Infrastructure NSW

Business Case Summary

Hexham Straight Widening (Pacific Highway improvements at Hexham)

June 2024

Contents

1 About this report

1.1 Hexham Straight Widening FBC (previously Pacific Highway improvements at Hexham)

The Hexham Straight Widening project (the project) undertaken by Transport for NSW (TfNSW) proposes the upgrade of a 6km section of Hexham Straight in both directions between Newcastle Inner City Bypass and Hexham Bridge. Hexham Straight is one of the busiest transport corridors in the region carrying significant volumes of regional and local traffic. Additionally, it is an important element of the junction of the New England Highway, the M1 Motorway and the Pacific Highway.

This project will seek to:

- improve road user safety
- remove some of the physical constraints on freight traffic
- improve the overall capacity of the network
- support the forecast urban and regional growth.

The FBC, finalised in September 2020 was developed by TfNSW and submitted to the NSW Government for approval. This business case summary has been prepared by Infrastructure NSW in accordance with NSW Treasury Guidelines for Capital Business Cases. It is based on the approved final business case and does not address any subsequent changes to the project.

The Hexham Straight Widening FBC has been completed and is forecast to commence procurement and delivery in 2023.

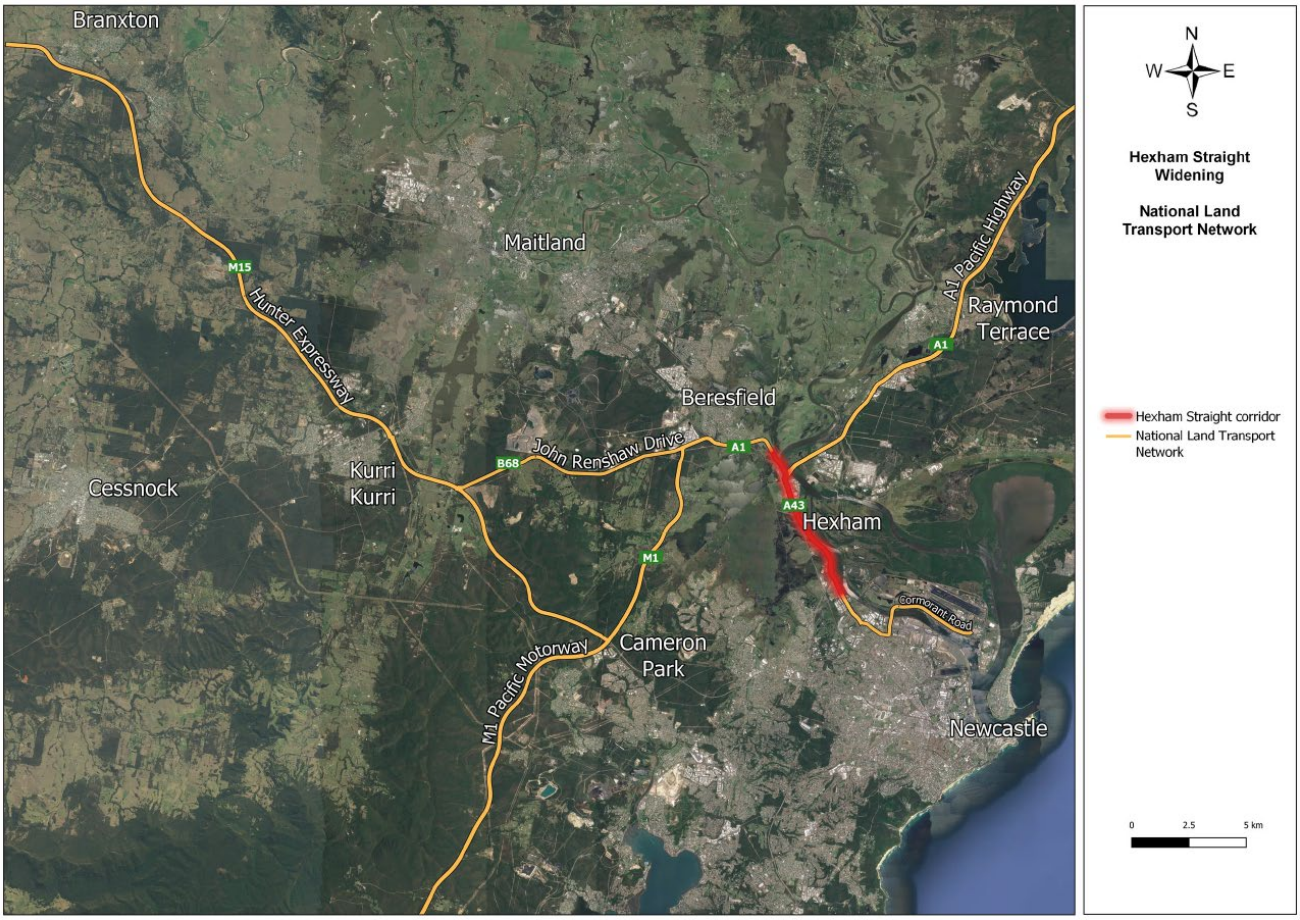
2 Strategic alignment and context

2.1 Background and context

The Hexham Straight refers to the section of the Pacific Highway which sits between Hexham (at the intersection with the New England Highway) and the intersection with the Newcastle Inner City bypass. It is a key north-south movement corridor for both commuter and freight traffic in the Greater Newcastle region and serves as a major access corridor into the Newcastle urban area.

It is one of the busiest corridors in the region with a demand of approximately 60,000 vehicles per day. It is identified as a critical element of the national land transport network, providing connectivity between Sydney and Brisbane and also to the Port of Newcastle.

Figure 1 Hunter National Land Transport Network and the Hexham Straight corridor



The corridor is currently 4 lanes wide (2 lanes in each direction). It has a posted speed of 80km/h. There are 9 signalised intersections, 3 U-turns and 7 at-grade intersections and a fixed speed camera. The project scope area also includes the Hexham Bridge which spans the Hunter River and the bridge over Ironbark Creek.

2.2 Strategic alignment

Alignment with government strategies & policies

The project positively contributes to the strategic direction and vision of several key government policies and strategies. Most notably, it directly aligns with Future Transport Strategy 2056, by supporting regional NSW transport customer outcomes.

Table 1 below summarises how the project aligns with key national, state and regional strategic documents.

Table 1 Alignment with Government Strategies & Policies

Region	Government strategy or policy	Project alignment
National	Government commitment	In November 2020, the Australian Government committed $1.6 billion on top of the NSW Government's $400 million commitment to build the M1 Motorway to Raymond Terrace extension and improve Hexham Straight.
State (NSW)	NSW State Infrastructure Strategy 2018- 2038	The Strategy identifies improved reliability and efficiency of the M1 between Sydney and Newcastle, will allow residents to access a wider variety of jobs and business opportunities in both cities.
	NSW Future Transport Strategy 2056	The project directly supports the strategies outlined with future transport 2056 by: ► improving a critical part of the road network which provides access to Newcastle which is identified as a global gateway city ► increasing road capacity to meet future demand in regional areas ► upgrading a primary freight route comprising of the New England Highway and the M1 Pacific Highway.
	Connecting to the Future – 10-year Blueprint for Transport	This plan outlines a clear set of priorities and outcomes to deliver the Future Transport 2056 strategy. The project aligns with this plan by supporting several of its outcomes. ► Outcome 1: For customers: the project improves the transport system that provides safe, seamless journeys for people and goods. ► Outcome 2: For community: the project improves the integration and accessibility of services in regional places. ► Outcome 3: For the people of NSW: the project allows for transport-led economic growth.
	Road Safety Plan 2021	The project is consistent with the following actions outlined within the Road Safety Plan 2021: ► Set road targets to drive the investment strategy for the State network. ► Enhance core safety feature requirements for road design and road network corridor planning.

Region	Government strategy or policy	Project alignment
	NSW Freight and Ports Plan 2018-2023	The proposed works will contribute to improving safety for all road movements, as well as improving efficiency and connectivity and access for heavy vehicle users.
Regional	Greater Newcastle Future Transport Strategy	The project aligns with a key initiative of improving the primary freight routes in Greater Newcastle. Specifically, it will provide upgrades to the strategic network of primary freight routes. This includes the New England Highway, M1 Pacific Motorway through to the Pacific Highway at Raymond Terrace, and the strategic junction with the New England Highway and Hexham Straight.
	Regional NSW Services and Infrastructure Plan	The proposed works align with the initiative of improving the primary freight routes in the Hunter.
	Hunter Regional Plan 2036	The Hexham Straight project will allow greater connection of the surrounding regions by improving travel times, expanding the capacity of freight and delivering the infrastructure to support growth and communities.

3 Project need

Between 2017 and 2048, traffic volumes are forecast to increase along Hexham Straight by:

- 19% at the Pacific Highway (north of Hexham Bridge)
- 61% north of Shamrock Street
- 48% along the Newcastle Inner City bypass.

This projected future growth along Hexham Straight along with the inefficient road configuration, generate a number of network performance issues for the outer Newcastle road network. These are summarised into 3 main problems and 1 opportunity:

- poor road network efficiency
- poor regional freight efficiency and costs to freight dependent industries
- poor road safety
- opportunity: to support planned growth areas of outer Newcastle.

Poor road network efficiency

The existing road capacity and intersection configuration is currently not able to support the efficient operation of the network. The average network travel speed is forecast to drop from 57km/h in the AM and PM peaks to 30km/h by 2048. The current and forecast speed and corridor performance is not consistent with Hexham Straight's classification of a movement corridor nor do they align with TfNSW standards.

The efficiency of the network is further hampered by the Hexham Bridge which acts as a bottleneck especially during major holidays. The grade separated intersection and approach along the south bank before accessing the bridge is forecast to operate at Level of Service (LoS) F[1] by 2038.

Heavy vehicles also represent a large proportion of traffic (approximately 17%), particularly for the north-south through traffic, traffic accessing the Hexham industrial area, and Port of Newcastle connection. High heavy vehicle volumes contribute to increased interactions between fast and slow-moving vehicles, slower travel speeds and turning impacts at intersections.

Poor regional freight efficiency and costs to freight dependent industries

Freight movement through Greater Newcastle is crucial for the economic function and growth of the Hunter region and NSW. As Greater Newcastle expands and becomes denser, the road and rail networks that transport freight will face increasing pressure. Enhancing network capacity and configuration is necessary to manage freight growth, ensure efficient freight movement, support productivity, and maintain sustainability.

Currently, the lack of dedicated freight infrastructure along Hexham Straight means that heavy vehicles contribute to and suffer from the inefficiency of the general traffic network as highlighted above. The congestion on Hexham Straight, combined with existing limitations on Hexham Bridge, results in diminished regional freight efficiency and increased costs for freight industries. Without addressing these constraints, industries dependent on freight, such as agriculture and mining, will continue to incur higher transportation costs.

Poor road safety

Certain road sections, particularly intersections, present a heightened crash risk for users. As traffic volumes and the population in the Hunter Region grow, road safety performance is likely to worsen.

---

[1] A qualitative descriptor of the road environment describing the ability of vehicles to manoeuvre. 'A' represents complete freedom to accelerate or manoeuvre. "F' represents high levels of congestion.

From October 2013 to March 2019, there were 188 crashes on Hexham Straight. 26 out of 188 were fatal or involved serious injuries.

Opportunity to support planned growth areas in outer Newcastle

Due to its geographical location, and the combined influence of the broader Hunter Region, the road network in this area is critical to both the growth of Newcastle, as well that of NSW and Australia. The existing transport hubs include the Port of Newcastle and RAAF Base Williamtown/Newcastle Airport.

Strategic growth plans for the outer Newcastle area highlight several key areas poised to benefit from this geographic advantage:

- East Maitland: projected to create 2,400 new jobs by 2036.
- Beresfield – Black Hill: expected to generate 800 new jobs by 2036.
- Tomago: anticipated to add 700 new jobs by 2036.
- Williamtown: forecasted to offer 3,000 new jobs by 2036.

Achieving this growth is largely contingent upon the availability of suitable transportation options for residents, workers, goods, and freight. Currently, the road network faces significant congestion, which diminishes its attractiveness to developers and businesses. This congestion increases travel costs, impacting profitability and the ability to draw in workers.

4 Project objectives and design

4.1 Objectives

The primary objectives of the project are:

- Improve travel times on the Pacific Highway for the existing congested east-west route from the junction with the M1 Pacific Motorway to the Newcastle Inner City Bypass (NICB).
- Provide a route which reduces the overall freight transport time and cost for heavy vehicles along the Pacific and New England Highways, and other key strategic freight routes around the Greater Newcastle area, improving opportunity for increased freight capacity and efficiency.
- Provide long-term route reliability along the Pacific Highway corridor (including Hexham Straight and Hexham Bridge to Masonite Road) and the New England Highway.
- Improve road safety (reduce fatalities and serious injuries) for all road users, including vulnerable road users.
- Provide more efficient access to facilitate economic growth to and from key employment areas such as Tomago, Beresfield, Black Hill, the Port of Newcastle and Greater Newcastle.

4.2 Design Considerations

The key design criteria adopted for this project include:

- a design vehicle of a 30m B-Double
- a design speed of 80km/h
- posted speed of 80 km/h
- number of lanes: 6
- lane width varying between 3.3m and 4.0m
- shoulder width varying between 0.0m and 3.0m
- bus bay width: 3.5m
- cut and fill batter slope: 1 in 2 – max; 1 in 4 - desired
- minimum horizontal curve radius: R.170
- 100-year design life of the bridge
- flows must not extend into the traffic lane for rainfall events up to the 1 in 20-year Average Recurrence Interval (ARI) event
- carriageway would target immunity for a 1 in 20 ARI flood event to the outer edge line of each carriageway
- safety features to include: W-beam safety barriers, high profile redirective kerbs, wire rope safety barriers, and thrie-beam crash barriers.

Several design constraints were also considered throughout the development of the preferred option, including the proximity and potential impact to:

- existing properties along the corridor
- major structures (Hexham bridge, Main North rail Line)
- utilities
- environmental features including the Hunter River, Hunter Wetlands National Park, Aboriginal land claims and other heritage listed items.

5 Options identification and assessment

5.1 Strategic business case

Options were developed as part of the Strategic Business Case (SBC).

- Do minimum option – included committed projects within the study area in addition to some improvements to the road infrastructure which are required for a functional network.
- Widening the existing corridor – widening 6km of Maitland Road from 4 to 6 lanes.
- Establish a new corridor – development of a new corridor alignment.

Due to the considerable number of physical constraints within the study area, including the Hunter River, main north railway and the Hunter Wetlands National Park, widening the existing corridor was the preferred solution. The existing corridor has sufficient space for additional lanes in either direction with minimal impact on the existing infrastructure.

5.2 Final business case

The FBC utilises the initial strategic design as a starting point and undertakes a series of option investigations to advance the design. These include:

- corridor alignment
- intersection options assessment
- challenge design assessment and workshop
- value management / options assessment workshop
- bridge options assessment and workshop.

As a result of the above investigations, a preferred option was developed. Key features of the preferred option include:

- 80km/h design and posted speed zone
- replacement of the bridge which spans Ironbark Creek with new twin bridges
- generally, 3-lane separated carriageway each way
- consideration of future interchange at Newcastle Inner City bypass (opportunity for partial introduction)
- retain 9 signalised intersections.
- retention of the unsignalised U-turn at the northern extent of project
- median closures, preventing unsignalised access from opposing carriageway to:
  - minor roads (including Ash Island Bridge and Fenwick St).
  - U-turns where vehicles cross 3 lanes of opposing traffic (unless under traffic management)
  - properties (northern access to Oak factory/Gilbert & Roach Trucks).

Stakeholder Engagement

Engagement activities undertaken up to the FBC included:

- In 2018, the community was notified of survey work to be carried out for early geotechnical works.

- Further information was provided in April and in late May 2019 when TfNSW notified the community about the planning for potential future road improvements along the Hexham Straight.
- From November 2020 to February 2021, the strategic design was put on public display.

Table 2 provides a list of key stakeholders and the proposed ongoing engagement strategy throughout the delivery of the project.

Table 2 Engagement already complete

Stakeholder	Engagement Strategy
Federal and State Government (including members of state parliament)	▸ Ensure all government agencies are well briefed and kept updated as the report progresses. ▸ Ensure all government agencies are provided with regularly updated holding lines for the project. ▸ Early engagement for all stakeholders where key inputs are required.
NSW Government departments and local government	▸ Meetings with the project team. ▸ Briefing notes and provision of communication materials.
Transport clusters	▸ Meetings with the project team. ▸ Briefing notes and provision of communication materials.
Customers	▸ Community information sessions. ▸ Project phone number, e-mail address. ▸ Website. ▸ Community updates. ▸ Advertising. ▸ Media activities. ▸ Door knock.
Emergency Service	▸ Meetings with the project team. ▸ Provision of communication materials.

6 Cost and economic evaluation

6.1 Estimated costs

Table 3 below summarises the P50 and P90 capital costs for the preferred option.

Cost Component ($ million)	Estimate
P50 total CAPEX cost estimate nominal	$320 million
P90 total CAPEX cost estimate nominal	$372 million
OPEX estimate – over 30 years real	$30.8 million

6.2 Evaluation

The economic appraisal is consistent with the approaches described in the Transport for NSW Cost-Benefit Analysis Guide version 2.0 (2019), Transport for NSW Economic Parameter Values, Version 2.0 (2019), both of which align with the Australian Transport Assessment and Planning (ATAP) Guidelines.

6.3 Outcomes of the Analysis

The following benefits were quantified as part of the economic evaluation:

- travel time savings
- vehicle operating cost savings
- crash costs savings
- residual value
- externalities savings.

The CBA results are summarised in Table 3 below.

Table 4 CBA results summary

Option appraisal	Criteria	Preferred Option
Economic appraisal ([7.00%] real discount rate)	NPV ($ million)	$1,532 million
	BCR	8.6
Economic appraisal ([3.00%] real discount rate)	NPV ($ million)	$3,565 million
	BCR	15.1
Economic appraisal ([10.00%] real discount rate)	NPV ($ million)	$862 million
	BCR	6.0

7 Deliverability

7.1 Procurement

A variety of options to split the project into individual packages were considered. It was suggested that some early utilities work could be conducted prior to the main works contract. There is also a high likelihood that some works (which rely on the completion of the M1 Extension to Raymond Terrace) would occur later as part of a follow-on minor works package.

It is considered that a collaborative contract form (such as an alliance) would be the most suitable model for delivery of a single main works contract. Benefits of this model include:

- Shared risk of design with 'best for project' outcomes the focus.
- Increased ongoing input from TfNSW on construction staging, through embedded staff.
- Increased ongoing input from TfNSW on public communications in a highly visible and highly trafficked corridor.
- Increased opportunity for innovation through open engagement with market participants with shared commercial risks facilitating innovation.
- Increased diversity of delivery models within the portfolio of projects.

7.2 Timeframe

At the time of the FBC, the project was expected to begin construction in 2023 and be open to traffic by 2026.

7.3 Key risks and mitigation

The top project risks and mitigations that were identified within the FBC are summarised in Table 4

Table 3 Key risks and mitigation

Key Risk	Mitigation
Vertical changes cause flooding implications on upstream properties. Other items such as median barriers also have potential to create flooding afflux.	▸ Complete flood modelling on preferred option and sensitivity for median barrier types. ▸ Independent verification of flood model (bringing forward from 80% submission). ▸ Consider all design options to minimise afflux. ▸ More detailed survey to ensure precision in model. ▸ Challenge afflux settings.
Existing concrete pavement requires reconstruction.	▸ Contractor to undertake condition survey. ▸ Staging plans (20% concept).
Culverts require replacement where current estimate allows for relining.	▸ Contractor undertake CCTV investigations as early works package. ▸ Liaise with Hunter Water Asset team.

Key Risk	Mitigation
Typical traffic barrier solution may adversely influence flood behaviour.	▸ Complete flood modelling on preferred option.
Heavy vehicle requirements do not fit with the available cross section/road occupancy licence approved conditions.	▸ Consult with relevant divisions early in the design phase. ▸ Obtain client written notice on design vehicle before 80% design.
Dewatering of all excavations may require treatment before discharge.	▸ Consult with Newcastle City Council once water quality results are available and a management plan is established upon receipt of water quality paper.
Traffic management if built concurrently with M1 Extension to Raymond Terrace.	▸ Confirm procurement method via a market interaction process.

8 The Infrastructure NSW view

Consistent with the NSW Government's Infrastructure Investor Assurance Framework, Infrastructure NSW routinely assesses business cases and provides advice to government on the efficacy of the findings.

Infrastructure NSW's review found that the FBC was robust with a well-developed suite of project documents, including the cost plan, project schedule, risk register, stakeholder engagement plan and governance framework. Although Infrastructure NSW found that the project governance is robust, it would be significantly improved with the implementation of a Project Control Group (PCG) despite the relatively low value of the project. However, the project is a uniquely challenging regional project, and the risk profile will be best managed through the close supervision and rapid decision-making process that a PCG can provide.