



Pacific Highway Upgrade through Wyong Town Centre

Construction Staging Strategy Report

WTC-CS-001-REP-04

Prepared for: Roads and Maritime Services
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ABBREVIATIONS

AS/NZS	Australian Standards/New Zealand Standards
CAD	Computer Aided Drafting
DBYD	Dial Before You Dig
RDG	Road Design Guide
SMEC	Snowy Mountains Engineering Corporation
Stn.	Station
WHS	Work Health and Safety
WTC	Wyong Town Centre

1. INTRODUCTION

1.1 Project Background

Roads and Maritime Services (Roads and Maritime) has undertaken a planning study to provide a basis for the future development of Wyong and to assist Wyong Shire Council with its planning framework. As part of this, Roads and Maritime has appointed SMEC Australia Pty Ltd (SMEC) to undertake the concept design of the Pacific Highway Upgrade through the Wyong town centre (referred to as the Wyong town centre upgrade herein). The concept design works apply to a 2.4 km section of the Pacific Highway from Johnson Road to just north of Cutler Drive, with a proposal to upgrade the current single lane in each direction to a divided carriageway, with two lanes in each direction separated by a central median. This is expected to improve traffic flow and increase safety for road users, including cyclists and pedestrians.

The scope of works for the Wyong town centre Upgrade is as documented in the Description of Services (Version 2.8.1, October 2013). The project upgrade:

- Provides two through lanes in each direction of the Pacific Highway, with a central median. The posted speed limit through the town centre will be 50 km/h.
- Provides new twin road bridges over the Wyong River.
- Requires demolition of the existing bridge over Wyong River.
- Retains a significant amount of on-road short term parking in the town centre on the western side of the Pacific Highway between Church Street and North Road as feasible.
- Provides bus stop facilities on the Pacific Highway, and a bus layover facility, taxi parking and disabled parking on the eastern side of Wyong Station.
- Provides long term parking spaces for commuters in an extension of the Rose Street commuter car park.
- Provides pedestrian crossings across the Pacific Highway. Signalised crossings have been identified at Church Street, Rose Street (railway overbridge), Anzac Avenue, North Road and Cutler Drive. An unsignalised pedestrian refuge crossing facility is proposed at Bakers Lane.
- Upgrades key intersections with the Pacific Highway at Church Street, Anzac Avenue, North Road and Cutler Drive.
- Provides a new bridge over the Main North Railway at Rose Street and improved access from the Pacific Highway to Rose Street for areas east of the railway line.
- Provides a new footpath on the western of the road and a new off-road shared path through the town centre along the eastern side of the Pacific Highway.
- Provides an on-road cycle lane in both directions on the Pacific Highway.
- Provides a landscape design, incorporating the existing heritage palm trees, with the aim of retaining as many of the existing palm trees as reasonably practicable.

- Requires demolition of the heritage listed Station Master's Cottage.
- Requires demolition of the heritage listed Warner Shops.
- Retains right turn provisions into Church Street for southbound traffic on the Pacific Highway.

Figure 1-1 illustrates the project location in a regional context.

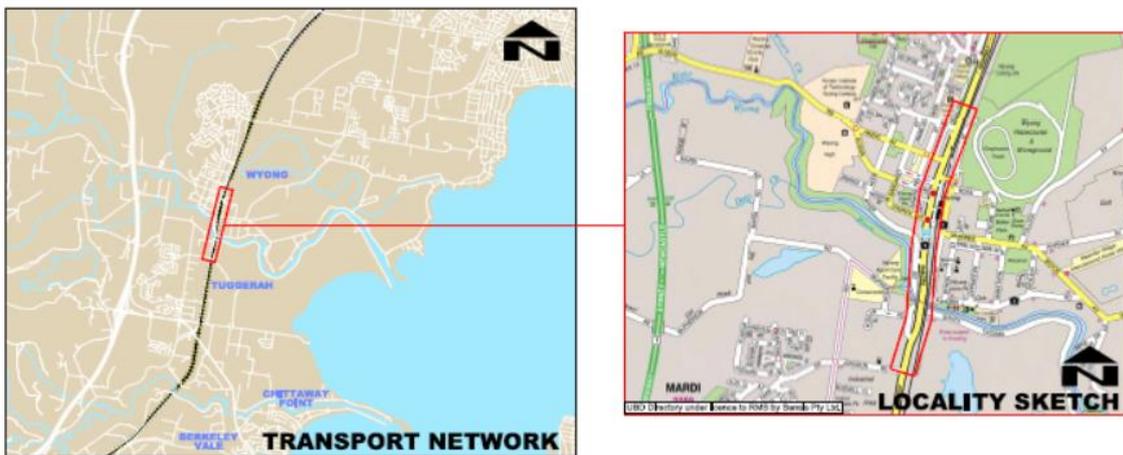


Figure 1-1 Project location (Source: RMS Strategic Design Rev E)

1.2 Scope of Report

This report documents the Construction Staging Strategy which is incorporated into design lot WTC-RD-001. This report covers the key aspects of the construction staging and temporary works. This report is to be read in conjunction with the 80 per cent Civil/Roads Concept Design Report (WTC-RD-001-REP-04) and the 80 per cent construction staging drawings which depict the overall strategy for the sequence of the construction works and temporary traffic arrangements (see Appendix A of WTC-RD-001-REP-04 for the list of drawings).

The purpose of this design report is to provide a description of the design, define the constructability issues and procedures identified at this stage in the concept design as well as potential future issues, and explain the reasoning behind key staging decisions. The intent of staging plans is to indicate which areas of the project will be constructed in each phase and also to give a general indication of where temporary road works are required in order to allow for construction of adjacent areas of the project. Documenting these considerations will assist Roads and Maritime in appreciating the intent of the current constructability design and the overall strategy defined for carrying out the construction works associated with the Pacific Highway upgrade through Wyong town centre.

This design report is intended to be retained and updated throughout the various concept design stages of the project. Further detail and a record of significant changes will be provided for each report revision.

1.3 General

The proposed construction staging strategy has been closely integrated with the latest alignment design and has been designed to minimise traffic delays and provide adequate

alternative routes for sections of the road closed temporarily due to construction works.

As noted in section 4.12 of the Description of Services, the management of construction traffic on local roads will be an issue of concern for Wyong Shire Council and for local residents. This requires the following issues to be considered:

- The development of measures to minimise and/or restrict the use of local roads by heavy vehicles involved in the project construction.
- Designated vehicle access points from local roads to the site and heavy vehicle routes on local roads.

SMEC will plan construction staging to minimise delays that will inconvenience motorists or interfere with traffic during periods of heavy traffic flows. Furthermore, SMEC will attempt to comply with the Roads and Maritime policy that stipulates not to reduce traffic capacity during peak periods, and to minimise delays outside of peak periods. The construction staging has also been designed with reference to Section 4.11 of the Description of Services for the requirements relating to road user delay management.

The construction staging / traffic management shall take into account the potential impacts on adjacent property, including access to public roads and properties. Also, temporary infrastructure requirements will be considered, including: compound sites, materials storage areas and temporary stockpile areas. Upon completion of the works, any temporary roadways and/or detour arrangements shall be removed and, if the area does not form part of the upgrade works, it will be restored to a condition equivalent to that which existed prior to the commencement of the work.

1.3.1 Road construction work adjacent to traffic

Where a temporary roadway or a detour is not provided or available, then subject to the approval by Roads and Maritime's representative, construction under or adjacent to traffic may be permitted provided that at least one 3.5 m lane remains open to traffic at all times and at least one 3.5 m lane remains open in each direction on divided multi-lane roads. Alternatively, subject to the approval of Roads and Maritime's Representative, lane width may be reduced to 3.1 m.

1.4 Design assumptions

The Construction Staging Strategy Report has been prepared based on the following assumptions:

- Unless noted otherwise, all stations in this design report refer to the control lines along the main carriageways of the permanent works, M100 and M110.
- Access to the rail corridor will be available at the commencement of the project for construction of the new alignment.
- The demolition of the Warner shops and the former Station Master's Cottage will be completed as part of the Enabling Works.
- Access to the pumping station in Apex Park will have to be maintained at all times.
- At least two lanes (one in each direction) of the Pacific Highway will be open for traffic

at all times.

- Rose Street Bridge is to remain trafficable at all times. Sub-staging has been developed for the construction of the new Rose Street overbridge and its approaches.
- Type-F barriers will be installed along the boundaries of all construction zones adjacent to live traffic.

2. DESIGN DESCRIPTION

2.1 Overview of the proposed traffic staging

The proposed upgrade works have been divided into three main stages as well as an Enabling Works stage. Stage 1 has been divided further into sub-stages to detail the construction of the new Rose Street overbridge. The four stages are summarised below:

- Enabling Works:
 - Relocation of critical utilities impacted by the design including the 11 kV, 66 kV and 132 kV overhead power lines on Howarth Street, the asbestos water main through the town, the gas main across Wyong River, the water mains at the southern end of the bridge over Wyong River, and the rising main in Apex Park.
 - Construction of the multi-level commuter car park on Rose Street.
 - Construction of McPherson Road and works along South Tacoma Road (excluding beneath the existing bridges). This includes the new connection from South Tacoma Road to McPherson Road.
 - Construction of the proposed offline section of South Tacoma Road as well as excavation and pavement works along the existing alignment.
- Stage 1:
 - Construction of the new Rose Street overbridge and its approaches. This has been divided into four sub-stages which are detailed in Sections 2.2.3 to 2.2.6.
 - Construction of the offline works along the Pacific Highway including sections of the new alignment south of the town centre as well as between North Road and the northern limit of works, including Cutler Drive.
 - Construction of the proposed northbound bridge over Wyong River including its approaches.
 - Construction of the proposed southbound carriageways through the town centre.
 - Works to upgrade the existing Howarth Street commuter car park to the new bus layover and disabled and taxi parking facility.
 - Works extending south to the intersection of the Pacific Highway with Johnson Road, including the proposed roundabout and the works adjacent to the western side of the main carriageway.
- Stage 2:
 - Demolition of the existing road bridge over Wyong River. The remaining works along South Tacoma Road will also be completed.
 - Works along Panonia Road and River Road. Note that these two roads will be closed to traffic during this stage of construction, with traffic required to divert to Rose Street overbridge or Church Street, respectively.

- Construction of the proposed northbound carriageway through the town centre to North Road.
- Construction of the online sections of the Pacific Highway between Johnson Road and Church Street.
- Stage 3:
 - Construction of the southbound bridge over Wyong River.
 - Construction of the southbound carriageways of the Pacific Highway between North Road and the northern limit of works.

The pavement construction where the proposed road surface closely matches that of the existing Pacific Highway surface will primarily consist of milling and resheeting. The works involved in this task can generally be completed during night work shifts, in short time frames, where traffic lanes can be temporarily closed and controlled by traffic controllers or devices.

The construction works and strategies for these four stages are described in detail in the following sub-sections of this report.

2.2 Traffic staging

2.2.1 Enabling Works

2.2.1.1 Utility relocations and property demolitions

Prior to undertaking any construction works, critical utilities impacted by the design will be relocated. This includes the 11 kV, 66 kV and 132 kV overhead wiring along Howarth Street and also the asbestos water main beneath the western side of the Pacific Highway through the town centre. In addition, the water mains south of the existing Wyong River bridge, the gas main across Wyong River, the rail power lines and the rising mains at Apex Park will also need to be relocated. The heritage-listed former Station Master's Cottage and the Warner shops will also be demolished prior to the construction of the new Pacific Highway alignment, and Pride Mowers and the antiques store will also be demolished to allow for the proposed works along South Tacoma Road.

2.2.1.2 Rose Street car park

Construction works on the multi-level car park along Rose Street will commence as early as possible to ensure that there is sufficient parking available for when upcoming works impact on the existing parking areas.

2.2.1.3 South Tacoma Road and McPherson Road

One of the key components of the Enabling Works involves the construction of the new offline section of South Tacoma Road and new pavement works on the existing road east and west of the existing bridge over Wyong River. The proposed alignment of South Tacoma Road is in a large cut section and construction of the twin bridges cannot commence until the level of South Tacoma Road is lowered to the design level. This is to ensure that there is sufficient vertical clearance for vehicles to travel beneath the bridges during and after the completion of the construction works. Single lane closure will be implemented through the use of traffic controls along South Tacoma Road. Due to the limited width and the proposed design

alignment of South Tacoma Road, works beneath the existing road bridge over Wyong River cannot begin until the bridge and its southern abutment are demolished. The works along McPherson Road including the approach to the proposed roundabout will also be undertaken.

In addition, a small section of temporary pavement will be laid on the outer edge of the bend in Panonia Road. This is to ensure that there is sufficient space for traffic flow in Stage 1 for when construction of the bridge and its abutments occurs.

2.2.2 Stage 1

2.2.2.1 Pacific Highway main alignment

The Stage 1 works focus heavily around the town centre including the construction of Rose Street bridge and its approaches as well as the proposed southbound carriageways from north of Wyong River to north of Anzac Avenue. Sub-stages 1a to 1d have been developed to demonstrate the staging plan for this area in more detail (see Sections 2.2.3 to 2.2.6). The proposed southbound works through the town centre are offline to the existing Pacific Highway main alignment and will have minimal impact on the traffic flow through the town. Works will begin with the clearing of the existing pavement and installing the new retaining wall along the boundary with the rail corridor. However, in order to construct these carriageways, the existing bus layover at Wyong Station will no longer be operational and a temporary bus zone will be established. This is a large fill zone which will subsequently require significant haulage along the Pacific Highway from either the northern or southern compound sites and therefore close consideration must be made to the impacts on traffic and local businesses. Pedestrian access to the station will be via the signalised intersection between Church Street and the Pacific Highway.

The mainline roadworks proposed for Stage 1 also include the offline section along the eastern side of the Pacific Highway south of the town centre from Station 550 to Station 1000 and also the section along the western side from North Road to the northern limit of works including Cutler Drive. As Cutler Drive is a main access route for Wyong Public School, it cannot be completely closed during construction and the works will subsequently be staged so as to ensure that it is open to traffic at all critical times.

To allow for the construction of the proposed northbound lanes and also effective traffic switches in later stages, these northern works will encroach upon the existing northbound carriageway between Station 1650 and Station 1770, which will require narrowing of the lanes and shifting the lanes east at this location to maintain traffic flow. This will subsequently require temporary linemarking to delineate the altered traffic lanes at this location, which will remain throughout Stage 2. However, two lanes (one in each direction) will be continuously maintained along the Pacific Highway in Stage 1. Undertaking the works through this approach allows for both of the proposed northbound carriageways beyond North Road to be constructed in Stage 1, which will facilitate the required traffic switch in Stage 3.

The approaches to the proposed bridges will also be constructed in Stage 1 to ensure that the northbound bridge can become operational in Stage 2. This involves significant fill south of Wyong River to create the required levels for the roundabout and the bridge approaches. The majority of the roundabout is offline to the existing main alignment and so a sufficient amount of it can be constructed in Stage 1 to allow it to become operational in Stage 2. Maintaining access to the businesses along South Tacoma Road and McPherson Road is an important consideration during this stage.

2.2.2.2 Proposed northbound bridge

Once the Enabling Works on South Tacoma Road have been completed, construction of the proposed northbound bridge and its approaches will begin. Major earthworks are required at both ends of the bridge to raise the surface level up to the design road level. The northern abutment encroaches into Panonia Road and therefore requires temporary linemarking to shift the traffic closer to the river and partially onto the temporary pavement laid in the Enabling Works to ensure that adequate traffic flow is maintained around Panonia Road.

Access from the Pacific Highway onto South Tacoma Road will be closed during Stage 1 to allow for the construction of the proposed roundabout and its approaches south of the bridges. Traffic entering or exiting South Tacoma Road will be required to detour via McPherson Road, Gavenlock Road and Johnson Road. Traffic control devices will be in place in Stage 2 along South Tacoma Road to restrict traffic flow to one way at a time beneath the bridges.

2.2.2.3 Rose Street overbridge

The construction of Rose Street overbridge requires a complex staging plan to maintain two-way access across the bridge at all times. This is a particularly important factor as the bridge is the only flood-free access to the eastern side of the railway and it provides the quickest and most direct access for emergency services to the eastern side of the railway. The bridge will also be the key means for buses to operate via the new bus interchange which will be constructed in Stage 1a on the eastern side of the railway. Detailed sub-staging for Rose Street overbridge and its approaches is discussed in the following sections.

2.2.3 Stage 1a

2.2.3.1 Howarth Street commuter car park

Stage 1a primarily involves the construction of all offline works for the existing Rose Street overbridge and its approaches as well as the upgrade to the Howarth Street commuter car park. Work on the car park will begin early to ensure the new bus interchange is operational as soon as possible. Commuters will be required to continue parking in the existing commuter car park on the western side of the railway or in the new multi-level car park on Rose Street during Stage 1a. Works associated with the proposed roundabout at the southern end of the new Howarth Street car park will most likely be undertaken as nightwork. This is because the associated pavement works are minimal as the roundabout will be at-grade and fully mountable with no necessity for kerbs.

2.2.3.2 Rose Street overbridge and its approaches (eastern side)

The existing Rose Street overbridge will remain fully operational during Stage 1a whilst the construction of the new bridge takes place adjacent to the southern side of it. The works in Stage 1a will have minimal impact on the existing traffic flow, however the existing southbound bus access to Wyong Station adjacent to the overbridge will be closed to allow space for bridge construction vehicles and equipment. Buses wishing to enter the bus lane alongside Wyong Station from Rose Street overbridge will be required to use the designated bus lane along the Pacific Highway. Apart from this, traffic will continue to use the existing Pacific Highway alignment through the town centre.

Prior to undertaking the earthworks for the proposed design, the retaining wall along the eastern boundary of the rail corridor will be constructed. Temporary pavement will be constructed in this stage at three locations to facilitate Stage 1b. Provision for temporary

earthworks and a retaining wall south of the proposed bridge may be required at one of the sections of temporary pavement located above the proposed embankment. This section of temporary pavement will allow for sufficient space for two-way traffic flow in Stage 1b. A minor lane width reduction is required on Howarth Street in the northbound direction just prior to the loop in order to taper the new pavement down to the existing pavement level and subsequently allow for the traffic switch in Stage 1b.

2.2.3.3 *Rose Street overbridge and its approaches (western side)*

The existing Rose Street overbridge will remain fully operational during Stage 1a while the construction of the new bridge takes place adjacent to the southern side of it. During this stage of works, approach and departure to the Rose Street overbridge on the southbound carriageway will need to be constructed to match existing levels on the current Pacific Highway. Bus access will need to be maintained while this work is undertaken.

2.2.4 *Stage 1b*

2.2.4.1 *Howarth Street commuter car park and bus interchange*

The new Howarth Street commuter car park and bus interchange completed in Stage 1a will become operation in Stage 1b. As a result, the existing bus interchange and western commuter car park will no longer be used and all works offline to the east of the existing Pacific Highway alignment will be constructed from south of Church Street to north of Anzac Avenue. This includes the proposed retaining wall between the Pacific Highway and the future rail corridor, the southbound carriageways, the kiss and ride and short-term parking facilities, the new pedestrian bridge connection to Wyong Station and part of the proposed northbound carriageway.

2.2.4.2 *Rose Street overbridge and its approaches (eastern side)*

Traffic will be switched onto the new Rose Street overbridge constructed in Stage 1a, which allows for the existing bridge to be demolished and the remaining portion of the new bridge to be constructed. To allow for the construction of the Rose Street loop east of the overbridge, traffic will be shifted almost completely off the existing roadway and directed into temporary lanes. Traffic will no longer be able to travel around the full loop but instead will be divided, with two lanes directing traffic over the new Rose Street overbridge and two lanes carrying traffic north or south along Howarth Street. A new section of temporary pavement will be constructed along the western side of Howarth Street, north of the Rose Street overbridge, to facilitate traffic flow in Stage 1c. However, the traffic arrangement shown at the westbound approach to the new Rose Street overbridge poses a possible issue in relation to the turn paths of vehicles using the bridge. The turn paths of a bus and a semi-trailer will have to be checked at this location to ensure such a movement is possible.

2.2.4.3 *Rose Street overbridge and its approaches (western side)*

In this substage of works, earthworks and pavement on the approach and departure to the Rose Street overbridge on both carriageways will need to be constructed. Critical works will be between Alison Road and Anzac Avenue, where finished surface levels are being raised by up to 1.5m from existing surface level. Given that vehicle access will need to be maintained at all times, while raising pavement by up to 1.5m, there are several methods which may be adopted to complete these works:

1. Complete the works over one weekend by diverting traffic around the Pacific Highway /

Rose Street intersection. By considering medium term weather forecasts and identifying a weekend when risk of flooding is low, traffic can be diverted away from this work area to allow earthworks and pavement works to be undertaken free of traffic. Heavy vehicles requiring access to the eastern side of the railway line would be diverted via Pollock Ave, light vehicles requiring access to the eastern side of the railway line would be diverted via Panonia Road. Through traffic could be diverted along Church Street, Margaret Street and Anzac Avenue.

By diverting traffic, earthworks can be completed to subgrade level on both the northbound and southbound carriageway between Alison Road and Anzac Avenue. Pavement works can be completed using a heavily bound base course and asphalt, ensuring that levels tie-in to the new Rose Street bridge abutment.

The Pacific Highway can then be re-opened to traffic, with the new bridge being used while the existing bridge is demolished and replaced with the other half of the new bridge.

This work would not need to coincide with a track possession, however it requires the new half bridge on the south side of the existing bridge to be constructed such that pavement approaches can be constructed and tie in to the new bridge, allowing traffic to be switched on to the new bridge.

2. If traffic cannot be diverted around this intersection, works between Alison Road and Anzac Avenue may be completed in a series of nightworks shifts. Embankment above existing pavement could be constructed by reducing traffic to one lane of contra-flow during nightworks, constructing a 300mm layer of Heavily Bound Base Course and a temporary seal, keying into existing pavement. This would be undertaken on consecutive nightshifts to incrementally raise the Pacific Highway to subgrade level and ensure it is traffickable during the day. The Heavily Bound Base and seal would replace the need for general fill under the pavement in this area. Asphalt layers could then be installed during subsequent nightworks.

Temporary signals or traffic control would need to be maintained during these works.

The Pacific Highway can then be re-opened to traffic, with the new bridge being used while the existing bridge is demolished and replaced with the other half of the new bridge.

3. Similar to option 2 above, existing pavement could be raised by installing layers of asphalt from existing pavement level to final surface level during nightworks. This would be an expensive option, but would have the least impact on traffic during the day.

It is noted that the finished surface level of the footpath will be increasing in this area, which will mean that any utility pits will need to be raised to meet the final path level.

2.2.5 Stage 1c

The proposed Rose Street overbridge will become operational in Stage 1c and the majority of the works associated with the approaches to the bridge will have been completed. Temporary traffic arrangements are still required to allow for the remaining works associated with the Rose Street overbridge approaches on the eastern side of the rail corridor. This includes partially shifting traffic onto the small section of temporary pavement constructed in Stage 1b,

preventing access to northbound traffic along Howarth Street and onto the Rose Street loop, and also closing off access between Rose Street and the loop. A detour for traffic wishing to use the new multi-level car park on Rose Street will be established via Warner Avenue and Ithome Street. With access to northbound traffic being restricted on Howarth Street, the road through the new Howarth Street car park will be utilised for all northbound traffic, tying in with the new approach to Rose Street overbridge.

2.2.6 Stage 1d

The new Rose Street overbridge and its approaches will be completed after Stage 1c. This sub-stage is required primarily to remove any remaining temporary pavement associated with the Rose Street works, to ensure any residual earthworks are completed, and to finish any remaining sections of kerb and pathways previously unconstructed due to temporary traffic arrangements.

2.2.7 Stage 2

2.2.7.1 Bridges over Wyong River including Panonia Road and River Road

To facilitate both the demolition of the existing road bridge as well as the works along Panonia Road and River Road, both of these roads will be closed to traffic with alternative routes operating by Rose Street overbridge and Church Street, respectively. Bridge demolition equipment and personnel will use the existing Panonia Road as an access road during the road closure. With this bridge demolished, the abutments can be removed and subsequently allow for the remaining section of South Tacoma Road to be completed. Following the demolition of the existing bridge, the roadworks along Panonia Road and River Road can commence. A significant amount of earthworks are required to build up the roadway at the approaches to the proposed bridge and also around the proposed roundabout between Panonia Road and River Road.

2.2.7.2 Pacific Highway main alignment

With large sections of the proposed Pacific Highway now constructed, traffic will be switched onto parts of the newly constructed pavement throughout Stage 2 to allow works to be undertaken on the existing alignment. The proposed retaining wall along the boundary of the rail corridor will be constructed prior to the Stage 2 roadworks. A small section of online works from the intersection with Johnson Road to Station 200 can be completed during night works as it primarily involves milling and resheeting. Temporary linemarking is required at this location to transition from the existing layout at the intersection to one lane in both directions. The existing road level between Station -10 and Station 220 will be constructed as part of the embankment zone beneath the proposed road and the remainder of the works south of the bridges will also be constructed. The roundabout will circulate one lane of traffic in each direction during this stage as all traffic must use the two-lane northbound bridge.

Two-way traffic will be shifted onto the southbound carriageways constructed in Stage 1 north of Wyong River and will continue through the town centre until the works tie back into the existing alignment north of Anzac Avenue. This will allow for the works along the proposed northbound carriageways to be completed from south of the town centre to North Road inclusive, tying in with the works completed in Stage 1. Works through the town centre will have to be undertaken in such a way so as to minimise disruption to the local businesses and maintain pedestrian access along the footways.

2.2.8 Stage 3

Stage 3 is focused on the construction of the southbound bridge over Wyong River and the section of the southbound carriageways from north of Anzac Avenue to the northern limit of works. Temporary linemarking is required north of the intersection between Johnson Road and the Pacific Highway to reduce the four lanes of traffic into two lanes with one in each direction. This is to direct the two-way traffic across the northbound bridge over Wyong River whilst the southbound bridge is being constructed.

Beyond the connection between the Pacific Highway and Panonia and River Roads, the two lanes will increase to four and traffic will flow through the town centre along the fully completed section of the highway. The lanes will once again be reduced to two lanes north of Anzac Avenue and will continue along the northbound carriageways whilst the southbound carriageways are constructed. The traffic will tie back into the existing alignment just south of the northern limit of works, with the last approximately 50 m to be completed as a mill and resheet.

2.3 Haulage routes for construction vehicles

The assumption at the 80 per cent concept design is that construction vehicles will generally use the Pacific Highway carriageway under construction to haul materials (including cut material) for short distances. With the staging plan shown in the relevant drawings, there is the potential for most of the haulage vehicles to access the site from the existing carriageway during construction. However, haulage will also be required on local roads such as South Tacoma Road for the associated road upgrades and Howarth Street and Rose Street for the reconstruction of the commuter car parks and Rose Street overbridge.

Significant consideration will have to be made in regards to the impact on the surrounding residential and commercial properties for haulage routes along these local roads.

In addition to the roadworks, movement of construction vehicles to and from the proposed ancillary sites also needs to be considered. Potential ancillary sites are detailed in WTC-RD-001-REP-04 *80 per cent Concept Design Report – Civil/Roads* and are summarised below:

- Lot 1 DP 1135878 (186 Pacific Highway, Tuggerah).
- Lot 5 Section 2 DP 3368 and Lot 4 Section 2 DP 3368 (200-202 Pacific Highway, Tuggerah).
- Lot 1 DP 739414 (204-206 Pacific Highway Tuggerah) // Lot E DP 312033 (1 McPherson Road, Tuggerah) // Lot 22 DP 864237 (210 Pacific Highway, Tuggerah).
- Lot 1 DP 123075 (Wyong Grove Public School, North Road, Wyong).

Discussion with Roads and Maritime regarding the proposed ancillary sites is ongoing.

3. DESIGN DEVELOPMENT

3.1 Changes from strategic concept design to 50 per cent concept design

The first construction staging plans have been developed for the revised 50 per cent concept design and therefore there are no changes to be addressed from the strategic concept design.

3.2 Changes from 50 per cent concept design to revised 50 per cent concept design

The following key changes have been made in the design development from 50 per cent to revised 50 per cent concept design:

- Complex staging relating to the proposed Rose Street overbridge and its approaches. Provision has also been made to ensure that Rose Street overbridge remains operational at all times throughout the project.
- Construction of the new multi-level car park on Rose Street to occur as early as possible to allow for adequate commuter car parking throughout construction of the project.
- Major staging changes in relation to bus movements and the construction of the new bus layover on the eastern side of the railway line (and the subsequent removal of the existing bus layover on the western side).
- Significant changes relating to the proposed twin bridges over Wyong River. Construction of the proposed bridge in the 50 per cent design occurred before the associated roadworks as it had minimal impact on existing traffic conditions. However, the proposed twin bridges in the revised 50 per cent design cannot be constructed until appropriate works on South Tacoma Road have been undertaken and the existing road bridge demolished.

3.3 Changes from revised 50 per cent concept design to 80 per cent concept design

- Revision of the staging plans based on the outcomes of the Constructability Workshop held on 25 November 2014. This was primarily concerned with prioritising the works relating to Rose Street overbridge and the town centre so that they occurred earlier in the construction process.
- Revision of the potential compound sites. The previously proposed sites have been assessed and the majority of these have been disapproved in lieu of new potential sites located at the southern and northern ends of the project.

3.4 Further design development and outstanding issues

- Further investigation of the proposed ancillary sites is required to determine which will be most feasible during the project works.

- The plans for sub-stages will be further developed and refined for the proposed Rose Street overbridge as well as South Tacoma Road and the construction of the twin bridges over Wyong River.
- The preliminary earthworks calculations will be further developed and detailed for the 100 per cent concept design phase once the design has been finalised. All pavement layers will be modelled in MX to provide accurate volumes and correct boxing dimensions. Additional information such as topsoil quantities will also be calculated.
- Staging of culvert works to be considered in future design phases. Issues to be considered include:
 - Construction of Culvert C200 (between Johnson Road and Wyong River) will be a considerable staging issue.
 - Existing drainage from the town centre to the rail corridor (at the station) will be severed when the large retaining wall is built. The drainage diversion from the town centre to the river will need to be constructed before this existing line is severed (or a temporary connection to the existing will need to be maintained until such a time).
 - Staging of construction of culverts between North Road and the northern extent of the job.
 - Construction of the proposed Culvert under Cutler Drive may need to be done in stages as night works if access to Cutler Drive cannot be cut off during the day.
- Staging of utility works to be considered in future design phases, when the detailed design of utilities is completed and alignments are confirmed.