures such as Build Own Operate Transfer (BOOT)), toll roads, Public-Private Partnerships (PPP), outsourcing or government owned corporations, full privatisation, and procurement models that enable more attractive risk and return in financial terms.

A key component is proper assurance over the business cases. If adequate assurance is undertaken, then viable projects will demonstrate that they provide triple bottom line value, including risk and private sector profit. If assurance is inadequately assessed or incorrectly executed, it becomes difficult to identify projects that represent the greatest value and attractiveness for the private sector.

To attract private sector investment, the projects must be well planned and include risk analysis and assessment. Long-term projects can be delayed because of government changes, policies, regulations, and other significant construction risks. Project risk needs to be allocated to the party best placed to manage it. For example, patronage risk (tunnels, toll roads, etc.) should be retained by government rather than being novated to the private sector.

¹³ 'State Infrastructure Fund' Queensland Government <https://www.statedevelopment.qld.gov.au/industry/infrastructure/infrastructure-planning-and-policy/state-infrastructure-fund>

Engineers Australia recognises that while hard infrastructure projects can get private infrastructure participation, soft infrastructure projects may not bring private capital into the mix. Hence, the state government and businesses will need to consider further adoption of user-pays funding models, in tandem with other incentives to provide more opportunities for the private sector to deploy capital alongside the government. Also, private sector investment strategies and incentives vary between the different types of infrastructure. For example, toll or user charges in transport sector investment by the private sector cannot be replicated to other sectors such as more hospital beds or prison cell usage.

Instead of seeking private sector finance alone, an opportunity to partner with the private sector for both the financing of infrastructure and the provision of services that could drive better outcomes for communities should be investigated.

5.3.3 Boosting Job Growth

Governments must recognise that strategic infrastructure investment does not always boost short-term job growth. For example, *Shaping SEQ*¹⁴ asserts that acquisition and protection of future transport and utilities corridors will help communities and commuters and is thus essential for effective regional and infrastructure planning, but it will not generate additional employment in the short-term. However, if it does not happen, communities cannot confidently plan for future land use without incurring substantial community disruption at some point in the future. Therefore, community leaders have an important role in educating communities about corridor protection.

Engineers Australia believes that the thorough consideration of the following points might help in boosting job growth:

1. Integrated planning. Master-planned communities for whole of life requirements or travel, not just multimodal individual journey sectors.
2. Incorporation of smarter technology into infrastructure. The incorporation of the smarter technology into infrastructure will boost the job growth as long as appropriate apprenticeship, work force planning and training programs are provided to support new and emerging industries.
3. No Water No Life. There is no alternative to water as an essential need for survival and prosperity. Engineers Australia believes that investment in the water sector would boost regional growth including the agricultural economy.
4. Energy crisis. In order to boost growth, sufficient energy is required to support new businesses but not just current demand.
5. Resilience to climate impacts requires quick reinstatement of infrastructure after extreme environmental events so as the impacts to businesses and communities is minimised.

Shaping SEQ documents the following two points which might boost job growth:

1. Maintaining and enhancing extensive infrastructure networks that connect different regions in Queensland will support mutual social and economic benefits by providing access to employment and recreation. They will also enable the efficient movement of commodities, services and skills.
2. The range and distribution of the employment opportunities, and our urban form, will provide more choices in finding fulfilling jobs in the communities and support the '30-minute city' concept in the Australian Government's Smart Cities Plan.

¹⁴ 'Shaping SEQ: South East Queensland Regional Plan 2017 QLD Department of Infrastructure, Local Government and Planning <https://dilgprpd.blob.core.windows.net/general/shapingseq.pdf>

5.4 Updating of SIP

8b. How can the update of the SIP attract greater private sector investment and boost job growth?

In addition to the comments made above in this section (5.3.1-5.3.3), Engineers Australia believes that private sector investment opportunities can be easily accessed for hard infrastructure, typically based on the user pays model. For social infrastructure, hybrid financing opportunities allow infrastructure projects to use a combination of capital forms by merging finance from government grants, debt, equity raised, and convertible capital. Such hybrid investment opportunities can also work for regions outside South East Queensland and Australia as a whole for hard infrastructure. For example, Asian Development Bank has facilitated various hard and soft infrastructure projects through PPP or hybrid finance models¹⁵.

In the Previous SIP's, the identified initiatives recommended were far beyond the funding capability allocated, so any dramatic change in this direction would need to be carefully explained. Strategic, collaborative, long term planning and implementation of infrastructure will allow for increased certainty around private investment and long-term business planning.

5.5 Building Thriving Communities & Successful Precincts

6b. How can infrastructure create thriving communities and successful precincts?

8a. How can infrastructure create thriving communities and successful precincts/industrial areas in your region?

Infrastructure is an enabler to support thriving communities. Regional planning creates thriving communities and infrastructure enables the Regional Plan outcomes to be realised. Thriving communities and successful precincts are planned by demographers, urban planners, social planners, economists, architects, engineers, transport planners, health professionals, teachers, developers, and asset managers working together. Therefore, it is a much more complex task than just planning infrastructure.

All the factors such as infrastructure, job growth, private sector investment, economic recovery are interrelated and when successfully integrated, will support the strategy and thriving communities. Such communities offer resilient local economies for improved jobs and quality of life. Environmental impacts of density and shared infrastructure are lowered. Infrastructure needs to recognise challenges of density by creating public spaces and rewarding infrastructure. To support communities having greater active travel infrastructure, Engineers Australia recommends federal government funding to state and local governments in a program that promotes an uptake of walking and cycling to key employment and transport hubs, particularly in outer suburban areas.¹⁶ This lighter form of transport infrastructure also creates more space within the urban footprint for landscaping and place making that has the ability to mitigate the heat island effect in urban areas.

Better public transport connectivity, adequate water and energy supply, flood resilience, hospitals and schools, and better broadband infrastructure, will support thriving Queensland communities and successful precincts. Communities will also benefit from intermodal functions such as shared user paths for cycling and walking, public transport links, including affordable and easily accessible parking places.

¹⁵ 'Facilitating Public Private Partnership for Accelerated Infrastructure Development in India Report' *Department of Economic Affairs (DEA)*

Government of India <https://www.adb.org/sites/default/files/project-document/66596/39659-ind-tacr.pdf>

¹⁶ 'Active Transport: Transport Australia Society Discussion Paper' *Engineers Australia*

<https://www.engineersaustralia.org.au/sites/default/files/Learned%20Society/Active%20Transport%20Discussion%20Paper%20V0.3.pdf>

A unique opportunity is available for the region in the wake of the COVID-19 pandemic, to plan future land use across SEQ LGA's to provide for optimal balance of population and employment. This will lessen the burden of large-scale transport infrastructure traditionally required to provide adequate accessibility for significant growth in population as planned for SEQ.

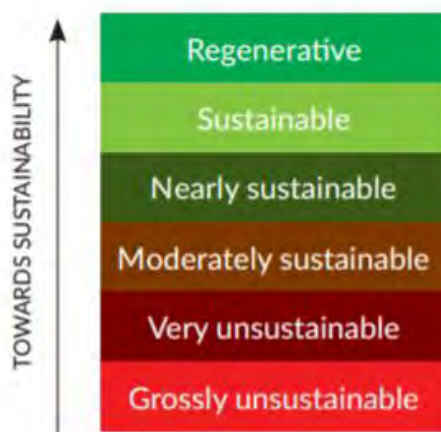
5.6 Infrastructure Sustainability and Resilience

6a. How can infrastructure be more sustainable and resilient, and support economic resilience in your region?

7b. How can our infrastructure be more sustainable and resilient?

Engineers Australia commends the Queensland Government on recognition of the imperative to embed sustainability and resilience in our infrastructure. Engineers Australia's publication *Implementing Sustainability: Principles and Practice*¹⁷ focuses on how the sustainability principles in project planning and design can be embedded. Engineers Australia's guidelines on implementing sustainability outline different levels of sustainability (Figure 1).

Figure 1: Levels of sustainability¹⁷



Engineers Australia recommends Queensland Government to consider the approach outlined above as documented in Engineers Australia's publication *Implementing Sustainability: Principles and Practice*. Engineers Australia further recommends the Queensland government to incorporate this as one of its principal objectives and supported projects should be described as *sustainable* or preferably *regenerative* in the ranking shown in Figure 1.

Engineers Australia further recommends that the infrastructure strategy should incorporate a high-level assessment and definition of 'design for resilience' into the definition of requirements for major infrastructure projects. Appropriate consideration of engineering design parameters and emerging climate change requirements will ensure that resilience is built into the infrastructure from the beginning and the concerned infrastructure is appropriate.

In addition to the above recommendation, Engineers Australia's response to this question is as follows:

¹⁷ 'Implementing Sustainability: Principles and Practice' Engineers Australia <https://az659834.vo.msecnd.net/eventsairaeuprod/production-engineersaustr-public/6497eadea9a24836941a49a2759ae9ae>

5.7.1 Sustainable Infrastructure

5.7.1.1 Environmentally Sustainable Infrastructure -The infrastructure can be made environmentally sustainable by incorporating the following ideas during the various stages of infrastructure development:

- Using Green Infrastructure Rating Tool (Infrastructure Sustainability Council of Australia (ISCA) tool¹⁸ or the Green Building Council of Australia (GBCA) Green Star rating for Buildings¹⁹) during Design and construction;
- Re-purposing of existing infrastructure and better progressive planning during planning;
- Flood protection of cities in regional areas and flood immunity of connecting roads during the design;
- Improved accessibility to mass transit services with the increase in residential densities during operations;
- Contracting the renewable energy during the tendering process resulting in less impact from energy price fluctuations during the operations;
- Including Greenspace and green infrastructure networks and consideration for vegetation, soils, natural habitat (flora/fauna), water and air quality during planning and construction.

Ports can play a role in facilitating sustainable maritime energy. Engineers Australia recommends the state government contributes to the master planning at appropriate intervals for their key ports, to guide sustainable development whilst balancing long term economic growth, job creation, environmental protection and community interests. These master plans would need to be integrated with the relevant long range strategic and infrastructure plans.²⁰

For the aviation sector, an integrated and multidisciplinary approach is required to develop a permanent solution to manage the environmental impacts across the whole aviation value chain, which includes airport operators, airlines, local governments and universities.²¹

5.6.1 Commercially Sustainable Infrastructure

The infrastructure can be made commercially sustainable by:

- Integrated planning, e.g., including Land Use;
- Using Sustainable Business Models;
- Procurement for lifecycle ops/management and better stakeholder engagement.

Engineers Australia believes that the following two existing issues, if resolved, will further lead to commercially sustainable infrastructure:

- Rapid increase in **electric vehicles** while road maintenance funding still tied to fossil fuel excise is a major looming issue undermining the sustainability of our road infrastructure funding & requiring policy changes.
- Similar issue is with **rooftop solar panels** and ongoing funding for power grid poles and wires in addition to baseload generation commercial sustainability.

¹⁸ 'Tools and Resources' ISCA <https://www.isca.org.au/Tools-and-Resources>

¹⁹ 'What is green star' Green building council Australia <https://new.gbca.org.au/rate/green-star/>

²⁰ 'Maritime Transport Infrastructure' Engineers Australia

<https://www.engineersaustralia.org.au/sites/default/files/Maritime%20Transport%20Discussion%20Paper%20June%202020%20200629.pdf>

²¹ 'Aviation Discussion Paper' Engineers Australia <https://www.engineersaustralia.org.au/sites/default/files/resource-files/2021-05/Aviation-Infrastructure-Discussion-Paper-March-2021.pdf>

5.6.2 Resilient Infrastructure

The Queensland Government's pathways to a climate resilient Queensland, Queensland Climate Adaptation Strategy 2017-2030²² serves as a core component of Queensland's climate change response to help guide a transition to a zero net emissions economy.

Resilient infrastructure can be achieved by:

1. Improving flood immunity design standards for critical infrastructure (Q100 vs Q50) with key performance indicators for recovery developed to guide future design and investment.
2. Reviewing and updating the existing Codes, such as for bushfires and housing in risk areas.²³ Cyclone zones (Yasi/Charters Towers 2011 and Seroja/ WA 2021), were not previously designated/included and therefore were inadequately prepared.
3. Greater intergration with land use, for example adequate analysis of risks and mitigation for dams and downstream residential developments.
4. Focussing on asset improvement rather than replacement, under the National Disaster Relief and Recovery Arrangements (NDRRA). Federal government should consider improvements based on lessons learned, rather than repeating risk exposures through replacement to the same standards. This requires ongoing negotiations between state and federal governments.
5. Ensuring infrastructure is fit for purpose. Resilient infrastructure should not cause significant disruption to the community and should function effectively as quickly as possible after a catastrophic event.
6. Addressing risk management to the agreed parameters at design, implementation and beyond, with continuous improvement planning and monitoring at agreed cycles.

5.6.3 Supporting Economic Resilience

To support economic resilience, Engineers Australia recommends the following:

- Infrastructure planning needs to differentiate between economic and financial parameters and should be separately managed over the full lifecycle of the infrastructure.
- Future infrastructure land requirements need to be identified, acquired and preserved, For example indentifying, acquiring and preserving new transport corridors.
- Strategic limitations must be identified and addressed through effective risk management.

5.7 Infrastructure Practices and Innovations

7a. What leading infrastructure practices or innovations should be considered for more productive and smarter infrastructure solutions in your region?

Engineers Australia recommends consideration of the following practices towards more productive and smarter infrastructure solutions:

1. **Fit for Purpose:** Engineers Australia recognises that any infrastructure which is more effective, efficient, and which drives the desired outcomes, and level of service, would lead to a smarter infrastructure.
2. **Forward-looking:** Engineers Australia further recommends that the Queensland Government look to innovative ideas, including the application of digital technologies in infrastructure planning and development,

²² 'Queensland Climate Adaption Strategy' Queensland Government <https://www.qld.gov.au/environment/climate/climate-change/adapting/strategy>

²³ 'Cyclone Yasi: What happened?' ABC News <https://www.abc.net.au/news/2016-02-03/cyclone-yasi-what-happened-in-2011/7067086?nw=0>

the IoT (Internet of Things) to be used in bridge and structure monitoring. Employing the right emerging technologies so that infrastructure is available and fit for purpose for longer periods in tandem with greater accessibility to and transparency of data will enhance benefits. Continuous improvement is required from the state government to incentivise, promote and reward innovative concepts in all engineering sectors that drive optimal solutions for projects, particularly through the procurement process.

3. **Sustainability:** Engineers Australia supports this practice in this Strategy and believes that further use of recycled products, innovative contracts and specifications based on outcomes and not components will be beneficial for productive infrastructure. Overspecifying and detailed specifications increases costs and reduces innovation.
4. **Resilience:** Engineers Australia recommends critical infrastructure should be able to resist and recover from major shocks in a timely manner to protect the community and the economy. A resilience standard with clear key performance indicators for recovery is essential to guide investment for improving infrastructure resilience.



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