2. Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It identifies the various options considered and the selection of the preferred option for the proposal.

2.1 Strategic need for the proposal

The New England Highway forms part of the inland Sydney to Brisbane Corridor of the National Land Transport Network (NLTN). This transport network is funded by the Australian, State and Territory governments and is recognised for its strategic importance to national and regional economic growth, development and connectivity.

On a regional scale, the New England Highway is a major freight and commuter route, passing through Singleton and forming the main road access through the town. The route allows for the transport of goods to domestic and international markets via Newcastle and Sydney. Due to mining activities in the region, the route also accommodates the transport of mining equipment and vehicles, which are often oversize and/or over-mass vehicles.

Within Singleton, the New England Highway generally consists of one lane in each direction and has a reduced speed limit of 50 kilometres per hour through the town. Average daily traffic volumes indicate that up to 28,000 vehicles use the highway through Singleton each day, with around 15 per cent of these being heavy vehicles. Based on the existing configuration, volume and mix of road users travelling the highway, traffic efficiency and safety of the existing highway would benefit from separation of local and through vehicles.

The traffic flow along this route currently experiences delays and congestion, notably for extended morning and afternoon peak periods due to the movements of mining workers and then local school and work trips. Heavy vehicle movements on this route add further delays and congestion.

The capacity of the route will be put under further pressure as regional growth continues, with longer delays and increased traffic congestion predicted. The ability of road users to continue their journey on a bypass would reduce the volume of heavy freight vehicles and road users travelling through Singleton. The proposal is expected to improve traffic flow, travel times and safety through Singleton, which would meet the proposal objectives as outlined in Section 2.3.1.

The proposal was identified in the NSW Government's Rebuilding NSW plan which is a $20 billion program to fund and deliver infrastructure projects in NSW. Under this plan, the NSW Government committed $92 million towards the New England Highway bypass of Singleton and allocated a further $2.7 million in 2019-2020 to continue development of the proposal.

The proposal is also considered to be consistent with the objectives of the following Australian and State government strategic documents:

- Australian Infrastructure Plan (Infrastructure Australia, 2016)
- Future Transport Strategy 2056 (NSW Government, 2018)
- State Infrastructure Strategy 2018 – 2038: Building Momentum (Infrastructure NSW, 2018)
- Premier's Priorities 2015 – 2019 (NSW Government, 2015)
- NSW Freight and Ports Plan 2018 – 2023 (Transport for NSW, 2018a)
- Road Safety Plan 2021 (Transport for NSW, 2018b)
- New England Highway Draft Corridor Strategy (Transport for NSW, 2016)
- Hunter Economic Infrastructure Plan 2013 (Hunter Development Corporation, 2013)

- Upper Hunter Strategic Regional Land Use Plan (NSW Department of Planning and Infrastructure, 2012)
- Singleton Land Use Strategy (Singleton Council, 2008).

The consistency of proposal with these plans is discussed further below.

Australian Infrastructure Plan

The *Australian Infrastructure Plan* (Infrastructure Australia, 2016) recognises the importance of key freight routes. The Plan notes that bottlenecks and pinch points reduce efficiency and that these issues would be further exacerbated by population growth. Domestic freight is projected to grow by 80 per cent between 2011 and 2031, with much of that expected to be handled by road freight. A National Freight and Supply Chain Strategy was recommended in the Plan to define nationally significant freight corridors and precincts, identify the gaps and outline an investment plan to address these challenges. This strategy is currently being developed by the Australian Government. The proposal would address one of the challenges recognised in the Australian Infrastructure Plan, by removing a pinch point and alleviating congestion along a major freight and commuter transport route.

Future Transport Strategy 2056

The *Future Transport Strategy* 2056 (NSW Government, 2018) is an update of the *2012 Long Term Transport Master Plan for NSW*. The Future Transport Strategy 2056 provides the framework for delivery of a transport system which focuses on customer needs and maximises the benefits of emerging technologies and innovation. The strategy sets out six state-wide outcomes for the NSW transport system and ten customer outcomes for the regional NSW transport network which include: ensuring economic development is enabled by regional transport services and infrastructure; providing safe, efficient and reliable movement of people and goods; and providing improved connectivity for customers. The proposal would assist in achieving a number of these outcomes, as it would improve connectivity of communities and industries, improve freight connections to markets and provide better links between the Upper Hunter, New England and Newcastle regions.

State Infrastructure Strategy 2018 – 2038: Building Momentum

The *State Infrastructure Strategy 2018 – 2038: Building Momentum* (2018 State Infrastructure Strategy*)* (Infrastructure NSW, 2018) is a 20 year strategy to plan and fund the infrastructure that the NSW Government delivers. The 2018 State Infrastructure Strategy provides an update from the *State Infrastructure Strategy 2012: First Things First* (2012 State Infrastructure Strategy) and *State Infrastructure Strategy 2014: Rebuilding NSW* (2014 State Infrastructure Strategy).

The 2012 State Infrastructure Strategy and the 2014 State Infrastructure Strategy identified and prioritised critical public infrastructure projects to drive productivity and growth in NSW, while the 2018 State Infrastructure Strategy identifies the policies and strategies which are needed to continue driving infrastructure delivery.

Included in the 2014 State Infrastructure Strategy was a commitment to develop a corridor strategy for the New England Highway to guide investment priorities. In March 2015, the NSW Government announced a $92 million commitment for a bypass of the New England Highway at Singleton to address a well-known pinch point. The geographic directions of the 2018 State Infrastructure Strategy identifies that different parts of NSW have different opportunities and needs and that regional NSW needs to be supported by good transport links.

This proposal delivers on the commitment made as part of the 2014 State Infrastructure Strategy which would assist in delivering a regional transport link by alleviating the congestion on the New England Highway through Singleton, improving efficiency and connectivity along a major freight and commuter route. The proposal would also address a key transport recommendation made as part of the 2018 State Infrastructure Strategy, to develop and protect freight and service networks by improving road and rail access for goods and services to local, national and global markets.

Premier's Priorities 2015 - 2019

In 2015 the NSW Premier committed to delivering 12 priorities, including the Delivering Infrastructure priority which aims at delivering key metropolitan, regional and local infrastructure projects. This priority aims to ensure all local communities across NSW have access to the infrastructure they need, including safer and higher quality roads and highways.

The proposal would be consistent with the aims of the Delivering Infrastructure priority, as it would improve the freight and commuter efficiency along the New England Highway and improve congestion and safety for local traffic in Singleton.

NSW Freight and Ports Plan 2018 - 2023

The *NSW Freight and Ports Plan 2018 – 2023* (Transport for NSW, 2018a) identifies key issues for the transport sector that need to be considered and incorporated into land use and infrastructure planning. The plan sets out five objectives to encourage economic growth; increase efficiency, connectivity and access; deliver capacity enhancements; and improve safety and sustainability. The plan includes a specific goal for creating a safe freight supply chain, with safe networks, transport, speeds and people.

The New England Highway is identified in the plan as an important regional road for freight. The proposal would contribute to the goals and objectives of the plan as it would improve the efficiency and safety of the highway and local Singleton road network by separating heavy vehicle movements along a bypass instead of through the town of Singleton.

Road Safety Plan 2021

The *Road Safety Plan 2021* (Transport for NSW, 2018b) sets out targeted initiatives across six priority areas that will be delivered to progress towards the State Priority Target of reducing fatalities by 30 percent by 2021. Initiatives include infrastructure upgrades on country roads (such as wide centre lines, flexible barriers and sealed shoulders), enhanced planning and design of major roads and upgrades with safety at the core, and development of a new heavy vehicle safety strategy to improve operational safety of road freight in NSW.

Consistent with these initiatives, the proposal has been designed in accordance with relevant safety standards and design criteria (refer to Section 3.2) and would improve road safety for through and local traffic in Singleton. The diversion of traffic, especially heavy freight vehicles, to the bypass would reduce the volume of traffic travelling through Singleton and reduce the potential for crashes involving heavy vehicles.

New England Highway Draft Corridor Strategy

The *New England Highway Draft Corridor Strategy* (Transport for NSW, 2016) sets out the 20 year plan to manage and guide the development of the road corridor to improve safety, traffic efficiency and sustainability. The strategy sets out the short-term priorities which include selecting a preferred option for a New England Highway bypass of Singleton and preserving the corridor in the Singleton Local Environmental Plan.

The proposal would assist in delivering the preferred option for a New England Highway bypass of Singleton which would also improve safety and traffic efficiency on this route.

Hunter Economic Infrastructure Plan 2013

The *Hunter Economic Infrastructure Plan 2013* (Hunter Development Corporation, 2013) recognises capacity constraints and recommends priority infrastructure improvements that would assist the development of industry and affected communities. The Plan recognises the Singleton township (south and north) as a major pinch point on the road network serving the Hunter region, and recommends the consideration of a New England Highway bypass of Singleton in the medium-term (ie 2015 to 2020).

Consistent with this Plan, the proposal would provide the necessary infrastructure to address the traffic efficiency and safety issues by improving the movement of heavy freight vehicles and other road users along the bypass, rather than through the town of Singleton.

Upper Hunter Strategic Regional Land Use Plan

The *Upper Hunter Strategic Regional Land Use Plan* (The Upper Hunter Strategy) (NSW Department of Planning and Infrastructure, 2012) outlines a framework for supporting growth, protecting the environment and responding to competing land uses in the Upper Hunter region, whilst also preserving the key regional values of the Upper Hunter over the next 20 years. A key objective of the Upper Hunter Strategy is supplying required infrastructure to cater for sustainable economic and population growth in the region. The Upper Hunter Strategy also notes that consideration needs to be given to improved traffic management through towns (in particular Singleton).

The proposal would improve freight efficiency along the New England Highway by supporting the expected increase in road freight due to economic growth and population growth, as well as improving traffic efficiency through Singleton.

Singleton Land Use Strategy

The *Singleton Land Use Strategy* (Singleton Council, 2008) outlines key land use policies and principles for the Singleton LGA. This Strategy notes that increased traffic along the New England Highway would affect the adequacy and safety of existing traffic arrangements within Singleton and recommends that options for a bypass of Singleton be considered. The Strategy also recognises that determining a suitable bypass route would assist in future planning, particularly in deciding the location and layout of future residential and commercial land.

The proposal would contribute to the future planning of Singleton by reducing current levels of traffic congestion, improving road safety and increasing capacity of existing road infrastructure along the New England Highway. The proposal would also reduce potential crashes associated with heavy vehicles travelling through Singleton.

2.2 Existing infrastructure

The New England Highway is the main access road through Singleton. Access to the town from the south-west is also provided by Putty Road via the Golden Highway as well as from the north-east by Gresford Road and Queen Street. On a regional scale, the New England Highway connects Singleton with Muswellbrook and Scone to the north and Maitland to the south.

Passenger and freight train access is provided by the Main North railway line, which is located along the town's western boundary and includes the Singleton train station. The New England Highway passes under the recently upgraded Main North railway line rail bridge on the north side of Singleton, known as the Gowrie Gates.

Key road infrastructure (based on the connections and services they provide) to Singleton includes the following roads:

- New England Highway
- Putty Road.

The key infrastructure on each of the above roads is described below in Table 2-1 and Table 2-2. The infrastructure descriptions only consider the roads where they are in close proximity to or connect with the New England Highway.

Other roads within the proposal area or immediate vicinity include:

- Bridgman Road which connects Singleton Heights and Hunterview to the New England Highway
- John Street which runs through the Singleton town centre
- Maison Dieu Road which connects the suburb of Maison Dieu with the existing New England Highway
- Magpie Street which facilitates access between the industrial estate at McDougalls Hill and the New England Highway.

Existing infrastructure within the proposal area includes the Main North railway line, which intersects the proposal area at the bridge over the floodplain and then runs along the eastern boundary of the proposal area. Existing utilities within the proposal area include overhead and underground electricity, water, sewage, telecommunications and gas services (further detailed in Section 3.5). The Rixs Creek Rest Area is adjacent to the proposal area to the north-west, on the southbound side of the England Highway and accessed via Rixs Creek Lane. The Rixs Creek Rest Area caters for both heavy and light vehicles and provides amenities, sheltered picnic tables and litter collection facilities.

New England Highway

Table 2-1: Existing road infrastructure on the New England Highway within Singleton

Existing road infrastructure	New England Highway within Singleton
Connections	• This is a major north-south route passing through Singleton • It provides access to Singleton town centre, Singleton Heights, coalfields and rural properties in the area
Road configuration	• Generally one lane in each direction • The road widens to accommodate turning lanes at major intersections • Traffic light controlled at major intersections • A bridge over the Hunter River • Highway underpass at Gowrie Gates
Posted speed limit	• 50 kilometres per hour through Singleton town • 60 kilometres per hour between Bridgman Road and Park View Crescent • 80 kilometres per hour between Park View Crescent and Rixs Creek
Traffic volumes	• About 28,000 vehicles per day
Pedestrian facilities	• Concrete pedestrian paths are on both sides of the road south of the Hunter River bridge and only on one side of the road north of the bridge • Signalised pedestrian crossings are at major intersections
Cyclist facilities	• A shared pedestrian and cyclist path is located west of the Main North railway bridge
Parking	• Some sections of this route provide on street parking opportunities that are unrestricted and some that are subject to timed parking restrictions • In other places along the route, the kerbside lane is managed by No Stopping and No Parking restrictions
Public transport	• Bus service 403 and 404 operated by Hunter Valley Buses services the New England Highway and George Street within the town centre of Singleton • Designated bus zones are provided within this corridor for pick up and drop off of bus passengers and include shelters and signage

Putty Road

Table 2-2: Existing road infrastructure on Putty Road near Singleton

Existing road infrastructure	Putty Road near John Street
Connections	• This is a rural arterial road which connects the Golden Highway to John Street, Singleton.
Road configuration	• Generally one lane in each direction • Highway passes under the Main North railway line bridge • Signalised intersection where Putty Road meets Ryan Avenue with a left turning lane and a through lane in the northbound direction. In the southbound direction, there is a left turning lane and a through lane
Posted speed limit	• 50 kilometres per hour
Traffic volumes	• About 6000 vehicles per day
Pedestrian facilities	• There are no dedicated pedestrian facilities
Cyclist facilities	• There are no dedicated cyclist facilities, however cyclists can use the shoulder of the road
Parking	• There are no on street parking opportunities on Putty Road south of Ryan Avenue • North of Ryan Avenue, there are some on street parking spaces subject to timed parking restrictions, as well as sections with 'No Stopping' restrictions (in both the northbound and southbound direction)
Public transport	• There are no public transport services on Putty Road near Singleton

2.3 Proposal objectives and development criteria

2.3.1 Proposal objectives

The objectives of the proposal include:

- Improve travel reliability on the New England Highway through Singleton, particularly for road freight supporting the Upper Hunter and the North West New England region
- Improve the amenity of Singleton by removing freight traffic
- Improve road safety for through and local traffic in Singleton
- Support future traffic growth along the New England Highway associated with planned land use in the Upper Hunter area
- Provide access for oversize over mass vehicles along the New England Highway.

2.3.2 Development criteria

The development criteria for the proposal include:

- Provide about eight kilometres of new highway bypassing the town of Singleton with one lane in each direction, undivided with wide centreline treatment, and with provision for a future upgrade to four lanes

- Traffic lane widths to be minimum 3.5 metres
- Provide shoulder widths of three metres (outside shoulder) and 2.5 metres (outside shoulder on viaduct)
- Provide minimum flood immunity along the new highway for a one in 20 year flood event
- Provide connection at both the northern and southern ends of Singleton.

2.3.3 Urban design objectives

Urban design objectives for the proposal include:

- Enhance the urban connectivity and respond to the desired future character and functioning of the area
- Minimise impact on the community
- Design for low maintenance
- Respect the values of the surrounding heritage listed items
- Design the components of the bridges to be complimentary of each other
- Minimise visual impacts to the existing character of the setting.

2.4 Alternatives and options considered

The following sections describe the options that have been considered and assessed over the development of the proposal.

2.4.1 Methodology for selection of preferred option

Roads and Maritime has carried out multiple investigations to identify a preferred route for a New England Highway bypass of Singleton. The initial investigations considered multiple corridors where the bypass could be placed, with the following investigations considering more specific areas and route options. As the development of the proposal progressed, Roads and Maritime then looked closely at three shortlisted route options and incorporated community feedback as a key component in selecting a preferred route option.

The full options identification and assessment process is described in the *New England Highway Singleton Bypass Options Assessment – Route Options Identification Report* (Roads and Maritime, 2015) and the *Preferred Option Report* (Roads and Maritime, 2016). A summary of how the preferred option was identified throughout this process is summarised in Figure 2-1 and described briefly below.

The shortlisted route options for the bypass are discussed in Section 2.4.2 and an options analysis is provided in Section 2.4.3.

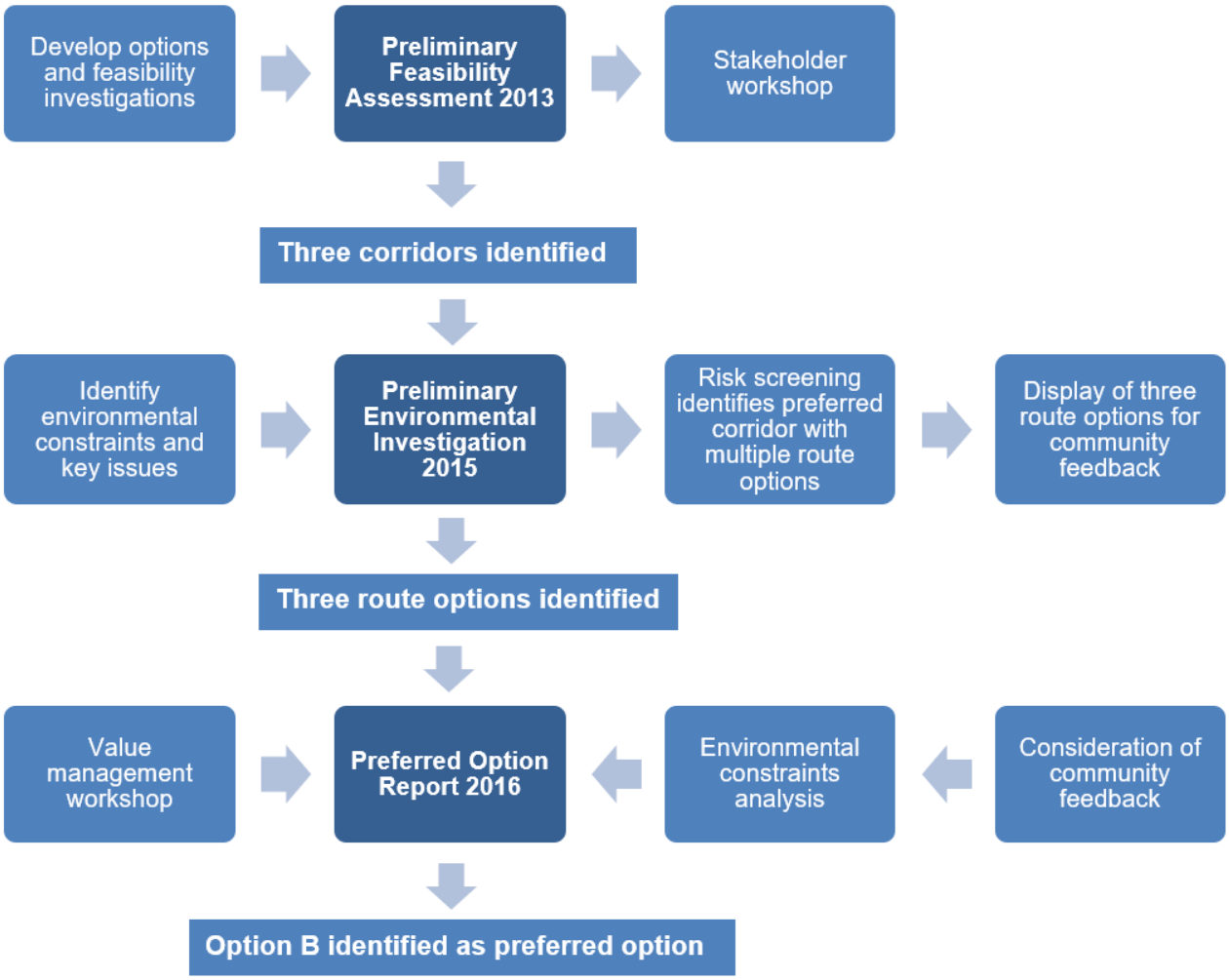

Figure 2-1: Development of the preferred option

Preliminary Feasibility Assessment Report 2013

The Preliminary Feasibility Assessment Report (AECOM, 2013) (Feasibility Assessment) included a corridor identification process which highlighted multiple corridors which could address the objectives of the proposal. The Feasibility Assessment determined the merit in carrying out further detailed investigations and planning for a New England Highway bypass of Singleton.

Four potential corridors were considered, including multiple route options within each corridor. Detailed traffic assessments, environmental constraints mapping and economic analysis were used to analyse the feasibility of each corridor.

The outcomes of the Feasibility Assessment assisted in reducing discussions to four strategic route options within three corridors.

Preliminary Environmental Investigation 2015

The three selected corridors from the Feasibility Assessment were then further analysed within the Preliminary Environmental Investigation Report (PEI) (AECOM, 2015) to identify potential environmental constraints in each corridor. The key environmental constraints considered in the PEI included biodiversity, Aboriginal and non-Aboriginal heritage, noise and vibration, flooding, visual amenity, social and economic factors and land use.

Following identification of the above mentioned environmental constraints in the three corridors, a preliminary environmental risk screening was used to identify multiple route options to be investigated. A total of 12 route options were identified within the Northern, Central and Southern corridors and were

assessed at a Multi Criteria Analysis workshop held in February 2015. The workshop reduced the 12 options to five and further investigations of these five options included detailed traffic investigations, environmental and flooding evaluations, strategic designs, cost estimates and economic analysis. Each option was assessed against a range of factors, including ease of construction, social and environmental factors and how well the road would function, to further reduce the options to three.

Three shortlisted route options (two in the Central Corridor and one in the Northern Corridor) were put on public display for community feedback in late 2015. The display period was held between 28 September 2015 and 23 October 2015, with a total of 168 submissions received. This community consultation is further discussed in Section 5.2.

Preferred Options Report 2016

The Preferred Options Report (AECOM, 2016) brought together community feedback, the results of further technical investigations as well as outcomes of a value management workshop held in March 2016 to compare and assess each of the three shortlisted route options.

In addition to the technical, socio-economic and environmental aspects of each shortlisted route option, the traffic efficiency of the route and how the option would affect flooding in and around Singleton were identified to be key considerations.

Out of the three shortlisted options, Option B was identified as the preferred route which provided a bypass to the west of Singleton which connected to the New England Highway north of McDougalls Hill and at Whittingham. All three shortlisted options are described in Section 2.4.2.

This route was also secured in the Singleton Local Environmental Plan 2013 for the future construction of the New England Highway bypass of Singleton.

2.4.2 Identified options

The main features of the three options considered for a New England Highway bypass of Singleton are described below and the routes are shown in Figure 2-2. The do nothing option has also been considered in this REF.

Do nothing option

This option would result in the New England Highway through Singleton continuing to function in its current state. There would be no New England Highway bypass of Singleton or improvement in traffic flow, travel times and safety though Singleton.

Option A

Option A would bypass Singleton to the west. This option would start south of Singleton and depart from the existing New England Highway at Range Road. A bridge would allow the bypass to cross over the Main North railway line and the bypass would then continue to the west, before curving to the north-west.

The bypass would pass over Army Camp Road via a bridge and would continue north-west with another bridge over both Putty Road and the Hunter River. Once on the northern side of the Hunter River, the bypass curves towards the north-east and then back to the north before crossing the New England Highway, west of Gowrie Gates. The bypass would continue north between the Main North railway line to the east and the New England Highway to the west.

This option would have a connection with Magpie Street at the McDougalls Hill Industrial area and would continue north to tie in with the existing New England Highway, north of McDougalls Hill.

This option would be about 13 kilometres in length.

Option B

Option B would bypass Singleton to the west. Option B would start south of Singleton, departing the New England Highway south of Newington Lane and would head west. The connection to the New England Highway would be located within the Doughboy Hollow floodplain. The main alignment would continue west and then cross over the Main North railway line with a bridge that also crosses Putty Road and then continues north to cross the Hunter River.

After crossing the Hunter River, Option B would curve towards the north-east and then back to the north, before crossing the New England Highway immediately west of Gowrie Gates. From here, Option B would continue in a northerly direction, and is positioned between the Main North railway line to the east and the New England Highway to the west.

This option would have a connection with Magpie Street at the McDougalls Hill Industrial area and would continue north to tie in with the existing New England Highway, north of McDougalls Hill.

This option would be about nine kilometres in length.

Option C

Option C would bypass Singleton to the east, departing the existing New England Highway, south of Newington Lane. It would then head north-east. The connection to the New England Highway would be located within the Doughboy Hollow floodplain, which would be bridged.

Option C would head north-west on a bridge across the Doughboy Hollow floodplain and the Hunter River floodplain. After crossing the Hunter River south of Gresford Road, Options C would curve towards the north through the suburbs of Clydesdale and Fern Gully. It would then run next to the left bank of the Hunter River and would pass over Gresford Road via a bridge.

Option C then curves to the north-west to pass between Hunterview and Wattle Ponds, and then heads west passing to the north of Singleton Heights. At this location Option C would travel over Gresford Road and then under Pioneer Road, Wattle Ponds Road and Bridgeman Road. North of Singleton Heights, Option C would cross over the Main North railway line via a bridge before connecting with the New England Highway north of Rixs Creek Lane. Included in this connection is a link to the McDougalls Hill industrial area.

This option would be about 11.9 kilometres in length.

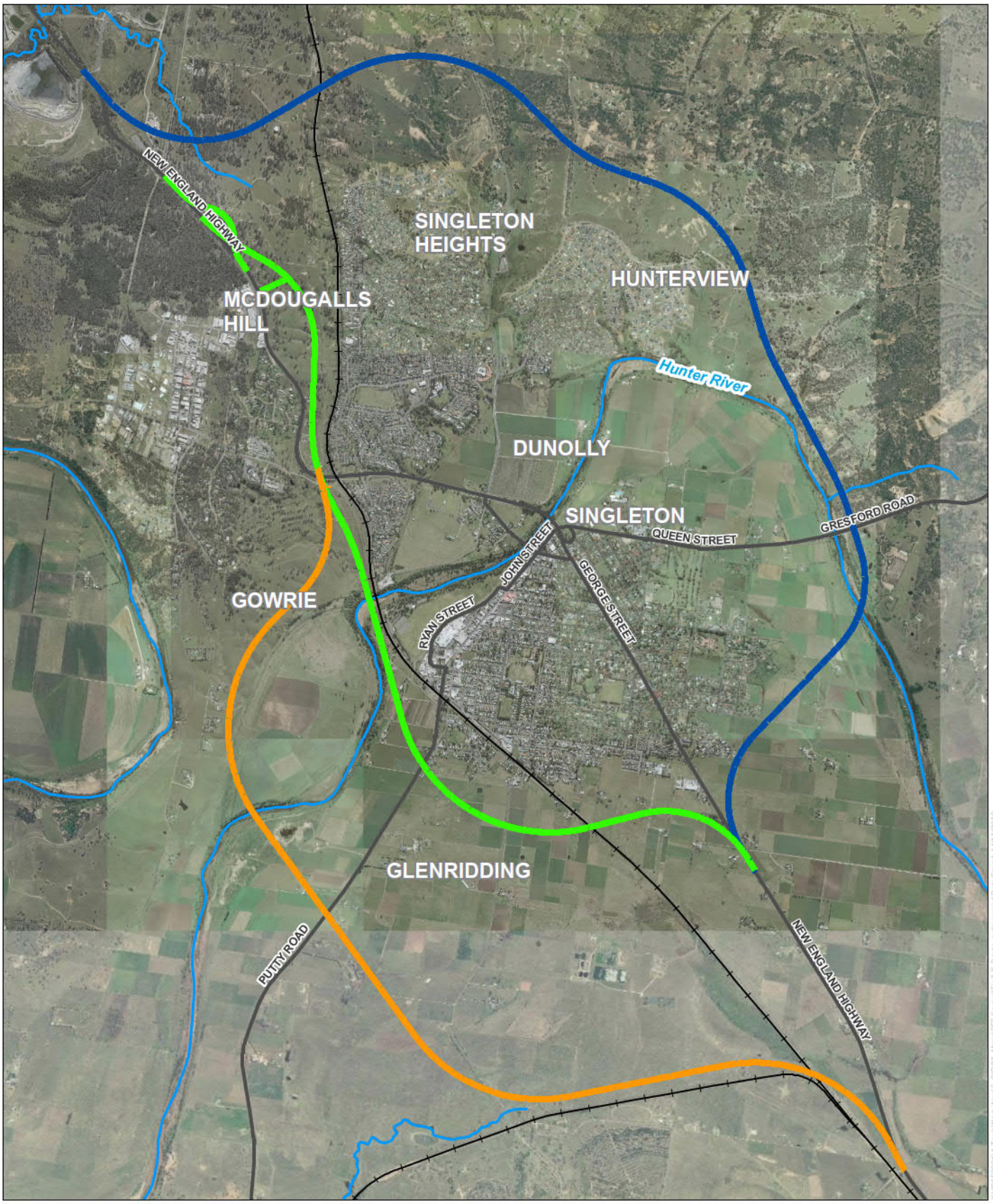

FIG. 2-2 Route options

N

0 0.5 1 Kilometers

Legend

Route option

- Option A
- Option B
- Option C

Other features

- State roads
- Watercourse
- Main North railway line

Source: LPMA 2016, LPI 2019, AECOM, 2019

Imagery credit: © 2011 Spatial Services 2019, © 2017 AAM Pty Ltd 2019 and © 2008 SKM 2019

2.4.3 Analysis of options

The objectives of the proposal are presented in Section 2.3.1. The do nothing option would not meet the proposal objectives. There are some advantages of the do nothing option, including no costs incurred or funding required and there would be no construction traffic disruption or noise impacts. However, the large number of heavy vehicles and road users travelling through Singleton would continue to increase and there would be no improvements to the existing traffic congestion.

While all three of the shortlisted route options would generally meet the objectives of the proposal, some options performed better with regard to improvements to traffic efficiency and impacts to flooding in and around Singleton. As discussed in Section 2.4.1, these matters were identified to be key considerations in the analysis of route options. A comparison of the improvements to traffic efficiency and flooding impacts as a result of each route option as well as other factors assessed is detailed within the Preferred Options Report (AECOM, 2016).

As well as meeting the proposal objectives, Option B provides positive outcomes in terms of traffic efficiency and flooding. Option B was identified to have the shortest travel time and would reduce heavy vehicle and other traffic travelling through Singleton, providing the greatest improvement in overall network efficiency. Option B also provides the safest access to and from Singleton during flood events.

Community feedback also noted a preference for Option A and B (roughly equal in preference) compared to Option C.

2.5 Preferred option

The preferred option is Option B.

This option meets the proposal objectives and provides a significant improvement to traffic efficiency and an effective flood evacuation route, while only having a minor impact on flooding. Option B would achieve the most beneficial improvement to traffic flow, travel times and safety on the New England Highway through Singleton by attracting the greatest volume of traffic away from the New England Highway to the proposal.

Key benefits of the preferred option compared to the other options assessed include the following:

- Providing the best functional, social and environmental outcomes and has the equal lowest cost
- Providing good economic benefits of reduced travel times and congestion
- Having the least environmental impact
- Providing the greatest connectivity of the options reviewed
- Having the least impact on property, local access and community cohesion
- Having the least impact on high quality agricultural land
- Having the least impact on future residential growth precincts in Singleton
- Meeting a range of other benefits such as potential evacuation routes, better access to the town centre and providing a heavy vehicle bypass between the north and west.

As the concept design of Option B has progressed, there have been some design refinements which are discussed in Section 2.6.

2.6 Design refinements

Following selection of Option B as the preferred option, a number of refinements have occurred during the concept design phase. Key design refinements are summarised in Table 2-3.

Table 2-3: Key design refinements

Proposal element	Design refinement	Reason
Length of bridge over the floodplain	Overall length reduced from around 3.1 kilometres to 1.7 kilometres and inclusion of two additional bridges.	Large cost savings attributed to shortening of the bridge structure, with minimal additional flood impacts.
Alignment north of Gowrie Gates	The alignment was shifted west away from a gully area.	Substantial reduction in fill material required for construction.
Putty Road interchange	Refinement from full interchange to connection consisting of a northbound entry ramp and southbound exit ramp.	Refinement of strategic traffic study indicated insufficient demand for northbound exit ramp, and southbound entry ramp. Refer to Section 6.6 for further information.
Northbound exit ramp at the northern connection/Gowrie Gates	The northbound exit ramp at the northern connection was moved to the connection with the New England Highway at Gowrie Gates in conjunction with a new roundabout at Maison Dieu Road	The traffic modelling suggested the roundabout would be utilised by vehicles travelling to Singleton Heights, as an alternative to either driving to the northern connection or travelling through Singleton via the New England Highway. This refinement facilitated the shift of the alignment to the west as described above.