New Bridgewater Bridge Project

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Table of Contents

Table of Contents 3

1 Introduction 6

1.1 Project Name 6
1.2 Project Summary 6
1.3 Project Location 8
1.3.1 General location details 8
1.3.2 Site's environmental values 8
1.3.3 Site's heritage values 10
1.4 Strategic Context and Related Projects 12

2 Project Scope 13

2.1 Problem/Opportunity Statement 13
2.1.1 Problem 1: Restriction of growth due to the existing bridge geometry and load rating . 15
2.1.2 Problem 2: Decreased level of service due to population growth 16
2.1.3 Opportunity 1: Increased freight efficiency 17
2.2 Options Evaluation 17
2.2.1 Background 17
2.2.2 Review of functional requirements 19
2.2.3 Option identification and development 22
2.2.4 Selected option (Reference design for public consultation) 29
2.3 Scope of Works 33

3 Project Cost 35

3.1 Project Funding 35
3.2 Reference design cost estimate 35
3.3 Business Case submitted to Infrastructure Australia 36

4 Project Benefits 39

4.1 Expected positive outcomes and benefits to be delivered by the Project 39
4.2 Local involvement in construction 39
4.3 Socio-economic impact 40

5 Procurement 42

5.1 Procurement Summary 42
5.2 Procurement Strategy Evaluation 43
5.3 Selected procurement methodology – Early Contractor Involvement 44
5.3.1 Request for Proposal 44
5.3.2 Short listing 44

5.3.3 Stage one (ECI) 44
5.3.4 Stage 2 (Design & Construct) 45
5.4 Project Timeline 45

6 Risk and Sustainability **46**

6.1 Major risks, and proposed mitigation strategies 46
6.2 Project dis-benefits 50
6.3 Compliance with sustainability strategies 51

7 Stakeholder Engagement **52**

7.1 Public and Stakeholder participation and consultation 52
7.2 Issues raised through stakeholder consultation 55
7.3 Directly affected landowners and property acquisition 57

8 Development Impacts and Approvals **59**

8.1 Major Project approval under s60O(1) of LUPAA 59
8.2 Additional approvals 59
8.3 Noise 60
8.4 Environment (Terrestrial and Marine) 61
8.5 Heritage (Aboriginal and Historic) 63

9 Summary **65**

10 Appendices **67**

Appendix A: Reference Design Plans 67
Appendix B: Reference Design Engagement Report 68

	Name	Signature	Date
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1 Introduction

1.1 Project Name

New Bridgewater Bridge Project.

1.2 Project Summary

The Bridgewater Bridge is a critical link in Tasmania's transport network. It forms part of the Australian Government's National Land Transport Network and is a key link in the Burnie to Hobart freight corridor, Tasmania's highest volume freight network.

The crossing has a long history, with work to build the causeway starting in 1830 and the first bridge connecting the causeway with Bridgewater opening in 1848. The existing Bridgewater Bridge was completed in 1946 and is the fourth bridge to be built at this location.

The Bridgewater Bridge provides the link between the Midland Highway, the main freight and passenger vehicle route between the north and south of the State, and the Brooker Highway, which is the main northern access route into Hobart.

It is an important regional transport connection for greater Hobart, facilitating access between central Hobart and growing communities at Brighton, and between the Brighton Transport Hub and major industrial and freight distribution centres in Glenorchy.

The current bridge and causeway provide one lane in each direction, with a 60km/hour speed limit, despite connecting to the National Land Transport Network at each end. The bridge and causeway have dimensional limitations and do not meet contemporary general and geometric design requirements. Issues include insufficient lane and shoulder widths, unsafe and insufficient space for cyclists and pedestrians, and restrictive speed, height and weight limits.

A new Bridgewater Bridge has been identified as a medium term (5 -10 year) priority on Infrastructure Australia's *Infrastructure Priority List.*

The New Bridgewater Bridge Project (the Project) is supported by an informal $576 million funding commitment from the Australian and Tasmanian governments (80 per cent and 20 per cent respectively) as part of the Hobart City Deal, which represents the largest ever investment in a single transport infrastructure project in Tasmania's history.

The Project represents the next stage in the evolution of this historically important crossing point and will meet Tasmania's current and long-term transport needs.

The Tasmanian Government has elected to use a competitive Early Contractor Involvement (ECI) procurement process to deliver the Project, and this is detailed in Section 5 of this document.

Objectives

The Project's primary objective is to deliver a new crossing of the River Derwent between Bridgewater and Granton that provides an efficient, high standard connection for the Brooker Highway and Midland Highway that reliably meets the standards required of the National Land Transport Network.

The secondary objective is to provide safe and efficient connections with the Lyell Highway and local traffic movements.

Benefits

- Increased heavy vehicle freight efficiency through the removal of Over Size and Over Mass (OSOM) vehicle restrictions and generally increased capacity of the heavy vehicle network.
- Improved safety and efficiency for current and future commuter and freight movements through a continuous, high standard connection of the Brooker Highway and Midland Highway.
- Introduction of grade separated intersections to prioritise traffic on the National Land Transport Network.
- Increased, and more consistent, speed limit through the area.
- Reduced travel time due to increased speed and reduced congestion and queuing.
- Improved safety and efficiency for cyclists and pedestrians.
- Removal of intermittent closure of the National Land Transport Network to allow vessels to travel under the bridge.
- Reduced risk of the loss of the Bridgewater Bridge and causeway as an operational crossing of the River Derwent due to mechanical failure of the bridge or seismic events impacting the causeway.

1.3 Project Location

1.3.1 General location details

The Project is located on the River Derwent approximately 20 kilometres north of Hobart and connects the outer Hobart suburbs of Granton and Bridgewater.

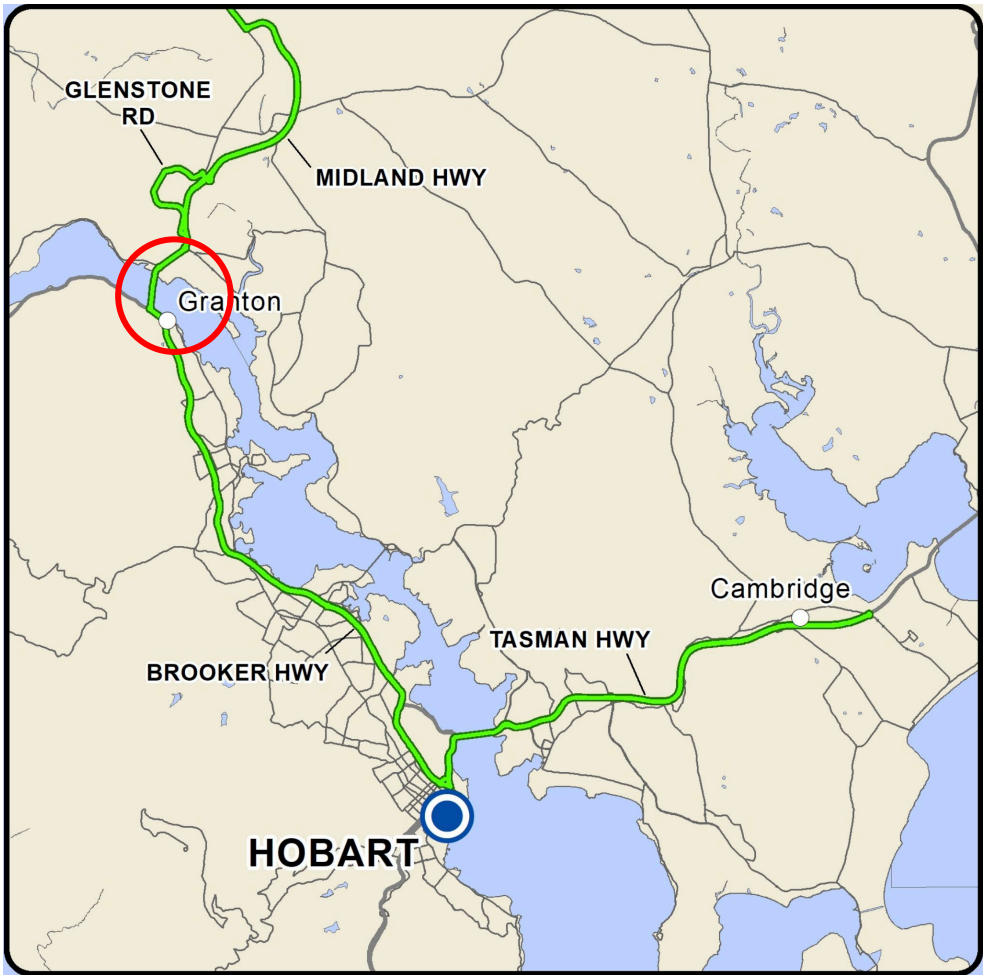

Figure 1. General project location.

1.3.2 Site's environmental values

The land within the broader vicinity of the Project is highly modified and includes a mix of rural, residential and small commercial areas. Natural areas and original habitat exist in patches particularly along the river frontage.

The river component of the Project Land lies within the River Derwent Marine Conservation Area. The conservation area contains habitat for several marine threatened species and migratory wading birds.

The Derwent River itself is an ancient deep rift valley, which flooded post ice age and became part of a tidal estuary. Two geo-conservation sites are found with the Project Land. The Lower Derwent River Estuarine Delta and Flood Plains recognises the estuarine sedimentary sequences and landforms and the Granton to New Norfolk Quaternary Stratigraphic Sites provide clear exposure of sedimentary sections, which preserve evidence of changing environmental conditions in the Lower Derwent Valley over thousands of years.

Figure 2. Derwent River and south east corner of the causeway in 2020. Photo: North Barker Ecosystem Services.

Surrounding the Bridgewater Bridge are pockets of native vegetation among the developed and modified land. Six TASVEG native vegetation community types exist. Three are aquatic, including saline aquatic herbland, saline sedgeland/rushland and fresh aquatic sedgeland/rushland and three are terrestrial, including Eucalyptus viminalis grassy forest and woodland, Bursaria – Acacia woodland and scrub, and lowland grassland complex.

Threatened vegetation communities include the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) listed Subtropical and Temperate Coastal Saltmarsh ecological community (represented by the saline sedgeland/rushland and the saline aquatic herbland) and the *Nature Conservation Act 2002* (NCA) listed wetlands (represented by the freshwater aquatic sedgeland and rushland and saline aquatic herbland). These vegetation communities occur around the natural banks of the River Derwent and the man-made banks of the causeway.

Threatened flora species recorded in the Project Land include the Double Jointed Speargrass, Largefruit Seatassel and the Woolly New-Holland Daisy, which are listed under the *Threatened Species Protection Act 1995* (TSPA).

The pockets of terrestrial native vegetation provide some habitat for wide-ranging threatened fauna, such as the Eastern Barred Bandicoot, which can tolerate the peri-urban environments. Overall, the area is highly modified and as such, land-based fauna habitat is limited. Widespread ground-dwelling species with relatively broad ecological niches, such as Tasmanian Devils and Eastern Quolls, appear to disperse through the area but the site is unlikely to represent a permanent part of a range for these species.

Small numbers of planted Eucalyptus globulus, the feeding habitat for the Swift Parrot (protected under TSPA and the EPBCA) are present. Observations of the Australasian bittern (EPBCA listed) are known around the causeway and banks of the River Derwent and several other bird species including the Grey Goshawk, Tasmanian Wedge-Tailed Eagle, White Bellied Sea-Eagle and the Great Crested Glebe may be transient or forage through the area.

The estuarine areas around the bridge support a wide range of bird species including waterfowl, native ducks and black swans and has been identified as a significant breeding area for waterfowl (GHD 2010). The habitats along the River's edge and intertidal macrophyte (aquatic plant) beds provide shelter and large area for foraging.

The fish species Australian Grayling is listed as vulnerable on the TSPA, the EPBCA and the International Union for Conservation of Nature's Red List of Threatened Species. It is known to occur in the River Derwent and is expected to occur periodically within mid-upper estuarine environments, most likely on their migration downstream as larvae and upstream as juveniles.

Within the functional design constraints, the Project will be designed to avoid, minimise and mitigate impacts on natural and physical resources as well as protect the amenity of the vicinity.

1.3.3 Site's heritage values

The site forms part of a rich historic cultural heritage landscape that demonstrates traditional use by Aboriginal Tasmanians as well as the evolution of European transport linkages over a period of more than 200 years.

The area surrounding the Project is situated around the confluence of the boundaries of three Aboriginal Nations, being the South East Nation, the Oyster Bay Nation and the Big River Nation. The southern portion of the Project Land falls within the range of the Mouheneenner Band of the South East Nation, who occupied the land around present-day Hobart.

The Oyster Bay Nation occupied the area to the east of the Jordan River, on the north side of the River Derwent. Of the clans that comprised the Oyster Bay Nation, it is the Moomairremener that likely occupied the land close to Bridgewater. The area to the west of the Jordan River was believed to have been the Territory of the Big River Nation. The north-west of the area surrounding the Project would have been part of the land occupied by the Leenowwenne people.

Desktop and field surveys have identified a small number of Aboriginal Heritage values throughout the Project Land. Aboriginal Heritage Tasmania (AHT) would have jurisdiction under the *Aboriginal Heritage Act 1975* for any works that may impact these values, including managing consultation with the Aboriginal community.

The European history of the crossing of the River Derwent between Granton and Bridgewater spans back to 1830 and includes ferry operations, a causeway, numerous road and rail bridges and the current combined road and rail structure. The place is arguably the focus of Tasmania's most historically important transport route.

The construction of a river crossing at Bridgewater included one of the first bridges built in Tasmania following British settlement in 1803. The causeway was initially built in 1830 by convicts with a punt used to complete the crossing from its end to the northern bank of the River Derwent at Bridgewater until the first bridge structure was completed.

The causeway was one of the largest items of civil infrastructure constructed in Tasmania using convict labour and demonstrates the scale of public works that could be carried out by convict labour, which was the key workforce available during the first half of the nineteenth century.

The length of time to construct the causeway, and the methods used to address the difficult geological conditions are a testament to the work carried out. The causeway is a rare place, being one of only two causeways constructed in the State during the early nineteenth century using convict labour. It is considerably larger in length and volume than the other convict-built causeway, the Hunter Island causeway.

From 1849, a series of road and later rail bridges were erected from the northern end of the causeway and connecting to Bridgewater. The sequencing of the bridges and their uses is somewhat complex. The first bridge was constructed in 1848-49 to allow for river navigation upstream to New Norfolk, the bridge (and all subsequent structures) included moving spans. Historic bridge infrastructure from a series of previous bridges exists at both the northern end of the causeway and on the northern shore of the River Derwent.

The existing bridge is an all-welded vertical lift-span bridge completed in 1946 to the design of Sir Allan Knight and forms one component of the entry of the place under the Tasmanian Heritage Register (THR). The bridge is a steel welded Pratt through truss style bridge and was Tasmania's second, and the only surviving, lift span bridge. It is the largest surviving lift span bridge in Australia.

The historic heritage values of the crossing have been extensively studied including surveys and assessments of individual sites and broad and specific policy and management advice. The Project will represent the fifth such bridge infrastructure project in the European history of the place. As a result of the THR listing, the Tasmanian Heritage Council would have jurisdiction under the *Historic Cultural Heritage Act 1995* (HCA) for all works within the extent of the listed place, which in this case includes areas around the northern and southern landings as well as extending 20 metres parallel from the road centre line to the east and rail line to the west.

Figure 3. Bridgewater Causeway in 1800s. Courtesy: W.L. Crowther Library, Tasmanian Archive and Heritage Office.

There are a number of other heritage places in and adjacent to the Project Land that are listed under the THR and the local planning schemes and local provisions schedules. These include the Bridgewater Railway Station, of which very little remains, other than the central concrete island platform and the adjacent redundant rail lines, the Black Snake Inn, which is believed to have been originally constructed between 1817 and 1821 and later replaced with the existing gothic inspired building during the 1850s, the Watch House, Granton Convict Quarry, Commandant's Cottage, Old Black Snake Lane, a Pioneer Avenue Elm, the Cypress Grove at 37 Black Snake Road, Granton and St Mary's Anglican Church and Cemetery, Bridgewater.

1.4 Strategic Context and Related Projects

The Bridgewater Bridge is one of three major crossings of the River Derwent. While the other two crossings – the Tasman Bridge and the Bowen Bridge – provide important arterial access into Hobart, and from one suburb to another, the Bridgewater Bridge is part of the National Land Transport Network, providing a link between the Midland Highway and the Brooker Highway and is the main northern access route into Hobart for freight and passenger vehicles.

The need for the bridge replacement is imminent and premised on the considerations below.

- The importance of the bridge in terms of its linkage between the Brooker Highway and the Midland Highway as part of the National Land Transport Network.
- The inability of the current bridge and connecting infrastructure to meet the growing demands on the freight and passenger network.
- The existing bridge has passed its serviceable design life, and significant investment and ongoing maintenance expenditure is required to supporting ongoing functions.
- The single lane construction of the existing bridge significantly limits the dual lane carriageways of the adjacent highways.
- The existing bridge does not meet contemporary design or loading standards and constrains the heavy vehicle network, as speed and access for OSOM vehicles are constrained on the existing bridge and future levels of service will therefore decrease over time.
- The existing lift span is unreliable.
- Continued use of the existing bridge will increase reliance on the East Derwent Highway, which will cause the further dislocation of the suburbs bordering the East Derwent Highway.

Related projects

Midland Highway Upgrade

The Bridgewater Bridge is a vital connection between Hobart and the Midland Highway. The combination of an upgrade at the Hobart connection to the Midland Highway, together with the investment in improvements to the overall National Land Transport Network (NLTN) are complementary.

2 Project Scope

2.1 Problem/Opportunity Statement

The existing Bridgewater Bridge is a steel structure with a vertical lift span creating a navigable channel for water-based traffic. It is reaching the end of its useful life and an effective replacement is needed for its role as a critical river crossing in the National Land Transport Network.

The existing bridge is a vital infrastructure link serving the national and state economies and is part of the National Land Transport Network, including the Midland Highway. The Midland Highway is the main freight and passenger vehicle link between the north and south of the State and the bridge provides the link between the Midland Highway and the Brooker Highway, which is the main northern access route into Hobart.

Through this connection, the bridge links regional producers to Tasmania's major ports and is a vital part of Tasmania's Freight Strategy.

Aside from freight connections, the bridge serves as a key travel route for Hobart locals, particularly those in and around the suburbs of Brighton and Bridgewater.

In 2019, annual average daily traffic (AADT) across the bridge was 22,363 vehicles per day, with 11.4 per cent of vehicles classified as heavy vehicles. This represents approximately one crossing for every 11 residents of greater Hobart.

The Bridgewater Bridge represents a key piece of infrastructure for Tasmania's economy and addressing the following problems are therefore a priority for the Tasmanian Government:

- **Problem 1:** Restriction of growth due to the geometry and load rating of the existing bridge.
- **Problem 2:** Decreased level of service due to population growth.
- **Opportunity 1:** Increased freight efficiency.

Table 1. Summary of problems and opportunities.

Problem	Description	Evidence	Cause	Impact
Problem 1	Restriction of growth due to the existing bridge geometry and load rating.	• Single lane of traffic. • 60km/hour posted speed limit. • 68.5 tonne mass limit. • 4.3 metre vehicle height limit. • 2.5 metre vehicle width limit.	Old structure that was not built for contemporary standards. Increased freight demand on existing network.	Adverse impacts on freight movement and productivity. Traffic congestion. Travel time uncertainty. Re-routing of heavy vehicles. Driver frustration. Inability to meet the long-term design standards of the NLTN.
Problem 2	Decreased level of service due to population growth.	Forecasted Level of service F (unstable flow, operating at capacity) using current bridge for projected vehicle growth.	Population target of 650 000 by 2050.	Increased public and private transport travel times. Increased freight industry travel times. Driver frustration. Increased traffic congestion.
Opportunity 1	Increased freight efficiency.	Industry projects for fleet changes.	Increase of size/mass limits with new bridge.	Reduction in laden trips. Decrease demand on network. Less heavy vehicles using unsuitable detour routes.

2.1.1 Problem 1: Restriction of growth due to the existing bridge geometry and load rating

With the increasing freight task in greater Hobart, a 50 per cent increase in heavy vehicles travelling on the bridge/network is expected over the period to 2041. This is illustrated below.

Table 2. Expected increase in heavy vehicles.

Year	Heavy Vehicle AADT
2021	2 600
2041	3 900

The ability to meet this forecasted increasing freight task is compromised by the existing bridge due to the age of the structure and its inability to provide contemporary load rating or geometry. These dimensional limitations affect traffic carrying capacity, travel time reliability, and result in delays at intersections on the approaches to the bridge in both directions.

The bridge currently restricts traffic movements largely due to the following:

- **Single carriageway.** The current arrangement leading to, through and out of the bridge results in lower than ideal levels of service, with an average of 22 363 vehicles travelling over the bridge in December 2019. In 2016, the utilisation (i.e. ratio of actual traffic demand to theoretical highway capacity) of the Brooker Highway on the southern approach to the bridge was 88 per cent. This results in a traffic performance level of service of D, 'approaching unstable flow'.

  Forecasts indicate that by 2037, utilisation will rise to 106 per cent, resulting in a level of service of F, or 'unstable flow, operating at capacity'.

- **Posted speed limit of 60 km/hour across the bridge.** This limit does not comply with the level of service requirements associated with infrastructure within the NLTN.

- **Vehicle size and mass restrictions.** The existing bridge has a vehicle size and mass limits of:
  - 4.6 metres height
  - 26 metres length
  - 2.5 metres width and
  - 68.5 tonne mass limit (a B-double vehicle, depending on the combination).

- **Over Size Over Mass diversion.** Vehicles outside the above restrictions (most class 1 vehicles such as cranes, agricultural vehicles, oversize load carrying vehicles) are required to detour via the Bowen Bridge. This has the impacts outlined below.
  - Additional travel time.
  - In the case of the East Derwent Highway to Bowen Bridge, directing them along a suburban route that is not suitable in the long term for this type of traffic.

- **Traffic flow restrictions.** The roundabout at Boyer Road, north of the bridge, has been provided to manage the safe flow of vehicles between the Midland Highway, Boyer Road and Gunn Street. However, this intersection impedes the efficient movement of freight by necessitating reduced speeds and increased braking and stopping when approaching the roundabout.

- **Reliability of lift span.** The lift span operation impacts journey-time reliability. This does not comply with the level of service requirements associated with infrastructure on the NLTN.

- **Travel time.** The existing travel time across the causeway and bridge is estimated at a maximum of 7.6 minutes (PM peak, northbound). In 2041 conditions (without a new bridge), this is expected to increase to 27.4 minutes, a 370 per cent increase due largely to the fact that the Granton roundabout performs at a level of service 'F' for two northbound approaches. For context, the maximum travel time under the proposed arrangement is 1.7 minutes due to the increased travel speed, additional lanes and grade separated intersections.

Comparing current and projected travel times highlights the impact of the current crossing arrangement, with the new bridge to provide a travel time saving of around 5.9 minutes. Any delay in delivering the New Bridgwater Bridge Project (the Project) will increase travel time and decrease the level of service provided.

In addition, the gross mass limit of 68.5 tonnes on the existing bridge is inconsistent with the program to upgrade bridges along the Midland Highway and Bass Highway to between 85.5 and 91.0 tonne gross mass limits. This program will allow at least PBS 2B vehicles access to the Tasmanian network connecting major ports and industrial locations in the north west of Tasmania with southern Tasmania.

Almost all of the Tasmanian freight network will operate at the 85.5t at 30.0m long capacity level. However, there will be limits on some of the axle masses due to bridge capacity. By the end of 2022, the Bridgewater Bridge will be the only remaining crossing that would not have been strengthened to support these high productivity freight vehicles at maximum masses.

2.1.2 Problem 2: Decreased level of service due to population growth

The Bridgewater Bridge is a key commuter route from the Bridgewater and Brighton areas into greater Hobart. Recent residential growth has contributed to the remaining capacity on the bridge being stretched, with cars making up 89 per cent of average daily vehicle movements over the bridge in 2019.

The suburbs in and around Bridgewater and Granton are expected to experience significant increases in population to 2037 subsequently increasing demand on the bridge and interchanges.

The Tasmanian Government has set a population target of 650 000 by 2050. This target is somewhat supported by ABS modelling suggesting population figures of between 575 000 and 675 000 (high and base case) based on current population figures and forecast population growth factors. As the State progresses towards this target, there will be increased pressure placed on the river crossing.

2.1.3 Opportunity 1: Increased freight efficiency

The Department is aware of multiple companies that are planning to utilise PBS 2B vehicles once upgrades are provided throughout the network, which will provide substantial benefit to major industrial sites. For example, freight operators travelling to and from transport depots on the western shore of greater Hobart could increase to higher productivity freight vehicles with masses approaching 90 tonnes.

Specific examples are provided below.

Nyrstar Zinc - A large proportion of the zinc produced at Nyrstar in Lutana, is transported by truck to the Brighton Transport Hub where it is loaded into containers for transport by train to the northern Tasmanian ports.

The Nyrstar site has a production capacity of around 280 000 tonnes of zinc per year, and in 2016 reported production of around 240 000 tonnes. In the existing B-double combinations, this involves around 5 300 laden trips per year, or more than 100 per week. Using PBS 2B and an improved Bridgewater Bridge would be a reduction as low as 4 000 laden journeys per year – a 26 per cent reduction in trips.

Cement and milk - Cement supply to large producers, such as Hazell Bros, is transported from Railton in northern Tasmania to southern Tasmania. Currently the most common freight option is using a B-double, with the Department estimating this task at between 70 000 – 100 000 tonnes per year south of River Derwent.

The scenario of using a PBS 2B and an improved Bridgewater Bridge would be a reduction from 2 040 laden journeys per year on B-doubles to as low as 1 500, representing a 26 per cent reduction in laden trips. Similar higher productivity options would also be available for tasks such as milk concentrate from north west to Cadbury.

2.2 Options Evaluation

2.2.1 Background

The Bridgewater Bridge crossing of the River Derwent between Granton and Bridgewater is at the end of its functional life. As the main northern access route into Hobart for freight and passenger vehicles, providing the link between the Midland Highway and Brooker Highway, the replacement of the bridge with a contemporary four-lane, fixed crossing, designed for a highway environment expected of the NLTN, has been contemplated for decades.

A significant amount of feasibility and planning work had been completed by various Governments, departments and consultants to determine the most suitable crossing arrangement at the site prior to the development of the project in its current form.

As part of the *2010 Bridgewater Bridge Replacement Planning Study*, a set of *Community Agreed Functional Requirements* were prepared to guide the development of options. These were formed out of a Value Management Study undertaken by the then, Department of Infrastructure, Energy and Resources (DIER).

The functional requirements included the following outcomes:

- the crossing will be a bridge
- design should cater for pedestrian/cycle crossing
- navigability of the river is needed
- it will be a dual carriageway of four lanes throughout
- service for traffic is expected to improve
- the rail corridor must be protected
- the new crossing will provide a standard of service consistent with the Brooker Highway, but this will not preclude exploration of design speeds below 110km/hour and
- minimise impact to environment and community.

Prior to the 2018 State election, the Tasmanian Government committed: *"…$46 million over five years to start the State's 20 per cent share of the full project cost."* The Tasmanian Liberal Party policy also stated that *"full construction is expected to take six years to complete at a cost of $576 million".*

A business case outlining the benefits and costs of the proposed project was submitted to Infrastructure Australia for their review, which in June 2019 found that the *"…business case did not demonstrate that the benefits of the Project are likely to outweigh its costs. The business case also identifies a number of unresolved engineering issues that could add further costs to the Project, including the future maintenance requirements of the existing bridge."*

Infrastructure Australia recognised the strategic importance of crossing capacity over the River Derwent and stated that it would welcome a revised proposal for a less expensive solution that matched the calculated benefits. Specifically, Infrastructure Australia considered that the Project required more analysis of alternative options and more investigation of geotechnical conditions to provide more certainty on the likely project outturn costs.

These matters have now been addressed. The options development and evaluation process described below has been undertaken. Detailed geotechnical investigations have been undertaken to inform these options development and evaluation processes. This information was also provided to the ECI Tenderers to inform their option analysis and development of their tender designs. Further targeted investigations responding to the specific information needs of the ECI Tenderers were undertaken during the ECI period. As a result, the outcome of the ECI procurement process (refer to Section 5) will be a fixed price contract sum based on an accepted developed design that has been informed by extensive options analysis and the detailed geotechnical investigations completed from 2019 to 2021.

Further information responding to the issues raised by Infrastructure Australia is contained in Section 3.3.

2.2.2 Review of functional requirements

Analysis was undertaken in 2019-20 of the pre-existing options developed over previous years involving a review of the costs and escalation to bring the budget up to 2020 dollars and revising escalation figures to the new anticipated start date for construction. Ultimately this showed that previous options were unaffordable in the context of the existing funding commitments and that significant cost savings would be required either through design improvements or scope reduction.

A review of the functional requirements was completed in early 2020 to achieve a bridge solution that met the Project budget. The functional requirements (now referred to as design requirements) determined from this review are summarised below.

- A minimum of four lanes, two in each direction, for motor vehicles between the Brooker Highway and Midland Highway.
- Establishment of a single three metre clear width shared pathway on the new river crossing for pedestrians and cyclists from the northern and southern shores of the River Derwent. There is no warrant for a pathway on both carriageways, given the available funding and the cost of a second pathway. The pathway must achieve design standards required for access by disabled persons (i.e. must be *Disability Discrimination Act 1992* compliant (DDA).
- Design and posted speed limits on the Bridgewater Bridge(s), and the Brooker Highway approach to the south and Midland Highway approach to the north to be a minimum speed limit of 80km/h, based on a proposed "Safe Systems Assessment".
- Grade separated connectivity of the Brooker Highway and Midland Highway to the surrounding road network, particularly the Lyell Highway.
- Safe and effective routes for local traffic movements across the Brooker Highway and Midland Highway with minimal queuing or vehicle conflict points.
- Design of road levels to consider Q100 (one in one hundred year) storm events, forecast sea level rise, storm surges and measures to protect against structural damage from overtopping.
- Accommodation of marine vessel passage by a minimum air draft clearance consistent with the defined navigation span clearance under the Bowen Bridge, equivalent to a clearance height of 16.2 metres AHD[1] across a width of 45 metres.
- Barriers to thrown objects on bridge sections passing over land and the navigation channel to protect traffic and people underneath from objects being thrown from above.
- Barriers on the bridge for suicide prevention in locations that risk assessments identifies that it is warranted.

1 AHD = Australian Height Datum

Rationale for dual traffic lanes and revised design speed

The crossing of the River Derwent between Granton and Bridgewater provides the link in the National Land Transport Network between the Midland Highway and Brooker Highway, both of which are four lanes (two lanes northbound and two lanes southbound), excluding the narrowing sections within the 1-kilometre approaches on either side of the crossing that are to be addressed as part of this project.

Therefore, the new crossing and approaches are also proposed to be four lanes, consistent with the Midland Highway and Brooker Highway they connect. In addition to the four traffic lanes, a three-metre-wide shared path for pedestrians and cyclists is proposed on the new bridge.

The Midland Highway to the north has a posted speed limit of 110km/hour and the Brooker Highway to the south has a posted speed of 100km/hour. The initial functional user requirement was a posted speed of 100km/hour and design speed of 110km/hour.

The 2020 review of the functional user requirements concluded that 80km/hour still provided a functional fit-for-purpose design solution consistent with other bridge crossings in Australia. Further, it was noted during the previous Value Management process that the community would be receptive to options that did not meet the 100-110km/hour speeds providing there was justification.

Typically for low-to-moderate height road formations, fill embankments are more cost effective than bridge structures. By reducing the operating speed to 80km/hour and design speed to 90km/hour, the design would be able adopt a more appropriate and cost effective horizontal and vertical road geometry, reducing the overall length of the bridge structurers and enabling the potential use of the existing causeway.

This would:

- Allow for more cost-effective access for construction of the new bridge than assumed and priced in past options.
- Reduce the length of bridge structure required for the two northbound lanes (refer to reference design).

It is also noted that the ECI Tenderers, in their development of designs, have had the opportunity to produce options that maintained the higher design speed.

Rationale for air draft for navigation

Feedback from the community at the time of developing the functional requirements indicated that maintaining navigability of the river was important. At the time, the reference was the Bowen Bridge as any higher was not deemed necessary and any lower would potentially restrict passage up the river. Hence the conclusion was to maintain the same navigation height clearance for the New Bridgewater Bridge as the Bowen Bridge.

This was a key outcome adopted in the 2011 GHD concept design and 2016 JMG concept design of the preferred option, and further communicated by the Tasmanian Government in both the 2012 report to Infrastructure Australia and the 2016 Review of the Bridgewater Bridge Design and Cost Estimate.

A fixed structure is proposed for the new bridge rather than a bridge with a lift span or swing span. Although the existing lift span bridge may have been a suitable option in the 1930s and 1940s, it is no longer appropriate to intermittently close the main northern access route into Hobart for freight and passenger vehicles, with higher freight loads and traffic volumes of more than 22 000 vehicles per day, each time a medium or large vessel needs to navigate past the crossing.

Figure 4. Bridgewater Bridge closed lift span. Photo supplied by New Bridgewater Bridge Project.

The existing bridge has a lift span that is required to be raised for any vessel higher than 2.2 metres on an average tide level. The opening is approximately 35 metres and while the lift span could be lifted to a 30-metre height clearance, lifts are currently restricted to 15.2 metres height clearance.

Generally, the lift height is restricted because there is no need to lift the span higher than the navigation span on the Bowen Bridge and the restricted height lessens wind load and impacts on the existing structure.

Figure 5. Bridgewater Bridge open lift span. Photo: Ian D Cooper.

High tide at the Bridgewater Bridge is nominally 0.1 metres higher than in Hobart (and the Bowen Bridge), with the tidal lag between Hobart and Bridgewater around 50 minutes.

Survey of the Bowen Bridge indicates that a 45-metre-wide navigable clearance envelope through the navigation span (span 5) has a vertical clearance of RL 15.8 metres AHD to the underside of the bridge structure. An equivalent clearance at the Bridgewater Bridge would provide a clearance envelope of RL 15.8 metres AHD + 0.1 metres observed tidal difference = RL 15.9 metres AHD.

Allowing for survey tolerance and factoring in safety, a minimum vertical clearance of RL 16.2 metres AHD has been specified for the new Bridgewater Bridge. This clearance is considered consistent with the design requirements without overdesign, noting the budget constraints of the Project.

In addition to identifying the designated navigation channel, Marine and Safety Tasmania (MAST) has also installed a bridge height clearance sign on the second span of the Bowen Bridge (first span over water and highest clearance over water), as this span offers greater clearance for recreational vessels (i.e. tall-masted sailing boats) than the designated navigation channel.

Survey of the Bowen Bridge indicates that a 45-metre-wide navigable clearance envelope through the second span has a vertical clearance of RL 18.25 metres AHD (maximum clearance RL 18.90metres AHD at its highest point).

Given that the vertical clearance drives the vertical design of the bridge structure and approaches to the bridge on either end, as well as considering the budget constraints of the Project, the specified minimum vertical clearance of RL 16.2m AHD is considered appropriate for the new Bridgewater Bridge, as it is consistent with the designated navigation channel of the Bowen Bridge, plus a 0.3 metre safety margin.

2.2.3 Option identification and development

Once the issues and constraints were understood, the identification and development of options started, and four main options were developed and considered for assessment. The four options included:

Option 1 - two lane bridge southbound and re-use causeway northbound, replace existing bridge

Option 2 - two lane bridge southbound, two lane bridge northbound

Option 3 - two lane bridge southbound, re-use causeway northbound, retain existing bridge for northbound traffic and

Option 4 - widen existing causeway, incorporate new bridge structures through channel only.

Bridge options

The bridge options that were developed during scoping include:

- **Option 1 -** a new two-lane bridge to take southbound traffic and re-use of the existing causeway as part of the permanent works to take northbound traffic and
- **Option 2 -** a new four lane bridge with two separate carriageways each taking two lanes of traffic.

Non-bridge options

- **Option 4 -** Consideration was given to non-bridge options including widening of the existing causeway to allow four lanes of traffic with new bridges through the navigation channel only to allow for vessels to pass under the new structures.

Other options, such as tunnels, were not considered as they were excluded through the previous process and agreed as part of the functional requirements.

Other option considerations

Other options or option 'modifiers' considered after the initial options were prepared and are outlined below.

- **Option 3 -** Re-use or replacement of the existing bridge structure, with re-use of the bridge.
- **Span of bridge** between piers ranging from 35 metre to 105 metre spans.
- **Pile type**, including cased bored-in-situ concrete piles and driven steel piles.
- **Bridge construction type including:**
    - Super-T girders (precast pre-tensioned) with in-situ concrete deck and maximum spans of 35 metres
    - Super-U girders (precast post-tensioned) with in-situ concrete deck and maximum spans of 45 metres
    - steel box girders with in-situ concrete deck (incrementally launched). This allowed for spans between 65 metres and 85 metres and
    - segmental box girders (span-by-span and balanced cantilever), these allowed for spans between 65 metres and 105 metres.

Assessment approach

Following the initial identification of options, the options were assessed between March and June 2020 for the purpose of identifying a reference design to be used for community consultation purposes and to inform the ECI process. It is also being used in the approvals process before more information is made available from the ECI phase.

The assessment approach involved the following steps outlined below.

1. Investigations of fatal flaws – any options that had critical failures or did not meet the broad requirements of the Project were immediately discarded from further consideration.
2. Assessment of options in a qualitative sense against a performance matrix consisting of key functional requirements.
3. Project budget assessment – assessment of options in terms of their alignment with the Project budget, with options not meeting the Project budget being discarded.

The figure below indicates the stages that this process was applied, from initial option identification through to the selection of the option to be used as the reference design.

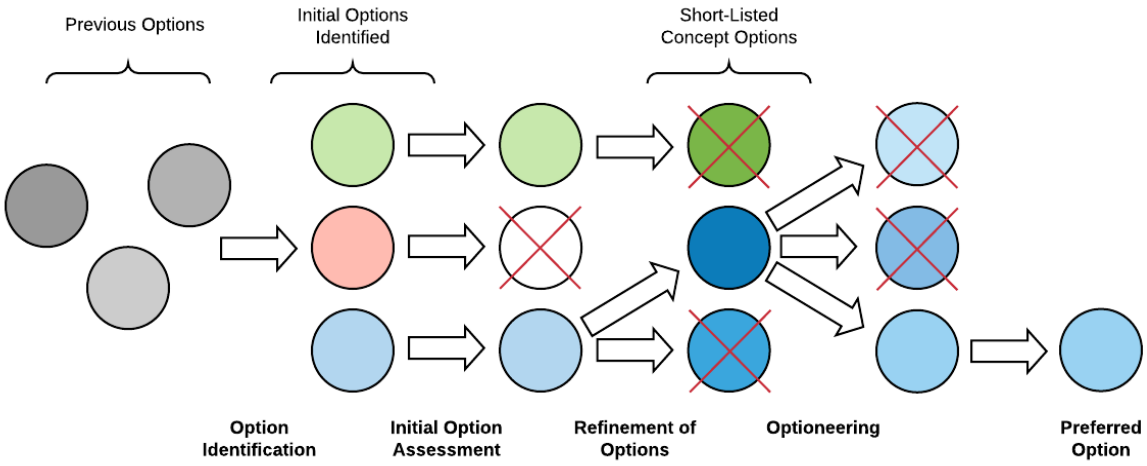

Figure 6. Option assessment stages.

Assessment of fatal flaws against the comparative matrix of criteria was undertaken at three points. The first after initial options were identified (the initial option assessment), the second after the refinement of options (the short-listed options) and the final after optioneering.

Optioneering involved the exploration of option modifiers including:

- bridge form and associated spans
- modified design speed and
- piling type and arrangement.

Assessment criteria

The assessment criteria were developed in line with the key design requirements together with metrics key to the Project such as project budget (noting that the Project budget will be reviewed more closely once the ECI Tenderers undertake development of their options). These criteria are outlined below.

- **Level of service -** The Level of service provided by each option is assessed in the context of the following items:
    - design/posted speed (the closer to 100km/hour, to align with the NLTN, and the adjacent connections, the better) and
    - traffic flow/congestion (increases to overall capacity of the network and reduction in queuing is preferred).

- **Navigability -** One of the key design requirements is the maintenance of a navigable span for vessels to transit the crossing. An unimpeded navigation span is preferred over one that requires a structure to be moved.

- **Approval risk -** Given the tight timeframes for the Project, any option that presents an increased approval risk and more importantly an increase to the time required to gain approvals, the lower the score.

- **Pedestrian and bicycle linkage -** Another key functional requirement is the maintenance of a pedestrian and bicycle linkage between the southern and northern shores. If the option provides other amenity to pedestrians, a higher score is achieved.

- **Maintenance –** Ongoing maintenance of the new crossing should be minimised. Increases to or a lack of reduction in maintenance expenditure is not preferred.

- **Project budget –** The options must meet the Project budget, including contingency and escalation. While this is a key criterion the Project will not be limited by this in order to enable the best long term, fit for purpose and cost-effective bridge solution.

Initial option assessment - fatal flaws

After initial development of the options, several options with fatal flaws were identified. These are outlined in further detail below.

Geotechnical assessment of existing causeway

Geotechnical modelling of the existing causeway was undertaken utilising 3D finite element analysis (FEA). This modelling identified the issues outlined below with each of the initial options.

Option 1 – Requires raising existing causeway height

While the causeway can be utilised for construction access in conjunction with the proposed temporary finger platforms, and for option 1 as the permanent north bound access to the new bridge, there will be a long-term risk of higher maintenance due to ongoing settlement of the causeway and the less likely risk of impact in the event of a seismic event.

Where the causeway needs to be raised as part of option 1, to address long-term climate change and sea level rise, then short-term and long-term settlements can be adequately managed through construction and with suitable ongoing maintenance. Modelling of the causeway was completed, with up to 1.5 metres additional fill along the lower sections to achieve nominal RL 4.1m AHD surface level and this matches with existing finished surface levels near the existing southern abutment.

Where additional fill is used to raise the existing causeway under option 1, as detailed above, then this must be staged so as to manage the resulting increase in pore pressures and prevent bearing failure in the underlying material.

The 2009 GHD report indicated liquefaction risk in the vicinity of chainage 800 (taken from bore BH96-10) due to wet, fine sands underlying the existing causeway within the river sediments. Current testing using CPT (Pitt & Sherry BWB_CPT10) has identified significant sands beneath the existing causeway in the vicinity of chainage 930 and more analysis and investigations within this area of the causeway was recommended to accurately identify the extent and characteristics of the sands. This is not expected to be something that can be cost-effectively managed at this stage.

If option 1 was adopted, the Department would need to undertake further investigation to ascertain the overall risk and cost for this option and to further consider the long-term residual risk of damage resulting from seismic events.

Option 2 – No re-use of the existing causeway

While option 2 provides no geotechnical risk to the Project, the future use of the causeway would need to consider geotechnical risk, even if not carrying vehicles.

Option 3 – Retain existing bridge

This option is similar to option 1, although the ability to raise the levels of the causeway would be limited and the causeway would be subject to potential impact during future sea level rise or storm surge events.

It is also noted that in this option, the risk of impact due to a rare seismic event is heightened due to the reliance of the bridge abutments, which are known to have insufficient bearing to withstand such an event.

Option 4 – Widening of existing causeway

Option 4 includes a 7-metre widening of the existing causeway to provide for both north and southbound traffic in place of a bridge structure and was reviewed for geotechnical risk.

At chainage 900m (near to existing southern abutment), analysis showed that the existing alluvial material (river mud) is not able to support a seven-metre causeway widening built up to design finished surface levels under standard construction techniques. Bearing failure in that underlying material is demonstrated in the model.

At chainage 300m (nominal mid-length along causeway), widening is possible, but the issues outlined below should be noted.

- Placing rock onto the existing river muds will result in penetration of that rock into the mud before the formation can be built up. The depth of penetration is difficult to assess with the currently available information. In-situ testing (water jetting) undertaken by Pitt & Sherry in 1999 indicates the existing causeway formation extends up to 6.5 metres into the mud. Modelling is based on a 2.5-metre embedment, accepting current material quality and construction techniques.
- Short-term settlements are expected to be up to 1.10 metres, hence additional fill is required to achieve design formation height.
- Long-term settlements are expected to 300mm to 400mm (vertical), and this will require significant ongoing maintenance activities and have impacts to amenity, likely require a reduced operating speed through the causeway and visual impact.
- During placing there is also the risk of localised bearing failures and this would need to be managed through construction.

Level of service

The options were assessed against the level of service that they offer to the crossing. The level of service is assessed against elements such as posted speed, restrictions of vehicle mass or size, and overall vehicle efficiency.

Options 1, 2 and 4 all offered higher levels of service than currently offered due to the removal of the existing bridge and the increase to the speed limit through the area.

Option 3 was of greatest concern as achieving a higher level of service on the existing bridge would be very difficult due to:

- the sharper curves required to connect it at the Brooker Highway would reduce design speed
- the narrowing of the carriageway would not provide sufficient clearances for higher speeds and would not be possible to separate the carriageways
- the increased risk that the bridge structure presents in terms of being a roadside hazard
- structural load limits for heavy vehicles that are inconsistent with the rest of the highway network (noting the crossing is part of the NLTN)
- the works that would be required to the existing heritage structure would be significant and would be considered as having almost as significant an impact as demolition and
- the cost to modify it to meet the requirements would likely outweigh the benefits.

In summary, it was determined that it would be very difficult to achieve a minimum 3-star Australian Road Assessment Program (AusRAP) rating for the existing carriageway.

Table 3 below outlines the initial options assessment that was undertaken on the first concept options developed.

Table 3. Summary of initial option assessment.

Option	Fatal Flaws	Level of Service	Navigability	Approval Risk	Pedestrian Linkage	Maintenance	Project Budget
Option 1	✓✓	✓✓	✓✓	-	✓	✓	×
Option 2	✓✓	✓✓	✓✓	✓	✓✓	✓	××
Option 3	✓✓	×	✓	✓	✓	×	×
Option 4	××	Not assessed due to fatal flaw in terms of geotechnical stability					

Following the assessment, option 4 was removed due to fatal flaws, particularly relating to geotechnical risk and option 3 was removed due to its lack of alignment with the key criteria relating to levels of service.

Further, it is noted that in the previous work undertaken that the risk of retaining the existing bridge is significant not only in the context of the ongoing maintenance impost to the State, but also in terms of reliance on the bridge for the NLTN. Not only does the bridge provide key linkage to the north and south, but it is also one of only three major crossings of the River Derwent and forms a key part of the redundancy of the network. The reliability of the bridge and its vulnerability to extreme events presents an unacceptably high risk.

Shortlist option assessment and value management

Following the removal of options 3 and 4, further design refinements were undertaken to the two remaining options, examining the potential levers to reduce project costs. This has been undertaken with respect to:

- opportunities in the construction staging and site access arrangements
- consideration of permanent works arrangements both at the bridge approaches (grade separations and local roads) and bridge arrangement

- assessment of design requirements and where appropriate, relax these requirements to see savings in the Project and
- cost modelling and methodology with respect to contingent and inherent risk and escalation.

This reduced the estimated cost of both option 1 and option 2, but not sufficiently for option 2 to be within budget.

Figure 7. Illustration of option 1. Two-lane bridge/replacement two lane bridge.

Figure 8. Illustration of option 2. Four-lane bridge.

Following the optioneering and value management processes, the options were again assessed. Table 4 below outlines the assessment of the two short-listed options.Table 4. Assessment of short-listed options.

Option	Fatal Flaws	Level of Service	Navigability	Approval Risk	Pedestrian Linkage	Maintenance	Project Budget
Option 1	✓✓	✓	✓✓	✓	✓	✓	✓
Option 2	✓✓	✓✓	✓✓	✓	✓✓	✓	✗

2.2.4 Selected option (Reference design for public consultation)

Based on the assessment, option 1 was selected option as the reference design for the purposes of public consultation at the end of 2020. The basis for this assessment outcome is outlined below.

- Options 1 and 2 were the only short-listed options that passed the initial assessment process.
- Both options provide a good degree of alignment with the design requirements.
- Option 1 presented a slightly higher risk to planning and environmental approvals due to the requirement to demolish the existing bridge and would require longer to complete than option 2.
- Option 2 provided a slightly higher level of service through the avoidance of the existing causeway.
- Following the option costing and the optioneering workshop and assessment, option 1 was identified as the option most likely to be deliverable for the Project budget. Option 2 was estimated to cost approximately $35 million (about 6 per cent) more than option 1, noting the ECI Tenderers may present viable options with different construction methods and margins.

While option 1 was selected as the reference design, this did not preclude consideration of option 2 in the ECI process (as described further in Section 5). Both designs for options 1 and 2 were provided to the ECI Tenderers for information and both were considered in the development of materials for the purpose of planning approvals (as described further in Section 8).

The potential cost advantages of option 1 over option 2 would depend on the design and construction management of geotechnical risks associated with the existing convict-built causeway to ensure that there would not be excessive settlement of this section of the highway during operation. Detailed construction records of the causeway do not exist, and the causeway has a history of settlement and repair.

The ECI procurement process adopted by the Project has allowed the two experienced construction companies competitively tendering for the works to assess all of the information previously available, plus additional geotechnical information collected by the State during the ECI phase. Based on this assessment and using their knowledge and experience of constructing within a range of challenging geotechnical environments, the ECI Tenderers were required to develop their own designs for the option(s) they considered would best meet the specified requirements.

The reference design released for public consultation also included indicative designs of the road interchanges at either end of the bridge as shown in Figure 9 and Figure 10. These interchange concepts were designed to efficiently achieve the required traffic movements within the budgetary constraints of the Project. As with the bridge, the ECI tenderers were required to assess and develop their own designs for the option(s) they considered would best meet the specified requirements.

Reference design plans can be found in Appendix A.

Figure 9. Reference design of southern interchanges at Granton.

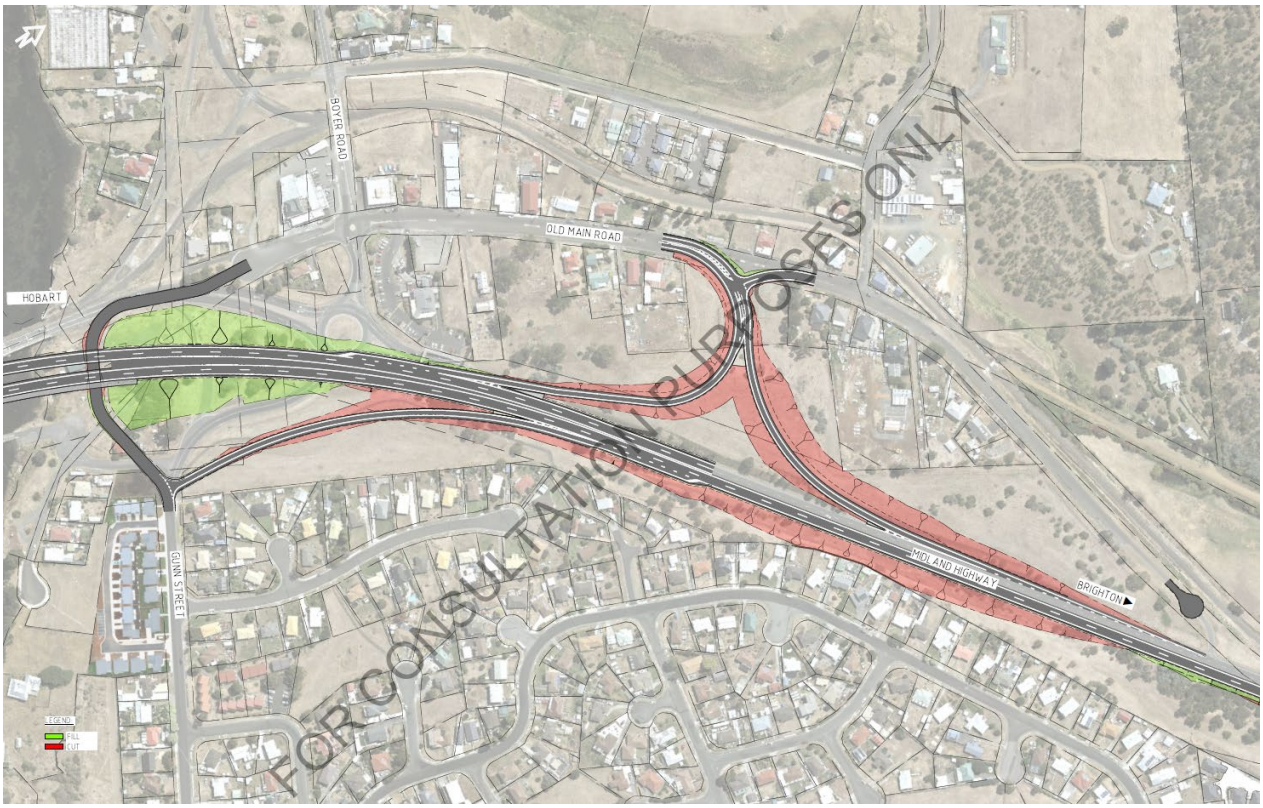

Figure 10. Reference design of Northern interchanges at Bridgewater.

Consultation on reference design

Following the selection of option 1 as the reference design to be used for public consultation, the Department sought a range of community and stakeholder feedback over a four-week period in October and November 2020.

During this public consultation period, the project team undertook a suite of formal and informal stakeholder engagement activities. The three impacted councils (Brighton, Derwent Valley and Glenorchy) were briefed at General Manager level prior to the release of the reference design, as well as directly impacted landowners and residents in Bridgewater and Granton. Face-to-face briefings were provided to a variety of environmental regulators and stakeholders including:

- National Parks and Wildlife Advisory Council
- Natural and Cultural Heritage Branch (DPIPWE)
- EPA
- Aboriginal Heritage Tasmania
- TasRail
- Heritage Tasmania
- Birdlife Tasmania
- Derwent Estuary Program

Following the consultation, a report was prepared summarising activities undertaken and key issues and concerns raised by the community and stakeholders. The report also highlights the Department's essential and desirable requirements from contractors involved in the ECI phase of the Project.

Throughout the consultation period, more than 2 500 people visited the Project's online interactive map, and more than 200 comments and pieces of feedback were received in relation to the reference design.

Key issues raised during the consultation process are described in Appendix B – *Reference Design Engagement Report.* Key themes highlighted during the consultation process included:

- local connectivity
- speed limit
- environment and heritage
- public and active transport
- navigation height
- heavy vehicles and
- rail.

Evolution of the reference design

While the option chosen as the reference design highlighted an option considered most likely to achieve the design requirements within the budgetary constraints of the Project, constructability considerations may lead to other options being adopted within the constraints of the site, the existing road network and the Project budget.

The competitive ECI procurement method being adopted has enabled the two tenderers to develop their own design options to deliver the bridge and interchanges to meet the Project requirements in the most cost-effective way.

All community and stakeholder feedback received through the community consultation process was provided to the ECI Tenderers and both tenderers have consulted with key stakeholders, government

agencies and utility providers. The information received has been considered by the tenderers in the development of their tender designs.

Evolution of the reference design – road interchanges

The Project's design requirements include the grade separation of the connection between the Brooker and Lyell Highways, as well as the local connector Black Snake Road. Recognising the budgetary constraints of the project, the reference design provided this connectivity by utilising the existing Black Snake Road underpass, with roundabouts either side of the highway.

The location and format of these roundabouts were selected to prioritise the main through traffic flowing to and from the Lyell Highway. The opposing traffic flows are much smaller in comparison, meaning that queuing delays at each roundabout would be minimal.

Stakeholder and community feedback in response to the reference design raised significant concerns about the proposed arrangements, highlighting issues with the path that Lyell Highway traffic would need to take, including traversing roundabouts and similar concerns with connectivity between the bridge and Boyer Road, which also links into the Derwent Valley.

Following the consultation period, all feedback received from stakeholders and the community was provided to the two ECI Tenderers to assist in developing their tenders. Throughout the ECI process, both ECI Tenderers have consulted widely with key stakeholders, including local councils, government agencies and utility providers as they continue to develop their designs.

Due to the feedback received from the community, Councils and other stakeholders, the Department highlighted to the two ECI Tenderers the specific concerns about the connectivity with the Lyell Highway and Boyer Road. The Department indicated its preference for a more direct connection at this location to address these concerns.

The sites have significant constraints due to the challenging topography and geology at these locations, particularly when combined with the current budgetary constraints. Despite these constraints, the ECI Tenderers have engaged with this challenge and have developed some innovative design options that are expected to improve on the connectivity proposed in the reference design.

Throughout the ECI phase, the Department has reiterated its preference that there be a direct connection to the Lyell Highway. The confidentiality needed during the competitive ECI procurement process means that there have been limited opportunities to provide feedback to the Council and other stakeholders that would demonstrate that their concerns had been heard and considered.

The community, Councils and other stakeholders will have further opportunities to consider and provide feedback on the Project as the planning approval process progresses, the preferred tenderer is selected and its developed design is publicly released, and pre-construction consultation and engagement is undertaken.

2.3 Scope of Works

General description of works

The Project's design requirements (as listed in section 2.2.2) have been incorporated into the following scope of works to be delivered by the Project.

Table 5. Scope of works to be delivered by the Project.

Design Requirements	Included in scope
Two lanes in each direction between the Brooker Highway and Midland Highway, terminating prior to the East Derwent Highway roundabout.	✓
Three-metre shared path for cyclists and pedestrians.	✓
Minimum design speed of 80km/h.	✓
Grade separated connectivity of the Brooker Highway and Midland Highway to the surrounding road network, particularly the Lyell Highway.	✓
Safe and effective routes for local traffic movements across the Brooker Highway and Midland Highway with minimal queuing or vehicle conflict points.	✓
Design of road levels to consider Q100 storm events, forecast sea level rise, storm surges and measures to protect against structural damage from overtopping.	✓
Air-draft clearance of 16.2 metres AHD, consistent with the defined navigation span clearance of the Bowen Bridge.	✓
Safety screens and barriers at locations along the Bridge to minimise the risk of suicide or injury from thrown objects.	✓

Removal of existing Bridgewater Bridge

The crossing of the River Derwent between Granton and Bridgewater has a long history. The existing bridge is the fourth to be built at this site and is reaching the end of its useable life and the Department understands that many members of the community have a strong connection to both the existing Bridgewater Bridge and the significance of the area as a river crossing.

The removal of a redundant asset following replacement is a normal part of infrastructure development and is consistent with what has occurred at the site for each of the prior bridges since 1830 when it first became a crossing.

The Department notes that removing the existing Bridgewater Bridge, including the lift span, support towers and approach spans is desirable due not only to the poor condition of the bridge, but to the growing maintenance costs. The State would be required to fund these maintenance costs regardless of whether the existing bridge would continue to play a role in the State's transport network.

Retaining the existing bridge would restrict the navigation channel, which is a key project requirement. In this situation, either the lift span would need to remain operational (which would require ongoing maintenance) and would need to be operated for vessels passing, or the lift span would need to be left in a raised position to achieve the vertical clearance, but the horizontal clearance target of 45 metres would not be met. It is not possible that this project objective can be met with the existing structure in place.

If the bridge was to be retained in an unused state, there would likely be an increase in anti-social activity on the existing structure, including activities that could pose a hazard to the public and risk to the State.

While the Department is seeking planning approval for the future removal of the bridge, the timing would depend on the scope of works proposed in the ECI process. If the preferred design adopted by the successful tenderer requires the removal of the existing bridge, the removal will be included within the scope for the design and construction of the new bridge.

If not required for the adopted design, removal of the existing bridge would be anticipated to cost approximately $30 million, compared with maintenance costs of approximately between $50 million and $100 million over the next 50 years. These works would need to be scheduled after the new bridge is operational and would most likely be delivered through a procurement separate from the design and construction of the new bridge. Demolition of the existing bridge was not part of the pre-concept project cost estimate of $576 million and will be dependent on sufficient funding being made available.

The convict-built causeway and existing 1874 and 1893 stone abutments would be retained as part of the Project under all scenarios, providing physical reference to the significance of the place as a historic crossing point.

Outside of Scope

Rail infrastructure

The rail line on the existing bridge has been non-operational since the Brighton Transport Hub opened in 2014.

The Department notes the public desire for rail to be included as part of the Project. Providing for rail is not as simple as attaching an additional structure onto the side of the new bridge for railway tracks as trains require an alignment with shallower slopes, wider curves and different load capacities than roads built for cars and trucks.

The exclusion of rail was an issue raised considerably throughout the public consultation process on the reference design. There was a strong desire from the community reflected in the feedback received for the rail line on the existing bridge to be retained, which highlighted an assumption that removing the existing bridge would preclude the future use of the rail corridor.

While including rail infrastructure on the new Bridgewater Bridge is outside the scope of the Project, the Project's design requirements specify that the new bridge must not obstruct the existing rail corridor, ensuring that it can be used in the future if needed. This requires that there is sufficient clearance above and beside the designated rail corridor, but it would not prevent the existing bridge being removed or replaced, if required.

3 Project Cost

3.1 Project Funding

Informal funding commitments have been made to the New Bridgewater Bridge Project (the Project) based on a pre-concept estimate for a total of $576 million, inclusive of all project development, procurement and management costs. The Australian Government made a $461 million commitment in the 2018-19 Federal Budget, representing an 80 per cent contribution. This was followed by a $115 million commitment (20 per cent contribution) from the Tasmanian Government.

In April 2021, the Australian Government formally accepted and approved funding for the scoping and development phase to conclude at the end of 2021.

Table 6. Approved funding for scoping and development phase of Project to December 2021.

P50 Outturn		Past Exp. ($m)	FY20-21 ($m)	FY21-22 ($m)	TOTAL ($m)	Balance of Commitment ($m) *
	Aust. Gov. contribution		$4.0	$12.7	$16.7	$444.3
	State Gov. contribution	$2.6	$6.0	-$4.5 **	$4.1	$110.9
	Total	$2.6	$10.0	$8.2	$20.8	

**Balance of commitment based on original total commitment of project including for the Delivery phase, which is not subject to this PPR, of Australian Government $461 million and Tasmanian Government $115 million at the agreed 80/20 funding split for this project.*

*** Negative figure reflects reimbursement of Tasmanian Government funding with Australian Government funding, to maintain the agreed 80/20 funding split to the Project.*

Progressing with the Project into the delivery phase is dependent upon the formalisation of the balance of the funding commitments through the submission of a *Delivery Phase Project Proposal Report* (PPR) to the Australian Government. This will occur after selection of the preferred tender for the design and construction of the bridge.

3.2 Reference design cost estimate

As noted above, the informal funding commitment of $576 million was based on a pre-concept estimate.

The reference design was developed through and following the options evaluation process detailed in Section 2.2.

Table 6 below contains the cost estimates for the delivery of the reference design. They indicate between a 50 - 90 per cent probability (P50-P90) that the reference design could be delivered within the budget commitment of $576 million.

Table 7. Cost estimates for delivery of reference design.

	P50 ($m AUD)	P90 ($m AUD)
Base Cost Estimate	$460,481,700	$460,481,700
Contingency	$46,412,472	$79,700,000
Total Project Cost Estimate	$506,894,172	$540,181,700
Escalation	$54,371,996	$58,102,350
Total Outturn Cost Estimate	$561,266,168	$598,284,050

Based on the above, it was determined there was sufficient confidence to proceed with the procurement strategy detailed in Section 5 to engage with the construction industry for early input using a competitive design development and tender process so that the Project can adopt the most efficient and cost-effective option of designing and building the bridge and interchanges.

3.3 Business Case submitted to Infrastructure Australia

A draft business case, prepared by Deloitte Access Economics, was submitted to Infrastructure Australia in March 2019.

Infrastructure Australia undertook an evaluation of the Business Case on 13 June 2019.

Infrastructure Australia did not endorse the Business Case, identifying a number of issues that needed to be addressed. The Project's responses to addressing these issues are summarised in table 8 below.

Table 8. Responses to Infrastructure Australia feedback.

Infrastructure Australia feedback	Response/action taken
Further geotechnical work is required to ensure the preferred construction method for the proposed project can be supported by the riverbed, and that there is a risk of significant cost increases if it cannot.	Undertaken geotechnical investigations in both the marine and terrestrial environments which has fed into scoping and costing as well as being provided to the ECI Tenderers. Additional geotechnical investigations been undertaken at the direction of the ECI Tenderers during the ECI period.
Cost estimates have been developed prior to release of the updated standard AS5100:2017 for bridge design. There could be further costs for the design to comply with the updated standards.	Scoping design (reference design) completed to this standard and all costing work completed reflects this. Requirement of the ECI Tenderers to meet this design standard and other relevant standards.

Infrastructure Australia feedback	Response/action taken
The cost of decommissioning the current bridge, assumed by the proponent at $500,000, may be understated. A detailed decommissioning plan was not provided, and publicly available bridge decommissioning information suggests this could be higher. This uncertainty will also impact on the ongoing operating and maintenance costs of the current bridge. There may also be complications with the heritage value of the existing bridge.	• The Department is now seeking planning approval for the future removal of the bridge, irrespective of whether the adopted design requires it. • Scoping design considered the process to deconstruct the bridge and dispose, including the treatment of lead paint. The cost plan prepared for reference design reflects this. • Heritage investigations have been completed to understand the implications. • If not required for the adopted design, removal of the existing bridge would be anticipated to cost approximately $30 million, compared with maintenance costs of approximately between $50 million and $100 million over the next 50 years. These works would need to be scheduled after the new bridge is operational and would most likely be delivered through a procurement separate from the design and construction of the new bridge.
The risk of a seismic event impacting on the causeway and existing bridge in the Base Case has not been quantified in the central case of the economic evaluation. Instead, this risk has been considered through a sensitivity test of the bridge failing. Incorporating the ongoing seismic risk and likely impact on traffic into the core analysis would worsen the Base Case conditions and, in doing so, slightly raise option 2's net benefits.	• Consideration of seismic event risk noted in option evaluation. • Acceptance or otherwise of the risk will be dependent on the option(s) put forward by the ECI Tenderers. The ECI Tenderers are aware of the risk of a seismic event impacting on the causeway. • If the reference design approach is adopted, a rare seismic event (e.g. 1 in 200-year event) may cause significant damage to the two northbound lanes. In this event, the highway may be temporarily reduced from four lanes to two lanes, as the northbound traffic would need to use one of the two southbound lanes until repairs were completed.
The proponent has not estimated the maritime benefits of a higher bridge clearance, which would allow vessels to pass underneath without interrupting vehicle traffic. This would benefit road users, but the proponent has advised that this	• A recreational impact assessment and a socio-economic assessment have been completed to answer this question and are being included in the Major Project Impact Statement (MPIS) to

Infrastructure Australia feedback	Response/action taken
benefit is unlikely to be significant relative to the other quantified benefits.	be submitted by the project as part of the planning approval process.
The proponent has not provided a strategic plan for industrial, commercial, or transport uses of the river, which may capture some minor benefits of economic development.	• As above.
The new bridge alignment would slightly increase the distance vehicles travel across the River Derwent, resulting in higher vehicle operating costs, environmental externalities, and crash costs.	• This is dependent on the final alignment and design. The additional distance may be offset by the reduction in stopping at intersections (roundabouts at both ends) and the higher travel speed and more efficient operation.
The proponent's analysis of option 1 indicated an NPV of -$47.9 million, with a BCR of 0.67, using a 7 per cent real discount rate and P50 cost estimate. Option 1 is expected to cost $271 million (nominal, undiscounted), compared with $471 million for option 2 (the Project). Despite the lower BCR and higher cost, the proponent chose option 2 as the preferred option for the reasons stated in Section 5, namely, better fit with the six investment themes used in the 10-Year Infrastructure Plan, mitigation of the existing settlement issues, and reduced risk of Bridgewater Bridge being closed as a result of a seismic event.	• Economic analysis will be updated in the Delivery Phase Project Proposal Report to the Australian Government. • Also note that option 1, as referenced in the IA comments is not the same Option 1 as referenced elsewhere in this document. Instead, it refers to the options developed and outlined in the March 2019 business case.
Option 1 relies on widening the existing causeway which may not be feasible given the heritage values associated with the current causeway. The clearance for option 1 is half that of option 2, which would restrict a small number of vessels each year from passing under the bridge. Overall, we agree with the proponent's business case findings that the costs of the project, as currently specified in option 2, outweigh its benefits, resulting in net costs to society. We also identified a number of risks, which may further increase project costs.	• No widening is currently being considered in the Reference Design and no works are expected to require widening at this stage.

4 Project Benefits

4.1 Expected positive outcomes and benefits to be delivered by the Project

Building a new Bridgewater Bridge is Tasmania's largest ever transport infrastructure project. The New Bridgewater Bridge Project (the Project) will make travel safer and more efficient. It will connect local communities, create more open space and change the way people travel between the north and south of the State.

Benefits to the State are outlined below.

- Increased heavy vehicle freight efficiency through the removal of existing Over Size Over Mass (OSOM) restrictions that are inconsistent with the remainder of the Midland Highway.
- Improved safety and efficiency for current and growing future commuter and freight movements through a continuous, high standard connection of the Brooker Highway and Midland Highway with:
    - introduction of grade separation intersections to prioritise traffic on the NLTN
    - increased posted speed and more consistent speed through the area
    - reduction in travel time due to reduced congestion and queuing and increased travel speed and
    - improved safety and efficiency for pedestrians and cyclists.
- Removal of the need for the NLTN to be closed intermittently to allow vessels to navigate past the Bridgewater Bridge and more convenient and reliable access for vessels wishing to navigate past the Bridgewater Bridge.
- Reduced risk of the loss of the Bridgewater Bridge and causeway as operational crossing of the River Derwent due to mechanical failure of the existing bridge, major weather events (e.g. floods) or seismic events impacting the causeway.
- Reduction in maintenance costs to the existing Bridgewater Bridge, noting that it will no longer form part of the National Land Transport Network and that it may be demolished as part of, or subsequent to, the Project.
- The creation of economic and social benefits resulting from the capital infrastructure investment in accordance with the Australian Government requirements and the Tasmanian Government's Buy Local policy.

4.2 Local involvement in construction

Because of the size and scale of the Project, only relevant prequalified construction companies were able to respond to the Request for Proposal issued to market.

While there were no Tasmanian construction companies eligible to submit proposals, there will be opportunities for local businesses and suppliers to be involved throughout the Project, which will bring local knowledge and expertise to the Project.

ECI Tenderers have been strongly encouraged to use local businesses and suppliers where they can and have been required to submit a Tasmanian Industry Participation Plan (TIPP) as part of their tender submissions. They will be required to implement this plan during the construction phase of the Project.

The Department of State Growth (the Department) expects that a large portion of the Project's design and construction activities will be delivered by the successful contractor through subcontracts and agreements for supply of different services.

The Tenderers have been building relationships with local businesses and suppliers prior to submitting their tenders and the successful contractor will start engaging suppliers, including subcontractors, service providers, component suppliers and material suppliers from early 2022.

This will allow interstate companies that have experience in delivering major infrastructure projects to share their extensive knowledge with Tasmanian companies.

4.3 Socio-economic impact

A socio-economic impact assessment has been prepared to evaluate the Project's intended and unintended socio-economic impacts, considering the overall effects on the local community and economy as a result of the construction and operation of the Project.

The assessment was conducted using the Tasmanian Government's guidelines to evaluate both qualitative and quantitative impacts of the Project.

The assessment found that based on the estimated capital cost of the Project ($576 million) and operational expenditure, the construction and operational phase impacts will generate the following increases and additional revenue to the local, State and Australian Government:

- $470 million increase in Gross State Product (GSP)
- $385 million increase in Gross Value Added (GVA)
- $68 million increase in State Government revenue and
- $94 million increase in Federal Government revenue.

During construction, local communities and businesses within the project area will likely be temporarily impacted by reduced amenity and restricted access. However, it is expected that local economic activity will also increase due to the demands on labour, materials, and services.

Once operational, the Project is expected to create benefits for the nearby communities within the Brighton, Glenorchy and Derwent Valley local government areas (LGAs) and provide an improved transport network.

A new Bridgewater Bridge will not only provide quantifiable benefits but will also realise a wider range of social and economic benefits to the State and the broader community. Key findings in the assessment are outlined below.

Improved transport network efficiency

Less delays and more reliable travel time

Traffic modelling undertaken for the Project by Midson Traffic highlighted an aggregated travel time savings of around 3 000 hours per day in 2041-42, which will make travel times more reliable. Most of these savings would occur during the AM and PM peak periods because of less traffic congestions and delays. Reduced travel time will benefit the local community, including more than 1 500 Brighton LGA residents who commute to Hobart for work each day. Reduced travel time will enable people to spend more time with

their families or in leisure, facilitating improved community cohesion. Reduced travel times will also benefit freight operators, enabling more efficient supply chains and, therefore, lower transport costs. Reliable travel times will also provide local residents with important access to services in the greater Hobart area, and will provide for critical emergency vehicle access.

Improved access for high-capacity freight vehicles.

Currently, high-capacity freight vehicles must detour via suburban streets to the Bowen Bridge or Tasman Bridge to access the greater Hobart region. The Project will provide increased load limits on the new bridge, which will reduce the need for freight operators to detour. This will reduce detrimental amenity impacts within the townships of Brighton and Bridgewater, as well as improve the efficiency of the State's freight task.

A new shared path across the River Derwent

The Project will include a three-metre-wide shared path for cyclists and pedestrians, making travel across the bridge safer and better connecting local communities either side of the River Derwent. Facilitation of increased walking and cycling trips can improve the health and wellbeing of residents within the local community. It is possible that such infrastructure will also facilitate increased recreation within the Bridgewater and Granton region, contributing to improved social participation and community cohesion.

Generation of more jobs and benefits to the local market

Jobs and benefits to the local market will be generated through:

- generation of direct and indirect jobs during the construction phase
- providing learning opportunities for Tasmanian residents and facilitating the development of knowledge and skills in the construction industry, particularly those from socio-economically disadvantaged areas
- the sourcing of considerable amounts of materials, equipment, goods and services from Tasmanian businesses, creating further direct and indirect job growth to Tasmanians and
- benefits to upstream and downstream industries, both locally and for the State.

Enhanced overall amenity and improved quality of life

Reduced impacts on suburban streets, improved land values and increased demand for housing

As road traffic, particularly high-capacity freight vehicles, will be able to reduce the use of suburban streets, it is expected that the nearby residential areas would become more liveable and attractive to home buyers and investors, thus increasing demand and improving land values in the surrounding areas.

Improved social and economic connections

The Project will provide improved connections between residential and employment clusters, contributing to enhanced economic participation and productivity, as well as improved social cohesion between nearby communities within the Brighton, Glenorchy and Derwent Valley LGAs.

5 Procurement

5.1 Procurement Summary

Following consultation with industry, the Tasmanian Government elected to use a two-stage Early Contractor Involvement (ECI) procurement process.

Because the State rarely delivers projects of this size and scale, the ECI process was adopted to provide the opportunity to engage the construction industry for early input about the design, which will allow the Project to adopt the most efficient and cost-effective way of designing and building the bridge and interchanges.

A Request for Proposal (RFP) was released to the country's tier one contractors at the end of August 2020 and four proposals were received from national and international construction companies.

CPB Contractors Pty Ltd and McConnell Dowell Constructors Pty Ltd were awarded ECI Agreements to enter a competitive design and tender process that started in December 2020 to develop a design that meets the design requirements and achieves a value-for-money solution.

During the ECI Phase, tenderers worked collaboratively with the Department to refine and develop their individual tenders for the design and construction of the Project, based on the Project Scope and Technical Requirements.

Tenders are due to be submitted in August 2021 and a preferred tenderer will be engaged by the end of 2021.

This type of procurement allows the construction industry to use their specialist knowledge and expertise to design a bridge that will deliver the best outcome for Tasmania and provides opportunities for industry innovation and construction efficiencies.

5.2 Procurement Strategy Evaluation

A Procurement Options Workshop was held in January 2020 to provide advice on the suitability of the available procurement options to adequately address the objectives, challenges and constraints faced by the Project.

The assessment process consisted of an overview of the Project objectives, challenges and constraints, shortlisting of available delivery models (as outlined in the *Building and Construction Procurement Guide: Principles and Options*, published by the Australasian Procurement and Construction Council and Austroads), followed by a more comprehensive review of the shortlisted options outlined below.

Table 9. Procurement options.

Delivery Model	Suitable
Procure construction only	✓
Design and Construct (D&C)	✓
Early Contractor Involvement (ECI)	✓
Alliance contracting	✓
Managing contractor	×
Construction management	×
Direct managed	×
Public Private Partnership (PPP)	×

The workshop participants noted that the shortlisted delivery model options could all be used to deliver the Project and that each option had its strengths and weaknesses that would need to be managed. The workshop participants completed a qualitative comparison of risk between the options regarding the key risk factors that are expected to affect the success of the Project delivery. This comparison is outlined in table 10 below.

Table 10. Comparison of procurement options.

Delivery Model	Risk to…					
	Action	Budget	Scope	Program	Approvals	Experience
Construct only	High	High	High	Medium	Medium	Low
D&C	Medium	Medium	Medium	Medium	Medium	Low
ECI	Low	Low	Low	Low	Low	Low
Alliance	Low	Low	Low	Low	Low	High

Based on this comparison, the workshop participants concluded that the preferred option for this project would be an ECI based methodology.

It was noted that an Alliance procurement model could also be expected to provide a good outcome; however, the resourcing required and the lack of experience by the Department and the Tasmanian Government in establishing and participating in an Alliance contract were considered significant risks to successful delivery using this model.

5.3 Selected procurement methodology – Early Contractor Involvement

The approach to the ECI preferred option was further developed following the procurement options workshop.

The project team consulted with the Director Infrastructure Procurement at the Queensland Department of Transport and Main Roads (DTMR) as they have used the ECI delivery model on numerous occasions and have developed a clear, effective and well-documented process.

DTMR provided example procurement documentation to assist in the development of the Bridgewater Bridge procurement documents.

The adopted procurement process includes:

- Request for Proposal (RFP)
- shortlisting process
- stage one (ECI) and
- stage two (D&C) – part of the Delivery Phase.

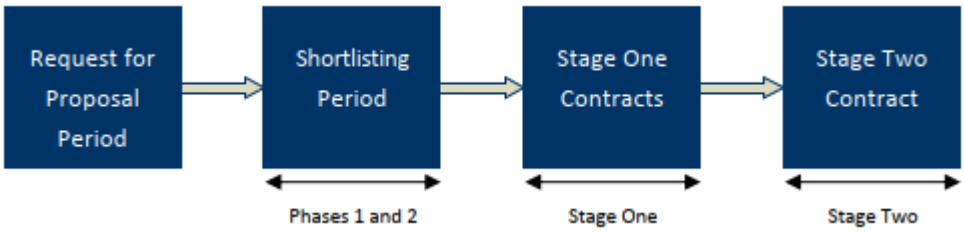

Figure 11. Procurement process.

5.3.1 Request for Proposal

Prior to issue of the RFP, the project team undertook a pre-procurement industry consultation with prequalified contractors in March 2020. This tested the industry availability and willingness to participate in the procurement process as proposed, and to gain some industry input into the critical factors that have since been addressed in the RFP documentation. The consultation was conducted in line with Departmental processes that complied with the relevant Treasurer's Instructions and International Procurement Obligations.

The RFP stage was open to all prequalified contractors that were able to meet the mandatory criteria.

5.3.2 Short listing

The proponents from the RFP stage were shortlisted based on their response to the evaluation criteria.

On 10 December 2020, in a joint media release from both State and Federal Government Ministers, McConnell Dowell Constructors (Australia) Pty Ltd and CPB Contractors Pty Ltd were announced as the short-listed contractors to participate in the ECI phase.

The process then proceeded to the Stage One phase with those two contractors, as outlined below.

5.3.3 Stage one (ECI)

The two contractors entered into Stage One (ECI) agreements to work with the Department to develop their designs and prepare and submit a Design and Construction (D&C) tender to complete the works for a

fixed sum. The two contractors are being paid a contribution toward their actual bid costs for Stage One, up to an agreed upper limit.

After the submission of the D&C Tenders in August 2021, Stage One (ECI) is expected to conclude with the selection of the preferred tenderer and the State entering an agreement with this preferred tenderer.

5.3.4 Stage 2 (Design & Construct)

While the ECI phase, which the State commenced in 2020, has proceeded to schedule for entering an agreement with the preferred tenderer by the end of 2021, the timing for the granting of the Major Project Planning Approval Permit (Permit) is proceeding more slowly than scheduled.

While it was originally intended that the project would secure the Major Project Approval Permit prior to executing the Design & Construction Deed, it is now expected that the Permit is unlikely to be received before the end of 2021. To avoid any delays to commencing the design activities, the project proposes that an early activities delivery strategy is adopted so that time-critical activities can continue to be progressed pending receipt of the Permit.

The early activities will be limited to those activities that can be undertaken prior to receipt of the Permit, such as early design activities and early development of the construction environmental management plan (CEMP). Some on-ground preparatory activities and some initial procurement of equipment or materials may also be progressed. Construction of permanent works will not be included until the Permit has been granted.

Following receipt of the Permit, the contractor's activities would continue seamlessly until the detailed design is complete. Construction on site is expected to commence in mid to late 2022.

At this stage, it is not expected that this staged approach will incur any additional costs and should lead to significant savings to the Tasmanian Government in the time and cost required to deliver the Project.

5.4 Project Timeline

The Tasmanian Government has committed to completing the Project so that vehicles will be using the new crossing by the end of 2024. Broad milestones to achieve this objective are shown in Figure 12.

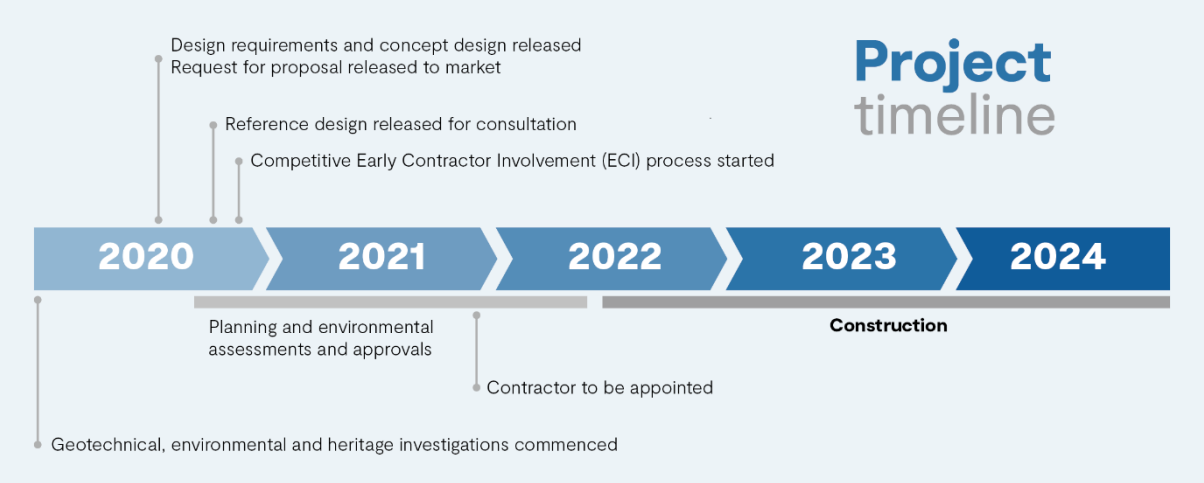

Figure 12. Project timeline.

6 Risk and Sustainability

6.1 Major risks, and proposed mitigation strategies

Identifying and actively managing risks surrounding the delivery of the Project will be critical to its success.

The risk management approach for the Project was adopted from the Department of State Growth's (the Department's) Project Management Framework and associated risk management guidelines. A project-specific risk management plan, which captures all the risks with their consequences, likelihoods, risk levels, treatments, and risk owners, has been developed and is regularly monitored and updated by the project team.

In developing the project-specific risk management plan, several workshops facilitated by external engineering and risk experts were hosted with key stakeholders to ensure the risk register is comprehensive and relevant to the Project. This risk information was used in forming the risk mitigation strategies and feeding into other critical documents, such as the Stakeholder and Community Engagement Plan (SCEP).

A total of 130 risks in seven risk categories were identified as of July 2021. Of these identified risks, 112 risks remain relevant and have been actively managed by the project team, with mitigation actions assigned to individual project team members. Table 11 below summarises the major risks identified in each risk category and their proposed mitigation strategies.

Table 11. Summary of Major Risks and Proposed Mitigation Strategies.

Risk Category	Major Risk Summary	Mitigation Strategy
Scope and design	• The final project outputs may fail to deliver the desired project outcomes or achieve the project objectives. • Formal approval for Australian or Tasmanian Government funding may not be secured if project objectives and benefits are not sufficiently demonstrated. • Additional funding may be required to deliver the desired project outcomes and project objectives that define the current scope. • Project scope or project technical requirements may need to be changed to address stakeholder requests, leading to additional cost or delivery timeframe. • Inadequate or impractical design may cause higher cost and possible delay to the project delivery timeframe.	• Understand cost planning and independent cost review through project options/scope development. • Understand the project outcomes and objectives and where potential savings may exist if scope reduction is required. • Apply appropriate project governance in the decision-making process and obtaining direction from the Executive Steering Committee in the management of significant risks. • Include formal review and client approval process for the Project technical requirements. • Utilise the Department's Change Management Process in managing scope. • Identify design enhancements that may be incorporated to deliver superior outcomes if affordable within budget or if associated funding is made available. • Apply appropriate level of review and approval in the progress of design, particularly if any deviations are encountered.
Implementation	• The State's procurement strategy and procurement documentation, including the project technical requirements, may not be contemporary or comprehensive enough to reflect the complexity of the Project, compromising project quality or causing extra costs. • Australian Government could go into caretaker mode when critical project decisions are required, leading to delays to commencement and possible extra costs.	• Use a two-staged competitive procurement process to maximise innovation and obtain value-for-money tenders via Early Contractor Involvement (ECI) approach. • Secure adequate expertise and resources, including review of similar contemporary examples, to ensure that project documentation is suitable for the level of complexity required for the Project. • Forecast key decision points and developing a contingency plan to cater for any associated risks.

Risk Category	Major Risk Summary	Mitigation Strategy
Communication	• Communication with community and stakeholders may be inadequate or inconsistent, causing dissatisfaction or loss of public and political support. • The community or the key stakeholders could be dissatisfied with the proposed project scope, causing loss of public and/or political support. • Disagreement over the future use of the causeway and/or the rail corridor may create inconsistent or unrealistic expectations.	• Develop and implement the Stakeholder and Community Engagement Plan and include a designated stakeholder communications manager within the project team. • Maintain clear and consistent communications with stakeholders through a single point of contact. • Adopt a policy of maximum transparency with the public and stakeholders and promote stakeholder interaction where possible, including providing regular updates. • Utilise the stakeholder consultation process to ensure open and transparent two-way communication.
Procurement	• The ECI tender process may not deliver the project outcomes and objectives, impacting on project cost, delivery and/or quality. • Procurement process compromised due to conflict of interest, inappropriate communication of information or security breach, resulting in invalid tender or re-tendering, which delay the delivery of the Project.	• Clearly define the project outcomes and objectives based on the independent cost estimation for the reference design. • Identify opportunities for innovation or scope reduction if required to achieve project objectives within current budget constraints. • Limit commitments to stakeholders for potential additional project outcomes until tendered costs are available. • Engage the required resources to manage the procurement process, including individuals experienced in high-risk infrastructure procurement. • Ensure all Departmental procurement procedures and policies are adhered to, with an Evaluation and Probity Plan in place.
Approvals	• The Department may be unable to obtain approvals from the relevant agencies (e.g. TasRail or Parks and Wildlife Service)	• Develop a clear approvals plan that defines the roles and responsibilities for managing the various approvals and their expected timeframes.

Risk Category	Major Risk Summary	Mitigation Strategy
	or permit authorities (e.g. Tasmanian Planning Commission), preventing the delivery of the Project. • It may take longer than expected to obtain the required approvals and permit, causing delays to work commencement and completion, plus associated costs. • Approvals or permit conditions may place unforeseen restrictions on critical elements of the Project. • Tender submissions may differ significantly from the basis of the planning assessment and approvals, leading to amendment of either the preferred tender or the planning approval outcome, which will cause significant delays and extra costs. • Difficulty or delay in acquiring any additional land required to undertake the Project, hindering the commencement of the construction works.	• Consult with regulators and the Planning Commission, and make submissions when appropriate, to ensure the intent of the legislation (from the proponent's perspective) is being followed. • Undertake early baseline studies and investigations to ensure that data is available and ready for the relevant applications. • Ensure flexibility in the assessment process is maintained, as intended, by making submissions to the Planning Commission / Assessment Panel where appropriate. • Undertake advanced works (e.g. land acquisition) and further site investigations to ensure that these do not hold up later tasks.
Construction	• Pandemic may affect project cost or timeframe due to unforeseen site restrictions or supply-chain logistic impacts. • Inadequate or inappropriate construction methods, materials and/or work conditions, resulting in unsafe, unsatisfied, or non-conforming works. • Unexpected ground or environmental conditions may impact on project cost, delivery and/or quality.	• Include expected pandemic impacts in the contract scope, and managing impacts resulting from unforeseen changes to the pandemic response. • Ensure suitable management plans that manage safety and environmental risks are provided and implemented by the contractor. • Undertake advanced works (e.g. geotechnical investigation, utility service relocations) early to ensure that they do not hold up later tasks.

6.2 Project dis-benefits

The Project will include the dis-benefits outlined below, including likely impacts to the community and environment.

- **Short-term construction impacts** – during construction, expected over a three-year period, there will be short term impacts to both local residents and road users. These will include impacts to the road network (delays, detours), noise from construction (piling, increased heavy vehicles) and restrictions to access to certain areas (reduced waterway access, reduced cycling/pedestrian access).

- **Increase in noise due to increased travel speed** – there is the potential for noise to increase due to the increase in overall travel speed through the crossing. Baseline noise logging was completed in Spring 2020 and further modelling has been undertaken to determine the impact and mitigation required. There is also a similar opportunity for noise to be reduced through the reduction of congestion and queuing.

- **Property acquisitions** – the State Government have already acquired properties through previous planning and future proofing activity. There is also the potential to acquire further properties to secure adequate space for the required intersections on both the north and south approaches.

- **Change of dynamic** – the shift of the crossing from a 60km/hour road to an 80km/hour+ part of the National Land Transport Network will also see a shift in the dynamic of the usage of the place. While pedestrian and cycle access are part of the Reference Design, there will be other impacts such as removal of bus stops on the highway (moved to local access roads adjacent to ensure safety).

- **Increased complexity for vehicle movements** – while the crossing will become a more direct route, there will be increased complexity for other movements that will be part of the intersections upgraded through the Project. These include the north/south access to the Lyell Highway and access to Boyer Rd. While overall travel time will be improved, vehicles taking some routes will be required to navigate several additional intersections.

- **Environmental impacts** – there is the potential for environmental impacts due to the works being undertaken in a marine environment. A comprehensive field investigation and then impact assessment process is being undertaken as part of the approvals process for the Project to ensure that these impacts are mitigated through the Project.

Together with these items, there are some dis-benefits that are a matter of opinion. These are outlined below.:

- **Removal of the existing bridge** – the reference design includes the removal of the existing bridge. People with a connection to the bridge may see the proposed removal as a dis-benefit, although an alternative view is that the removal is of economic benefit through the removal of a maintenance impost.

- **Increased air emissions –** there is potential for air emissions to increase due to the increase in overall traffic supported by the new crossing. There is also a similar opportunity for air emissions to be reduced through the reduction of congestion and queuing. Air modelling is being completed to determine the impact.

6.3 Compliance with sustainability strategies

The Project will improve travel times, network efficiency and safety outcomes for the greater Hobart area and will complement other transport initiatives. These interconnected initiatives enable the safe and efficient transport of people and goods through creating an integrated, sustainable transport system. The potential use of the existing infrastructure assets means that finite resources are utilised with maximum efficiency, both from an economic and environmental perspective.

This project will also comply with the *Positive Provision for Cycling Infrastructure Policy.* This forms part of the Tasmanian Government's *Walking and Cycling for Active Transport Strategy*, which aims to support a shift to more sustainable transport modes.

In relation to provisions for safe and efficient public transport, the design is to ensure the outcomes listed below.

- Future use of the existing rail corridor is not precluded
- Outcomes of consultation with relevant stakeholders are considered and incorporated where appropriate, including Department of State Growth, Brighton Council, Glenorchy Council, Derwent Valley Council, Metro Tasmania, local bus service operators, and private and school bus operators
- Impacts on existing bus routes and bus stops are minimised during construction and that the Department's Passenger Transport Branch and the relevant bus operators are provided adequate notice to potential delays to their services so that timetables can be adjusted and communicated to passengers
- Impacts on existing bus routes are minimised following construction completion, with any changes needing to occur to an existing bus route or schedule as a result of the Project having been actively considered in order to minimise, where possible, the additional time required to run the service, or the additional distance travelled.
- Impacts on existing bus stops are minimised following construction completion, with each of the existing bus stops needing to be relocated as part of the Project to be replaced with bus stops in the most suitable alternative locations without significantly reducing existing pedestrian catchments.
- Where the revised road network may require buses to reverse direction before continuing on their original route, suitable turning areas must be provided within the Project works.
- Any new or substantially modified bus stops to be constructed by the Contractor comply with the relevant provisions of the *Disability Discrimination Act 1992* and the *Commonwealth Disability Standards for Accessible Public Transport 2002*.
- Clearances at new bus stops must be fit for purpose suitable for the design proposed and existing design vehicles, with particular allowance made for vehicle clearance on intercity bus routes.
- Interfaces between existing or proposed bus stops and existing or proposed pedestrian and cyclist networks are considered and actively developed to increase connectivity.

7 Stakeholder Engagement

7.1 Public and Stakeholder participation and consultation

The Department of State Growth (the Department) is aware of the importance in facilitating public and stakeholder participation in the New Bridgewater Bridge Project (the Project). All stakeholder engagement has been, and will continue be, undertaken in accordance with the *Department of State Growth – State Roads Division Stakeholder and Community Engagement Framework (December 2018).*

A detailed Stakeholder and Community Engagement Plan (SCEP) has been developed for the Project, as well as a stakeholder classification and risk matrix. These documents are regularly updated as the Project progresses.

The successful contractor will be responsible for the management and coordination of community involvement, consultation and communications in relation to the Design and Construct (D&C) activities and will be undertaken in accordance with the Project Scope and Technical Requirements.

The engagement objectives set by the project team for this project are outlined below.

- Explain to stakeholders the objectives of the Project
- Provide regular updates to key stakeholders and maintain an open and ongoing relationship. This includes communicating the Project need, objectives, constraining factors, the Department's commitments, and project dates and timelines.
- Identify and engage productively with all impacted and interested stakeholders to design a fit-for-service product with understood and planned-for impacts.

The International Association of Public Participation (IAP2) has developed an internationally recognised Public Participation Spectrum. The spectrum allows an appropriate level of engagement to be tailored to a stakeholder

IAP2'S PUBLIC PARTICIPATION SPECTRUM

iap2 international association for public participation

The IAP2 Federation has developed the Spectrum to help groups define the public's role in any public participation process. The IAP2 Spectrum is quickly becoming an international standard.

INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Figure 13 - IAP2 Spectrum of Public Participation (Source: IAP2.org.au).

group based on the outcome desired. The stakeholder engagement objectives for this project focus on the *Inform, Consult, Involve* and *Collaborate* sections of the spectrum.

The Project's key stakeholders are identified in table 12 below.

Table 12. List of key stakeholders.

Stakeholder type	Stakeholder
Community members	• Road users • Local residents • Directly impacted land/property owners • Business owners • Commuters
Community and industry groups	• RACT • Tasmanian Heritage Council • Aboriginal Heritage Council • Derwent Estuary Program • Birdlife Tasmania • Tasmanian Transport Association • Tasmanian Bus Association • Metro • Tasmanian Transport Council • Bicycle Network Tasmania • Cycling South • RSL Tasmania • Royal Yacht Club Tasmania • Cruising Yacht Club Tasmania
Government departments/agencies	• Department of State Growth • MAST • EPA • Heritage Tasmania • Tasmania Parks and Wildlife Service • DPIPWE • Aboriginal Heritage Tasmania • Inland Fisheries
Local Government	• Brighton Council • Derwent Valley Council • Glenorchy City Council • City of Hobart • Clarence City Council • Kingborough Council

Utility providers	• TasRail • Telstra • NBN Co • Tas Gas • TasNetworks • TasWater

Extensive community consultation was last undertaken as part of the *2010 Bridgewater Bridge Planning Study* undertaken on behalf of the former Department of Infrastructure, Energy and Resources (DIER).

Following funding commitments from the Australian and Tasmanian governments, work on the Project has progressed quickly since late 2019, with a set of design requirements approved by the Project's Executive Steering Committee in late 2019. These design requirements and concept designs for two options were released publicly in July 2020. Engagement included:

- discussions with key stakeholders prior to, and immediately following announcement (including information pack)
- ministerial media release
- social media posts and
- newspaper advertisements.

As detailed in Section 2.2 – Options Evaluation, following the selection of option 1 as the reference design, the Department sought community and stakeholder feedback over a four-week period in October and November 2020. Throughout the consultation period, more than 2 500 people visit the Project's online interactive map, and more than 200 comments and pieces of feedback were received in relation to the reference design. Key issues raised during the consultation process are described in Appendix B – *Reference Design Engagement Report.*

Discrete communications have also occurred relating to baseline studies undertaken in the area for the purpose of advising of the works or impact of works.

Pre-construction consultation and engagement

Targeted engagement with key stakeholders and the broader community will continue in the lead up to construction and will include the activities outlined below.

- A series of drop-in sessions and pop-up sessions (as above) to update the community and prepare them for construction to commence.
- Pop up sessions at key places in the community to capture members of the community who didn't attend a drop-in session.
- Stakeholder briefings as required.
- Engagement through the Department's website, social media channels and via promotional material such as newsletters and project updates.

Community Information Centre

In the lead up to construction, a community information centre will be established in the local community. This will give members of the community somewhere to visit and find out the most up to date information about the Project.

7.2 Issues raised through stakeholder consultation

Table 13 below provides a summary of the key issues raised by the community during the formal stakeholder consultation period in October and November 2020, as well as the Department's response to the feedback received.

Table 13 – Issues raised through stakeholder consultation.

Issues	Concerns raised	Response to feedback
Connectivity	• Convoluted connection to Lyell Highway. • Connection from Boyer Road to Hobart. • Need for south bound on ramp. • Increased traffic on Old Main Road and Boyer Road. • Removal of access from Gunn Street directly onto bridge. • Preference for East Derwent Highway to be grade separated as part of the Project. • Importance of local roads connecting into the Project. • Issues with local access during construction.	• This information has been passed onto the ECI tenderers as they develop their designs. • The Project will provide significant travel time savings through reduced congestion and a higher speed limit. • Alternative options are being explored by the ECI tenderers to determine the most efficient value-for-money design options affordable within budget, • The grade separation of the East Derwent Highway is outside the scope of the Project.
Design	• Bridge must be four lanes and separated from the causeway. • The causeway should be removed. • Preference for a tunnel instead of a bridge. • Two lanes in each direction won't be enough to cater for future growth.	• The causeway is on the Tasmanian Heritage Register and will be retained. • A range of options are being explored by the ECI tenderers to determine the most value-for-money design options affordable within budget.
Exclusion of rail in design	• Project doesn't include rail. • Removing existing bridge will remove option for rail in the future. • Rail must be able to be added to new bridge in the future. • Hobart needs a light rail system.	• Including rail infrastructure on the new bridge is outside the scope of the Project. • The Project won't preclude the future use of the existing rail corridor.
Navigation height	• Questions around the need for navigation height to be 16 metres. • Navigation height should be reduced to reduce cost of the Project.	• The navigation height will be consistent with the Bowen Bridge.

Issues	Concerns raised	Response to feedback
	• Concerns that the navigation height was included at the expense of rail.	• Including rail infrastructure on the bridge is outside the scope of the Project.
Pedestrian and cyclist safety	• Shared path must connect in with local network. • Shared path should be separated for cyclists and pedestrians. • Shared path must be well-lit.	• The Project will include a three-metre shared path for cyclists and pedestrians.
Public Transport	• Preference for Park and Ride facilities to be incorporated into the Project. • Importance of ensuring bus stops are in sensible locations.	• Park and Ride facilities are outside the scope of the Project. • The Department is working closely with local councils and public transport operators to identify long-term public transport needs in the area.
Open space	• Community desire for more open space once project has finished.	• The Department is working with stakeholders and local councils to better understand the community's desire for more open space.
Environmental issues	• Impact on local wildlife and vegetation. • Loss of natural habitat and open space • Concerns about noise during construction.	• The Department is working with stakeholders to understand and address impacts.
Heritage	• Existing bridge should be retained given heritage status. • Need for heritage interpretation if the existing bridge is removed.	• The Project will ensure the historic heritage values of the area are managed in a sustainable way through the Project.
Noise and heavy vehicles	• Increase in heavy vehicle noise and impact on residential properties in Granton.	• Alternative options are being explored by the ECI tenderers to determine the most efficient value-for-money options affordable within budget. • The Department has undertaken noise modelling to assess the need for noise mitigation.
Speed limit	• Strong community desire for speed limit to be 80km/hour or higher.	• The Project includes a minimum design speed of 80km/hour.

7.3 Directly affected landowners and property acquisition

Following the *2010 Bridgwater Bridge Replacement Planning Study*, the Tasmanian Government compulsorily acquired several properties and parcels of land in Bridgewater and Granton using joint Tasmanian and Australian government funding (i.e. not included in the current project budget). This process was completed in 2014.

These property acquisitions included full or partial acquisition of the properties identified below and included primary residences and parcels of land.

Where these properties included existing residences, these were leased until vacated to allow demolition in 2020 in preparation for the construction phase. The structures at 37 Black Snake Road, Granton have not been demolished at this stage due to local heritage values and uncertainty on the final design footprint.

Table 14. Compulsory property acquisitions.

Suburb	Property
Bridgewater	28 Old Main Road, Bridgewater
	32 Old Main Road, Bridgewater
	34 Old Main Road, Bridgewater
	36 Old Main Road, Bridgewater
	37 Old Main Road, Bridgewater
	40 Old Main Road, Bridgewater
	4 Old Main Road, Bridgewater
Granton	28A Black Snake Road, Granton
	28 Black Snake Road, Granton
	30 Black Snake Road, Granton
	37 Black Snake Road, Granton
	41 Black Snake Road, Granton
	45 Black Snake Road, Granton
	49 Black Snake Road, Granton
	53 Black Snake Road, Granton
	2 Dickenson Drive, Granton
	6 Dickenson Drive, Granton
	8 Dickenson Drive, Granton
	10 Dickenson Drive, Granton
	6 George Street, Granton

Based on the Project's reference design, the needs and benefits of further acquisition (full and partial property acquisitions) were identified.

The properties listed in table 15 below were purchased in 2021 through purchase by agreement arrangements directly with the owners. While it was not anticipated that these properties would be directly impacted by the permanent works shown in the reference design, their purchase allowed for greater design and construction flexibility and should reduce the impact mitigation measures required during and post construction.

The purchase of these properties was communicated to the ECI tenderers to ensure the most efficient and cost-effective options could be developed and tendered.

Table 15. Properties purchased in 2021 by agreement.

Property	Type of acquisition
30 Old Main Road, Bridgewater	Voluntary acquisition of entire property
22 Black Snake Road, Granton	Voluntary acquisition of entire property

Further to this, the anticipated project footprint now differs from that outlined in the *2010 Bridgewater Bridge Replacement Planning Study* and as such several additional properties have been identified for compulsory acquisition (unless voluntary agreement is reached with the respective landowners).

Table 16. Additional potential property acquisitions.

Property	Type of acquisition
640 Main Road, Granton	Acquisition of entire property
650 Main Road, Granton	Partial acquisition of land (not Black Snake Inn building)
652 Main Road, Granton	Acquisition of entire property

In late 2020, prior to the public release of the reference design, the project team informed the respective landowners that the State may need to acquire parts or all of their properties, subject to the development of tender designs by the two ECI tenderers, selection of the preferred developed design and subsequent final design of the preferred developed design.

In July 2021, the project team commenced the formal consultation processes with the respective landowners in advance of potential purchase by agreement or compulsory acquisition. Information regarding the process for the acquisition of properties has been provided to the property owners in the Tasmanian Government's *"Owners Guide for the Purchase or Compulsory Acquisition of Property by the Crown for a Public Purpose"*.

Consultation and engagement with directly affected landowners has been ongoing throughout the scoping and development phase and will continue through the delivery phase in line with the Project's SCEP.

8 Development Impacts and Approvals

8.1 Major Project approval under s60O(1) of LUPAA

Because of the complexity, significance and economic value of the New Bridgewater Bridge Project (the Project), it was referred to the Minister for Planning in November 2020 for consideration to be declared as a major project utilising the Tasmanian Government's new Major Projects assessment pathway facilitated by the Land Use Planning and Approvals Amendment (Major Projects) Bill 2020. The Project was subsequently declared a major project on 23 December 2020 under S60O (1) of the Land Use Planning and Approvals Act 1993 (LUPAA).

The process provides for the coordinated assessment of project related impacts as relevant to land use planning, environmental impacts, Aboriginal heritage, historic cultural heritage, TasWater, threatened species and gas pipeline safety. In this way, the Major Project process replaces the need for separate approvals for the Project under local planning schemes, the *Environment Management Pollution and Control Act 1994*, the *Historic Heritage Act 1995*, the *Aboriginal Heritage Act 1975*, the *Threatened Species Protection Act 1995* and the *Nature Conservation Act 1992* and from Tas Gas and TasWater.

Following the Project's declaration, a Development Assessment Panel (the Panel) was established by the Tasmanian Planning Commission (TPC) and is responsible for the overall assessment of the Project and ultimately issuing a permit for the works.

As part of the process to develop Assessment Criteria, the TPC requested input from a number of parties. Final Assessment Criteria were provided to the Department of State Growth (the Department) on 27 May 2021 in order for the Project team to develop a Major Project Impact Statement (MPIS). Given that the Assessment Criteria determined by the Panel require the MPIS to include option-specific information, and were more prescriptive than anticipated, the MPIS will not be submitted until after the receipt of tenders for the design and construction of the new bridge, in late August 2021.

Following the submission of the MPIS, the Panel will commence their assessment, which will be undertaken in consultation with participating regulators including the Environmental Protection Authority, the Department of Primary Industries, Parks, Water and Environment, the Heritage Council, Tas Gas and TasWater. The assessment period will also include a period of public exhibition followed by public hearings.

On this basis and allowing some contingency time for the possibility that regulators may require information that cannot be provided until after the preferred tenderer has been selected later this year, planning approval is not expected until early 2022.

8.2 Additional approvals

In addition to the Major Project Permit, the project must also secure a Reserve Activity Assessment (RAA) from Tasmania Parks and Wildlife Service (PWS) for the work being undertaken in the River Derwent Conservation Area. The conservation area is protected under the National Parks and Reserves Management Act 2002 (NPRM Act).

The RAA process is the Environmental Impact Assessment system used by PWS to ensure proposed activities on PWS managed land are "environmentally, socially and economically acceptable".

A Level 3 or 4 RAA is expected to be required, although it is noted that, based upon liaison with PWS, the MPIS will provide the majority of the required information, even though the RAA approval is outside the Major Projects process. Any gaps between information required by the RAA and that which is provided in the MPIS will be provided to PWS directly.

As part of planning for the proposed new Bridgewater Bridge, investigations have been undertaken to understand the potential implications for the project regarding approval requirements under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). Based on the Project's impacts, there is not considered to be any requirement for referral of the project to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for consideration as to whether it constitutes a controlled action.

However, in addition to the current status of the project, consideration needs to be made of possible future changes to listings under the EPBC Act, which could have implications for the Project. In order to mitigate risks of delays associated with changes in listing status of any species or communities that occur within the Project Land, the project team will refer the Project to DAWE for consideration as to whether it constitutes a controlled action under the EPBC Act on the basis that it will likely be determined as a non-controlled action.

Under the EPBC Act any decision under Section 75 of the Act (this is the decision on whether a project is a controlled action or otherwise) protects that project from future listing events (new listings or changed listing status for existing Matters of National Environmental Significance) meaning that if a decision under Section 75 of the Act has occurred (including a non-controlled decision) then changes to listing status during the construction period do not require a reconsideration of the decision.

Throughout the Project, Development Applications with local councils may also be needed for minor works outside the Project Area declared for the Major Project Permit.

Other relevant legislation that is being considered through delivery of the project includes:

- *Crown Lands Act 1976*
- *Environment Protection (Sea Dumping) Act 1987*
- *Highways Act 195.*
- *Historic Cultural Heritage Act 1995*
- *Living Marine Resources Management Act 1995*
- *Rail infrastructure Act 2007*
- *Roads and Jetties Act 1935*
- *Weed Management Act 1999*

8.3 Noise

The Project has the potential to generate noise impacts during the construction and operational phases. During construction, noise will be generated by heavy vehicles, machinery (including equipment used for piling operations) and truck movements both within and off-site. There are several parts of the Project in proximity to existing residential dwellings and other sensitive receptors and the potential for construction noise at these locations will need to be quantified, assessed and managed throughout the Project.

Once operational, the Project will result in modifications to road access on either side of the river, altering the existing noise environment and potentially increasing or decreasing the road noise experienced at residential dwellings and other sensitive receptors. Additionally, the Project will facilitate a change in road usage, particularly for larger vehicles currently restricted on the existing bridge and could result in a change in overall traffic flow and composition in the area.

While the exact impacts are unknown at this stage, work is underway to collect background (existing) noise data to be used in modelling to quantify the impact. To address the potential noise impacts anticipated during the construction and operational phases, a Noise Impact Assessment will be undertaken as part of the Project. This assessment is expected to identify mitigation measures, such as noise barriers and other controls to be applied during the construction and operational phases of the Project and will be assessed against the *Tasmanian State Road Traffic Noise Management Guidelines*.

A preliminary Noise Impact Assessment based on the reference design for the Project has indicated that with appropriate mitigation measures, traffic noise levels during the operational phase of the project (post-construction) can be reduced to acceptable levels for surrounding residential areas.

8.4 Environment (Terrestrial and Marine)

A broad range of environmental investigations have been undertaken throughout 2020 and 2021 to allow the Project to better understand the nature and extent of potential environmental impacts of the proposed works.

Broadly, the Project will have an impact across both the terrestrial and marine environment including flora, fauna and geo-conservation sites, however given the Project Land lies within an already highly modified environment, the impacts are considered to be more limited than what they might otherwise be in a more natural setting.

Although a design has not been finalised for a permanent works footprint, it can be expected that only a subset of the designated Project Land will be impacted and/or permanently altered by the work.

Flora

The Project Land overlaps with the three species listed under the *Threatened Species Protection Act 1995* (TSPA):

- Double Jointed Speargrass
- Largefruit Seatassel and
- Woolly New-Holland Daisy.

Impacts to these species as a result of construction are expected, however the exact extent will be unknown until the final design has been confirmed.

In the marine environment, Largefruit Seatassel (TSPA) is the dominant species of the aquatic macrophyte beds, which are extensive within shallow aquatic environment of the Project Land. The macrophtye beds will be impacted by the direct footprint of the final design through pile driving and land reclamation as well as indirect impacts associated with shading from the new bridge, and sediment disturbance associated with construction methods including piling, vessel movement, floating plant and floating barriers and screen.

The Project Land contains and has the potential to impact up to 16.08 ha of the EPBCA vulnerable subtropical and temperate coastal saltmarsh community and 16.32 ha of the NCA listed wetland community.

The EPBCA subtropical and temperate coastal saltmarsh community has been assessed against the criteria for Matters of National Environmental Significance and is not assessed as triggering a significant impact. A range of mitigation and management measures have been proposed for the Project to reduce the impacts on threatened plant species and communities as far as practicable. Impacts that cannot be managed or mitigated will be assessed by the regulator for offset requirements.

Natural regeneration, particularly of the wetlands and macrophtye beds, is expected over time and revegetation and landscaping of disturbed areas will also re-establish native vegetation through the project extent.

Management of declared and high-risk environmental weeds will be a key management action to reduce the risk of weed spread throughout and outside of the Project Land. A dedicated Weed and Hygiene Management Plan will be implemented to manage and minimise this risk.

Fauna

Given the terrestrial components of the site primarily comprise highly modified land, much of which is near a large and busy highway, availability of habitat for threatened fauna such as Tasmanian Devils and Quolls is limited and is not expected to be part of a core home range. These species are expected to be transient through the area only and as such direct impacts from construction are not expected. The threatened Eastern Barred Bandicoot is

commonly observed in mixed modified environments in Tasmania's south east and habitat is very abundant outside of the Project Land. Specific impacts are not expected and therefore no specific management is required.

Similarly, extensive habitat for the White-Bellied Sea Eagle and Tasmanian Wedge-Tailed Eagle is found outside of the area and neither species is dependent on feeding or nesting habitat inside the Project Land. As such no specific management is required.

The potential removal of the 11 Eucalyptus globulus trees associated with project works was assessed as having negligible impact on the EPBCA listed Swift Parrot, and replacement of these trees is not seen as necessary given the context of the very marginal nature of the habitat and infrequent use.

The Great Crested Grebe was the only threatened species observed during project surveys, while the Australian Bittern is known from the general area and has minor sub-optimal habitat patches within the potential project footprint.

These species are at risk of direct impacts from the proposal in relation to lost or altered habitat, direct impacts to nests during works, light pollution (disorientated birds) and collision mortality from the proposed structure. These risks can be mitigated, and impacts can be expected to be relatively small in relation to the more extensive areas of habitat in the immediately adjacent areas of the River Derwent that are not at risk from the proposal.

These and other water birds are expected to disperse to avoid disturbance during works, which is not expected to have any long-term ramifications for these species once the Project is complete. Other impacts such as sediment disturbance and light pollutions will be managed as part of the construction environmental management.

The Project has a small potential to influence the EPBCA and TSPA listed Australian Grayling. The Grayling can be impacted by barriers to movement during migration. No permanent or long-term barriers will be in place as part of construction and as such, migration is not expected to be impacted. The primary potential sources of impact may be through the toxic effects of elevated metals and hypoxic water as a result of sediment disturbance and distribution however the mitigation of such effects will be a primary focus of construction management measures in the aquatic environment.

River Hydrodynamics

Hydrodynamic flows within the river in the vicinity of the project area are expected to be affected by the demolition of the existing Bridgewater Bridge and the installation of the new crossing including any land reclamation. Water moving can scour, suspend and transport sediment that would have otherwise remained in place had the new structure not been present.

Water slowed by the new structures can deposit suspended sediment and organic matter, resulting in localised accumulation of material. Scouring effects, particularly in the deeper parts of the river channel, are expected. Pile-caps, and to a lesser extent piles, in the shallow area adjacent to the causeway are expected to slow water movement in this area resulting in accumulation of sediment and organic material.

Mitigation and management of factors that affect the hydrodynamics are more limited given that these are influenced by the design of the new bridge and removal of the existing bridge. Possible management and mitigation measures include designing the shape of the reclamation areas to minimise changes to hydrodynamics and resulting effects on scouring and deposition and providing a wider span between piers to reduce the impact of the pile caps on local hydrodynamics in the shallow area adjacent to the causeway (particularly in regard to reducing the accumulation of sediment and organic matter).

Geo-conservation

Two geo-conservation sites were found directly in the Project Land including the Lower Derwent River Estuarine Delta and Flood Plains, and the Granton to New Norfolk Quaternary Stratigraphic Sites. Both sites are expected to incur some impact as a result of the Project.

The Lower Derwent River Estuarine Delta and Flood Plains geo-site is considered robust and in good condition. The potential impacts are related to piling works, removal of waste material from inside the piles, and land reclamation. The consequence of the proposed development is considered minor considering the relatively small footprint of the bridge works in comparison to the size of the geo-site, presenting a low impact to the geo-site.

The Granton to New Norfolk Quaternary Stratigraphic Sites are anticipated to be directly impacted by the proposed works. The modification of interchanges at the southern end of the proposed development and the widening of the Brooker Highway will have direct impacts through earthworks on the geo-site.

Although impacts from the proposed development are unavoidable, these could be mitigated by maintaining an exposure in the road works after road widening if possible and/or recording and collecting samples throughout the development. Additionally, offset for the potential loss of geodiversity values may include a study of the section to understand the significance of geodiversity values and geomorphological processes.

Contamination

There are a number of low, medium and high health risks identified to both human and ecological receptors during disturbance of soils and marine sediments during construction as a result of historical sources of contamination and actual and potential acid sulfate soils within the Project Land. Additionally, groundwater contamination was detected in some locations, with the area adjacent the Old Watch House on the Lyell Highway being a particular source of hydrocarbon contamination.

Based on the results of contamination investigations, specific terrestrial and marine soil, sediment and ground water management measures will need to be implemented during construction, particularly containment and disposal of contaminated material to a licenced facility. Location specific contamination measures will be documented in project specific contaminated soil and water management plans and any safety risk to workers addressed in appropriate safety plans.

8.5 Heritage (Aboriginal and Historic)

An Aboriginal Heritage Assessment has been undertaken for the Project including a search of the Aboriginal Heritage Register (AHR), field surveys focused on the parts of the study corridor that had been subject to comparatively lower levels of disturbances and where the natural soils were still available for inspection and sub-surface investigations to confirm the nature and extent of new values.

Investigations confirmed that three Aboriginal heritage sites are situated within the defined boundaries of the Project Land (sites AH11190, AH13833 and AH13880). All three sites are situated on the southern side of the River Derwent. Sites AH11190 and AH13833 are both classified as Isolated Artefacts. Site AH11190 was originally recorded by CHMA (2011) but was not able to be re-located during the survey assessment carried in 2020. Site AH13880 is a low-density artefact deposit that was identified during the test pitting program in 2021.

The preferred management option for all Aboriginal Heritage values is to avoid impacts to sites and to implement protection measures to ensure the sites are protected. The recommended management measures include marking exclusion zones on development construction plans, informing contractors of the location of sites and installation of exclusion fencing. It appears that there is the potential that these sites may be impacted by the proposed bridge construction works. As required, approval to impact the sites will be sought through the Major Projects approval process.

The Project's reference design includes demolition of the existing heritage-listed Bridgewater Bridge. The need for, and impacts of, this demolition will be addressed by the Project, considering the broader economic, social and environmental impacts informing this decision. Impacts to the heritage-listed Bridgewater causeway will also be assessed, noting that the causeway will be retained in the landscape and its removal is not within the scope of the Project.

The Project also has the potential to impact on the curtilage of other heritage listed places including the Black Snake Inn (650 Main Road, Granton) and 37 Black Snake Road, Granton and there are likely to be indirect impacts to the setting of the crossing and some views towards adjacent items such as the Watch House and Granton convict station sites. Potential impacts to unmarked burials beyond the listed boundary of St. Mary's Anglican Church and Cemetery will be monitored and mitigated as the extent of works boundary is defined. The Project will include measures to avoid, mitigate and offset heritage impacts including those that will result from the potential loss of the bridge. Avoidable impacts to heritage values will be managed and mitigated and measures to offset any unavoidable impacts will be undertaken such as Archival Recording and heritage interpretation initiatives.

9 Summary

The Bridgewater Bridge is a critical link in Tasmania's transport network. It forms part of the Australian Government's National Land Transport Network and is a key link in the Burnie to Hobart freight corridor, Tasmania's highest volume freight network.

It is also an important regional transport connection for greater Hobart, facilitating access between central Hobart and growing communities at Brighton, and between the Brighton Transport Hub and major industrial and freight distribution centres in Glenorchy.

The existing Bridgewater Bridge is a steel structure completed in 1946, with a vertical lift span creating a navigable channel for water-based traffic. It is reaching the end of its useful life and an effective replacement is needed for its role as a critical river crossing in the National Land Transport Network.

The current bridge and causeway provide one lane in each direction, with a 60km/hour speed limit, despite connecting to the NLTN at each end. The bridge and causeway have dimensional limitations and do not meet contemporary general and geometric design requirements. Issues include insufficient lane and shoulder widths, unsafe and insufficient space for cyclists and pedestrians, and restrictive speed, height and weight limits.

The Project's objectives are outlined below.

- Deliver a new crossing of the River Derwent between Bridgewater and Granton that provides an efficient, high standard connection for the Brooker Highway and Midland Highway that reliably meets the standards required of the National Land Transport Network.
- Provide safe and efficient connections with the Lyell Highway and local traffic movements.

The Project is supported by an informal $576 million funding commitment from the Australian and Tasmanian governments (80 per cent and 20 per cent respectively) as part of the Hobart City Deal, which represents the largest ever investment in a single transport infrastructure project in Tasmania's history.

The Project represents the next stage in the evolution of this historically important crossing point and will meet Tasmania's current and long-term transport needs.

A comprehensive option evaluation process has been undertaken, supported by and to inform extensive site investigations. This information has been used to inform the stakeholder consultation, design development and planning approval processes.

The Department sought community and stakeholder feedback on a reference design over a four-week period in October and November 2020. The reference design showed what may be built to deliver the Project's design requirements within the budget that is available. Throughout the consultation period, more than 2 500 people visited the Project's online interactive map, and more than 200 comments and pieces of feedback were received in relation to the reference design.

This feedback informed competitive design development undertaken from December 2020 to August 2021, by two experienced contractors with bridge design and construction expertise. The Tasmanian Government elected to use a competitive Early Contractor Involvement (ECI) procurement process to deliver the Project.

Because the State rarely delivers projects of this size and scale, the ECI process was adopted to provide the opportunity to engage the construction industry for early input about the design, which will allow the Project to adopt the most efficient and cost-effective way of designing and building the bridge and interchanges. The developed designs and fixed price offers from the two ECI tenderers will be submitted in August 2021.

Progressing with the Project into the delivery phase is dependent upon the formalisation of the balance of the funding commitments through the submission of a Delivery Phase Project Proposal Report to the Australian

Government. This will occur late 2021, after selection of the preferred tender for the design and construction of the bridge, providing confidence of both the preferred developed design and its cost.

Because of the complexity, significance and economic value of the Project, it was referred to the Minister for Planning in November 2020 for consideration to be declared as a major project utilising the Tasmanian Government's new Major Projects assessment pathway. The Project was declared a Major Project under Section 60O (1) the *Land Use Planning and Approvals Act 1993* on 23 December 2020.

The Major Projects process is considered to be fit-for-purpose for the Project and provides a transparent process with significant opportunities for consultation and engagement with the community, regulators, state agencies, councils, directly affected landowners and adjacent property owners.

After the completion of regulator, stakeholder and public consultation in early 2021, the Major Project Assessment Criteria were issued on 27 May 2021 by the Development Assessment Panel (the Panel), established by the Tasmanian Planning Commission. The Project's Major Project Impact Statement responding to these criteria will be submitted by the project team late August 2021.

The Panel will then commence their assessment, which will be undertaken in consultation with participating regulators including the Environmental Protection Authority, the Department of Primary Industries, Parks, Water and Environment, the Heritage Council, Tas Gas and TasWater. The assessment period will also include a period of public exhibition followed by public hearings.

On this basis and allowing some contingency time for the possibility that regulators may require information that cannot be provided until after the preferred tenderer has been selected later this year, planning approval is not expected until early 2022.

To mitigate the effect of any delays which might otherwise arise from the planning process, the State intends to adopt an early activities delivery strategy. This will involve appointment of the preferred ECI tenderer under an Early Activities Deed, awarded pending the receipt of the Permit and award of the Design and Construction Deed. The early activities will be limited to those activities that can be undertaken without the Permit and may include development of the construction environmental management plan, early design activities, some on-ground preparatory activities and some equipment/materials procurement. Construction of permanent works will not be included.

Regulators, stakeholders and the public will have further opportunities to consider and provide feedback on the Project as the planning approval process progresses, the preferred tenderer is selected and its developed design is publicly released, and pre-construction consultation and engagement is undertaken.

Award of the Design and Construction Deed to the preferred tenderer (to be engaged prior under the Early Activities Deed) and commencement of construction is scheduled to start shortly after planning approval has been received in early 2022. The Project remains on schedule for traffic to be using the new bridge by the end of 2024.

The Project is referred to the Parliamentary Standing Committee on Public Works for its consideration.

10 Appendices

Appendix A: Reference Design Plans

Appendix B: Reference Design Engagement Report