

SMITHFIELD TRANSPORT CORRIDOR UPGRADE  
DETAILED BUSINESS CASE 2017

BUSINESS CASE SUMMARY



Purpose of this document	This document provides an overview of the Smithfield Transport Corridor Upgrade Detailed Business Case 2017. The primary objectives of this document are to outline the key aspects of the project and provide transparency for how the business case was developed and may be implemented.
Status	This summary was prepared based on the contents of the detailed business case presented to the Building Queensland Board in Q2 2017. The information presented may be subject to change as the proposal progresses through future stages of development, delivery and operations.



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## 1 Summary information

Project name	Smithfield Transport Corridor Upgrade Project (STCU project)	
Location	The 3.8-kilometre section of the Captain Cook Highway between Yorkeys Knob Road and McGregor Road to the north west of Cairns.	
Proposal owner	Department of Transport and Main Roads	
Proposed delivery agency	Department of Transport and Main Roads	
Capital cost <sup>1</sup> (P90)	\$152 million (nominal)	\$136.5 million (real)
Incremental ongoing cost <sup>2</sup> (P90)	\$104 million (nominal)	\$60 million (real)
Economic net present value (NPV)	\$185 million (P50 costs)	\$174 million (P90 costs)
Benefit cost ratio (BCR)	2.9 (P50)	2.61 (P90)

<sup>1</sup> Nominal capital cost estimates are undiscounted 2016 dollars and have been rounded to the nearest million.

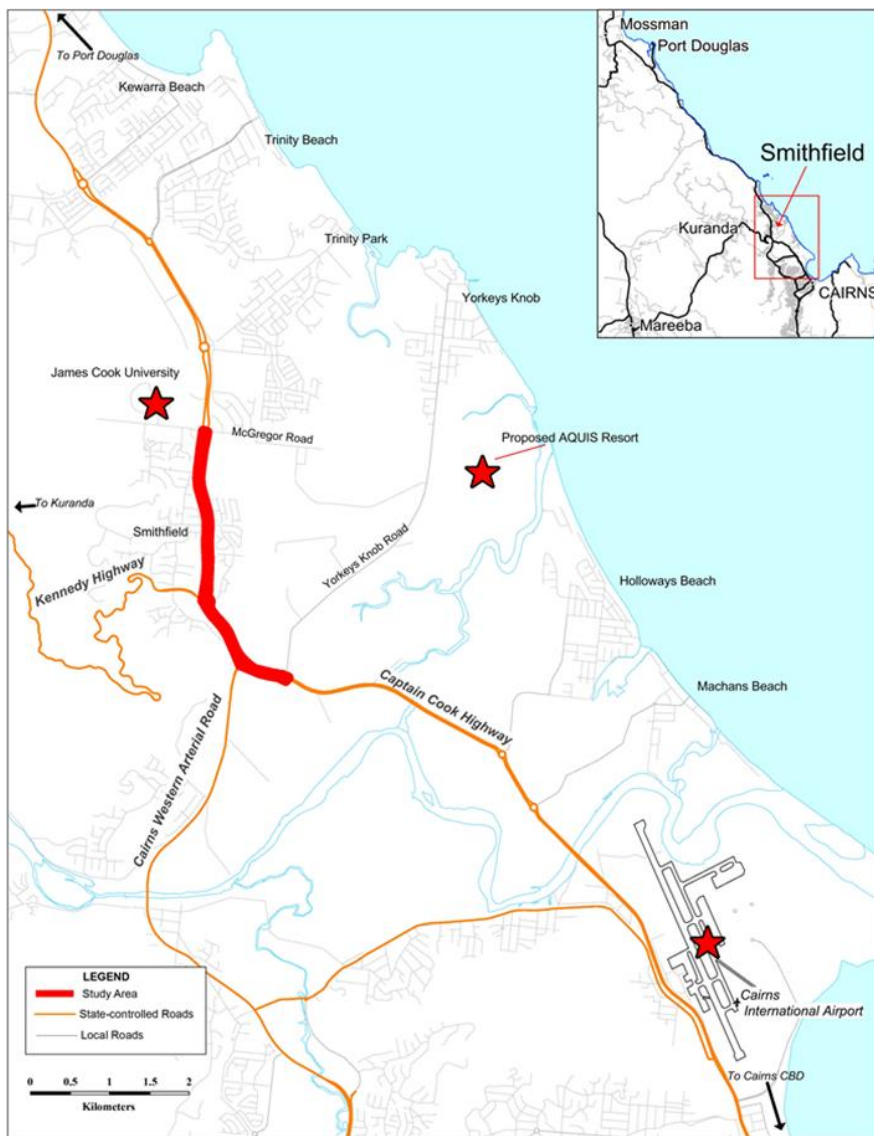
<sup>2</sup> Incremental ongoing cost estimates have been rounded to the nearest million and presented for the 30 years following construction period of the infrastructure initiative (assumed 2021–2051).



## 2 Proposal overview

The Smithfield Transport Corridor is a 3.8-kilometre section of the Captain Cook Highway that forms a crucial link in the road network between Cairns and all points north—Cape York, Port Douglas, Kuranda, Mareeba and the Atherton Tableland (see Figure 1).

Figure 1: STCU project location



With the state's bulk rail freight network terminating in Cairns, the Captain Cook Highway carries virtually all freight bound for northern communities, as well as playing a key role in the tourism industry. Decades of sustained population growth have created a traffic bottleneck, with the transport corridor reaching peak capacity. Safety has become a primary concern, with congestion contributing to crash rates three to six times higher than the Queensland average. As the corridor has become increasingly clogged, travel speeds are slowing and journeys are taking longer.

Forecast population growth in the area and increasing industry diversification and urban expansion are expected to generate traffic growth beyond the reliable capacity of existing infrastructure.

In 1995 the Department of Transport and Main Roads preserved a corridor east of the highway for a Smithfield bypass. Subsequent investigations by the Department of Transport and Main Roads under the



Captain Cook Highway Link Plan (2011) and Cairns Northern Access Corridor Strategy (2013) confirmed the need for a long-term solution to address safety and congestion. Furthermore, the Far North Queensland Infrastructure Plan 2009–2031, which identified Smithfield as a major regional activity centre, lists a Smithfield bypass as a regionally significant project. Building Queensland’s Infrastructure Pipeline Report (December 2016) recognised it as a priority for progressing through to detailed analysis. The proposed bypass also aligns with key objectives of the Department of Transport and Main Roads Strategic Plan 2016–2020 and the Queensland Government’s State Infrastructure Plan.

The key aims of the Smithfield Transport Corridor Upgrade project (STCU project) are to:

- improve road network reliability (including public transport travel time) and manage congestion
- address safety issues
- improve freight, high occupancy vehicle and tourism vehicle efficiency
- improve separation of local and regional traffic.

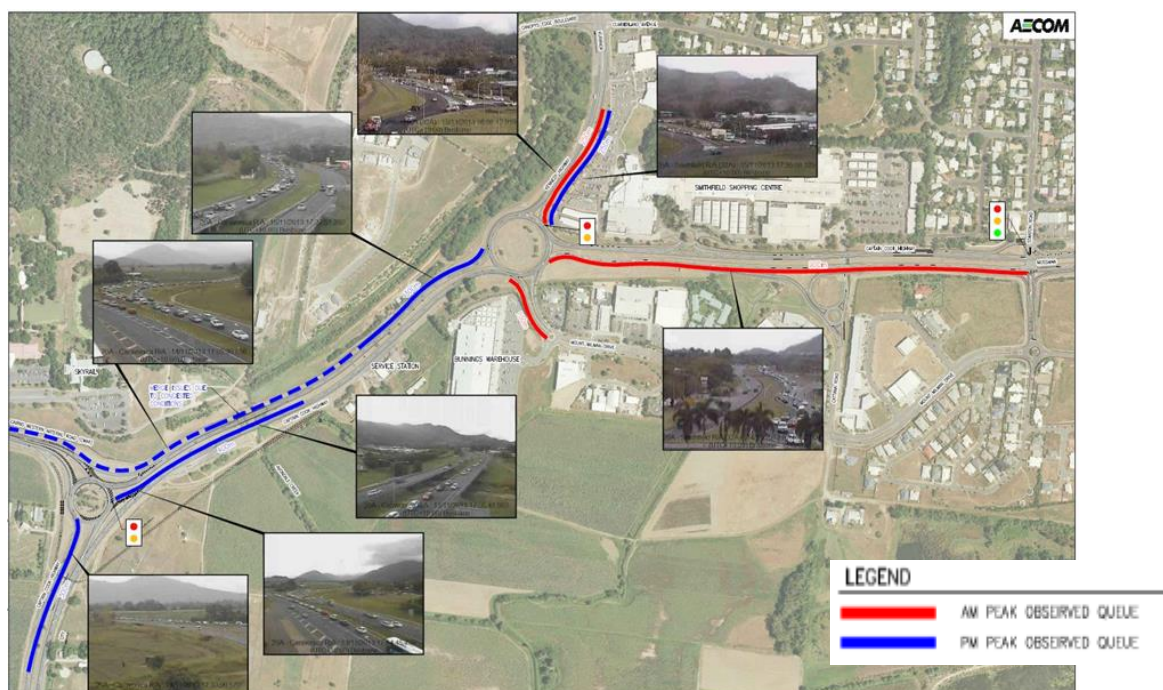
In addition, the STCU project aims to properly cater for planned and potential growth.

### 3 Service need and problem statement

The Captain Cook Highway (CCH) at Smithfield represents the only road access route north from Cairns. It is a key junction location for the main road access to Kuranda, as well as connecting with the Cairns West Access Road (CWAR) and the Cairns northern beaches areas. The imperative for this important project is to provide high quality upgraded vehicular access through the Smithfield area to provide broader network relief and resolve the congestion point.

The main drivers for the STCU project are congestion and safety. This section of the Captain Cook Highway is heavily congested during morning and afternoon peaks and has a high crash rate, resulting in increased travel times and reduced trip reliability. Photographs showing current congestion levels and diagrammatic representations of the observed queue lengths are shown in Figure 2.

Figure 2: Observed intersection queuing





The Captain Cook Highway provides the main access to the Cairns central business district for areas around Smithfield, the northern beaches and areas further to the north and west of Cairns such as Cape York, Port Douglas, Kuranda, Mareeba and the Atherton Tableland.

The section of the Captain Cook Highway, including the Cairns Western Arterial Road and Kennedy roundabouts, is a major confluence point of traffic flows from north and west of Cairns, carrying in the order of 44,000 vehicles per day, with 7 per cent commercial vehicles. The link has experienced average annual growth of 2.6 per cent over the past 10 years. By 2031, the Smithfield Transport Corridor is expected to be able to accommodate 64,000 vehicles per day.

Forecasts, based on the Queensland Government Statistician’s Office Regional Profiles for Cairns indicate the northern suburbs population in the STCU project study area is expected to increase from 48,946 in 2011 to 72,737 in 2031. Land zoned for residential development in the study area can accommodate the estimated population growth for at least the next 20 years but a commensurate increase in commuter, commercial and tourist traffic will only exacerbate congestion and safety problems.

Modelling of the base case scenario shows a major deterioration in performance of the Captain Cook Highway, with a significant increase in peak period travel times through the study area as in shown Table 1. Existing average travel times are 9 minutes during the morning peak and 5 minutes 30 seconds during the afternoon peak, with existing average travel speeds of 28 km/h and 49 km/h during the morning and afternoon peaks respectively.

**Table 1: Forecast corridor travel times without STCU project**

Year		2021	2031	2036
Time period	Direction of travel/option on Captain Cook Highway	Base case	Base case	Base case
Average travel times				
Morning peak	southbound travel	13 minutes	16 minutes	18 minutes
Afternoon peak	northbound travel	15 minutes	18 minutes	19 minutes
Average travel speed				
Morning peak	southbound travel	25 km/h	18 km/h	16 km/h
Afternoon peak	northbound travel	24 km/h	20 km/h	18 km/h

## Benefits

Key benefits captured in the appraisal for the STCU project include travel time savings, reduced vehicle operating costs and a reduction in the frequency of crashes for road users.

Key quantifiable benefits include a doubling of travel speeds during peak periods, resulting in a 47 per cent reduction in travel times through the corridor from day one of opening, and a 20 per cent reduction in forecast crashes as a result of the bypass.

The dedicated cycle path will also provide improved access to active transport for recreational and commuter cyclists within Smithfield and the wider region.

## 4 Options assessment

The preliminary evaluation for the project considered a range of infrastructure and non-infrastructure options which could potentially address the identified service need. Seven options were then evaluated using a multi-criteria assessment process to refine a number of upgrade options that would satisfy the

corridor’s transport requirements over a design period of 10 years from a proposed opening in 2021. The strongest options were:

- upgrade of the existing Captain Cook Highway (Stage 1)—upgrade the existing four-lane highway to six lanes
- construct an alternative bypass highway (Stage 1)—construct a two-lane alternate bypass of the existing Captain Cook Highway between Yorkeys Knob Road and McGregor Road.

Further multi-criteria assessment refinement overwhelmingly supported the bypass option. In addition, comprehensive sensitivity testing found it ranked higher than the upgrade of the existing Captain Cook Highway (Stage 1) option across all sensitivity tests and achieved a higher percentage match against each of the service requirements.

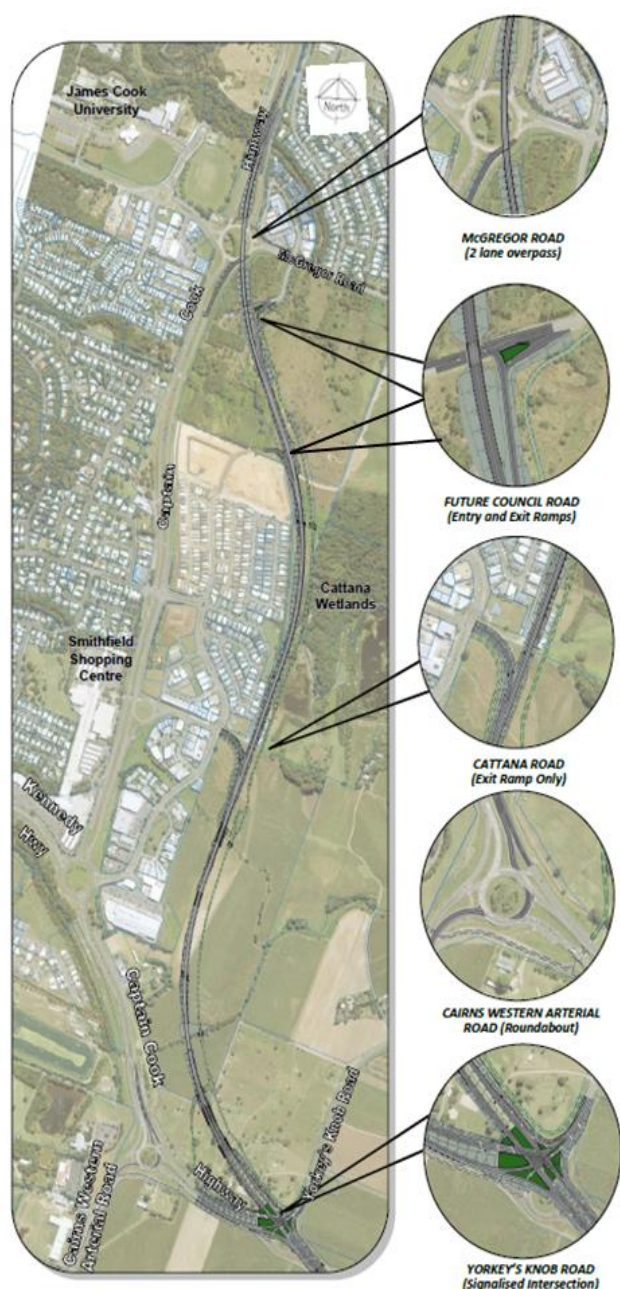
## 5 Proposal scope

The reference project (see Figure 3) is a new road infrastructure project with the following key features:

- bypass route continuity between the Captain Cook Highway at Yorkeys Knob Road roundabout and McGregor Road roundabout
- upgrading of the existing Yorkeys Knob roundabout with a four-legged signalised intersection to cater for the addition of the bypass route traffic
- upgrading of the Cairns Western Arterial Road roundabout with a signalised double right turn from Captain Cook Highway onto the Cairns Western Arterial Road
- northbound left off only exit ramp from the bypass route at Cattana Road
- exit and entry ramp to the proposed future Cairns Regional Council designated road at the northern end of the bypass route
- two-lane bi-directional overpass at McGregor Road roundabout
- wide centre line treatment for improved safety
- off-road cycle path.

The reference project does not change the existing road hierarchy for either state or local government-controlled roads within the boundaries of the study area. The reference project supplements the existing transport network in the Smithfield area and improves its efficiency.

Figure 3: STCU reference project







## 6 Proposal costs

The project capital costs estimates are outlined in Table 2.

Table 2: STCU project capital costs

Items	\$ million, \$ real
Total raw capital costs	98
<b>Total risk-adjusted costs (Real) at P90 level</b>	<b>136.5</b>

## 7 Proposal benefits

The STCU project benefits include:

- reduced delays and improved bus travel times and timetable reliability, particularly during morning and afternoon peak periods as a result of the reduction of traffic on the CCH attributable to the reference project
- improved access to active transport for recreational and commuter cyclists within Smithfield and the wider region as a result of the dedicated cycle path
- additional capacity as the reference project can accommodate 1,156 additional trips during the AM peak at 2021, increasing to 3,706 additional trips by 2036. During the PM peak, the reference project accommodates 1,915 additional trips at 2021 increasing to 5,022 additional trips at 2036
- significant travel time savings:
  - 1,076 hours saved during the AM peak at 2021 increasing to 1,366 hours at 2031, before dropping slightly to 932 hours at 2036 as the reference project becomes congested beyond 2031
  - 1,116 hours saved during the PM peak at 2021 increasing to 2,120 hours at 2036
  - 7 to 10 minutes faster through the study area on the CCH at 2021 and about 10 minutes faster better than the base case at 2031
  - between 4 and 10 minutes faster travel time on the CCH by 2036 under the reference project, with some deterioration during the AM peak as congestion increases in the reference project beyond 2031
  - between 8 and 11 minutes' saving Travel times on the bypass under the reference project at 2021, increasing to between 14 and 15 minutes at 2036
- reduced vehicle operating costs
- a reduction in the frequency of crashes for road users
- increased employment opportunities during construction.

A summary of the quantified economic benefits is shown in Table 3.



Table 3: STCU project economic benefits

Project benefits	Present value (\$ million, rounded, 7% discount rate)	% of benefits
Travel time savings	184	65
Vehicle operating costs	83	30
Crashes	15	5

## 8 Environmental and sustainability impacts

A review of environmental factors and an environmental management plan were prepared for the STCU project to identify potential approval requirements, issues and proposed mitigation measures. The review of environmental factors, concluded that the project is not likely to have a significant impact on a matter of national environmental significance within or adjacent to the project area. As a result, it is not anticipated the STCU project will be considered a 'controlled action' and will not require referral under the *Environment Protection and Biodiversity Conservation Act 1999*.

There are no environmental approvals potentially triggered for the STCU project, assuming that all land not currently designated as state-controlled roads will be resumed and will be state-controlled roads by the time ground activities start, and that work can be conducted within existing codes and exemptions. The review of environmental factors and environmental management plan also concluded that impacts on the majority of environmental aspects are minor and, with implementation of the proposed mitigation measures, impacts to the following environmental aspects will be manageable:

- erosion and soil
- surface and groundwater
- hydrology/flooding
- flora and fauna.

The Cultural Heritage Risk Assessment identified the project as potentially high risk due to the fact that proposed projects works would occur in previously undisturbed ground and within 500 metres of high risk landscape features. However, the Cultural Heritage Field Assessment report (completed after the Detailed Business Case was finalised was not expected to discover any issues that would not be able to be addressed during the detailed design phase of the project.

A sustainability assessment sought to identify sustainability considerations relevant to the STCU project to understand and, where possible, avoid or mitigate immediate and long-term economic, social and environmental impacts. The assessment found that the STCU project will contribute to positive economic, environmental and social outcomes.

## 9 Project management and delivery

### Packaging and delivery model

Market sounding conducted for the STCU project found a strong preference for a Design and Construct (D&C) contract (with possible early alignment preload works along the alignment utilising a Construct Only [CO] contract) as a single package.



The workshop concluded that challenges identified around traffic management, geotechnical and a flyover lent themselves to innovative solutions better addressed under a D&C contract.

The preferred packaging and delivery model involves a single package D&C contract, including consideration of an early works CO contract for preloading of soft soils along the alignment of the bypass.

### Implementation planning

As the Captain Cook Highway is a state-controlled road and the responsibility of the Queensland Government, the STCU project will be managed by the Department of Transport and Main Roads Far North district officers in accordance with the department's project management framework.

The detailed business case considered a January 2018 funding decision with the project development and procurement phase, including land acquisitions proceeding through to March 2019, when the construction and management phase begins. The bypass would open to traffic in May 2021.

Key risks to be considered during the procurement and delivery of the STCU project include environmental approvals, land acquisition, geotechnical issues and stakeholder considerations.

## 10 Proposed governance model for delivery

The governance arrangements for the implementation phase of the project will be similar to those for other road corridor projects delivered by the Department of Transport and Main Roads. The governance framework for the Department of Transport and Main Roads procurement and delivery of the STCU project follows best practice project management methodology, with project control group, project director and project manager functions providing oversight and undertaking management activities throughout the delivery phase.

## 11 Legal and regulatory impacts

The existing legal and regulatory regime provides a framework that would allow the Department of Transport and Main Roads to deliver the STCU project (subject to corridor acquisition by the department), provided the department adopts the various processes required by the regime.

One of the key risks will be issues in relation to land, particularly those specified in relation to land acquisition, native title, Aboriginal cultural heritage. Provided these issues are proactively managed, there are no particular concerns.

The Department of Transport and Main Roads has the authority to negotiate to purchase land required for the STCU project, or compulsorily acquire land under the *Transport Planning and Coordination Act 1994* and the *Acquisition of Land Act 1967*.

The native title assessment for the STCU project has determined the properties potentially impacted are clear of native title. The Department of Transport and Main Roads will need to take steps to ensure there is compliance with the cultural heritage duty of care, including that there is no unlawful harm to Aboriginal cultural heritage. There are well understood strategies to address these issues.

The construction contracts for the STCU project will need to be carefully prepared to ensure the principal contractor has management and control over the workplace on which any physical works are carried out so that it has the primary work health and safety obligations.

Referral of the STCU project under the *Environment Protection and Biodiversity Conservation Act 1999* can provide certainty, including providing protection from a future listing event.



A number of regulatory approvals may be required for the construction, delivery and operation of the STCU project. Apart from the *Environment Protection and Biodiversity Conservation Act 1999* approval and a compliance management plan in accordance with the *Transport Infrastructure Act 1994*, they are likely to be required as construction proceeds, and will not be required before construction starts.

## 12 Next steps

The detailed business case has been provided to the Queensland Government for consideration.