



# Construction Traffic Management Plan

**PROJECT: FOXGROUND AND BERRY BYPASS**

**CONTRACT No.: 12.2574.3019**

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## Document Control

This Plan interfaces with the other associated plans, which together describe the proposed overall project management system for the Project.

The latest revision of this plan is available on the Fulton Hogan server. If any unsigned hard copies of this document are printed, they are valid only on the day of printing.

The revision number is included at the bottom of each page. When revisions occur, the entire document will be issued with the revision number updated accordingly for each owner of a controlled copy.

Attachments/Appendices to this plan are revised independently of this plan.

## Revision History

Rev	Revised By	Reviewed & Approved By	Date	Description/Summary of Changes
0	A. Loader	A. McRae	02-06-14	Initial issue for approval.
1	S. Aga	A. McRae	25-06-14	Revised to adjust minor formatting and to incorporate the comments received from RMS, PV and the ER. Refer to the comments sheet for details.
2	S. Aga	A. McRae	21-07-14	Revised to incorporate further comments received from RMS, Shoalhaven City Council and Kiama Municipal Council. Refer to the comments within the transmittal for details.
3	S. Aga	A. Mcrae	03-09-14	Revised to incorporate the comments received from DP&E. Refer to the comments within the transmittal for details.

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## Acronyms

CEMP	Construction Environmental Management Plan
CTMP	Construction Traffic Management Plan
DP&E	Department of Planning and Environment
EWMS	Environmental Work Method Statement
FBB	Foxground to Berry Bypass Project
MCoA	Minister's Conditions of Approval
RASS	Radar Activated Speed Signs
RMS	Roads and Maritime Services
ROL	Road Occupancy Licence
SoC	Statement of Commitments
SWTC	Scope of Works and Technical Criteria
TCP	Traffic Control Plan
TCaWS	Traffic Control at Works Sites Manual
TMC	Transport Management Centre for NSW
TMC-SR	RMS's Southern Region Traffic Operations Unit located in Wollongong
TMP	Traffic Management Plan
VMP	Vehicle Management Plan
VMS	Variable Message Signs

## 1. Introduction

This Construction Traffic Management Plan (CTMP) describes how Fulton Hogan proposes to safely manage vehicular, cyclists and pedestrian traffic during the design and construction phase of the Foxground and Berry Bypass (FBB) Project, so that project objectives are fully realised.

Fulton Hogan acknowledges the safety of road users and the effective management of traffic is paramount to the successful day-to-day activities during the construction phase of this Project. This CTMP seeks to ensure the certainty of the delivery of the prescribed road user requirements including: provision of a safe environment for workers and the travelling public, and minimising impacts on the road network.

This CTMP covers the RMS's requirements depicted under Appendixes 21 and 43 of SWTC (Traffic Management and Safety Plan) and is also part of the Construction Environmental Management Plan (CEMP) to address the requirements of the Minister's Conditions of Approval (MCoA), Roads and Maritime Services of NSW (RMS)' Statement of Commitments (SoC), the safeguards listed in the FBB Environmental Assessment (EA) and all applicable legislation.

This Plan operates as the master document to a set of site or zone specific Traffic Management Plans (TMP) and their associated Traffic Control Plans (TCP) and Temporary Works Drawings. Together they deal with the safe and effective management of traffic during the design and construction phase of the Project.

This CTMP is applicable to all staff, employees, subcontractors, and any statutory Service Authorities undertaking service relocations throughout the duration of the contract until project completion and its implementation and on-going development will be managed by the senior project team.

### 1.1. Purpose

The intended purpose of the CTMP is to describe how Fulton Hogan will implement the work in accordance with the requirements of the Project Deed as well as the requirements of MCoA.

### 1.2. Scope

This Plan applies to all parts of the construction of the Works. It does not apply to the maintenance of the road after opening to traffic.

The scope includes:

- The provision for the safe movement of vehicular and pedestrian traffic
- The protection of workers from passing traffic
- The provision for access to properties located within the limits of the works
- The design, construction, maintenance and removal of any necessary temporary roadways and detours
- The provision of traffic controllers
- The installation of temporary signs, road markings, lighting and safety barriers

It also covers maintenance of the existing road corridor, including the existing road and road shoulder that may be used for the temporary diversion of traffic, over the duration of the works.

### 1.3. Project Description

The FBB Project is a Design and Construct (D&C) Project, which involves upgrading the Princes Highway (HW1) from Toolijooa Road to Schofields Lane, 50.66 to 63.72km south of Wollongong, NSW. The aims of the Project are to improve the standard of the highway, eliminate “black spots” and reduce overall travel time in the south coast region.

This Project is the second stage of three in the Gerringong to Bomaderry Upgrade Project and the Principal is RMS.

### 1.4. Background

The FBB EA (AECOM, 2012) considered the potential traffic impacts during the construction of the Project.

As part of the EA development, a detailed traffic and transport assessment was prepared to address the Secretary requirements issued by the then Department of Planning and Environment (DP&E). The traffic and transport assessment was included in the EA as Volume 2 Appendix D Technical paper: traffic and transport.

### 1.5. Requirement Matrix

The requirement matrix that is appended to this plan is developed to assist users and reviewers to identify where various elements of RMS requirements are addressed in this plan in particular to Appendix 21 of SWTC as well as the requirements of MCoA.

### 1.6. Environmental Management Document System

The Project Environmental Management document system is described in the CEMP. This plan is part of Fulton Hogan’s environmental management framework for the Project, as described in Section 4.1 of the CEMP. In accordance with the requirements of MCoA B36(a), this Plan has been developed in consultation with Shoalhaven City Council and Kiama Municipal Council (for details refer Section 4).

Management measures identified in this CTMP will be incorporated into the Contractor’s site or activity specific Environmental Work Method Statements (EWMS).

EWMSs will be developed and signed off by environment and management representatives prior to associated works and construction personnel will be required to undertake works in accordance with the identified safeguards.

Used together, the CEMP, sub-plans, strategies, procedures and EWMS form management guides that clearly identify required environmental management actions for reference by Fulton Hogan’s personnel and contractors.

The review and document control processes for this plan are described in Section 10 of the CEMP.

## 2. Key Issues

This CTMP addresses the following Key Issues and Processes identified within the RFT document:

- Safety and amenity of road users and the public;
- Site security, site access and signage;
- Project identification, including advertising and site signage;
- Traffic and road user delay and inconvenience management;
- Speed limit signage;
- Traffic transfer (switch) arrangements and procedures;
- Maintenance during Construction;
- Traffic and Safety Management Responsibilities;
- construction staging including detailing the intersection layout and capacities for each and every construction stage;
- Impact of construction traffic on local roads in particular to Sandtrack; and
- Emergency and Incident Response Plans.

The Table below shows the risks to be dealt with during the design and construction stage of the Project that may affect safety:

Table 1: Key Issues

Risks	Potential consequences	Proposed risk treatment
Construction methods may cause disruption to traffic.	Traffic delays causing frustration to drivers.	Consider methods of construction at an early stage during the design to reflect community needs and reduce delay times therefore minimising the impact on traffic.
Traffic management - inadequate anticipation and communication of issues.	Potential community issues causing dissatisfaction and frustration.	<ul style="list-style-type: none"> <li>▪ Determine traffic routes and engage with community to refine details.</li> <li>▪ Confirm pre-existing conditions.</li> <li>▪ Consider the need for night assessment.</li> <li>▪ Identify any short-term corrective actions.</li> </ul>
Severe delays to traffic perceived by the community as a direct result of the construction activities.	Community dissatisfaction, claims for loss of trade, time delays.	<ul style="list-style-type: none"> <li>▪ Establish good public relations from the outset.</li> <li>▪ Erect Early Warning information signs through Variable Message Signs (VMS).</li> <li>▪ Early engagement of affected property/business owners to explain process and ascertain needs and potential effects of changed access.</li> </ul>
Access for emergency services restricted.	Emergency vehicles and personnel unable to attend to an emergency situation.	Liaise with Emergency Services at an early stage to establish requirements and measures to be adopted in the Vehicle Movement Plan (VMP)



Risks	Potential consequences	Proposed risk treatment
Local Bus and other commercial operators.	Impact bus routes, commercial operations, disruption to business causing frustration.	<ul style="list-style-type: none"> <li>CTMP to be developed with consultation with CCS.</li> <li>Bus routes to remain unchanged where possible to avoid “changes” due to construction activities.</li> <li>Changes to be managed by Fulton Hogan Community Manager to ensure co-ordinated approach.</li> </ul>
Major Traffic Incident.	Local traffic disrupted upsetting locals.	<ul style="list-style-type: none"> <li>Regular checking of Traffic Management Plan implementation.</li> <li>Have procedures in place for rapid recovery, Keep locals informed.</li> </ul>
Access to site for deliveries.	Traffic disruption or interference.	<ul style="list-style-type: none"> <li>Development of this Plan in conjunction with Community Communication Strategy - access points will be high risk locations and will need detailed consideration.</li> <li>Simplification of traffic staging will simplify access arrangements or minimise impacts.</li> <li>Signage and pre-delivery notifications for delivery routes to be clear and simple as per the VMP.</li> </ul>
Traffic Speed.	Works in multiple areas across the Project may result in intermittent speed changes that may frustrate road users.	Traffic to generally be reduced to 80kph speeds within construction zone. Construction zone to be full length of the Project. CTMP to consider simplifying traffic staging to avoid construction zone impacting on traffic.
Pedestrian access.	Potential disruption to progress causing pedestrians to not comply with pedestrian provisions.	Liaise closely with the relevant bodies from an early stage to ensure pedestrian access provisions are adequately addressed, well established and maintained.
Lowering speeds, when it is perceived unnecessary.	Poor public opinion and safety for workers if motorists start ignoring limits.	Appropriate design of traffic protection measures, intersections, alignments etc. to allow consistent speed limits, i.e., 80km/h where-ever possible.
Too many changed configurations.	Unfamiliarity causing potential confusion of road users that may cause traffic incidents.	Keep motorists on existing alignment for as long as possible. Effective use of VMSs for advanced notification and clear direction during any traffic flow adjustments.
Inadequate provisions for break-downs during construction.	Traffic delay.	Design temporary break down bays. Consider temporary verges where possible during design of traffic staging.

Risks	Potential consequences	Proposed risk treatment
Public or livestock entering work-site or Princes Highway. Unauthorised access to site.	Traffic Incident.	Provide clear delineation and fencing. Educate community (farmers/neighbours, of WorkCover requirements etc.). "Neighbours induction". Channel interests through formally organised tours.
Dangerous entry and exits to sites and properties.	Traffic Incident.	Ensure that entries and exits are designed to cater for expected traffic volumes and with respect to sight distances, acceleration and deceleration provision and clear advanced warning signage.
Seasonal traffic variations not allowed for	High volumes during holidays and weekends.	Consider seasonal volumes in programming works. Keep RMS informed and up to date. Be aware of reporting and notification requirements.
Reduced allowable movements	Traffic delay, confusion to commuters that may lead to an incident.	Implement effective community engagement strategies that will consider businesses, property owner's requirements.
Paddle Power - complying with cyclists demand for better access and routes during construction including safety measures	Confusion to Pedestrians and Cyclists that may result in dangerous movements. Community dissatisfaction.	Engagement of Traffic Steering Groups to liaise with local and regional cycle groups and commuters to ensure provision for cyclists is well addressed and notified to the community.
Damage to local roads due to heavy vehicle movements.	Vehicle damage and potential incidents. Poor community and council relationship.	<ul style="list-style-type: none"> <li>Allow for heavy vehicle movements in traffic staging and planning to ensure existing, temporary alignment and pavements are suitable during the construction period.</li> <li>Carry out Road Dilapidation Surveys</li> </ul>
Impact of construction traffic on Sandtrack	Increased traffic on the Sandtrack and excessive damages to the local road	<ul style="list-style-type: none"> <li>Monitor the road safety on 'the Sandtrack' during construction.</li> <li>Implement measures where reasonable and feasible, in consultation with Kiama Municipal Council and Shoalhaven City Council, should additional road safety issues be identified appropriate road safety</li> </ul>

### Traffic Management Risk Assessment Workshop

Further to the above mentioned key issues, a Traffic Management Risk Assessment Workshop will be conducted prior to the commencement of any traffic management works in accordance with Clause 2.9 of Specification RMS D&C G10. This will identify and address the risks associated with the road safety, traffic management and local network issues specific to the site.

All workshops will be organised and championed by the Traffic Management Steering Group to incorporate all relevant parties to determine best for project outcomes.

Additional workshops and trainings will be undertaken to train the Project team regarding the implementation of this plan, TCPs and when traffic arrangement issues need to be reinforced or reviewed.

The outcomes of the workshop will be documented in the Project Risk Register that is appended to the Risk Management Plan.

### **Traffic Management and Mitigation Measures**

A range of environmental requirements and control measures are also identified in the EA, Statement of Commitments, Conditions of Approval and other RMS documents. Mitigation and management measures will be implemented to avoid, minimise or manage impacts to traffic. Specific measures and requirements to address impacts on traffic are outlined in the requirements matrix accompanied with this Plan. Further details on the key issues relating to traffic management are provided in this Plan.

The measures have been prepared in accordance with RMS QA Specification G10 - Control of Traffic and Traffic Control at Work Sites Manual (2010).

### **Impact of Construction's Heavy Construction Vehicles on Local Roads**

The local roads likely to be used by the Project's heavy construction vehicles are identified in the appendixes of this Plan. Road dilapidation reports are required to be prepared for these local roads, and a copy of the report(s) are to be provided to the relevant council (Kiama Municipal Council and Shoalhaven City Council), prior to use by the Project's heavy construction vehicles. Any damage resulting from the use of the identified local roads by the Project's heavy construction vehicles, aside from that resulting from normal wear and tear, will be required to be repaired, unless otherwise agreed by the relevant council.

A road dilapidation report is also required to be prepared for the 'Sandtrack' and a copy of the report is required to be provided to the relevant council (Kiama Municipal Council and Shoalhaven City Council), prior to commencement of construction. Should monitoring in accordance with MCoA B36(a) reveal higher than anticipated volumes of traffic (as defined in the document referred to in Condition A1(b)) resulting in a higher rate of deterioration in the condition of local road infrastructure, consultation with the relevant Council shall be undertaken to determine mitigation measures in accordance with Condition B36(a). A report will be required to be prepared and submitted to the DP&E's Secretary at 12 months and 24 months after commencement of construction, and prior to operation, unless otherwise agreed by the DP&E's Secretary.

## **3. Strategy for the Project**

The roads affected by the construction of the Project vary greatly from the heavily trafficked Princes Highway to infrequently used local roads. However, the requirement remains the same as impacts in both cases must be kept to a minimum

Therefore Fulton Hogan will:

- Design the works to ensure the current number of lanes exist at all times and minimise lane closures in both number and duration;
- Schedule the works to exclude lane closures during Public Holiday Weekends and School Holidays and minimise closures during daylight hours;

- Schedule the work to minimise the Lane, road occupancy and shoulder closures for tie-ins to existing pavements
- Ensure appropriate controls and procedures are implemented during construction activities to address potential traffic impacts along the Project corridor;
- Ensure appropriate measures are implemented to address the relevant MCoA and SoC outlined in the appended requirements matrix, and the safeguards detailed in the EA;
- Incorporate traffic control measures for construction vehicle movements and works programs in order to minimise traffic and transport impacts on local roads and the existing highway; and
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in this Plan.

## 4. Objectives and Targets

The project objectives have been developed to align with those of the RMS as documented, including but not limited to, the Project Deed and associated SWTC.

In summary, the key objectives to be adopted by the project team with respect to the CTMP are to:

- Keep traffic delays to a minimum;
- Minimise disruption to businesses;
- Comply with MCoA and RMS's SoC;
- Maintain satisfactory property access;
- Minimise disturbance to the environment;
- Traffic impacts are within the scope permitted by the Planning Approval;
- Ensure the safety of employees, contractors, the general public, Project Verifier (PV) and RMS personnel, pedestrians, cyclists and traffic;
- When required, obtain approvals and licenses such as Speed Zoning Authorisations (SZA);
- Design temporary roadways and detours in accordance with RMS Road Design Guide, Traffic Control at Worksites Manual and RMS specification D&C G10; and
- Meet the requirements of SWTC, project specific Specification RMS D&C G10 Traffic Management, and the RMS Traffic Control at Works Sites Manual (TCaWS).

Progress against the nominated objectives will be continually assessed during the course of the project.

The delivery of the objectives for this project is the responsibility of the Project Director or nominee, as detailed in the Duties and Responsibilities section of this Plan.

The Key Review Areas (KRA) associated with the traffic management is summarised in the following table:

Table 2: Key Performance Areas

KRA	Target	KPI
<b>Traffic Operations</b>	<ul style="list-style-type: none"> <li>No unplanned impact on traffic flow due to works</li> <li>Average travel times are maintained during peak periods</li> <li>Provide a safe environment for road users and workers</li> <li>Ensure impacts on road users are kept to a minimum</li> <li>Ensure road users and the community are regularly informed about traffic changes</li> </ul>	<ul style="list-style-type: none"> <li>Number of Community complaints</li> <li>Record of internal and external traffic incidents</li> <li>Travel time as nominated in schedule 31 of Project Deed</li> <li>Traffic Scores as nominated in schedule 31 of Project Deed</li> </ul>

## 5. Traffic Management Responsibilities

The project team is responsible for all construction activities, including the implementation and maintenance of the various temporary traffic management arrangements and have the qualifications depicted under 'Traffic Controllers' of this Plan.

Fulton Hogan's initial Project Team organisational structure is appended to the Project Management Plan (PMP) and overall roles and responsibilities are outlined in both PMP and the CEMP. Specific responsibilities for the implementation of construction traffic management are detailed below. In addition, at least one of the site personnel is required to carry an Orange (Design and Inspect) licence for TCP.

### Project Director

- Ensures the Project's road safety and traffic management objectives are achieved;
- Ensures that all the incidents caused by site activity, and incidents on public roadway that are unrelated to the construction activity are reported to RMS; and
- Co-ordinating incidents to RMS Incident Manager for Southern Region and Police.

### Project/Construction/Engineering Managers

The Project Managers are responsible for ensuring traffic management:

- Is properly planned, organised, directed and controlled;
- Is properly resourced with people, equipment, facilities and systems;
- Meets the requirements of the contract including the Project Deed, SWTC and RMS Specifications D&C G10;
- Complies with all other legislation; and
- Is achieving its objectives.

**Project Superintendents**

- Co-ordinates the field resources;
- Supports the delivery of the road safety and traffic management objectives;
- Assists with the implementation of the CTMP
- Provides direction and support to enable effective planning of temporary traffic management arrangements;
- Ensures all field team members receive the appropriate training; and
- Managing all Emergency Controls as depicted in Incidents and Emergency Response Plan.

**Traffic Manager**

The nominated Traffic Manager will be required to have, as a minimum, RMS' Select/Modify Traffic Control Plan (Red Card) qualifications and will be required to have the delegated authority from, and responsibility to, the Project Managers for continuously monitoring the implementation and operation of all road occupancies to ensure that they are compliant with the ROLs, TCPs, VMPs, etc., including, but not limited to:

- Monitoring and quantifying the durations of delays to the free flow of traffic;
- Monitoring, measuring and recording traffic queue lengths, including the maximum traffic queue lengths in each direction and the total occupancy or stoppage time;
- Maintaining and adjusting traffic control measures and devices to assist prevailing traffic flows, minimise lane and shoulder occupancies and any lost traffic flow capacity and minimise traffic flow delay durations and queuing;
- Monitoring of over-dimension heavy vehicle movements;
- Prepare and keep records of all road occupancies and records of all traffic flow delays and durations, traffic queue lengths and other ROL related matters and submit a report including copies of those records to RMS by 9.00am on the Thursday following the week being recorded;
- The selection of any Traffic Control subcontractors;
- Ensuring that processes and control systems needed are established, implemented and maintained;
- Approving TCPs (where required) for individual tasks including those of subcontractors;
- Arranging and approving training;
- Ensuring that the requirements of all the plans are properly implemented;
- Regularly reviewing the continuing suitability, adequacy, and effectiveness, of all the plans;
- Preparing and submitting Hold Point Forms, SZAs, applications and Directions to Restrict applications 10 working days before the works are scheduled to begin;
- Allocation of all resources required for the implementation of all the plans;
- Ensuring that control measures are maintained and that work-in-progress is inspected



- Identifying training needs and arranging for employees and subcontractors to attend the training;
- Ensuring subcontractors/suppliers have suitable qualifications and experience;
- Carrying out and recording weekly inspections and verifications to demonstrate compliance;
- Facilitating traffic awareness and giving toolbox talks to the site; and
- Reporting traffic incidents to the Project Director.

The Traffic Manager (or the delegates in his absence) will be contactable at all times (7 days per week and 24 hrs. per day) during the construction phase of the works to receive and answer traffic/incident related inquiries from RMS and the Police. Site Emergency contact list shall be located in the Fulton Hogan Incident and Emergency Response Plan that will be displayed in the site office and the crib room. Refer to the Incident and Emergency Response Plan for details concerning the managing of incidents and emergencies on the project.

The Traffic manager will have the authority to stop work on any activity if it is considered to be necessary to prevent traffic incidents, or to comply with the directions of RMS or Police.

### **Traffic Coordinator**

The Traffic Engineer will be required to be qualified to the “Traffic Control Worksite Manual” course (i.e. holds a current Select /Modify Traffic Control Plans) and will have delegated authority from, and responsibility to, the Traffic Manager for:

- Implementing the Traffic Management Plan and the TCPs on site
- Maintaining the TCPs
- Assessing and monitoring subcontractor’s capabilities and performance in respect of site activities
- Ensuring the safe passage of traffic at all times
- Ensuring everyone on site is inducted and wears the appropriate approved clothing
- Driving through the site to inspect the traffic control layout, recording any deficiencies and the action taken to rectify them
- Report incident including public roadway that are unrelated to the construction activity, near misses to Traffic Manager/ WHS Manager.

### **Engineers Responsible for the Work Activity**

- Assist in the delivery of the road safety and traffic management objectives outlined in the Plan;
- Plan all work activities and identify the required traffic management arrangements to facilitate the works;
- Liaise with the Traffic Crews in the planning and implementation of the required traffic management arrangements;
- Prepare TCPs to facilitate the works and obtains approval from the Traffic Manager;

- Conduct regular inspections (including pre-starts) of traffic controls and VMPs and, where necessary, instruct the rectification of deficiencies;
- Allocate plant, equipment and human resources for the works including the provision of the temporary traffic control arrangements; and
- Conduct and keep records of daily and weekly (day and night) inspections of the traffic control arrangements, assist audits and, where necessary, rectify deficiencies.

**Foreman**

- Ensure compliance to the approved TCPs;
- Issues the required TCPs and, where relevant, road occupancy approvals and speed zone authorisations to the traffic control crew / or subcontractor;
- Ensures adequate plant, equipment and human resources are made available for the installation and maintenance of temporary control devices;
- Conducts pre-start inspections and regular night / weekly inspections of traffic control arrangements, and ensure all deficiencies are rectified;
- Assist with the implementation of mitigation measures to address unsafe road conditions, and unusual traffic congestion;
- Assist with the management of unplanned incidents, providing initial response to make the site safe; and
- Records unplanned incident details, and when traffic controls are in operation, including the installation and removal of regulatory signage.

**Functional Personnel**

- Functional personnel provide support for all construction activities and their traffic management related responsibilities are described above; and
- WHS team is responsible for managing haulage routes in compliance with WHS Management Plan.

**Community Relations Manager**

- Liaises with the community for all aspects of community and stakeholder issues;
- Represents the Project for all community and stakeholders issues;
- Conducts consultation with stakeholders for traffic planning, and provides an on-going liaison role;
- Prepares and distributes changed traffic condition information to the community; and
- Community relations including addressing complaints.



## 6. Time Management

Fulton Hogan aims to meet its time related obligations. Among them are:

- Submitting CTMP 60 days from date of the Project Deed or 4 weeks prior to the proposed commencement date for construction which affects traffic conditions;
- Submitting TCPs and VMPs at least 10 business days prior to its proposed use;
- Submitting ROLs at least 10 business days prior to its proposed use;
- Notifying a day prior to opening temporary roadways and detours to traffic;
- Allowing 2 days after opening a temporary roadways or detour to traffic prior to disturbing sections of the existing roadway being placed to provide for the event where failure of the temporary roadway or detour occurs and there is a need to direct traffic back onto the existing roadway;
- Conduct a Road Safety Audit within 24 hours of opening temporary roadways or detours.
- Submitting Road Safety Audit Reports within 7 days of implementation of the TCPs;
- Notifying emergency services and relevant sections of the community and transport industry of work which results in significant traffic disruption. Provide to the RMS a draft of an appropriate advertisement 3 weeks before the proposed placement of the advertisement;
- Notifying residents and businesses affected by disruption to property access or by night works in built-up areas. A letter will:
  - be “letter-box-dropped” at least three Business Days before the proposed date
  - detail the dates and times of the proposed access restrictions and contact details
- Performing work and Services only in the times permitted; and
- Lodging early as possible (at worst no less than 10 Business Days before the work) a road occupancy application. Noting, however, the exemptions for emergencies and hazards;

The above mentioned community notification is required to be done in accordance to the Community Communications Strategy (CCS).

## 7. Traffic Staging

Traffic Management and Safety issues on FBB are diverse as the area incorporates varied traffic flow arrangements and capacities through rural and urban environments in particular to construction heavy vehicle traffic impacts depicted under appendix E of this Plan.

The Project has been divided into three zones, each of which has typical and also specific issues due to:

- The type of works required in relation to the proximity of the existing highway;
- The vicinity of local residents / business;
- The varied traffic; and

- Flows in and around each area.

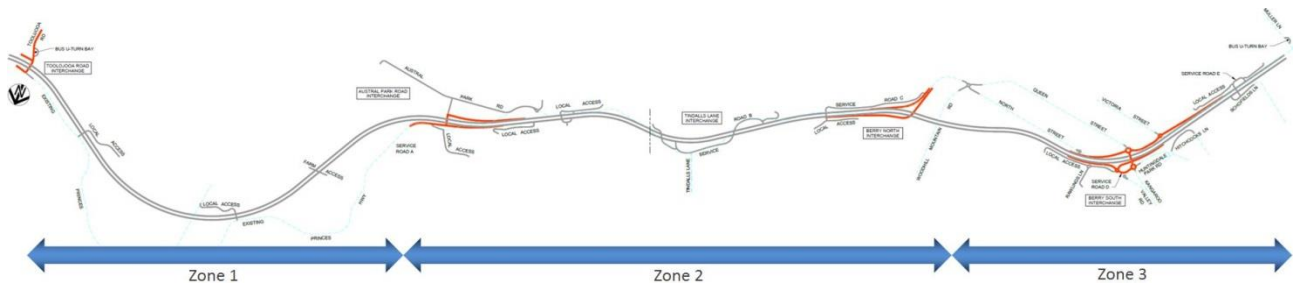


Figure 1: Construction zones – for illustration purposes only, refer to construction staging design package for details

The details of each zone are summarised in Appendixes B and C of this Plan.

### Staging Strategy

Initial traffic staging plans (series TS-01) submitted during the tender stage of FBB project will be further developed and issued as part of the design packages. These indicate the general staging methodology across the Project, detailing the location and timing of construction works in any given stage. These plans also show traffic flow locations and any temporary pavement works required to ensure sufficient separation is achieved between construction areas and live traffic.

These Traffic Staging Plans will be revised/prepared in accordance with clause 2.6 of Specification RMS D&C G10 and there will be a series of TCP to be implemented that are associated with each Traffic Staging Plan in order to safely progress each stage of the works as outlined in this Plan.

For each zone of the FBB Project, safety will be considered based on the specific nature of the works in particular to the risks associated to existing environment under appendix D of this Plan, the impacts of construction vehicular traffic depicted under appendix E of this plan and the general vehicle movements for construction sites and site compounds as depicted under section 9.3 of this Plan. Fulton Hogan will provide the skills and resources required to minimise the overall effect of the works on road users and the public to keep safety at front of mind. This will be done through strategic planning and implementation of sound construction and staging techniques that will always consider the impact and safety of road users and the public.

Measures that Fulton Hogan will use to deliver public safety include:

- Providing separation between the public and the works. This is a key element to providing safety to road users and the construction team. This will be done through the use of barriers, haul roads, side tracks, staging works and roadside furniture such as approved safety barriers to provide sufficient separation and safety measures to minimise the impact of the works. Predominant methods in each specific zone include:
  - **Zone 1** - Separation will be achieved through implementing an effective internal haul road system, including temporary creek crossings, in the Broughton Creek flood plain, south of Toolijooa Ridge. This will facilitate earthworks operations and construction of the underpasses in this zone. The

on-site haul road will largely eliminate earthworks construction vehicles from the existing road network;

- **Zone 2** - Separation will be achieved through a number of side tracks and temporary widening of the existing highway to allow construction of the northbound carriageway to minimise disruption to traffic. Once this is completed, traffic will be switched onto the new northbound carriageway, in contraflow, and the southbound portion of the works will be completed; and
  - **Zone 3** - The critical areas are around the Kangaroo Valley Interchange where a temporary pavement will be constructed around the works catering for vehicular, cyclist and pedestrian access. Temporary pavement widening around the Schofields Lane Interchange will be constructed in order to shift traffic and construct the main alignment through contraflow.
- Implementing specific traffic management measures only where absolutely necessary to reduce traffic speed, volumes and alignment to provide safety to both construction crews and the public;
  - Limiting the working hours of works that could pose substantial impact on road users and the public;
  - Minimising disruption during peak traffic periods, public holiday weekends and school holidays by limiting the extent of traffic management undertaken during these times;
  - Providing and maintaining public access to affected properties, farms and agricultural crossings/tracks, and recreational areas such as Broughton Creek. VMPs will be developed for specific areas that require work access restrictions to maintain public access. Fulton Hogan's community team will be overall responsible for discussions with these affected parties to determine what measures will be put in place;
  - Design the works to minimise the number of construction site entry and exit points and provide traffic control to avoid traffic conflicts and minimise delays;
  - Implementation of visual barriers to reduce potential distraction of road users;
  - Community consultation and notification to keep road users and the public up to date regarding traffic management measures or restrictions; and
  - Avoid the hazardous movements as depicted under Managing Construction Vehicular Movements of this Plan.

### Construction Traffic Routes

Proposed traffic routes for construction vehicles during construction taking into account the impacts of construction traffic depicted under appendix E of this plan will vary during the life of the Project. As haul roads become established, usage of the existing highway by heavy vehicles will be reduced across the alignment pending the position of site access locations across each stage of the Project.

Delivery of materials and plant are expected to come from both north and south of the project extents. These heavy vehicle movements will make their way to the safest access gate location depending on their direction of travel and the respective delivery location. Access gate locations will be provided in locations that will provide the least disruption to road users and safe entry/exit movements.

Haul of material generated by earthworks during construction, including movements to and from processing areas, will be predominantly internal haul movements which will not disrupt the Princes Highway.

Where feasible, plan for using the cleared footprint adjacent to the Princes Highway along the section to be duplicated for construction traffic to minimise use of the existing road network by construction traffic.

Expected traffic volumes are addressed in the tables of Appendix-D of this Plan.

## 8. Construction Staging for Intersections

The Construction Staging for Intersections summarised in the appendix B and C of this Plan has been developed primarily based on the limitations inherent in the alignment design. Where potential options existed for staging of traffic, the following was considered in determining the preferred staging arrangements:

- Alignment, i.e. the relationship of in plan location of both the northbound and southbound carriageways to plan location of the existing pavement.
- Alignment i.e. the relationship in elevation at locations where traffic was planned to deviate from an existing pavement to a newly constructed pavement or vice versa.
- Location of services and potential relocation requirements
- Construction program
- Requirements for temporary works

This staging design will be further developed to ensure that it provides a safe environment for our workforce, the travelling public including cyclists and pedestrians during all stages of construction. This development will take into account the existence of established community provisions, such as public transport arrangements and any other requirements that are identified during the design and community consultation processes.

Fulton Hogan fully appreciates the complexity and sensitivity of any traffic management provision to the local residents and businesses, particularly at Croziers Rd and Jaspers Brush. The strategy and subsequent refinement of the traffic management plan will consider and address all matters concerning safety, risk, time delay and conversely the opportunity of early delivery of parts of the works to the benefit of road users.

Fulton Hogan have adopted the less disruptive construction staging and methodology at intersections by utilising temporary pavement extensively in order to minimise the number of traffic switches and ultimately providing the most cost effective and simple staging solution.

### Intersection Layouts and Capacities

The intersection layouts and capacities at intersections will be derived by the requirements of each construction stage of the Project. Staging at intersections incorporates temporary and permanent traffic switches to provide access for works required during each respective stage. These traffic switches will be at existing and new intersections at various times during the Project.

A summary of each intersection and its respective staging elements is Appendix-B of this Plan.

Intersections, in both temporary and permanent states, will be designed to ensure that capacities at each respective intersection will maintained as a minimum at the levels that existed at the original intersection prior to the commencement of construction, in accordance with the SWTC.

Preliminary traffic capacity analysis indicates the 100th highest hourly traffic volume (100HHV) for the opening year, 2017, on this section of the Princes Highway would be approximately 1091 vehicles/hour in each travel direction.

This is based on Table 9.10 of SWTC, Appendix 9, which indicates the future main carriageways would carry approximately 16,789 vehicles per day south of Berry in the opening year. Assuming a 50/50 directional split. There would be 8395 vehicles/day on each carriageway. Under the 100HHV conditions (i.e. 13% of the daily traffic volume), there would be approximately 1091 vehicles/hour in each direction.

The Figure below indicates that for a minimum gap ( $t_a$ ) requirement of 3 seconds, and a major stream flow of 1091 vehicle/hour/direction, the travel lanes would have capacity to absorb an additional 800 vehicles/hour. This is shown by point A in the following Figure.

These results indicate there will be ample spare capacity at temporary gates and intersections to absorb local traffic and construction vehicles. If for any reason this is not practical, then the a minimum gap ( $t_a$ ) requirement of 5 seconds will be considered.

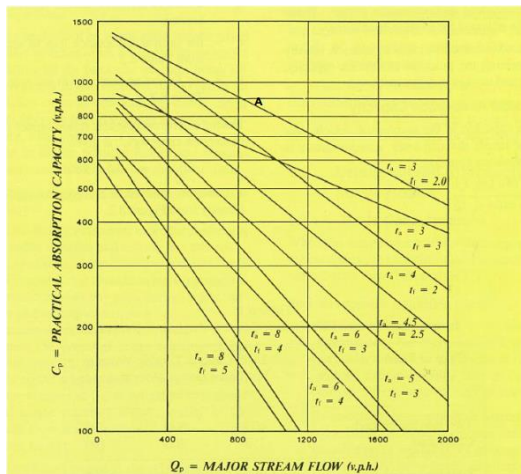


Figure 2: Practical Absorption Capacity for Major Streams at Un-signalised Intersections

The worst case movement at the temporary at-grade intersections is likely to be the right turn movement from side roads onto the Princes Highway. During detailed design, right and left turning traffic may be separated to maximise the intersection performance.

### Minimum Design Standards

Fulton Hogan will design both temporary and permanent intersections in accordance with the following as a minimum:

- The SWTC and its Appendices; and

- RMS Road Design Guide in accordance with RMS Specification G10.

### **Lighting Requirements at Intersections**

Permanent lighting at intersections has been assessed in accordance with Clause 5.19 of the SWTC. Based on this, intersections that will incorporate permanent design lighting are as follows:

- Berry South Interchange
  - Roundabout at Kangaroo Valley Road / Queen Street; and
  - Roundabout at Kangaroo Valley Road / Hitchcock's Lane;
- Roundabout at Rawlings Lane / Northbound Entry and Exit Ramps;
- Roundabout at Queen Street / Victoria Street / Southbound Entry Ramp;
- Roundabout at Woodhill Mountain Road / North Street / Princes Highway;
- Intersection of Toolijooa Road and the Northbound Entry Ramp;
- Intersection of Toolijooa Road and the Southbound Exit Ramp; and
- Intersection of Austral Park Road and the Northbound Entry Ramp / Service Road.

Generally existing lighting will be maintained until new lighting is installed and commissioned at each respective intersection; however where this is not possible or appropriate temporary lighting will be provided. During further development of traffic staging during Detailed Design, specific staging arrangements for each intersection will be developed which will provide substantial detail regarding lighting staging and will include:

- Sequencing of construction activities at the intersection;
- Details of traffic management requirements and techniques;
- Timing of new lighting installation during staging;
- Timing of commissioning new lighting;
- Any temporary lighting that may be required during staging; and
- Any potential impacts on traffic and the community.

## **9. Traffic Control Plans**

Fulton Hogan will implement approved Traffic Control measures for any works which disrupt free traffic movement in road related areas such as highway, local roads, car parks, driveways, pedestrian accesses/ facilities etc.

These measures will include Traffic Control Plans (TCP) and Vehicle Movement Plans (VMP) as required and will encompass vehicle movement and pedestrian movement for both construction resources and the general public. Any property accesses affected by the construction activities will also be identified on the TCPs.



TCPs for any activity associated with the Works, including the use of temporary warning signs, will be required to be developed on the basis of the following documents and in the order of hierarchy listed below:

1. RMS D&C G10
2. RMS Traffic Control at Worksites Manual
3. AS 1742.3 - 2002 "Traffic Control Devices for Works on Roads"
4. Construction Traffic Management Plan

TCPs must not be hand drawn and all text, dimensions and symbols must be clear and legible to the naked eye.

Property accesses, side roads and any special features affecting position of signs and devices must be shown on TCPs, as required.

TCPs must be designed and implemented to allow for and accommodate the passage of over-dimension heavy vehicles through all the road occupancies. The project team is required to liaise with the RMS to establish communication protocols for the passage of over-dimension heavy vehicles through all road occupancies.

For all planned and scheduled maintenance and other works under the contract; Fulton Hogan will prepare Traffic Control Plans as follows:

#### 9.1. For Works which are Accommodated by Standard TCPs

Fulton Hogan will use the standard TCPs that have been extracted from TCaWS. The standard TCPs will be examined for suitability; approved and signed by Traffic Manager or delegate, who holds the "Traffic Control Worksite Planning" qualification (i.e. holds a current RMS's Select/Modify Traffic Control Plans, the Red Card).

Fulton Hogan will not begin any works which will involve any obstruction to traffic until these TCP's have been approved by the RMS.

A Hold Point release will be submitted by Fulton Hogan in accordance with Clause 2.8.3 of Specification D&C G10 as follows:

Table 3: Hold Points – Standard TCP

Hold Point	
Process Held:	Works which would involve any obstruction to traffic
Submission Details	TCP as described above.
Release of Hold Point:	The RMS's approval of standard TCPs.

#### 9.2. For Works requiring a Non-Standard TCP

Non-Standard TCPs will be drawn and signed off by the Traffic Manager or a person employed by Fulton Hogan or engaged as a subcontractor. The person designing/drawing the TCPs must be qualified in the RMS "Design and Audit Traffic Control Plans" course (i.e. holds a current RMS's Design & Inspect Traffic Control Plans,

the Orange Card) and is experienced in the design and implementation of traffic management plans.

Work will not begin until the RMS has approved the non-standard TCP.

A hold point release form will be submitted by Fulton Hogan in accordance with Clause 2.8.3 of Specification D&C G10.

Table 4: Hold Points – Non-Standard TCP

Hold Point	
Process Held:	Works requiring a non-standard TCP.
Submission Details	Non-standard TCP as described above
Release of Hold Point:	The RMS's approval of Fulton Hogan's non-standard TCP

### 9.3. For Works requiring a VMP

Vehicle Movement Plans (VMPs) will be developed to provide for traffic associated with the Works such as trucks delivering materials and equipment and work supervisors' vehicles, to safely manoeuvre into and out of traffic streams, and turn at work areas, stockpile sites, local roads and turn around. VMP/s will also reflect the parking, turning areas and vehicle entry and exit points to the worksite and indicate clearly that these are the only points where interface with the road traffic is permitted.

VMPs may be prepared integrating into Traffic Staging Plans and Construction Staging Plans reflecting the work activity so that the intended purpose and objectives in the plan are met.

The VMPs will be updated throughout the Project. An example of the VMP from another project is provided below. The format of the VMP allows it to be easily understood for all that require information regarding site access. For example, if one were to require access into gate 19, a quick reference notes that this is a southbound, left in, left out access and to utilise UHF30 for entry contact. This VMP will be issued to the project team and as an instruction to all suppliers to ensure compliance by delivery drivers. Included in the VMP is a list of delivery protocols and contact details to ensure that all vehicle movements in and out of site are managed consistently and do not compromise the safety of the road user.



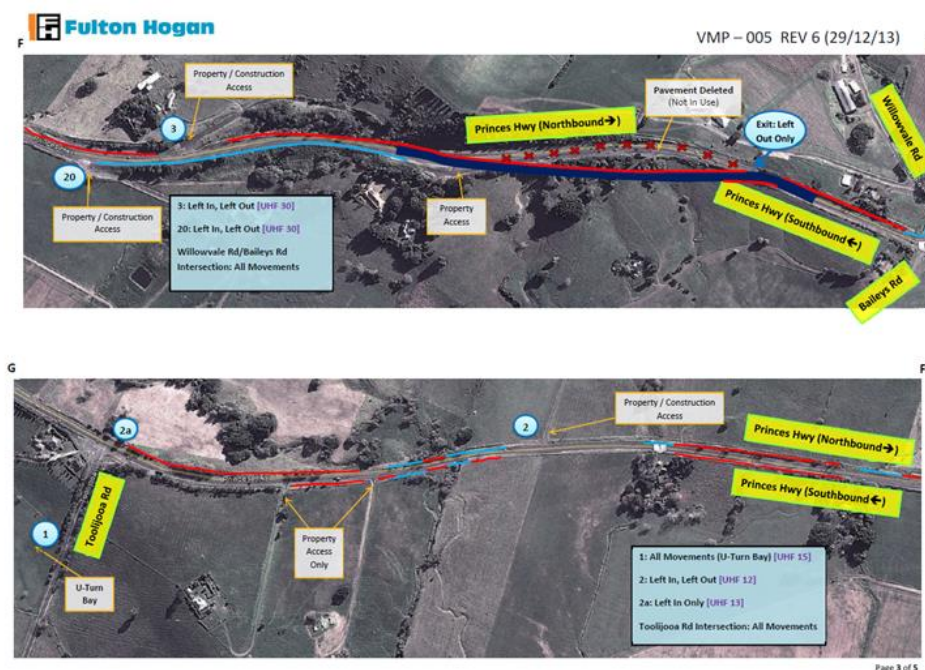


Figure 3: Sample VMP

VMPs will be prepared by a person who has qualified in the RMS “Design and Audit Traffic Control Plans” course (i.e. holds a current RMS’s Design & Inspect Traffic Control Plans) and is experienced in the design and implementation of traffic management plans.

Another Person with similar qualification should review and sign off the final VMP (i.e. VMPs should not be prepared and signed off by the same person).

VMPs are to allow for safe management of pedestrians, including the workforce via means of separation and segregation in particular in the areas where heavy vehicles operate as depicted under Key Traffic Management and Safety Issues section below. This will be a risk based approach and an example of the risk treatments options could be installing water filled barriers, safety barriers, witch’s hats, flagging or other treatments identified in the risk assessment to delineate the workers from plant giving the workers a reminder that heavy plant are nearby, or the treatments depicted under relevant Fulton Hogan procedures and site rules where workers are not allowed to approach the plant within (15/30 meters no-go zone) prior to making an eye contact with the relevant operator.

Considerations will also be given for displaying VMP information at access gates and site display boards and at appropriate heights for the drivers to view.

Work will not begin until the RMS has approved the VMP.

A Hold Point release form will be submitted by Fulton Hogan in accordance with Clause 2.8.3 of Specification D&C G10.

Table 5: Hold Points - VMP

Hold Point	
Process Held:	Works requiring a VMP.
Submission Details	VMP as described above.
Release of Hold Point:	The RMS's approval of Fulton Hogan's VMP.

#### 9.4. Modifications to TCPs and VMPs

Traffic control plans shall be regularly reviewed for their effectiveness, and shall be amended and recorded in traffic control register with revision and approval date:

- As and when deemed necessary to maintain or improve safety of the public and construction activities; including both vehicular and pedestrian movements;
- When there are programmed changes to the construction activities that will affect traffic movements on public roads; and
- When existing traffic control measures are required to be amended to improve traffic flow or to minimise the impact of construction traffic on road users.

Any modifications to approved TCPs and VMPs will require RMS approval through Hold Point approval process.

## 10. Key Traffic Management and Safety Issues

### 10.1. Safety and Amenity of Road Users and the Public

#### 10.1.1. General Road Users and the Public

For each zone of the Project, safety will be considered based on the specific nature of the works. Fulton Hogan will provide the skills and resources required to minimise the overall effect of the works on road users and the public to keep safety at front of mind. This will be done through strategic planning and implementation of sound construction techniques that will always consider the impact and safety of road users and the public.

Measures that Fulton Hogan will use to deliver public safety include:

- Providing separation between the public and the works. This is a key element to providing safety to road users and the construction team. This will be done through the use of barriers, haul roads, side tracks, staging works and roadside furniture such as approved safety barriers to provide sufficient separation and safety measures to minimise the impact of the works. Predominant methods in each specific zone include:
  - **Zone 1** - Separation will be achieved through implementing an effective internal haul road system, including temporary creek crossings, in the Broughton Creek flood plain, south of Toolijooa Ridge. This will facilitate earthworks operations and construction of the underpasses in this zone. The on-site haul road will largely eliminate earthworks construction vehicles from the existing road network;

- **Zone 2** - Separation will be achieved through a number of side tracks and temporary widening of the existing highway to allow construction of the northbound carriageway to minimise disruption to traffic. Once this is completed, traffic will be switched onto the new northbound carriageway, in contraflow, and the southbound portion of the works will be completed; and
  - **Zone 3** - The critical areas are around the Kangaroo Valley Interchange where a temporary pavement will be constructed around the works catering for vehicular, cyclist and pedestrian access. Temporary pavement widening around the Schofields Lane Interchange will be constructed in order to shift traffic and construct the main alignment through contraflow.
- Implementing specific traffic management measures only where absolutely necessary to reduce traffic speed, volumes and alignment to provide safety to both construction crews and the public;
  - Limiting the working hours of works that could pose substantial impact on road users and the public;
  - Minimising disruption during peak traffic periods, public holiday weekends and school holidays by limiting the extent of traffic management undertaken during these times;
  - Providing and maintaining public access to affected properties, farms and agricultural crossings/tracks, and recreational areas such as Broughton Creek. Construction Method Statements (CMS) and the VMP will be developed for specific areas that require work access restrictions to maintain public access. Fulton Hogan's community team will be overall responsible for discussions with these affected parties to determine what measures will be put in place;
  - Implementation of visual barriers to reduce potential distraction of road users; and
  - Community consultation and notification to keep road users and the public up to date regarding traffic management measures or restrictions.

The strategy and subsequent refinement of the Traffic Management Plan will consider and address the potential safety impact of construction works on the public. Fulton Hogan will manage these issues through planning, implementation and inspection of the works.

RMS's Representative may order removal, or cessation of any activity, which causes delay to traffic or threatens or threatens the safety of the public, notwithstanding that approval has been given to the traffic change.

A Traffic Steering Group will be established for the Project. It will consist of a spectrum of the Project management, engineering and workforce personnel. It will also incorporate representatives from RMS and the Project Verifier. This group will meet monthly to ensure all aspects of traffic management and safety are being addressed.

The Table under Key Issues of this Plan shows the risks to be dealt with during the design and construction stage of the Project that may affect safety:

#### 10.1.2. Pedestrians

##### Identifying Pedestrian Needs

When planning construction activities, the Project team will give consideration to the:

- Number of pedestrians;
- Type of pedestrian activity: whether office, retail, residential or recreational;
- Origin and destination points of the pedestrians, and their desired travel path;
- Needs of vulnerable pedestrians, such as young children, the elderly, vision impaired, disabled people, people with prams and trolleys; and
- Proximity of pedestrian generation developments, such as schools, shopping centres, railway stations, bus terminals.

Particular attention will be given to pedestrian movements in and around Kangaroo Valley Road and North Street in Zone 3 as these roads provide key residential links for pedestrians to and from local business and schools in Berry.

The AUSTROADS Guide to Road Design – Part 6A Pedestrian and cyclist paths provides guidance on the needs of pedestrians and the Project team will be required to adhere to these guidelines.

### **Defining Work Area**

To provide a safe environment for pedestrians, the Traffic Manager will clearly define the boundaries of all work areas, and provide defined walking paths, where required.

Fencing will be installed to restrict physical access to hazardous areas and for site security, which will be appropriately sign posted. Various types of temporary and semi-permanent fencing may be installed including plastic mesh; water filled plastic delineators, weldmesh pool fencing, chain wire mesh, and the like. All physical barriers must be maintained during the Project and appropriately secured to prevent injury to the public.

### **Providing Temporary Footpaths**

Where the work areas restrict access to existing footpaths, the Traffic Manager will be required to develop and implement alternative routes and facilities.

This will be initiated through community engagement to confirm any specific requirements or suggestions that they may have regarding any changes required.

Alternative routes may include using the opposite footpath or detours via other streets. Alternative facilities may include footpath protections such as barriers or a speed reduction to ensure adherence to minimum lateral clearances to traffic or provision of temporary footpaths through the work area.

All temporary footpaths will be required to be:

- Clearly defined;
- Signposted appropriately to indicate the direction of the footpath;
- Constructed of an all-weather surface, free of trip hazards;
- Designed to accommodate the type of pedestrians to be encountered within the area;
- Provided with pram ramps, hand rails and street lighting where required;

- The minimum width specified by the road authority; and
- Kept well maintained while in operation.

In locations where pedestrians are diverted onto the existing roadways adjacent to traffic flows, additional treatments will be required to be implemented by the Traffic Manager to ensure adequate safety separation is provided and that it is clearly delineated.

*The AUSTROADS Guide to Road Design – Part 6A Pedestrian and cyclist paths* provides guidance on the design parameters of footpaths.

RMS' requirements and specifications will be considered when designing alternative pedestrian footpaths and associated facilities.

A TCP/VMP will be developed by the Traffic Manager for any alterations to existing pedestrian footpaths.

### **Providing Pedestrian Crossings**

Where feasible, the Traffic Manager will aim to maintain all existing pedestrian crossing facilities. Where this cannot be achieved, alternative facilities that are a similar standard to the present facility will be provided.

Alternative facilities may include pedestrian refuges, marked foot crossings, pedestrian actuated traffic signals, temporary grade separated pedestrian bridges, and the like.

*The AUSTROADS Guide to Road Design – Part 6A Pedestrian and cyclist paths* provides guidance on the design parameters of pedestrian crossing facilities.

A TCP/VMP will be developed by the Traffic Manager for any alterations to existing pedestrian crossing facilities.

The Traffic Manager will obtain approval from the RMS prior to adjusting any existing pedestrian crossing facility or the implementation of any new temporary facility.

### **Providing Separation and Segregation**

Where possible, the VMPs are to allow for safe management of pedestrians, including the workforce via means of separation and segregation in particular in the areas where heavy vehicles operate as depicted in the Project WHS Management Plan.

#### **10.1.3. Cyclists**

##### **Considering Cyclists Needs**

Due to the beautiful scenery and environment in Berry and the Shoalhaven area, cycling is very common among recreational groups as well as daily commuters, tourists and school children. There are a number of cycling groups that Fulton Hogan will engage with during ongoing community consultation to ensure that the needs of cyclists are addressed and the impacts of the Project works minimised with respect to cyclist movements in the area. Provision will be made upon discussion with cycle groups, based on dates of cycle events, locations of mountain bike trails and the typical daily movements of cyclists.



When planning construction activities, the Project team will give consideration to the:

- Number of cyclists;
- Type of cycling activity: school children, recreational, commuter, utility, touring or sport training;
- Origin and destination points of the cyclists, and the connectivity of their routes;
- Needs of vulnerable cyclists, such as young children under 12 years;
- Proximity of cyclist generating developments, such as schools, universities, public transport terminals, shopping precincts etc.; and
- The travel speed of cyclists.

The AUSTROADS Guide to Road Design – Part 6A Pedestrian and cyclist paths and NSW Bicycle Guidelines provides guidance on the needs of cyclists and the Project team will adhere to these guidelines.

### **Defining Work Areas and Hazards**

To provide a safe environment for cyclists, the Project team will be required to clearly define the boundaries of all work areas, and implement measures to mitigate any hazards.

The speed of cyclists can be high, at around 50km/h on downhill grades, and many bicycles have no suspension. Any hazards, whether rough and loose surfaces, squeeze points, obstacles, low clearance heights and so on can be potentially dangerous.

Where possible, the Project team will be required to avoid introducing hazards into the travel path of cyclists. Where this is not feasible, appropriate physical barriers, treatments and or warning signs will be required to be implemented.

Fencing will be required to be installed by the Project team to restrict physical access to hazardous areas and for site security, which will be appropriately sign posted. Various types of temporary and semi-permanent fencing may be installed including plastic mesh, acceptable temporary barriers, chain wire mesh, and the like. All physical barriers must be maintained during the Project and appropriately secured to prevent injury to the public.

Crash testing of weldmesh fencing has shown it to be hazardous to vehicle occupants. Weldmesh fencing therefore should be avoided where such hazards exist.

In accordance to RMS's Engineering Technology's advice, water-filled barriers are not to be used in cases where crash-proofing is required.

### **Providing Temporary Cycle Paths**

Where work areas restrict access to cycle paths, the Project team may be required to implement alternative routes and facilities. Alternatives may include using, detours via other streets/cycle routes, or the provision of temporary cycle paths through the work area.

A risk assessment is required to be conducted if the alternatives routes direct cyclists to the other side of the road and introduce the need for bicycle crossovers as this could introduce more safety risks compared with keeping them on the same side of the road with less ideal facilities.

All temporary cycle paths will be required to be:

- Clearly defined;
- Signposted appropriately to indicate the direction of the cycle path;
- Constructed of an asphalt or concrete smooth surface equivalent to the section of path on each approach to the temporary path, free of loose materials and obstacles;
- Designed to accommodate the type of cyclists to be encountered along the route;
- Provided with ramps, holding rails and street lighting where required; and
- Kept well maintained while in operation

The design parameters for off-road cycle paths are specified in *AUSTROADS Guide to Road Design –Part 6A Pedestrian and cycle paths* and in NSW Bicycle Guidelines.

The provision of on-road cycle facilities requires careful assessment, and the following factors shall be considered by the Traffic Manager, as required:

- On-street parking conditions;
- Acceptable grades for bicycle path;
- Function of the shoulders as a breakdown lane;
- Travel speed of traffic;
- Traffic volumes;
- Bicycle volumes;
- Experience of the cyclists;
- Percentage of heavy vehicles;
- Carriageway, lane, and parking lane widths available; and
- The alignment of the road.

The *AUSTROADS Guide to Road Design – Part 6A Pedestrian and cyclist paths* provides guidance on the design parameters of on-road facilities.

A TCP/VMP is to be developed by the Project team for all alterations to existing cycle paths.

### **Providing Cycle Crossings**

Where feasible, the Project team will aim to maintain all existing cycle crossing facilities. Where this cannot be achieved, alternative facilities that are a similar standard to the present facility might be required to be provided. Should alternative facilities be required, the local community will be consulted to discuss the type and location of crossings to ensure it is fit for purpose. Following consultation, the wider community and local cycling

clubs/groups in Berry/Shoalhaven will be notified of any significant changes that may affect their routes.

Types of temporary crossing facilities may include general crossing treatments (Figure 6-29 AUSTROADS), refuge islands, controlled traffic signals and the like.

The *AUSTROADS Guide to Road Design – Part 6A Pedestrian and cyclist paths* and NSW Bicycle Guidelines provide guidance on the design parameters of cycle crossing facilities.

A TCP/VMP is to be developed by the Project team for all alterations to existing cycle crossing facilities.

The project team might also be required to obtain approval from the relevant road authority prior to adjusting any existing cycle facilities, or the implementation of any new temporary facilities.

#### 10.1.4. Public Transport

Berry and the surrounding area are serviced by:

- The South Coast railway line, with Berry station located at Railway Street;
- Shoal Bus, a private bus operator providing two local services, and two school bus services, routes and stops;
- Premier Motor Service, a private bus operator providing regional/interstate services and school bus services;
- Coach lines, taxi services and Scenic tour buses.

Fulton Hogan will liaise with public transport services throughout the project in accordance with the Community Communication Strategy to minimise potential impacts on these services.

It is noted that some bus services, including school buses currently stop at informal locations, such as local roads or property accesses will be reviewed to ensure safe alternative or temporary stop locations during each stage of the project. The locations of any alternative or temporary stop locations, including school bus stops, will be confirmed in conjunction with affected transport services and regular users.

It is to be noted that Rail Corporation of NSW closes the South Coast Rail Line for regular ongoing track maintenance. During these closures the Corporation transports passengers via road coach between Kiama and Bomaderry. The Project Team will be required to liaise directly with State Rail with a view to ensuring that impact to passenger service schedules are minimised.

Management of other potential impacts will be assessed on an ongoing basis in conjunction with affected stakeholders. Key consideration will be given to the effects of traffic switches as a result of the staging required for the Project.



#### 10.1.5. Road and Property Access

Fulton Hogan will ensure that property owners/users are able to carry on their normal activities as far as possible and that any disruption of access to and from those properties is minimised. While access disruptions or restrictions to affected properties are likely to occur at various times throughout the Project, Fulton Hogan, with RMS's approval, will minimise any disruption or restriction of property access by the following:

- Providing suitable alternative access as agreed with the property owners/users;
- Locating entries to properties as close as practicable to the existing entrance and in a location where minimal disruptions will occur;
- Assigning an interface engineer to property owners/users, with access to the Community Relations Manager;
- Signposting entries to any businesses where necessary;
- Planning and forecasting disruptions or restrictions well in advance, wherever possible, so that adequate notice can be given and early discussions can be held with property owners/ users;
- All planned disruptions or restrictions of access will be by agreement with and when convenient to the property owners/users; and
- Unplanned disruptions or restrictions of access will be minimised in frequency and duration. Fulton Hogan will maintain a strong and transparent focus on minimising unplanned disruptions or restrictions by monitoring and recording their frequency and impact, and reporting them in each monthly report.

It is not anticipated that any business access will be affected by the works, however should access restrictions apply to a local business, the minimisation of disruption techniques as described above will be utilised.

Where access is needed for Dilapidation Surveys, inspections will be conducted by agreement with the property owners. A detailed record (including dated photographs) of the preconstruction condition of the property will be documented and a copy will be provided to the property owners.

In addition, the project team will ensure that:

- Suitable access is maintained at all times to all properties and between severed portions of properties;
- Any traffic management measures implemented as part of the Works, including the installation of temporary signage that does not have any adverse impacts on property access;
- Farming and grazing activities are not adversely affected by the Works; and
- Appropriate detours are arranged and provided as required to maintain property access

The project team will comply with these requirements unless an approval otherwise is obtained from all persons having legal access to the affected property.

The project team will make all arrangements with all affected persons in relation to the impacts and consequences of the interruption of any services.

## 10.2. Road Construction Work Adjacent to Traffic

Where a temporary roadway or a detour is not provided or available, then subject to the approval of RMS, construction under or adjacent to traffic maybe permitted provided that:

- at least one 3.5m lane remains open to traffic on a two lane roadway (including to contraflow/reversible flow); and
- At least one 3.5m lane remain open in each direction on divided multi-lane roads.

Alternatively, subject to the approval of RMS, the lanes maybe linemarked to an acceptable reduced width.

Prior to cessation of work each day, the carriageway(s) are required to be restored to a safe and trafficable state for through traffic, unless otherwise stated in the approved TCP.

The requirement for managing construction works adjacent to traffic is summarised in a flow chart that is appended (Appendix-A) to this Plan

## 10.3. Site Security and Site Access

### Site Security

Site security, site access and signage will be managed through the implementation of this plan, WOHSMP and the VMPs covering the area in and around the work-site access points.

The location of rumble grids, wheel washes and other environmental protection measures shall be included in the VMPs and will be as determined by the requirements of the CEMP.

The VMPs will also provide details of the layout within the worksites and the site compound area including:

- The movement of construction and other vehicles within the work site and site compound area and the associated signage including off-road plant movements;
- Movement of vehicles on adjacent publically accessible roads e-g haulage of spoil from and excavation site, across the highway to a stockpile site;
- The location of and access to parking areas and the associated signage;
- Visitor parking areas;
- Pedestrian routes;
- Access paths to crib sheds, offices and the like;
- All associated signage; and
- Security point locations including boom-gates if required.

VMPs will be developed and updated throughout the Project to direct the construction personnel on how to safely manoeuvre around the site.

### Site Compound Traffic Management

The locations of site compounds along the project alignment are shown in Indicative Ancillary Facility Drawings as part of CEMP.

As each site compound has different requirements and expected vehicle capacities, the traffic management required will vary.

Traffic Management at these site compounds will be developed to accommodate expected vehicle movements required based on the location, requirements and layout of each respective compound. The requirements of each compound will be assessed on an ongoing basis due to the changing nature of the project, such as:

- Opening of haul routes causing reduction of traffic going to and coming from the existing Princes Highway alignment.
- Increasing number of workforces as the project works progress;
- Changing vehicle capacities during the project as different stages of the work site open up and have different vehicle movement requirements.

Where temporary works are required for safe ingress and egress within the compounds, they will be designed implemented to minimise effects on existing traffic flows (refer to Section 7.7 of this document for temporary interchange layouts).

Dedicated light vehicle and heavy vehicle turning areas will be developed and detailed with the Vehicle Movement Plan (refer to Section 7.4.2 of this document).

### **Site Access**

Site accesses will be constructed and maintained to ensure minimal impact on adjacent traffic on the Project. Typically accesses will allow for acceleration and deceleration lanes for construction vehicles and will be located in areas along the Upgrade alignment that provide sufficient sight distance.

Construction access arrangements have been developed and will be refined to ensure the safety of workers and road users for the duration of the Works. Access points have been developed to maintain efficient traffic flows on the existing road network.

The access strategy includes a gate at Woodhill Mountain Road to the south of Berry. Fulton Hogan will construct the permanent roundabout works at the intersection with the Princes Highway, North Street and Woodhill Mountain Road at the beginning of the construction period. This will assist traffic flow and movements in the area during the Works.

U-turn facilities will be provided at Toolijooa Road, Tindalls Lane and Mullers Lane, at the southern limit of the works, to assist the efficient movement of traffic.

A schedule outlining the construction access strategy, including gate locations and traffic movements, is presented in Table 2. The proposed strategy will be further assessed and refined in consultation with affected stakeholders and the Transport Management Centre for NSW (TMC).

Typical gate and intersection layouts have been provided in the Construction Staging Drawings. The details include indicative acceleration/deceleration lane lengths, lane widths and required lane markings.

Table 6: Construction Access Gates

Stage	Locations	Left in	Left out	Right in	Right out
<b>1A</b>	Toolijooa Road	X	X	X	
	Existing highway chainage 9900	X	X		
	Existing highway chainage 10100	X	X	X	X
	Existing highway chainage 12250	X	X	X	X
	Existing highway chainage 14610	X	X	X	X
	Existing highway chainage 15250	X	X		
	Woodhill Mountain / Berry Bridge	X	X	X	X
	Kangaroo Valley Road	X	X	X	
	Existing highway chainage 18450	X	X		
<b>1B</b>	Toolijooa Road	X	X	X	
	Existing highway chainage 10100	X	X	X	X
	Existing highway chainage 12250	X	X	X	X
	Existing highway chainage 12930	X	X		
	Existing highway chainage 13800	X	X	X	
	Existing highway – chainage 14610	X	X	X	X
	Existing highway (new side track) Chainage 15250	X	X	X	
	Woodhill Mountain / Berry Bridge	X	X	X	X
	Kangaroo Valley Road side track	X	X	X	
	Existing highway chainage 18450	X	X	X	X
	Existing highway chainage 18800	X	X	X	X
<b>1C</b>	Toolijooa Road	X	X	X	
	Existing highway chainage 10100	X	X	X	X
	Existing highway chainage 12250	X	X	X	X
	Existing highway chainage 12930	X	X		
	Existing highway chainage 13800	X	X	X	
	From newly constructed Tindalls on ramp at chainage 14560	X			
	chainage 15000	X	X		
	Service Road C/Princes Highway	X	X		

Stage	Locations	Left in	Left out	Right in	Right out
	Intersection				
	Woodhill Mountain / Berry Bridge	X	X	X	X
	North Street chainage 16800	X	X	X	
	Kangaroo Valley Road western roundabout	X	X	X	X
	Kangaroo Valley Road Eastern roundabout	X	X	X	X
	Chainage 18450	X	X	X	X
<b>2A</b>					
	Toolijooa Road	X	X	X	
	Existing highway chainage 10100	X	X	X	X
	chainage 12920	X	X		
	chainage 14160	X	X		
	chainage 15000	X	X		
	Woodhill Mountain / Berry Bridge	X	X	X	X
	North Street Chainage 16800	X	X	X	
	Kangaroo Valley Road western roundabout	X	X	X	X
	Chainage 18450	X	X	X	X
<b>2B</b>					
	Chainage 12250	X			
	Chainage 129200	X	X		
	Chainage 14160	X	X		

#### 10.4. Lighting

Lighting along live road alignments, affected by the Project works, will be maintained in its existing or final design arrangement at all times during the Project. Any changes to lighting resulting from works on the Project will be identified within the relevant TCP along with mitigation and contingency measures for maintaining sufficient lighting as required. Contingency for lighting of roadways may be provided through use of daymakers a temporary generator on existing lighting arrangements or through provision of daymakers where applicable.

### 11. Managing Construction Vehicular Movements

The effective management of construction vehicle movements on site and throughout the road network is critical to the success of all projects. The project team will plan all

construction vehicle movements with the aim to minimise the risk to other road users and keep the traffic generated by the project to minimum.

The project team will monitor the use of local roads by construction heavy vehicle traffic in consultation with the local Council, TMC-SR to develop measures for minimising and/or restricting use of local roads by heavy vehicle traffic as far as reasonable and practicable.

The types of construction vehicle movements may include:

- Deliveries of materials, supplies, plant or equipment to site;
- Transportation of over dimension loads;
- Haulage of materials on and off site associated with earthworks operations;
- Deliveries of concrete and AC bitumen from batching plants to pavers; and
- Regular trips by construction personnel in work trucks and utility vehicles.

The types of vehicles used on projects will vary depending on the type of infrastructure being constructed. Off road plant/vehicles may include: scrapers, dump trucks and all wheel drivers tippers. Whereas, the on road registered vehicles may include: 4wd utilities; single unit trucks with or without dog trailers; semi-trailers; B-Doubles; and over dimension floats/platforms etc.

### **Driver Responsibilities**

The project team will be required to ensure that drivers employed on the Project, whether direct employees or subcontractors, understand a responsibility to drive safely, in accordance with the NSW Road Rules and any other directives issued on the project and the company in particular to Fulton Hogan's [Safe Operation of Light Vehicle Standard](#).

Drivers must comply with the Vehicle Movement Plans (VMPs) developed for the project and special care must be taken when exiting and entering traffic flows.

### **Hazardous Movements**

When planning construction vehicle movements, the following movements are considered hazardous:-

- Entering and exiting work sites to and from adjacent travel lanes;
- U-turns movements across travel lanes and at median crossover points between dual carriageways;
- Reversing manoeuvres within the work area and in the adjacent travel lane;
- Travelling through the work area between construction personnel and hazards;
- The stopping of construction vehicles within the adjacent travel lanes; and
- Transit of trucks through school zones when the school zone periods are in effect.
- Right-turn movements to and from the Princes Highway
- Three-point turns for construction vehicles whilst on public roads.
- All entry and egress to construction sites/ gates not in a forward direction.
- Over-dimensioned vehicle movements
- Hazardous goods vehicles using unapproved routes

The project team will be required to apply controls and measures to mitigate the risk of these hazardous movements including, but not limited to:

- Restrict the practice of specific movements (e.g. turning bans);
- The provision of temporary traffic controls;
- The installation of deceleration, acceleration and turning lanes outside of the through lanes;
- Educating drivers; and
- Installation of warning devices on vehicles and the application of VMPs.

### **Planning Vehicle Movements**

Fulton Hogan acknowledges that attention must be given to the safe movement of construction vehicles when planning construction activities.

When planning construction vehicle movements the project team will be required to:

- Comply with all relevant environmental approvals;
- Minimise the number of vehicle movements by balancing earthworks and recycling excavated materials;
- Set-up depots and stock piles at locations that minimise travel distances and limit the number of movements (conflicts) with the highway traffic;
- Conduct a risk assessment to identify specific hazards and to facilitate the application mitigation measures;
- Promote safe driving principles;
- Develop on road haulage routes that not only provides an efficient operation but minimises the impact on the road network and local community;
- Where feasible, maximise haulage operations within the construction corridor;
- Analyse, assess and mitigate the impacts of the traffic generated by the construction works;
- Limit the number of access points and haul road crossings;
- Evaluate the need for temporary traffic control;
- Implement appropriate environmental controls;
- Plan on-site vehicle movements;
- Design and implement safe access points;
- Provide an efficient and well maintained vehicle fleet;
- Prepare VMPs for all construction vehicle movements;
- Determine the most appropriate hours of operation that shall minimise the impact on the road network and local communities;
- Minimise stopping and laying over of construction vehicles beside or on the roadway; and
- Avoid or minimise truck reversing and three-point turns on site

Guidance on planning for works traffic is provided in Sections 7 of the RMS's TCaWS Manual.

The VMPs will be required to show travel paths for trucks at key points on routes remote from the work site such as places to turn around, accesses, ramps and side roads. A



VMP may be combined with or superimposed on a TCP which can be either a written document or drawing.

The hours of operation for the movement of construction vehicles is required to be in accordance with the approved operating hours as stipulated under the relevant environmental approvals.

### **Haulage Routes On-Site**

Whilst driving on construction sites there are a number of hazards a driver may experience, including: rough surfaces; deep excavations; low clearance; other larger plant; steep embankments etc.

Of equal importance is the safety of those construction personnel working on foot within the construction site. The various risks for different types of construction activities and measures to mitigate these risks are detailed in Section 9 of RMS's TCaWS Manual as well as on the Workplace Risk Assessment (WRA) Register that is appended to the project WHS Management Plan.

The Project team lead by WHS Team will be required to ensure that

- A risk assessment is conducted for all work activities and vehicle movements;
- The nominated haulage route should be free of load/length/vertical clearance restriction as well as class-approved route;
- VMPs are developed for all vehicle movements;
- Regular toolbox meetings are held to discuss on-site vehicles movements;
- All plant are fitted with the appropriate flashing yellow lights, reversing alarms, horns and two-way radios;
- Access tracks are clearly defined and sign posted;
- Pedestrian tracks and crossing points are defined and clearly sign posted;
- Where possible, large plants, such as scrapers are separated from small plant items;
- Workers do not operate within 3 metres of moving plant;
- Spotters and Traffic Controllers are positioned when workers are operating in close proximity to access tracks and plant;
- Appropriate warning signs are installed on the approach to hazards;
- Where necessary appropriate temporary traffic controls are installed;
- Consideration is given to the installation of reduce on-site speed limits (i.e. maximum of 20km/h whilst passing workers on foot); and
- As necessary, delivery vehicles are to be escorted whilst proceeding on-site.

### **Haulage Routes on the Road Network**

The project team will be required to plan all vehicle movements to minimise the impact on the road network. Where possible, movements will be limited to the construction site, by fine tuning the alignment to achieve an earthworks balance and reusing materials generated by excavations to reduce the need for off-site transportation.

When on-road haulage operations are required; the project team will be required to:



- Conduct traffic analysis to determine the number of vehicle movements and assess the potential impact on the road network;
- Develop a route that maximises the use of the arterial roads and minimises the use of local roads;
- Assess the route and determines the potential impacts on existing developments/traffic facilities (such as school, shopping centres, intersections, LATM etc.);
- Select a route that has a minimal impact, and/or where the potential impacts can be effectively managed;
- As required, consult with Local Councils, RMS Vehicle Regulations, other road authorities and key stakeholders;
- Select haulage vehicles that can negotiate the route or can handle the nominated haulage vehicle;
- Where possible, avoid movements during peak periods;
- Develop a detailed VMP and toolbox all drivers;
- Ensure the fleet are regularly maintained;
- Operate a works crew to assist with vehicle breakdowns and to clean up spills (only be applicable to spills within the works areas or ones caused by construction-related traffic. The spills that occur in the public space come under the RMS Incident Manager's jurisdiction as an unplanned incident);
- Develop contact lists for heavy tow operators; and
- For major operations engage a haulage coordinator.

### **Construction Access Points**

The most hazardous movement for construction vehicles occur when the vehicle is entering or exiting the construction site to and from the adjacent travel lane. The risk is increased on high speed high volume roads where existing access points are limited, as drivers do not expect vehicles to be turning from or entering the traffic flows.

When planning construction access points the project team will be required to:

- Where feasible, utilise local road junctions to access construction work areas;
- Keep the number of access points to an absolute minimum;
- Ensure the new construction access points do not adversely impact on any existing intersections, traffic facilities or traffic generating developments;
- Only install access points that have adequate sight distance (example Safe Intersection Site Distance of 250 @ 100KM/H);
- Design all access points in accordance with AUSTROADS Part 5 and relevant state design standards;
- Ensure the junction configuration has sufficient capacity to accommodate the traffic generated by the construction site;
- The access is designed to accommodate the turning movements of the largest vehicles that will be accessing the site;
- The junction maximises rear end protection for vehicles turning right into the access;
- On high speed roads appropriate acceleration and deceleration lanes are provided;

- Where installed, security fences and gates are indented to enable vehicles to park clear of the adjacent travel lanes;
- Access junction must be constructed of a suitable all weather surface that prevents debris from being tracked onto the adjacent travel lanes;
- Ensure all access points are clearly visible to approaching traffic and signposted accordingly;
- Implement signposting in accordance with the standard TCP 195 from the Traffic Control at Worksites Manual; and
- Accesses should be free of obstructions to flow, such as security gates and parking areas. This is to prevent any queues spilling back onto the highway.

AUSTROADS Design Guide Part 4 – Intersections at Grade and Section 4 of the RMS's Road Design Guide provide guidance on the design of junctions and access points.

No matter the type of junction configuration implemented, temporary traffic controls may be required from time to time to facilitate short-term major haulage operations and the movement of over-dimension vehicles.

### **Traffic Controls**

The risk assessment, and/or VMP will identify those specific locations where temporary traffic controls will be required to mitigate a particular hazardous movement.

The type of temporary traffic controls to be installed by the project team may include:

- Truck turning ahead signs in advance of access points must be accordance with standard TCP195 from the Traffic Control at Worksites Manual;
- Reduce speed zones on the approaches to access points and turning locations must be accordance with standard TCP 57 from the Traffic Control at Worksites Manual;
- Traffic Controllers at access points to facilitate entry and exit movements;
- Road shoulder closures to provide deceleration and acceleration lanes; and
- Closure of slow and fast lanes on dual carriageways to provide deceleration and acceleration lanes.

In addition, all access points will have a unique identification number that will be sign posted on the approaches and at the access.

A TCP/VMP will be required to be developed for all sign posting schemes.

### **Environmental Controls**

The project team will be required to implement various environmental controls and measures for the haulage operations to mitigate the impacts on surrounding haulage routes on the road network.

Measures to be applied shall include:

- The compulsory covering of all loads prior to leaving the site;
- Provision of suitable wheel cleaning facilities at major access points, if required;

- Dust suppression measures conducted regularly at loading/unloading areas and along the routes;
- Haulage vehicle noise and pollution emission will be monitored to ensure they are in compliant with the vehicles manufacture's specifications;
- Clean-up crews, including street sweepers, will be available to manage material spills; and
- All materials will be managed in strict accordance of the Meeting MCoA and any subsequent approvals.

Further, environmental controls will be outlined in the CEMP and related Sub-Plans.

### **Monitoring**

During haulage operations regular monitoring will be required to be carried-out along the various haulage routes to ensure that:

- Operations are complying with the MCoA and the requirements of the EMP;
- Haulage vehicles are only travelling along those routes that have been agreed for use with road authorities;
- Haulage operations are not causing increased traffic congestion throughout the road network;
- The VMPs are being applied and complied with;
- Damage to pavements and traffic facilities are reported and rectified;
- Haulage vehicles are fitted with appropriate warning devices;
- All required TCP are installed; and
- The required vehicle and access point environmental controls are applied.

The monitoring of local roads will be conducted in consultation with the Kiama Municipal Council and Shoalhaven City Council.

The Site Foreman will be required to continuously observe the existing queues of trucks to quantify if the haulage traffic is contributing to congestion or not.

## **12. Traffic and Road User Delay Management**

### **12.1. General Protocols**

Fulton Hogan will require the Project team not to delay the free flow of traffic in any direction:

- At any single road occupancy for a duration of longer than 5 minutes; and
- Cumulatively due to all road occupancies between Belinda Street, Gerringong and Croziers Road, Jaspers Brush for longer than seven minutes.

Further to the above mentioned requirement, traffic queues caused by road occupancies, measured along a single lane in any direction are required not to exceed 250m in length. If traffic queues reach 250m in length, the responsible traffic controller will be required to remove the cause of the delay until the flow of traffic returns to free flow conditions.

For the purpose of this plan, a traffic queue means the situation where the traffic is backed up on a roadway either stationary or moving at a rate much slower than the designated posted traffic speed limit signags.

Fulton Hogan acknowledges that maintaining the Level of Service (LOS) of the road network and minimising the delays experienced by road users during the construction of any project is important. The various strategies and measures that can be applied to minimise road user delays can be done by applying the following.

### **Delay Minimisation Strategies**

The delay minimisation strategies to be applied by the project team will include:

- Minimising the impacts of each work area;
- Maximising the operating performance of the individual routes;
- Aim to maintain access; and
- Coordinating works at each work area to ensure road users do not encounter several delays in quick succession.

### **Implementing Measures**

Measures to minimise road user delays for the development of any major infrastructure project starts during the concept design phase and continues through to the opening and operation phase.

Fulton Hogan acknowledges there are various measures that can be applied to minimise road user delays, which are generally divided in four categories:

- Design;
- Isolation of work areas;
- Work methods; and
- Planning of lane closure / road occupancies.

Where practical, the Traffic Engineer will be required to apply the following measures:

- Ensure road user delays are given consideration during the concept design phase (i.e. develop alignments to avoid conflicts and potential impacts with the existing road network);
- Isolate work areas from traffic flows (e.g. using alternative routes, and temporary safety barriers);
- Develop alternative work methods to minimise impacts (e.g. utilise more efficient plant / equipment, apply different design solution, enclosed work platforms, time of day applications);
- Plan all lane closures / road occupancies with the aim to: minimise the actual work area, limit obstructions and restrictions, maximise the roads capacity, and avoid peak traffic flow periods;

- Analyse traffic volume data to: establish the capacity of the road, assess the potential impact on traffic flows and identify the best time to apply temporary traffic arrangements, so as to minimise the inconvenience to road users; and
- Provide road users with changed traffic condition information to enable them to plan their journey and avoid the roadwork.

## 12.2. For Works requiring a Road Occupancy Licence

A number of diversions/staging will require the shoulders and lanes on either the existing, temporary or new pavements of the Princes Highway and associated local roads to be closed in order to construct the works.

Where any work by the Project will or is likely to obstruct or have the effect of restricting, closing, interfering with or obstructing the free flow of traffic on any lane or shoulder of the existing Highway or local road, the Project Team will be required to lodge with RMS or the local council (in the case of local road closures and occupancies):

- An application in the form set out in Schedule 42 of the Project Deed for a Road Occupancy Licence (ROL), providing all relevant details of the proposed Work; and
- A TCP as required by SWTC, item 29(I) of Schedule 1.

The Traffic Manager will obtain the ROLs as part of the consultation with the RMS as the owner and will maintain records as required by Schedule 30 of the Project Deed.

It is to be noted that consent under Section 138 of the Roads Act will need to be obtained from Shoalhaven City Council and/or Kiama Municipal Council for any work proposed to be undertaken within the road reserve of local roads which Council is the road authority for. A single application detailing all affected roads will be sufficient – further information on this may be obtained through Council's Road Asset Manager.

An application and TCP will be required to be lodged no less than 10 business days prior to that date when the Project team intends to undertake the work, so as to allow RMS to review the application and TCP, issue a ROL and, where appropriate, make arrangements for implementation of the TCP.

The application to the RMS or Council will include:

- Submission of a completed road occupancy application form
- Brief details of the works to be conducted;
- Any relevant design drawings of the works;
- Program of the works;
- Copies of TCPs;
- If applicable, details of speed limit authorisation submission; and
- Contact details of a construction site representative.

The project team will consider traffic volumes during the period of the ROL that are likely to exceed the capacity of the subject road such as during holiday periods, during a

special event or during other periods of, or other circumstances which give rise to, increased traffic volumes, reduced traffic speeds or lowered capacity of the road.

ROL applications will be submitted to RMS for approval.

Work will not begin until the RMS has approved and issued the ROL/licence.

A copy of any ROL issued pursuant to the provisions of clause 5.14(e) of the Project Deed and including all terms, conditions and requirements will be available:

- At the location of the relevant road occupancy; and
- At all times when construction activities associated with the ROL are taking place.

Fulton Hogan must make a copy of ROL available to RMS, Police and Council.

When any unplanned closure of a lane or a restriction in the flow of traffic occurs on the existing Highway or on specified local roads, the Project will immediately advise RMS (via a phone call or an iTWOcx correspondence) of the nature of the closure or restriction and of the schedule for reopening of the lanes. The project team will take all required measures to open the lane as quickly as possible. If required, an Incident Report in accordance with the WHS Management Plan will be forwarded to RMS for information or concurrence.

### 12.3. Periods for Implementation of Road Occupancies

Road occupancies consisting of traffic lane occupancies or closures or which stop traffic must not be implemented on existing Highway, or temporary works being used by existing Highway, or any part of the new Works opened to traffic during the following periods:

- From 6.30am to 10.00am Monday to Friday; and
- From 3.00pm to 6.30pm Monday to Friday

Road occupancies must not be implemented during the following periods associated with school and public holidays:

- For any period commencing one working day prior to a NSW government gazetted public holiday and/or long weekend, and until the 2<sup>nd</sup> working day after the public holiday and/or long weekend;
- For any period commencing one working day prior to a NSW government gazetted school holiday, and until the 2<sup>nd</sup> working day after the completion of the school holiday period;

Notwithstanding the above, the Princes Highway must have at least one permanent lane in each direction being operational as depicted in Appendix 27 of SWTC:

- From 6:00am to 7:00am Monday to Friday;
- From 7.00am to 2.00pm Saturday;
- From 10:00am to 6:00pm Sunday; and
- For all other period during the NSW School holiday periods



However, work may be undertaken outside these hours where:

- The delivery of materials is required outside these hours by the Police or other authorities for safety reasons;
- It is required in an emergency to avoid the loss of lives, property and /or prevent environmental harm;
- The work can be undertaken in such a way that would be inaudible at sensitive receivers;
- If a temporary additional lane is provided in such a way that there is no net loss of capacity and the ROL is submitted and approved by RMS; and
- Restrictions stipulated by other authorities in road/rail corridors such as track procession allowances by rail asset owner/manager.

It's to be noted that the construction of the FBB will not commence in terms of physical roadworks until Jan 2015. The Gerringong Upgrade will be nearing completion by April 2015. The 2015 Easter period will be carefully planned to ensure total impacts are managed.

#### 12.4. Closure of Shoulders or Auxiliary Lanes

Road occupancies involving closure of any shoulder or auxiliary lane, where auxiliary lane(s) exist, must provide a minimum of one travel lane in each direction at all times through the road occupancy.

For partial closures of any length of auxiliary lanes; it may only be implemented if the remaining open length of the auxiliary lane is equal to or greater than 400m where the posted speed is 80km/h or more. If this open length cannot be achieved, the entire length of the auxiliary lane must be closed.

#### 12.5. Forecast of Proposed Road Occupancies

A weekly forecast of the proposed road occupancies for the following week will be provided to RMS by the Traffic Manager.

The forecast must be in the form of a schedule running from Monday to Sunday and contain full details on the locations, the features of the traffic control to be implemented and timing of all proposed road occupancies.

The Traffic Manager shall provide the forecast to RMS by 9.00am on the Thursday of the week proceeding the week being forecast.

#### 12.6. Temporary Speed Zones

Roadwork speed zones in road occupancies will be required to comply with section 8.2 of SWTC and section 5.6 of RMS' NSW Speed Zones Guidelines:

Temporary speed zones will be:

- 60km/h during standard working hours;

- The lesser of 80km/h or the existing speed limit on the Princes Highway when outside of working hours
- 40 km/hr. for emergency situations, installation of long-term traffic control devices when approved by ROL for use on local roads, and during approved night works and ROL conditions.

A 24 hour speed zones of 40 km/h for all construction vehicles is to be applied throughout the off line haulage roads at all times.

Whenever work is proceeding within 5m of vehicles associated with construction such as trucks, works supervisors vehicles traffic, speed zones of 20 km/h may be applied at the haulage roads. The exact locations of the restrictions are to be included in TCPs. If it is on a public road, then there will also be a need for a Speed Zoning Authorisation (SZA).

The requirement is further addressed under the WHS Management Plan.

Copies of SZAs applicable to any road occupancies will be required to be available at the road occupancies for the duration of the road occupancies.

## 12.7. Speed Limit

Where a TCP, either short term or long term, major or minor, requires a change in the posted speed limit, a formal direction from the RMS will be required (including restoring the existing speed limit on completion). This will be requested as part of the SZA application submitted to the RMS, which is an extension to ROL.

This issue requires the Project team to manage the speed of traffic approaching and passing through a work site and address the varying of speed limit signage through construction speed limit signs.

Existing speed limits can be varied through the authorisation of a SZA by RMS.

The issue of speed limit signage will be managed through the implementation of the Traffic Staging Plans and their associated TCPs.

### 12.7.1. Determining the Need for a Roadwork Speed Zone

A reduced roadwork speed zone must only be implemented where it is warranted.

The Traffic Manager will assess whether roadwork speed zones are necessary to assist in controlling vehicle speeds in circumstances that may include:

- Traffic travelling directly through a work site;
- Workers placed in danger by the high speed or speeding traffic; reference to Traffic Control at Worksites Manual Section 8;
- Reduction in visibility via smoke, dust, fog or poor weather conditions;
- Unusual road conditions such as:
  - Loose material on the road surface;
  - Road geometry limitations;
  - Urgent or imperative construction activities adjacent to the travel lanes; and

- Crossover and temporary contra-flow diversions.

The project team will be required to address RMS' TCaWS Manual, NSW Speed Zoning Guidelines and Australian Standards 1742.3 to provide guidance with the selection and installation of roadwork speed zones. Specifically Section 8.2 of RMS' TCaWS Manual outlines: the general principles, what to consider when selecting the speed limit (40, 60 or 80 km/h), installation guidelines and regulatory issues.

#### 12.7.2. Submission of SZA Procedure

The project team will be required to apply for a SZA as described in RMS' Road Occupancy Manual. The manual contains a number of explanatory notes, checklists, and application forms. The documents applicable to this project include:

- SZA Application Explanatory Notes Form R
- SZA Application Form R which is attached as a knowledge resource to this Topic

When deemed necessary, the Traffic Manager will process a submission to the RMS in accordance with the ROL/SZA requirements. The SZA Application shall be forwarded to RMS' Regional Office in Wollongong (SR-TMC) for processing and approving the SZA within a period of up to 10 working days.

An approved copy of the SZA shall be forwarded to the local NSW Police Highway Patrol Office, and if necessary, to the Local Council. The project team will manage the records associated with the speed zone in accordance with Section 8.2.6 of RMS' TCaWS Manual.

#### 12.7.3. Extensions to SZA Period of Operation

The RMS limits the period of operation of a SZA from one month to six months. To obtain extensions, the Traffic Manager will be required to re-submit a SZA submission.

If there are no amendments, other than dates, to the original submission, the Traffic Manager will be required to submit a completed SZA Application Form R with a copy of original TCP, quoting the previous SZA number, otherwise a new SZA submission will need to be prepared and submitted.

It is the responsibility of the Traffic Manager or delegate to ensure the validity of each approved SZA, thus regular monitoring of SZA expiry dates is essential. The Traffic Manager will be required to maintain an ROL database, which will contain details of SZA including daily records of signs that were in place each day condition of the signs etc. to assist with this process.

Considerations maybe required to be given to Police Enforcement Bays so that mobile enforcement of roadwork speed limits can be carried out safely.

### 12.8. Traffic Switching Arrangements and Procedure

#### 12.8.1. General

Traffic switches will be required to be carried out during the staged delivery of the Princes Highway upgrade and local road upgrade components of the Project. Multiple

traffic switches will be required across the Project with varying impacts on the through traffic, local traffic, public transport, school buses, bicyclists and pedestrians.

The Project team will develop and implement a procedure for managing traffic switches in compliance with the Project Deed and the local authority requirements (i.e. Local Councils).

Specific Traffic Staging Plans and accompanying TCPs will be required to be developed for each traffic switch. In doing so, the Project team will:

- Comply with RMS Specification D&C G10 and the SWTC to ensure that the design of any temporary works associated with the traffic switch provides a satisfactory:
  - Temporary pavement design;
  - Vertical profile;
  - Horizontal alignment;
  - Sight distances;
  - Lane and shoulder widths.
  - Minimum qualification of the designer, and
- Comply with the Australian Standard 1742 and AUSTROADS Guide to Traffic Engineering Practice to ensure the temporary traffic control devices used are appropriate for the traffic switch;
- Ensure the road lane capacity is not impacted where-ever practicable;
- Obtain all necessary RMS and local council approvals;
- Inform the public through the processes described in the Community Communications Strategy;
- Program and resource the traffic switch event to the satisfaction of the RMS and local authorities ensuring adequate:
  - Labour;
  - Plant;
  - Traffic control devices;
  - Traffic barriers;
  - Asphalt milling and re-sheeting resources; and
  - Traffic controllers;
- Tool-box the traffic switch with all staff, labour and subcontract resources to ensure a clear understanding of individual and team responsibilities during the day/night of the traffic switch;
- Brief the emergency services agencies about the proposed traffic switch, including the police, ambulance, fire brigade, rural fire brigade, bus operators and any affected service authorities;
- Make due allowance for the impact of holidays and other peak traffic events;

- Inspecting all pavement markings, signposting and safety barriers that they have been installed before opening temporary roadways to traffic by an Orange Card holder.
- Carry out an independent safety audit on the proposed traffic switch noting that all signposting, pavement marking, safety barriers and portable or temporary traffic signals must be completed before the opening of temporary roadways to traffic or after opening temporary roadway to traffic providing that its done within 24 hours after opening, the latter will benefit the auditor from seeing the switch in operation with traffic using it;
- Ensure sufficient resources are available to monitor the traffic after the traffic switch and to carry out minor adjustments;
- Inform the RMS of any circumstances that require modifications to the approved temporary traffic arrangement;
- Continue monitoring the new temporary traffic arrangement on a regular basis; and
- Unless otherwise approved by RMS, traffic shall be switched to a temporary roadway or detour only where the usual workforce will be on site for a minimum of two days thereafter.

#### 12.8.2. Temporary Roadways and Detours

##### **Designing Temporary Roadways and Detours**

Where temporary roadways and detours, or adjustments to existing lane configuration and geometry, are required as part of the traffic staging, they will be designed in accordance with the relevant design standards and in accordance to clause 2.7 of project specific RMS Specification D&C G10 and Traffic Control at Worksites Manual.

The road designer will be required to have at least 5 years' experience designing roads to RMS standards and must be engaged to prepare traffic staging road design drawings. The road designer is to provide a certificate that the traffic staging road designs comply with the relevant standards as depicted under relevant schedules under the Project Deed.

These design standards also apply where existing or unused roadways, including road shoulders, are proposed as temporary roadway.

##### **Constructing Temporary Roadways and Detours**

The construction of the temporary roadways and detours will be required to comply with the relevant RMS specification for the particular roadwork element.

##### **Opening Temporary Roadways and Detours to Traffic**

All works must be completed before opening the temporary roadways to traffic.

In addition, an inspection by a qualified Orange Card holder is required to be conducted to verify that regulatory signs, warning signs and traffic control devices have been suitably located to be visible and effective under the site conditions and expected traffic speeds before opening the temporary roadways to traffic.

Opening a temporary roadways and detours to traffic is subjected to a hold point release from the RMS in accordance with Clause 3.3 of project specific D&C G10 as follows:

Table 7: Hold Points

Hold Point	
Process Held:	Opening of temporary roadways and detours to traffic.
Submission Details	Notification that the works is conforming and ready for inspection (allow a day for this notification) by the RMS Representative.
Release of Hold Point:	The RMS Representative will undertake a joint inspection of the site for compliance with this specification prior to giving approval and authorising the release of the Hold point.

Unless otherwise approved by RMS, the project team will comply with the following:

- Traffic may only be switched to a temporary roadways or detour where the project team's usual workforce will be performing the works on site for a minimum of two successive days thereafter, and
- Sections of the existing roadway being placed is not disturbed for at least two days after opening a temporary roadways or detour to traffic, to provide for the event where failure of the temporary roadway or detour occurs and there is a need to direct traffic back onto the existing roadway.

### Auditing Temporary Roadways or Detours

A Road Safety Audit is required to be carried out, within 24 hours of opening temporary roadways or detours to traffic in order to inspect the traffic control measures during both day and night times.

The Road Safety Auditor must be independent and have as a minimum be certified to level 3 in the RMS Road Safety Auditor Register.

The road safety audit team should also include an orange card accredited TCP designer. If the original measures prove not to be fully effective, then in consultations with the Road Safety Auditor and RMS the TCPs are required to be revised without delay and appropriate measures are to be implemented.

A copy of the report from the Road Safety Auditor is required to be addressed to whichever party commissions it and submitted to the RMS within 7 days of implementation of the TCPs.

### Removing Temporary Roadways or Detours

Temporary traffic control arrangements will implemented with regard to:

- Suitability for purpose and compliance;
- The required duration for the use of temporary arrangements; and
- Removal methodology.

Upon completion of the Works, remove the temporary roadways and / or detour arrangements and restore the area to a condition equivalent to that which existed prior to the commencement of the work.



Where removal of pavement markings is required, the Traffic Staging Plans will provide details of the proposed methods for removal, the estimated durations to carry out the removal, and if necessary any proposed measures to restore the road surface.

The method of removal of redundant pavement markings from wearing surfaces, other than final wearing surfaces, will comply with the requirements of the TCaWS and the requirements of contract specification D&C R141. Removal of redundant linemarking within traffic lanes by covering with paint is not to be acceptable.

#### 12.8.3. Opening to Traffic upon Completion

All relevant permanent sign posting pavement markings, safety barriers and traffic signals required under the Project Deed is required to be in place prior to opening of any part of the Project Works to traffic.

All temporary traffic control devices no longer required for the safety of traffic, when any part of the Project Works is opened to traffic are also required to be removed or covered. At least 14 business day's written notice is to be given to RMS of the date of opening any part of the Works to traffic.

Consultations for opening traffic are to be carried out with RMS and the Police.

### 13. Proposed Changes to Traffic Flow Arrangements

#### 13.1. Traffic Flow Arrangements

Traffic flow arrangements will be generally based on the Traffic Staging Plans which will be further developed and refined during Detailed Design and construction workshops held by the Traffic Steering Group. During each traffic stage of the Project traffic arrangements will be reviewed to ensure that most current and relevant traffic information and trends are catered for and community feedback is considered.

No long term local road closures are anticipated in addition to local roads that will be permanently severed by the main alignment (such as North Street). However, it is anticipated that local roads will require periodic short term closures for the movement of construction materials or bridge elements, such as at Toolijooa Road. In these cases, closures of a few minutes or less will be locally managed by traffic control. Longer closures will require temporary diversions with appropriate community consultation and advanced notice to all relevant stakeholders.

#### 13.2. Temporary Works

In order to provide/maintain access arrangements during construction, temporary works will be required as the Project works progress. Temporary works will be undertaken where existing infrastructure does not provide sufficient capacity to allow for site access/egress. Typically any temporary works required for construction access will consist of works associated with constructing seagull and left in/left out layout intersections as shown in Figures below. Each construction access location as identified previously in a Table under Site Access will be further assessed during the Detailed

Design phase and during development of the VMP throughout the Project to establish what temporary works are required.

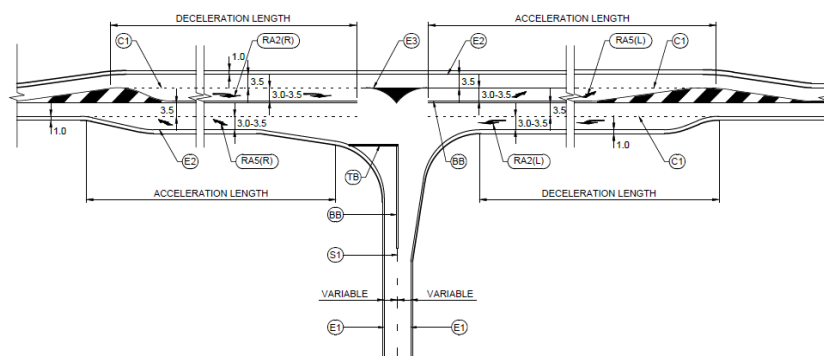


Figure 4: Typical Temporary Seagull Intersection Layout

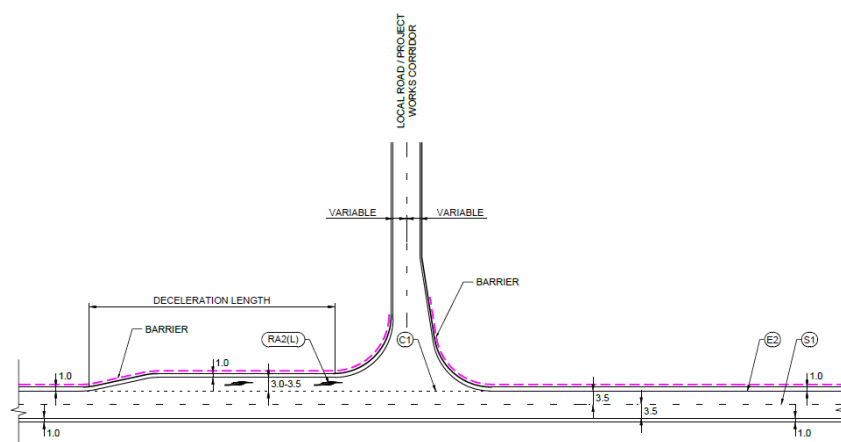


Figure 5: Typical Temporary Left In/Left Out Intersection Layout

### 13.3. Capacities

Fulton Hogan will aim to minimise the effect of the roadworks on existing road capacities through each traffic stage. This will be done through further development construction staging during detailed design that will ensure that the Project can be built safely whilst minimising adverse impact on the existing infrastructure in terms of traffic capacity and road user delays. The capacity of intersections will be maintained, as a minimum at the levels that existed at the original intersection prior to the commencement of construction, in accordance with the SWTC. Any works that may affect the capacity of the road network will be discussed with RMS and methods of minimising impacts will be addressed by the Traffic Steering Group.

#### The Sandtrack

The potential impacts on sandtrack will be monitored in consultation with the RMS, Kiama Municipal Council and Shoalhaven City Council in accordance to the details stipulated in Appendix B to D of this Plan. Evidence based mitigation measures will be carried out to address potential impacts on the 'Sandtrack', as directed by RMS.

### 13.4. Facilities on Existing, Local and Regional Roads

#### 13.4.1. Overtaking Lanes

Fulton Hogan will plan and develop its traffic staging and work sequences to provide minimal impact on existing overtaking lanes. This will be achieved by maintaining all existing overtaking lanes and only closing or restricting their use where absolutely necessary. Works that may require overtaking lane closures or restriction for any amount of time will be detailed within Traffic Control Plans that will be subject to approval by RMS and relevant Authorities. These requirements will be discussed during initial planning periods by the Traffic Steering Group to ensure that all key stakeholders are involved in the early in the process where construction methods may require traffic restrictions.

#### 13.4.2. Rest Areas

Existing rest areas will be assessed on a case by case basis during the Detailed Design period to determine methods of maintaining the existing rest area or relocating through temporary works. Where rest areas are determined to be maintained or relocated appropriate signage will be installed and maintained as required.

#### 13.4.3. Shoulders

Existing shoulders on local and regional roads will be maintained during the Works and only reduced or closed where an appropriate TCP and ROL has been submitted and approved for works that cannot be achieved without shoulder restriction. Where required, temporary shoulder adjustments could cause adverse effects for any particular reason, measures will be taken to review and provide the most practicable solution.

#### 13.4.4. Parking Areas

Parking areas will be maintained through the Works. Should there be a requirement to close, remove or relocate existing parking areas, Fulton Hogan will liaise with RMS, Council and any other applicable authorities/stakeholders. This is to ensure that any change in use of existing parking areas is agreed and the community is involved and notified of any changes as required.

#### 13.4.5. Breakdown Bays

Where a single carriageway of the main carriageways is utilised as a two way road for Princes Highway traffic as part of traffic staging and where the available shoulder width on the single carriageway is less than 3.0 metres, breakdown bays must be provided for each direction of traffic flow at a maximum spacing of one kilometre along the single carriageway.

Breakdown bays must as a minimum:

- Have a sealed surface
- Be a minimum 35 metres long and 3.5 metres wide, excluding shoulder
- Be signposted, including advance signage

For the avoidance of doubt:

- When a permanent carriageway is utilised as a two way road and the single carriageway contains a 2.5m wide shoulder and an adjacent 1.0m wide SO gutter the 3.0m shoulder width condition will be satisfied
- When the permanent carriageway is utilised as a two way road, the single carriageway will generally require widening, on the offside of the permanent carriageway, in the areas that do not contain cross carriageway access at spacing of less than 1 km. Cross carriageway accesses with deceleration lanes is required to be a minimum 35 metres long and 3.5 metres wide, excluding shoulder

#### 13.4.6. Other Facilities

Any other existing public facilities that may be affected by the Project Works will be assessed based on their current and future usage to determine whether they are to be maintained, removed or allowed for as temporary works. Fulton Hogan will consult with RMS, Council and any other applicable authorities/stakeholders to ensure that any effects on facilities are reviewed and outcomes are agreed.

## 14. Traffic Controllers

If undertaking traffic control, the company conducting traffic control is required to be registered under the RMS's Registration Scheme Category G "Traffic Control".

All traffic controllers used by Fulton Hogan and its subcontractors will be required to have completed RMS accredited Traffic Controller training as follows:

Table 8: Traffic Control Qualifications

Traffic Control Roles	RMS Traffic Control Course
Using stop/slow bat	Blue Card
Set up traffic control	Yellow Card
Select standard TCP from TCaWS, with minor modifications	Red Card
New TCP Inspect setting out of TCP at work sites	Orange Card

A list of their names, tickets and ticket expiry dates will be registered in the project inductions.

A Hold Point release will be submitted in accordance with Clauses 1.4.4 of Specification D&C G10 as follows:

Table 9: Hold Point – Traffic Controller

Hold Point	
Process Held:	Submission of traffic control personnel details.
Submission Details	The names of the proposed Traffic Controllers and the registration numbers and expiry dates of their cards.
Release of Hold Point:	The RMS's approval of Traffic Controllers. Release of the Hold point.

At the same times, the traffic controllers are required to undertake training in the following relevant training package(s) and are examined and certified as competent to perform their respective traffic controller duties:

- Package T89.4 Guidelines for the Selection of Traffic Controllers
- Package T89.5 So You Think You are Going to be a Traffic Controller?

When controlling traffic; the Blue Card Traffic Controllers will be required to carry their tickets with them at all times and wear high-visibility outer garments complying with AS/NZ 4602 which is suitable for daytime, night time and/or wet weather conditions, as applicable. In addition, they will be required to bear the words “Authorised Traffic Controller” and the RMS logo.

### **Spacing of Traffic Controllers**

Spacing traffic controllers are required to be in accordance with relevant approved TCPs.

In addition, traffic controllers located closest to and within road occupancy where shuttle flow or alternate flow of opposing directions is occurring will be required to be positioned no greater than 600 metres apart. A clear line of sight is also required between traffic controllers to have visual confirmation of radio advice and also to see the back of a platoon for clearing traffic in a bi-directional single lane operation.

## **15. Plant and Equipment**

All vehicles used in traffic control operations will be equipped with the appropriate vehicle mounted warning devices in accordance with the RMS Traffic Control at Work Sites Manual.

During daytime, plant and equipment working in a position adjacent to traffic and having a projection beyond the normal width of the item, for example, a grader blade, will have a fluorescent red flag attached to the outer end of the projection. During poor light conditions or at night, an additional traffic controller with an illuminated red wand will direct traffic around such plant and equipment.

During night time, where traffic is permitted to use the whole or portion of the existing road, all plant items and similar obstructions will be removed from the normal path of vehicles, to provide a lateral clearance of at least 6 m, where practicable, with a minimum clearance of 1.2 m.

Plant and equipment, within 6 m of the normal path of vehicles, will be required to be lit by a yellow steady lamps suspended vertically from the point of the obstruction nearest to a traffic lane, and two yellow steady lamp at each end of the obstruction on the side furthest away from the traffic lane, as required.

All construction vehicles are required to be maintained to prevent any loss of fuels, lubricants, loads or other substances, whether in the form of dust, liquids, and solids or otherwise and also must cover loads as required to prevent loss / nuisance.

## 16. Traffic Control Devices

### 16.1. Safety Barriers

Where identified in TCPs, safety barriers are required to be from the list of safety barrier products accepted by the RMS. This list can be obtained from RMS website at:

[http://www.rta.nsw.gov.au/doingbusinesswithus/designdocuments/safety\\_barriers.html](http://www.rta.nsw.gov.au/doingbusinesswithus/designdocuments/safety_barriers.html)

The use of water filled plastic barriers is to be risk based in order to avoid the barriers from leaking and being blown away by high winds. They might be used at those locations that preclude the use of rigid barriers, such as at corners or intersections and any other locations approved by the RMS, provided that their use complies with the TCaWS and the Acceptance Conditions for the safety barrier product. Water-filled barriers are also not to be used in cases where crash-proofing is required as advised by RMS's Engineering Technology Branch.

The safety barriers are to be erected in accordance with Specification RMS D&C R132 and the Acceptance conditions for that safety barrier product.

The project team is also required to provide the manufacture's recommended buffer zones (Exclusion zones) on approach side of the water filled barriers and behind barriers, as required, and construction work or pedestrian movement is not to be permitted within the deflection or working width zone of safety barriers.

### 16.2. Temporary Traffic Signals

If required, portable traffic signals are to be installed at the locations shown on TCP. The portable traffic signals are required to comply with section 10 of TCaWS Manual and the requirements of contract specification D&C G10.

Portable traffic signals should be covered or turned away from traffic when not in use. This is to avoid driver confusion associated with the blackout of permanent signals in which case the intersection/ control point becomes STOP controlled under the default road rule.

### 16.3. Pavement Marking and Signage

Signage will be utilised as required by this CTMP and health and safety regulations to ensure that traffic and site staff are aware of all restrictions and hazards along the alignment. Gate access signage will be provided for advanced warning and at the gate position. This approach has been successfully implemented on a number of Fulton Hogan Projects.

Existing information signage, distance information, street name signage for local roads and advance warning signage will be managed through the implementation of the Traffic Staging Plans and their associated TCP/VMPs.

These plans will allow for the temporary relocation of the existing signs and any roadside tributes located on or adjacent to Local Roads in consultation with the RMS and the Authorities including the Kiama Municipal Council and Shoalhaven Council.

Signage adjustments include all street name signage for local roads.



All pavement marking, retro-reflective raised pavement markers and signposting for use in temporary works are required to be appropriate to the climate, lighting and traffic conditions reasonably expected along the project Works all areas accessible by the public, which are affected by the Project Works.

They are also required to be in accordance with Specification RMS D&C R141, RMS D&C R142 and RMS D&C R143 and several RMS policies for use, such as VMS and, potable VMS, to the same standards as for permanent work. Unless otherwise specified, waterborne paint is to be used for pavement markings of temporary works.

The method for removal of redundant pavement markings from wearing surfaces, other than final wearing course, is required to comply with the requirements of TCaWS. Removal of redundant line marking within traffic lanes by covering with paint is not to be acceptable.

Temporary speed zoning signs are to be supplied and erected by the project team at the locations indicated in relevant TCP.

The signs are to be kept covered when the speed zone is not in use. Temporary Speed Zoning signs are to be removed when they are no longer in force.

#### 16.3.1. Project Identification, including Signage to Acknowledge Government Funding and Management

Fulton Hogan will install the following project signs on the approaches to the Site that also includes a contact number for inquiries. The project signs will be located as directed by RMS and in consultation with Kiama Municipal Council and Shoalhaven City Council. The faces of the Project signs must be in accordance with those described in Appendix 26 of the SWTC. The final project sign design must be submitted to RMS for approval prior to manufacture and installation.

All temporary signs are required to be maintained in good condition for the full period of display and are required to be removed no later than the Date of Construction Completion or when directed by RMS.

A Hold Point specified in Clause 5.1 of RMS Specification D&C R143 applies to information signs.



Figure 26.1 Project Entry Sign (Northbound and Southbound)

Figure 6: Project Entry Sign (Northbound and Southbound) (4 no. required)

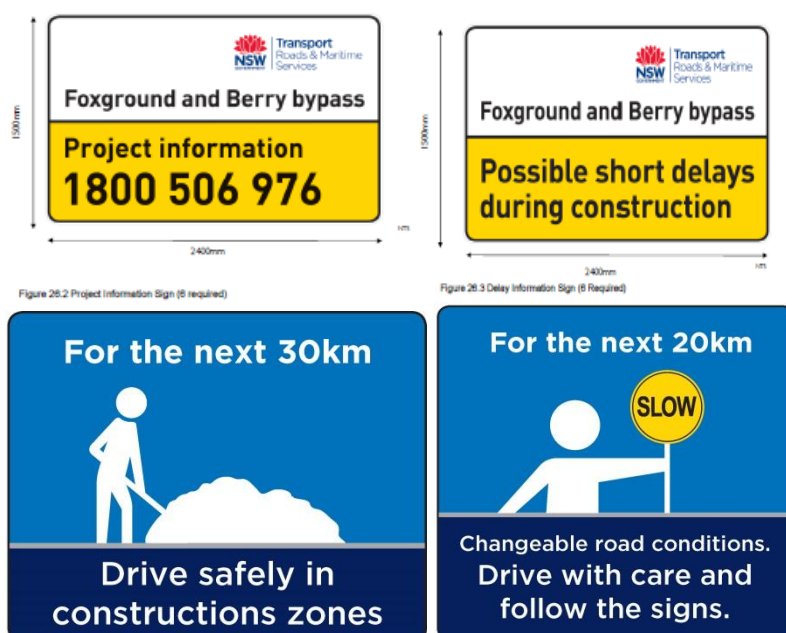


Figure 7: Project Safety Sign A and B (2 no. required)

All temporary signs are required to be maintained in good condition for the full period of display and are required to be removed no later than the Date of Construction Completion or when directed by RMS.

### Watercourse and Road Overpass Naming

All overbridges and underpasses must have road name signs and be signposted in accordance with the directional signposting scheme in section 16.3 and the sign designs in section 16.4 of Appendix 16 to the SWTC.

### Numerical Identification of Structures

All creeks and rivers must have the relevant name displayed and be signposted in accordance with the directional signposting scheme in section 16.3 and the sign designs in section 16.4 of Appendix 16 to the SWTC.

#### 16.3.2. Information, Distance Information and Advance Warning Signage

This issue requires the project team to address the location of the existing:

- Information Signs
- Distance Information Signs
- Advance Warning Signs

The issue of information signage, distance information and advance warning signage will be managed through the implementation of the Traffic Staging Plans and their associated TCP/VMPs.

These plans will allow for the temporary relocation of the existing signs and any roadside tributes located on or adjacent to Local Roads in consultation with the RMS and the Authorities including the Kiama Municipal Council and Shoalhaven City Council.

#### 16.3.3. Regulatory Signage

Where a TCP, either short term or long term, major or minor, requires a change in the posted speed limit, a formal direction from the RMS will be required (including restoring the existing speed limit on completion). This will be requested as part of the SZA application submitted to the RMS, which is an extension to ROL.

This issue requires the project team to manage the speed of traffic approaching and passing through a work site and address the varying of speed limit signage through construction speed limit signs.

Existing speed limits can be varied through the authorisation of a Speed Zone Authorisation (SZA) by RMS. This is detailed under Speed Limits section of this Plan.

The issue of speed limit signage will be managed through the implementation of the Traffic Staging Plans and their associated TCPs.

#### 16.3.4. Directional Signage

Changes to directional signage will be required to be shown on each TCP.

In addition, the information signage will be required to be consistent with the Guide: Signposting (RTA July 2007), Tourist Signposting guide (RMS and Destination NSW 2012) and provide information on the range of services available within Berry including advice on any parks that could be used as a rest area (and directional signage to these parks) and that the route through the towns may be taken as an alternative to the highway.

#### 16.3.5. Advanced Warning and Notification Signage

Advanced signage will be installed by Fulton Hogan during the Works to:

- Provide warning and notification of upcoming works
- Provide distance information, particularly before and during any adjustments to the traffic flow
- Inform of any upcoming traffic management adjustments as required

The issue of information signage, distance information and advance warning signage will be managed through the implementation of the Traffic Staging Plans and their associated TCP/VMPs.

These plans will allow for the temporary relocation of the existing signs and any roadside tributes located on or adjacent to local roads in consultation with the RMS and the Authorities including the Local Council.

#### **Portable Variable Message Signs**

Variable Message Signs (VMS) are to be placed at prominent locations on each end of the site, in addition to those required by section 7.5(g) of the SWTC, and as agreed with the RMS to keep road user informed of changes to road conditions and if possible delays as a result of construction work.

The VMSs must be:

- Minimum of two(2);
- Trailer mounted;
- Type C size;
- Solar powered ;
- Comply with AS 4852.2;
- Comply with RMS D&C No. P3074A; and
- Have a remote message change facility to allow the Project team to make immediate changes to the VMS messages

The messages will be determined by the Traffic Manager in consultation with the Community Relations Manager and RMS, and detailed in the TCPs.

The VMSs will be required to operate continuously to notify all road users of the road occupancy by displaying appropriate messages to this effect.

The messages displayed on the VMS are required to remain current over the duration of the works. The location of the VMS is to be moved, as needed, during the progress of the works. The location of the signs and the messages displayed must be approved by the RMS.

Over and above the requirements of section 7.5 of the SWTC for the provision of variable message signs (VMSs), a minimum of one additional VMS will be required to be provided and installed on each approach to all road occupancies.

VMSs are also to be used for publicising any pending changes in traffic arrangement for 7 days prior to those changes, and for changed traffic arrangements for 7 days after marking those changes.

The VMSs are required to be secured and regularly maintained, this includes cleaning the VMS Perspex and solar panels and checking the batteries.

The VMS's will be required to be installed at least one week prior to the day of the implementation of the road occupancy to provide advance notification to all road users of the future road occupancy.

### **Radar Activated Signs**

A minimum of two trailer mounted Radar Activated Speed Signs (RASS) with variable message signs are to be provided for use during the construction period.

The RASS is to be located in positions suitable for influencing the speed of motorists entering the reduced speed zone. The location of RASS and the messages displayed must be agreed with RMS and will be indicated on the VMP and any applicable TCPs.

It's to be noted that calibration details are required to be obtained from the supplier prior to mounting. The calibration records are to be kept by the Traffic Manager.

The effectiveness of the speed limit reductions is to be monitored and a detailed log of the speed each week is to be furnished to RMS.

#### 16.3.6. Advertising

Fulton Hogan will not erect any advertising on or near the Construction Site without prior approval of RMS Representative. RMS may install signage on or near the construction site at its own discretion. Should any advertising placed along the construction site by external parties, without prior approval by RMS, Fulton Hogan will ensure that these are removed during routine site safety inspections.

### 17. Communication and Consultation

Traffic management information will be communicated to the community as detailed in the CCS, this includes local and regional communications.

The Community Relations Manager on behalf of the Project and in consultation with RMS will provide timely, accurate, relevant and accessible information about changed traffic arrangements and potential delays to road users and local communities with provision for feedback through a complaints line during construction.

Consultation requirements will be updated by E&P/RMS on receipt of responses to consultation letters.

A consultation with respect to a signage policy which addresses the bypassed towns of Foxground and Berry is required to be done with the relevant council.

This Plan and subsequent revisions will send to the representatives of Kiama Municipal Council and Shoalhaven City council and their comments will be sent to RMS for concurrence.

The Mitigation measures will be developed with the RMS in consultation with the relevant council should monitoring of the Sandtrack reveal higher than anticipated volumes of traffic resulting in higher rate of deterioration of local road infrastructure.

Appropriate road safety measures will also be implemented in consultation with Kiama Municipal Council and Shoalhaven City Council on the Sandtrack should additional road safety issues be identified.

### 18. Community Involvement

In addition to the requirements of the Community Communication Strategy, the project team will be required to meet the reasonable needs and desires of the community for information on changed traffic conditions including property access provisions, bicyclist impacts, pedestrian impacts and heavy haulage transport impacts.

The following stakeholders will be consulted when preparing long term TCPs, as required:

- RMS;
- Kiama Municipal Council;
- Shoalhaven City Council;
- NSW Police;
- Bush Fire Brigade; and
- Affected Adjacent Land Owners

**Altered Traffic Arrangements**

The project team will be required to:

- Be available at all reasonable times to address any community questions concerning planned traffic arrangements including any temporary traffic switches;
- Establish stakeholder or Issues Groups to inform the community on:
  - Traffic management (including property access);
  - Cyclist needs;

**Project Display Material**

The project team will be required to:

- Provide project display material when key project milestones are reached. The display material must include, as a minimum:
  - Access information for temporary and permanent works, including pedestrian/cyclist access and temporary traffic arrangements;
  - Any traffic disruptions and restrictions; and
  - The construction of temporary detours.

**Notifications and Advertising**

The project team will be required to:

- Notify local residents and businesses about construction activities which will affect access to their properties or otherwise significantly disrupt use of their premises. Such notification shall be made at least five working days before commencing work affecting the premises and shall advise the nature of the work, why it is necessary, indicate the expected duration plus any changes to arrangements for traffic or property access. Contact details for the Project team shall also be provided;
- Advertise significant traffic management changes, detours, traffic disruptions and work outside the working hours contained in the environmental assessment documents. Newspapers are to be identified that are read/used by the driving community on the Project; and
- Advise RMS if any part of the Temporary Works that is the subject of an advertisement is to be changed or varied so as to make the advertisement substantially incorrect

**Media and Community Events**

The project team will be required to:

- Hold on-going discussions with RMS regarding dates, commencing at least 3 months prior to the anticipated occurrence of the event, for major milestones / traffic switches and the opening of the Works or any stage of the Works and Local Road Works to traffic;
- Give RMS at least 8 weeks' written notice of the date for commencement of construction and at least 8 weeks' written notice of the date of opening of the works or any stage of the works and Local Road Works to traffic, to enable RMS to organise any associated official media / community events;
- Plan for an event of some form to mark the opening of the works to traffic; and
- Not announce the proposed opening of the Works and / or any stage of the works or Local Road Works to traffic without the approval of RMS.



## **24 Hour Emergency Contacts and Public Complaints**

The 24 Hour Emergency Contact List is located within the WOHSMP under Emergency Preparedness and Response.

The 24 Hour Emergency Contact List along with the Variable Message Sign (VMS) supplier contact details are to be provided to the SR-TMC so that the TMC can arrange for message displays to be changed in the event of a traffic emergency.

The RMS 1800 506 976 hotline number will be used for capturing complaints; this is further addressed under the Community Involvement Plan.

## **19. Provisions for Special Events**

A special event in traffic management terms is defined as any planned activity that is wholly or partially conducted on a road, requires multiple agency involvement, requires special traffic management arrangements and may involve large numbers of participants and/or spectators. Major events may attract crowds in excess of 30,000 people.

Further to this, seasonal variations in traffic volumes, day light savings changes and NSW holiday periods are also events that will require attention by the project team due to the effects on traffic flows during these periods.

### **Special Event Responsibility**

The Event Organiser has the responsibility for the assessment and coordination of special events using Special Events Guide, which is conducted in consultation with relevant stakeholders, Police, Kiama Municipal Council, Shoalhaven City Council and may include Fulton Hogan.

### **Key Guide**

In consultation with relevant stakeholders which may include Fulton Hogan, the event organiser will be required to develop a specific TCP for the special events in accordance with NSW Government "The Guide to Traffic and Transport Management for Special Events"

### **Role of the Project Team**

A major event requires planning to successfully cater for the movement of large volumes of people in an efficient manner to minimise disruption to normal transport patterns.

The project team is required to participate in regular forums, communicate, and cooperate in the management process with the road authority, event organisers and relevant project members and clients. This is further addressed in CCS.

### **Types of Special Events**

Special events may include:

- Marathons;
- Fun runs;
- Cycling races and rides;
- Parades and marches;

- Motor sport events;
- Sporting events; and
- Street market days.

**Classes of Special Events**

Special events are generally categorised based on the potential disruption to traffic and transport systems, and the disruption to the non-event community. The four broad categories are generally as follows:

**Major** –an event that impacts major traffic and transport systems and there is significant disruption to non-event community. For example: an event that affects a principal transport route, or one that reduces the capacity of the main highway through a country town.

**Minor** – an event that impacts local traffic and transport systems and there is low scale disruption to the non-event community. For example: an event that blocks off the main street of a town or shopping centre but does not impact a principal transport route or a highway.

**Local** – an event with minimal impact on local roads and negligible impact on the non-event community. For example: an on-street neighbourhood Christmas party.

**Police Controlled** – an event that is conducted entirely under Police control (but is not a protest or demonstration). For example: a small march conducted with a Police escort.

## 20. Emergency and Response to Incidents

Fulton Hogan will provide traffic control by qualified traffic controllers for emergencies such as crashes and spillages along the work corridor. Traffic management for these events will not require a hold point release to be submitted to RMS.

Despite any other provision of the Project Deed, where the New South Wales Police Force, Emergency Services, RMS and TMC are controlling an incident, the Project team:

- Shall comply with any instruction or direction by the New South Wales Police Force, Emergency Services, RMS and TMC in relation to any proposed closure to a lane or shoulder;
- Shall not restrict, close, interfere with or obstruct the free flow of traffic on any lane or shoulder of the existing Highway, the works or a Local Road contrary to the instructions of the New South Wales Police Force, Emergency Services, RMS and the TMC; and
- If permitted to restrict, close, interfere with or obstruct the free flow of traffic on any lane or shoulder of the existing Highway, the works or a Local Road, shall act in accordance with any instructions of the New South Wales Police Force, Emergency Services, RMS and TMC including to suspend any of the contractor's work and to re-open the lane or shoulder. Except to the extent that compliance with any instructions of the New South Wales Police Force, Emergency Services, RMS and TMC makes it

impossible to do otherwise, this clause shall not relieve the Project team from its obligations under this Project Deed

The types of emergencies / unplanned incidents that may occur include, but are not limited to:

- Motor vehicle crashes;
- Bush fires;
- Environmental spills;
- Terrorist attacks;
- Bomb threats;
- Construction type incidents;
- Structural catastrophic failures;
- Inclement weather conditions;
- Flooding; and
- Anti-social behaviour.

The inevitable nature of emergencies and their potentially significant social, economic and environmental consequences is acknowledged and relevant state acts and legislation have been enacted to controlling these situations.

The relevant acts identify agencies primarily responsible for controlling particular hazards/emergencies. Such agencies are detailed in the Table below.

Table 10: Emergency Agencies

Event	Agency
Law Enforcement / Emergencies	Police
Fire:	Fire Brigades / (e.g.) Rural Fire Service
Hazardous Materials:	Fire Brigades
Flood	(e.g.) State Emergency Service
Storm and Tempest	(e.g.) State Emergency Service

The project team will adopt the operating procedures for managing emergencies and unplanned incidents that are addressed in the WHS Management Plan.

In the event of a traffic accident occurring within the construction site or at other locations affected by the works, the Project team will record the knowledge of the facts and photograph the approach to the accident site including the location of all safety devices and signs as soon as possible after the accident. A report with this information must be forwarded to RMS within 2 days of the occurrence of the accident.

In addition, the Project team will use an appropriate standard plan from TCaWS, adjusting it as needed to suit the site conditions.

### Emergency Services

The Community Relations Manager and the WHS Manager will be responsible for providing up to date information to the respective emergency services regarding any changes or restrictions to traffic flows during the project. The wider project team will be

responsible for adhering to these requirements and notifying the Community Relations Manager and Safety Manager of any restrictions or changes as required.

Arrangements to manage impacts on emergency services include:

- Notification and communication with affected emergency services in accordance with the Community Communication Strategy;
- Updating the project team and work crews of any requirements or measures to be undertaken to enable access through site in conjunction with emergency services;
- Notification of out of hours works or works that may restrict access including suggested detour routes;
- Provision for emergency service access through construction zones and subsequent notification to emergency services of any changes to these conditions;
- Communication with the project workforce to ensure understanding of emergency access and response requirements.
- Training of staff to ensure understanding of expectation and requirements (Refer Section – Training and Awareness of this Plan).

#### **Emergencies in close proximity to the project (Not within Project Boundary)**

The Traffic Manager will be required to notify relevant key stakeholders including traffic/incident controllers such as NSW Police, TMC, Local Council for traffic incidents that occur in close proximity to but not within the Project Boundary. For example, if a major crash occurred just outside the Project Boundary and was due to issues un-related to the construction site, the construction personnel may be the first “eyes and ears” to detect the incident. This notification is required to be done immediately in order to mitigate traffic delays caused by these incidents.

The Traffic Manager or the delegates will then be required to contact the relevant incident controller in accordance to the project’s Incident and Emergency Response Plan.

## **21. Notification Requirements to Authorities**

Fulton Hogan acknowledges the importance of keeping RMS and all stakeholders regularly informed. Therefore, during the Project, the Project team will report to RMS, community consultative committees and other relevant stakeholders on all road safety and traffic management issues that may impact on the road network.

When any unplanned closure of a lane or a restriction in the flow of traffic occurs on the existing Highway or on local roads, the project team is required to immediately advise RMS of the nature of the closure or restriction and of the schedule for reopening of the lanes. The project team will take all required measures to open the lane as quickly as possible.

### **21.1.1. Information to be Reported**

The traffic management information to be provided by the Project team will include:

- Reports on recent traffic, pedestrian and cyclist incidents;

- Community and media feedback as they relate to road safety and traffic management issues;
- Current and upcoming critical issues, (including those identified by the client, and other stakeholders and the proposed measures to address these issues as required);
- Construction activities and scheduling;
- Recent and proposed changed traffic conditions and the impacts on the operation of the road network;
- Traffic analysis and modelling results, and the current performance of the road network and traffic systems;
- The current status of CTMP, TCP, VMP, development, approvals and implementation;
- Status of approved and anticipated ROL/SZA applications;
- Media and community information released and proposed to be released;
- Results and feedback from recent inspections and road safety audits; and
- Performance results and trends of traffic KRA/KPI and targets

#### 21.1.2. Frequency

The frequency of reports provided by the Project team to RMS will be in four categories:

- **Immediate** - reporting of major incidents and critical issues;
- **Within 1 working day** - formal reports of major incidents;
- **Weekly reports** - on forecast road occupancies and performance results of recently implemented changed traffic conditions/operations; and
- **Monthly reports** - summarising: construction activities; proposed major traffic changes; upcoming media releases; incidents and issues; road network performance etc.

#### 21.1.3. Methods of Reporting

The methods of reporting to be applied by the project team will be as follows:

- **Verbal reports** - on issues of an urgent nature, (e.g. initial reporting of major unplanned incidents, adverse community/political feedback) which will be followed up with a formal written report;
- **Formal written reports** - in a format subject to client and stakeholder needs;
- **Presentations** - to consultative forums such as community consultative committees, and or traffic and transport liaison groups etc.

#### 21.1.4. Presentations

Presentations to consultative forums such as community consultative committees, and or traffic and transport liaison groups etc.

## 22. Monitoring and Inspections

In addition to the inspections conducted by the PV, a nominated member of the project team, holding appropriate Traffic Control tickets (Yellow, Red or Orange Card), is required to inspect the temporary traffic controls during the construction phase, focusing on monitoring compliance against the TCP/VMP and identifying safety hazards, to enable implementation of corrective solutions.

The Traffic Manager, or delegate, will be required to conduct four main types of inspections:

- Daily pre-start and pre-close down inspections of short-term traffic control;
- Weekly inspections of long-term traffic control;
- Night inspections of long-term traffic control; and
- Pre-opening inspections of minor temporary traffic switches.

Requirements and responsibilities in relation to monitoring and inspections are also documented in Sections 8.1 and 8.2 of the CEMP.

These inspections will be required to be carried out in accordance with RMS TCaWS Manual, That is:

### **Daily Inspections:**

1. “TCP” – Traffic Team Leader (holding a Yellow Card – as required in G10) will tick that all Traffic Control devices have been implemented and sign off/date, the record of these inspections will be done on the actual TCP by ticking each sign, safety barrier...etc. to verify that the inspections are done. This will also be inspected by Traffic Subcontractor’s supervisor and co-signed on the TCP for acceptance after review.
2. “Daily Traffic Management Risk Assessment Checklist”– This identifies information regarding “Checks”, Start/Finish Times, etc. using subcontractor’s checklist. The Traffic Team Leader (holding a Yellow Card – as required in G10) will fill in information as per checklist and sign off/date. This will also be inspected by Traffic Subcontractor’s supervisor and co-signed on the checklist for acceptance after review.

In addition, Fulton Hogan team will inspect relevant TCPs and note any actions on Traffic Management Monitoring Checklist.

### **Weekly Inspections (Random TCP setup)**

1. “Traffic Control at Work Sites Safety Inspection Checklist” Appendix E – Will be utilised by Fulton Hogan’s Traffic Manager and Traffic Subcontractor’s Supervisor and both sign off/date.

The Traffic Manager, or delegate, will also be required to monitor traffic management and traffic controls to assess compliance with the conditions of ROLs, including:

- As-built layouts for compliance with approved traffic control plans, including sign maintenance and delineation; (Daily)
- Provisions for cyclists, pedestrians, disabled persons and buses; (Weekly)
- Timing and duration of road occupancies; (Weekly)
- Qualifications of traffic control personnel; (Weekly)



- Assist WHS team in monitoring Haulage routes off the Construction Site; (Weekly)
- Night inspections of roadworks. (After each traffic switch)

Other inspection checklists contained in Appendix C of TCaWS Manual, or equivalent will be utilised (or modified to suite local requirements) for recoding the inspections.

Records of inspections of road conditions and traffic control measures will be maintained by Fulton Hogan's Traffic Manager.

### **Special Monitoring Requirements**

The Traffic Manager will be required to monitor the performance of the southern interchange roundabouts within the first four weeks after opening and develop any remedial actions necessary to ensure continued safe access for pedestrians and cyclists.

The Traffic Manager will also be required to monitor traffic on the Princes Highway and key local roads in Berry, particularly during peak periods, six months and 12 months after opening the project to monitor the performance of the network and ensure it is performing as expected. The results would also be used to inform the operational noise monitoring for the project. The Project Team will then investigate and implement any remedial action, if required.

## **23. Maintenance of Roadways**

The existing roadways, temporary roadways and detours are required to be maintained in accordance to the requirements of appendix 25 of SWTC.

This includes:

- sections of newly completed roadways after opening until the date of construction completion; and
- Local Roads used by construction traffic.

Fulton Hogan will co-operate with the RMS, local council or their agents in carrying out these maintenance activities in order to provide a safe, trafficable condition road for all class of vehicles that may use them.

The work includes:

- maintenance of existing pavements, linemarking, kerb and gutter, road shoulders and verges, ancillary devices, roadside environment, drainage, signage, trimming of vegetation and housekeeping;
- Repairing any potholes, surface drainage blockages or other failures;
- Removing any debris of any type, including animal carcasses; and
- Re-applying linemarking or temporary delineation devices as needed to clearly delineate traffic lanes for the duration of temporary traffic arrangements;
- Conducting pavement quality checks and a road safety audits prior to use of temporary roadways. and

- Installing, maintaining and utilising wheel wash facilities or other devices to ensure that no mud, dirt or other material is deposited onto any road which is open to the public.

If the Roadways are to be maintained by RMS and/or local council at any stage of the Project, RMS/local Council will provide reasonable notice to the project team of any impending landscape maintenance works and similar lawful obligations required to be carried out in areas that may impact the construction activities of the Works.

The project team will be required to alter its construction activities to accommodate the lawful maintenance activities of the RMS/local Council.

## 24. Audits

### 24.1. General Audits

Audits (both internal and external) will be undertaken to assess the effectiveness of traffic management measures, compliance with this CTMP, MCoA, SoC and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in the PMP and the CEMP.

### 24.2. Road Safety Audits

In addition to Road Safety Audit for temporary roadways and detours, an independent road safety audit is also required to be conducted in accordance to Guide to Road Safety Audit Practices (2011) at the:

- Development of Concept Design stage; and
- Substantial Detailed Design stage.

The Road Safety Auditor must be independent and have as a minimum be certified to level 3 in the RMS Road Safety Auditor Register.

The audit findings are to be actioned as per the risks levels stipulated in the audit report which is usually immediately if there is a high risk to public or construction safety.

### 24.3. Audit Frequency and Responsibility

The Traffic Manager is responsible for managing the Project's road safety audit program in coordination with the Design Manager and the Project Managers. One of the team members must be orange card accredited TCP designer.

The responsibility and frequency of audits is summarised in the Table below.

Table 11: Road Safety Audit Program

Audit Type	Responsibility	Frequency
Internal audit of temporary traffic arrangements.	To be conducted by the Traffic Manager.	At least once per month.
External audit of temporary traffic arrangements.	Traffic Manager to engage a pre-qualified auditor who is	At least every 6 months.

Audit Type	Responsibility	Frequency
external to the Project.		
Pre-opening audit of new roads and or major temporary traffic switches.	Traffic Manager to engage a pre-qualified auditor who is external to the Project.	Prior to the opening of all new roads and major temporary traffic switches.

To enable RMS to observe all road safety audits undertaken, RMS will be invited to attend.

Issues identified in the road safety audits will be dealt with in accordance with the Project's Quality Management Plan under managing non-conformances.

Copies of the road safety audits are required to be issued promptly to the commissioning party and copied to RMS and the Project Verifier (PV).

#### 24.4. Reporting

Reporting requirements and responsibilities are documented in the PMP and the CEMP.

### 25. Review and Improvement

#### Continuous improvement

Continuous improvement of this plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement:

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of traffic management;
- Determine the cause or causes of non-conformances and deficiencies;
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies;
- Verify the effectiveness of the corrective and preventative actions;
- Document any changes in procedures resulting from process improvement; and
- Make comparisons with objectives and targets.

For the Purpose of this Plan, the process for measurement and improvement, including corrective actions, is addressed in the Quality Management Plan.

#### CTMP Update and Amendment

The processes described in Chapters 8 and 9 of the CEMP may result in the need to update or revise this CTMP. This will occur as needed.

Only the Traffic Manager or delegate (in consultation with the Environment Manager) can amend this CTMP.

A copy of the updated CTMP and changes will be distributed to all relevant stakeholders (including the PV and the RMS's Representative) in accordance with the approved document control procedure – refer to Section 10.2 of the CEMP.

In addition, as part of satisfying its intended purpose, Fulton Hogan will undertake on-going development, amendment and updating of the CTMP throughout the duration of the work to account for:

- Variations;
- Changes in law;
- Changes in the design and construction process;
- Those events, circumstances and requirements expressly identified in Appendix 21 of the Scope of Works and Technical Criteria (SWTC) identified in Item 29(f), for each project plan;
- Any breach or potential breach of the warranty in clause 3.8(h) of the Project Deed;
- The need to prevent the recurrence of any compromise to the safety of road users and the public during construction, including landscaping maintenance; and
- Any other event or circumstance impacting the delivery of the Works;

The review requirements are further addressed under the Project Management Plan and the Documents and Records Management Plan.

## 26. Training and Awareness

The project team involved in the works associated with TCP, VMP, ROL ...etc. will be required to be:

- Inducted in and made familiar with the TCP, VMP, ROL ...etc. terms, conditions and requirements prior to the implementation of the TCP, VMP, ROL or their deployment in this element of the works associated with the TCP, VMP, ROL;
- Regularly re-trained on the TCP, VMP, ROL terms, conditions and requirements throughout the period of the road occupancy.

They will also be required to undergo site induction training relating to traffic management issues. This induction training will address elements related to traffic management including:

- Existence and requirements of this CTMP;
- Relevant legislation;
- Roles and responsibilities for traffic management;
- Temporary and interim traffic arrangements;
- Response procedure for dealing with traffic incidents; and
- Other issues.

### **Safe Work Method Statements (SWMS)**

Where it is considered that a work process must be carried-out in a strictly controlled manner to ensure the specified safety and quality requirements will be met, a specific Safe Work Method Statement (SWMS) will be prepared and implemented.

The Traffic Manager will prepare SWMS in consultation with workers, relevant functional managers before the related work starts, to ensure the issues relating to safety and quality are appropriately addressed.

The provisions for working, on or adjacent to roadways, and the traffic control measures to be applied will be incorporated where necessary within the SWMS.

The requirement of SWMS is further addressed under PWHSMMP.

## 27. Related Standards/Legislations/Regulations/Guidelines/Codes

The following reference documents are to be used for the application of this document. For dated references; only the edition cited applies. For undated references; the latest edition of the referenced document (including any attachments) applies.

- Environmental Planning and Assessment Act 1979 (EP&A Act), under which the Project Approval was granted.
- Relevant provisions of the EP&A Act as explained in the register of legal and other requirements included in Appendix A1 of the CEMP.
- RMS's ROL Manual;
- Australian Road Rules
- RMS Road Design Guide;
- RMS NSW Bicycle Guidelines;
- RMS Traffic Control at Worksites Manual;
- RMS Specification D&C G10 – Traffic Management;
- Austroads Road Safety Audit: Checklist 4. Pre-opening scheme audit;
- Austroads Road Safety Audit: Checklist 5: Roadwork traffic scheme audit;
- Austroads Road Safety Audit: Checklist 6: Existing roads: road safety audit,
- Austroads Guide to Road Design Part 3 – Geometric Design;
- Austroads Guide to Road Design Part 4B – Roundabouts;
- Austroads Traffic Engineering Practice – Part 14;
- RMS Guide: Signposting; and
- RMS and Destination NSW's Guide to Tourist Signposting.

## Appendixes

Appendix A – Work Adjacent to Traffic Flowchart

Appendix B – Construction Staging

Appendix C – Traffic Staging Schedule

Appendix D – Existing Environment

Appendix E – Construction Traffic Impacts

## Appendix A – Work Adjacent to Traffic Flowchart

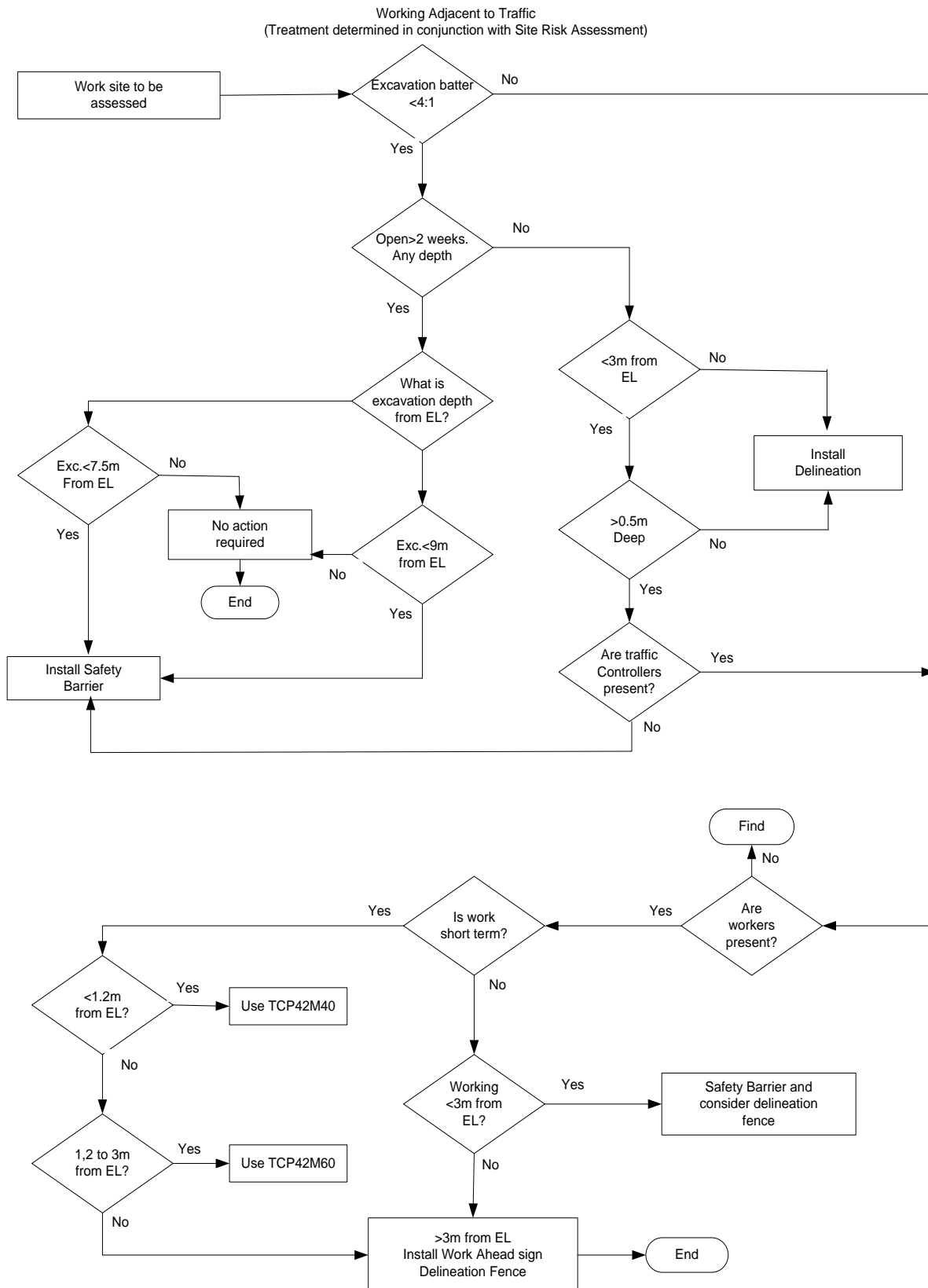


Figure 8: Work Adjacent to Traffic Flowchart



## Appendix B – Construction Staging

### Existing Traffic and Transport Environment

Construction of FBB project will be staged in a manner that suits the particular nature of each distinctive area in an effort to minimise disruption and ensure safety of road users and the construction workforce. As the Project is split between greenfield and brownfield environments the Project has been divided into three zones, each of which has typical and also specific staging methods that will be implemented with regard to:

- The type of works required in relation to the proximity of the existing highway and local roads;
- The vicinity of local residents / business; and
- The varied traffic flows in and around each area.

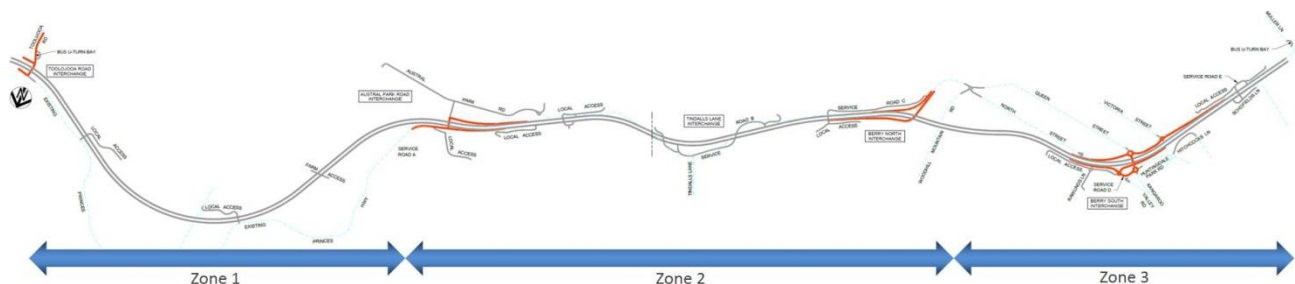


Figure 9: Construction zones – for Illustration purposes only, refer to construction staging design package for details

The details of each zone are summarised below:

### Zone 1

All Project Works and Temporary Works located east of the western abutments of the Bridge over Broughton Creek No. 3. (Approximate chainage 7500 – 11300)

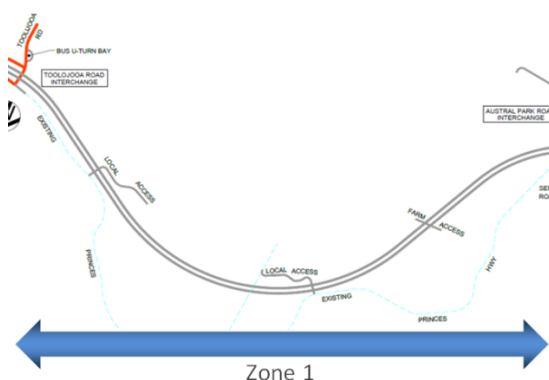


Figure 10: Construction Zone 1 – for Illustration purposes only, refer to construction staging design package for details

This 4.5km greenfield section of the Project comprises four highway underbridges with major earthworks over hilly terrain. Construction involves major blasting operations at Toolijooa Ridge. The majority of work will be constructed off-line from the existing

highway with the exception of Toolijooa Road connection and tie-in work with Gerringong Upgrade project.

There is potential to simplify tie-in works at the Gerringong upgrade since Fulton Hogan is constructing this section of highway upgrade. It is proposed that the temporary crossover from the southbound carriageway could be re-located off-line from the new works reducing the extent of temporary works and traffic stages required.

An effective internal haul road system, including temporary creek crossings, will be implemented in the Broughton Creek flood plain, south of Toolijooa Ridge. This will facilitate earthworks operations and construction of the underpasses in this zone. The on-site haul road will largely eliminate earthworks construction vehicles from the existing road network.

Cut to fill quantity is generally balanced within this zone. Some surplus rock from Toolijooa Ridge will be processed and stockpiled off-line for use throughout the wider project. These materials will be transported to other areas over time, mainly through backload operations, which minimise the impact to highway traffic.

## Zone 2

All Project Works and Temporary Works between the western abutments of the Bridge over Broughton Creek No. 3 and the eastern abutment of Berry Bridge over Broughton Mill Creek (Approximate chainage 11350 – 15750)

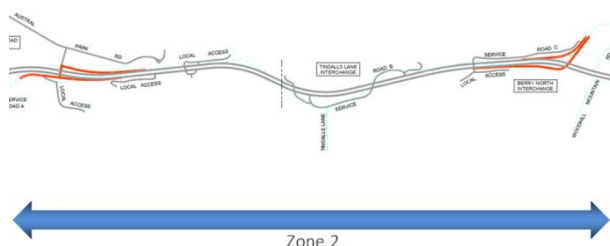


Figure 11: Construction Zone 2 – for Illustration purposes only, refer to construction staging design package for details

This brownfield duplication section of the Project will upgrade the existing highway partially within the existing road reserve. The existing highway in this section undulates with the ground contours and crosses the new alignment at five locations. Given the construction challenges presented by this arrangement, Fulton Hogan proposes a number of side tracks and widening of the existing highway to allow construction of the northbound carriageway. Once this is completed, traffic will be switched onto the new northbound carriageway, in contraflow, and the southbound portion of the works completed. This approach has been adopted to maximise the continuous length of main alignment constructed in each stage and minimise piecemeal work.

The Berry North Interchange northbound entry ramp will be used temporarily to accommodate two-way traffic on the northbound carriageway to allow construction of the southbound off-ramp and pavement north of Berry Bridge. This will be sign posted as

part of the 50km/h speed zone for Berry where it passes under the new Berry Bridge. The pier configuration for the bridge creates a pinch point in the alignment which limits the available cross section. At this location a short section of 0.5m shoulders are proposed that are similar to the adjacent section of highway on approach to Berry.

### Zone 3

All Project Works and Temporary Works located west of the eastern abutment of Berry Bridge over Broughton Mill Creek (Approximate Chainage 15750 – 19170)

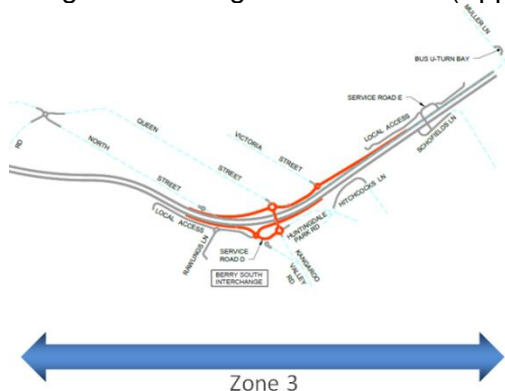


Figure 12: Construction Zone 3 – for illustration purposes only, refer to construction staging design package for details

This section comprises a 600m long bridge and a short section of new alignment in a greenfield scenario adjacent to North Street. The remaining section of upgrade, south of Berry, is semi brownfield towards the southern tie-in. Stage 1 involves the construction of the bridge at Kangaroo Valley Road and the northbound carriageway south of Berry. Traffic will be switched onto the new carriageway, in contraflow, and the southbound carriageway works undertaken.

The permanent tie-in works to the existing highway at the southern end of the Project have been designed to suit the temporary staging. Temporary pavement constructed to move traffic from the northbound carriageway, operating in contra-flow, has been designed for an 80km/h design speed and can be re-line marked to form the permanent tie-in configuration.

The temporary tie-in will be provided at the location where the project finishes, enabling southbound highway traffic to merge safely from two lanes into one. This would remain in operation from the opening of the current project until the completion of the proposed Berry to Bomaderry upgrade.

Further details of the staging proposals are presented in Table 1 and illustrated in the Construction Staging drawings within Part 5, Volume III. A detailed construction program is also presented in Part 5 of Volume III.

All the private accesses along the highway will be managed in consultation with property owners to maintain safe entry during construction.

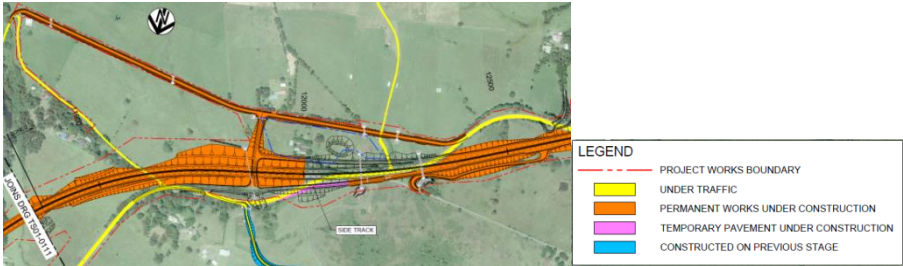
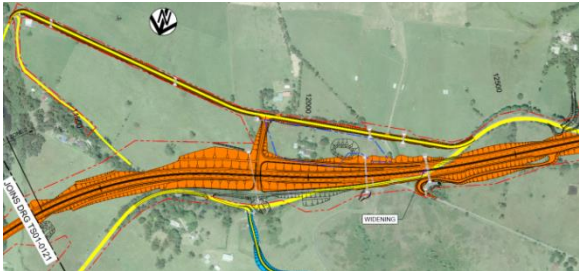
## Construction Staging at Intersections

### Intersection Layouts and Capacities

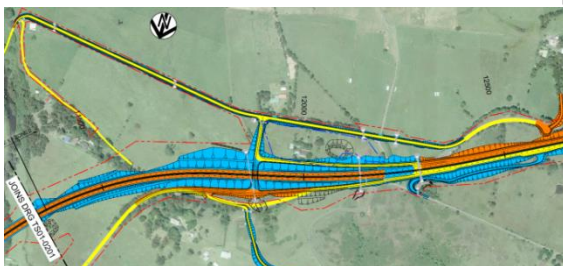
The intersection layouts and capacities at intersections will be derived by the requirements of each construction stage of the Project. Staging at intersections incorporates temporary and permanent traffic switches to provide access for works required during each respective stage. These traffic switches will be at existing and new intersections at various times during the Project.

A summary of each intersection and its respective staging elements is summarised in the following tables:

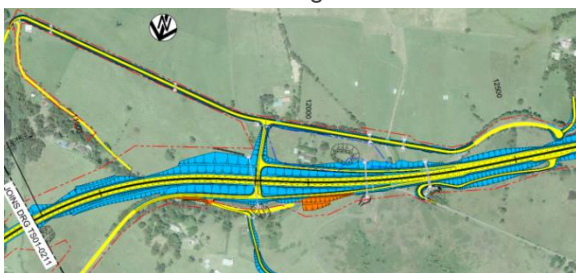
Table 12: Intersection Staging

Ch.7700: Intersection of Toolijooa Road, the Upgrade and Southbound Off Ramp	
Stage	Description
1A	Utilisation of existing intersection in its current state.
1B	Construction of new Toolijooa Road alignment, this has no impact on the current intersection.
1C	Traffic switch to final Toolijooa Road alignment.
Ch.9920: Future intersection of local access road and Princes Highway Highway	
1A	Construction of new local access road, this has no impact on the current intersection.
1B	Traffic switch from existing to final local road alignment.
Ch.11490-12450: Austral Park Road Interchange	
1B	Construction of new Austral Park Road alignment, this has no impact on the current intersections
	
1C	<p>Traffic Switch onto new alignment of Austral Park Road, incorporating:</p> <ul style="list-style-type: none"> <li>▪ New, final design, intersection of Austral Park Road and local road at Ch.11450;</li> <li>▪ Temporary intersection with Upgrade at Ch.12400; and</li> <li>▪ Construction of new local road and southbound onramp, this has no effect on existing intersections.</li> </ul>
	
2A	<p>Traffic switch onto new temporary access alignment utilising future southbound onramp incorporating:</p> <ul style="list-style-type: none"> <li>▪ Temporary intersection with Upgrade at Ch.12250;</li> <li>▪ Removal of temporary intersection at Ch.12400 utilised in Stage 1C;</li> </ul>

- Continued construction of Austral Park Underpass and local roads/intersections.



- 2B Traffic switch onto final alignment.



#### Ch.11920: Future intersection of local access road and Princes Highway

- 1A Construction of new local access road, this has no impact on the current intersection.
- 1B Traffic switch from existing to temporary intersection.
- 2B Traffic Management during construction of final intersection between local road and access road.  
Traffic switch onto completed intersection within this final stage.

#### Ch.14520: Tindalls Lane Intersections

- 1B Construction of new local road at the future intersection of the Upgrade, this has no impact on the current intersection.
- 1C Traffic switch to new local road alignment incorporating:
- Temporary intersection with the Upgrade alignment at Ch.14520;
  - Elimination of existing intersection of Tindalls Lane and Princes Highway at Ch.13590; and
  - Construction of final design intersection of the local road intersection with the Upgrade at Ch.13800
- 2A Opening of remainder of local road from Tindalls Lane to the new final design intersection at the Upgrade Ch.13800 and completed final design intersection of the service road and Tindalls Lane at Ch.13990

#### Ch.15200 - 15845: Berry North Interchange

- 1A Construction of temporary side track from Ch:15150 – 15600  
Construction of permanent works for Service Road C and Northbound Entry Ramp
- 1B Traffic switch to temporary side track alignment  
Construction of permanent works for Service Road C and Northbound Entry Ramp
- 1C Traffic switch highway traffic onto Northbound Entry Ramp  
Opening of Access Road C in its permanent state providing incorporating intersection with Northbound Entry Ramp  
Construction of Southbound Exit Ramp
- 2A Construction to complete Berry Bridge
- 2B Traffic switch to final interchange arrangement

#### Ch.16200: Roundabout at Woodhill Mountain Road, North Street and Princes



- 1A Construction of the roundabout through a series of traffic management measures.  
Traffic switch to fully completed roundabout.

#### **Ch.17400: Intersection of Rawlings Lane, Service Road D, Northbound Entry and Exit Ramps**

- 1B Closure of North Street access west of Rawlings Lane, changing the configuration of the intersection.
- 1C Removal of this intersection following access opening from the west side of the Upgrade.

#### **Ch.17600: Berry South Interchange**

- 1A Construct temporary widening at along Queen Street, perpendicular to Kangaroo Valley Road.  
Construct temporary detour for Kangaroo Valley Road traffic to enable construction of twin roundabouts



- 1B Traffic switch onto temporary road alignment with the following key intersection changes:
- Adjustment in alignment of the Kangaroo Valley Road / Queen Street intersection while maintaining existing traffic movements;
  - Adjustment in alignment of Kangaroo Valley Road / Huntingdale Park Road intersection. This will be adjusted in two stages to complete construction of the new roundabout; and
  - Construction of permanent roundabouts and Kangaroo Valley Road alignment.





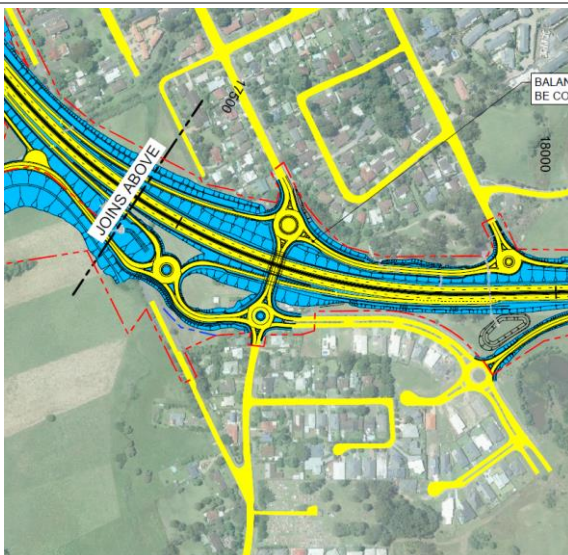
- 1C Traffic switch onto permanent roundabouts with the following provisions:
- Southern roundabout will be in a temporary state with a temporary intersection layout linking Kangaroo Valley Road to the Princes Highway. All traffic movements will remain available in this temporary arrangement;
  - Northern roundabout will be in a permanent state with exception of the western leg to Rawlings Lane and the northbound entry/exit ramps; and
  - Construction of the link road from the roundabout at Kangaroo Valley / Hitchcocks Lane roundabout to the roundabout at Rawlings Lane / Northbound entry/exit ramps



2A



2B



#### Ch.17900: Roundabout at Huntingdale Park Road and Hitchcocks Lane

- 1B Minor traffic management at the existing roundabout to enable construction of link road to Hitchcocks Lane.
- 1C Traffic switch to completed roundabout and subsequent removal of existing intersection of Hitchcocks Lane and the Princes Highway at Ch.18200.

#### Ch.17950: Roundabout at Victoria Street, Queen Street and Southbound Entry Ramp

- 1C Removal of existing intersection of Victoria Street and Princes Highway following the traffic switch onto the new Interchange alignment. This allows offline construction of the new roundabout.
- 2A Traffic switch to completed roundabout and subsequent removal of existing intersection of Hitchcocks Lane and the Princes Highway at Ch.18200.
- 2B Opening of new roundabout during major traffic switch during Stage 2B.

## Appendix C - Traffic Staging Schedule

The specifics of the proposed works and indication of traffic arrangements required for each zone are addressed in the following table:

Table 13: Traffic Staging Schedule

Zone	Stage	Traffic Arrangements	Under Construction
<b>Zone 1</b>			
	<b>1A</b>	<ul style="list-style-type: none"> <li>Traffic on the existing highway and local road pavements.</li> <li>Temporary road safety barriers installed to protect the workforce and road work speed zones implemented.</li> <li>Site access points operational at the locations noted in table.</li> </ul>	<ul style="list-style-type: none"> <li>Major services adjustments.</li> <li>Formation construction for the northbound and southbound carriageways formation between Toolijooa Road and zone 2.</li> </ul>
	<b>1B</b>	<ul style="list-style-type: none"> <li>Traffic switched onto the permanent works at Toolijooa Road.</li> <li>Princes highway traffic maintained on the existing alignment.</li> <li>Property access under Broughton Bridge No.1 becomes operational.</li> </ul>	<ul style="list-style-type: none"> <li>Construction of main carriageways south of Toolijooa Road.</li> <li>Permanent deviation of Toolijooa Road in conjunction with major embankment formation and construction of Toolijooa Road underpass.</li> </ul>
	<b>1C</b>	<ul style="list-style-type: none"> <li>Traffic conditions similar to the previous stage.</li> <li>Property access at chainage 8400 becomes operational.</li> </ul>	<ul style="list-style-type: none"> <li>Permanent tie-in works to the Gerringong upgrade.</li> <li>Continuation or works on the main carriageways.</li> </ul>
	<b>2A</b>	<ul style="list-style-type: none"> <li>Finalisation of main carriageway works in preparation of stage two traffic switches onto the new carriageways.</li> </ul>	<ul style="list-style-type: none"> <li>Finalisation of main carriageway works in preparation of stage two traffic switches onto the new carriageways.</li> </ul>
	<b>2B</b>	<ul style="list-style-type: none"> <li>Major switch of traffic onto the new alignment from the southern extent of works to zone 2.</li> </ul>	<ul style="list-style-type: none"> <li>Minor finishing works on the existing highway to construct the permanent works.</li> </ul>
<b>Zone 2</b>			
	<b>1A</b>	<ul style="list-style-type: none"> <li>Traffic on the existing highway and local road pavements.</li> <li>Temporary road safety barriers installed to protect the workforce and road work speed zones implemented.</li> <li>Widening provided at chainage 14300 and traffic diverted around the eastern abutment of Tindalls Lane Overbridge.</li> <li>Site access points operational at</li> </ul>	<p><b>Permanent works</b></p> <ul style="list-style-type: none"> <li>Main alignment carriageways at Tindalls Lane Interchange.</li> <li>Service Road C and the southern portion of Berry South Interchange.</li> </ul> <p><b>Temporary works</b></p> <ul style="list-style-type: none"> <li>Widening of the existing highway to allow construction of the northbound carriageway at the following locations: <ul style="list-style-type: none"> <li>Austral Park Interchange, between</li> </ul> </li> </ul>

Zone	Stage	Traffic Arrangements	Under Construction
		the locations noted in Table 2.	<p>chainage 12050 and 12250.</p> <ul style="list-style-type: none"> <li>– North of Austral Park Interchange at chainage 12750 and 13150.</li> <li>– North of Tindalls Lane Interchange at chainage 14700.</li> </ul> <ul style="list-style-type: none"> <li>▪ A major side track from the existing highway, chainage 14150, around Tindalls Lane Overbridge western abutment, and temporary side tracks from Ch.14600 to Ch.14700.</li> <li>▪ Side track of the existing highway adjacent to Service Road C.</li> </ul>
	<b>1B</b>	<p>Traffic generally on the existing highway with the following exceptions:</p> <ul style="list-style-type: none"> <li>▪ Traffic switched onto widened section of the highway at chainages to permit construction of the northbound carriageway.</li> <li>▪ Traffic diverted around the western abutment of Tindalls Lane Overbridge from chainage 14150 via a temporary side track and part of the newly completed northbound pavement.</li> <li>▪ Traffic switched onto temporary pavement adjacent to service road C.</li> </ul>	<p><b>Permanent Works</b></p> <ul style="list-style-type: none"> <li>▪ All main alignment and local road works off-line from the Princes Highway.</li> <li>▪ Austral Park Underbridges.</li> <li>▪ Top down construction of Tindalls Lane Overbridge</li> <li>▪ Berry Interchange North, northbound entry ramp, widened to cater for two-way traffic.</li> </ul> <p><b>Temporary Works</b></p> <ul style="list-style-type: none"> <li>▪ Switch from the existing highway to the new northbound carriageway at Austral Park Interchange, chainage 12000.</li> <li>▪ A major side track from chainage 13550 to 13850 between the existing highway and the northbound carriageway.</li> </ul>
	<b>1C</b>	<ul style="list-style-type: none"> <li>▪ Traffic on existing highway south of Austral park Interchange.</li> <li>▪ Traffic switch onto short section of northbound carriageway, in contraflow, between chainage 12000 and 12300.</li> <li>▪ Further traffic switch onto northbound carriageway, in contraflow, between Tindalls Lane Interchange and Berry North interchange.</li> <li>▪ Two way highway traffic on the Berry Interchange North, northbound entry ramp maintaining connectivity into Berry.</li> <li>▪ Local traffic will utilise the Tindalls Lane Interchange overbridge with a temporary intersection at the</li> </ul>	<ul style="list-style-type: none"> <li>▪ Main carriageways carriageway north of chainage 12300.</li> <li>▪ Continuation of northbound carriageway between Austral Park Interchange and chainage 13500.</li> <li>▪ Southbound carriageway between Tindalls Lane Interchange and Berry North Interchange.</li> <li>▪ Berry North Interchange southbound exit ramp.</li> </ul>



Zone	Stage	Traffic Arrangements	Under Construction
		Princes Highway chainage 14550.	
	2A	<ul style="list-style-type: none"> <li>Traffic on the existing highway switches onto the northbound carriageway at Austral Park Interchange.</li> <li>Tindalls Lane Interchange becomes fully operational with amendments to suit contra-flow on the northbound carriageway.</li> </ul>	<ul style="list-style-type: none"> <li>Remaining sections of southbound carriageway, south of chainage 11800.</li> </ul>
	2B	<ul style="list-style-type: none"> <li>Traffic generally on the completed works alignment with northbound and southbound carriageways operational.</li> </ul>	<ul style="list-style-type: none"> <li>Austral Park Interchange northbound exit ramp completed.</li> </ul>
<b>Zone 3</b>			
	1A	<ul style="list-style-type: none"> <li>Traffic on existing alignment.</li> <li>Temporary road safety barriers installed to protect the workforce and road work speed zones implemented.</li> <li>Site access points operational at the locations noted in Table 2.</li> </ul>	<p><b>Permanent Works</b></p> <ul style="list-style-type: none"> <li>Roundabout works at the intersection of Woodhill Mountain Road, Princes Highway and North Street.</li> <li>Property access from Rawlings Lane at the northern side of the alignment.</li> <li>Connection of Hitchcocks Lane to Huntingdale Park Road.</li> </ul> <p><b>Temporary Works</b></p> <ul style="list-style-type: none"> <li>Side track at the northern side of Kangaroo Valley Road to enable construction of the overpass, roundabouts and connecting roads (North Street and Huntingdale Estate).</li> <li>Widening of the existing Princes Highway at chainage 18450 to 19000, adjacent to Schofields Lane, to construct the new northbound carriageway.</li> </ul>
	1B	<ul style="list-style-type: none"> <li>Traffic on side track around Kangaroo Valley Road Bridge.</li> <li>North Street traffic permanently diverted to Kangaroo Valley Road.</li> <li>Hitchcock Lane accessed via Huntingdale Park Road.</li> <li>Highway traffic switched onto temporary pavement at Schofields Lane.</li> </ul>	<p><b>Permanent Works</b></p> <ul style="list-style-type: none"> <li>Construction of Berry Bridge.</li> <li>Bulk earthworks and drainage provisions north of Kangaroo Valley Road.</li> <li>Rawlings Lane and Town Creek diversion.</li> </ul> <p><b>Temporary Works</b></p> <ul style="list-style-type: none"> <li>Construction of a temporary crossover from Queen Street to the new northbound carriageway.</li> <li>Northbound Carriageway between</li> </ul>

Zone	Stage	Traffic Arrangements	Under Construction
			Kangaroo Valley Road and the southern extent of the Project. This includes part construction of Schofields Lane Underpass.
	<b>1C</b>	<ul style="list-style-type: none"> <li>▪ Kangaroo Valley Road switched onto new overbridge and roundabouts</li> <li>▪ Rawlings Lane permanently diverted to the north of the main alignment.</li> <li>▪ Victoria Street traffic temporally diverted to Queen Street during construction of the new roundabout works.</li> <li>▪ Highway traffic switched onto the northbound carriageway between Kangaroo Valley Road and the southern extent of the Project.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Berry South Interchange north facing ramps.</li> <li>▪ Southbound carriageway south of Kangaroo Valley Road, over the existing highway, and the Berry Interchange South southbound entry ramp.</li> </ul>
	<b>2A</b>	<ul style="list-style-type: none"> <li>▪ Traffic conditions similar to the previous stage.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Construction of all ramps north of Kangaroo Valley Road Overpass.</li> <li>▪ Pavement work between Berry Bridge and Kangaroo Valley Road Interchange.</li> <li>▪ Finalisation of Southbound carriageway south of Kangaroo Valley Road.</li> </ul>
	<b>2B</b>	<ul style="list-style-type: none"> <li>▪ Traffic on permanent works.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Minor finishing works on the existing highway.</li> </ul>



## Appendix D – Existing Environment

### Existing Traffic and Transport Environment

The Princes Highway is the main north-south regional road corridor between Sydney, the Illawarra and through the NSW south coast to Victoria. Within the project area, the highway serves as a:

- Commuter route between Sydney, Wollongong and Nowra;
- Local route for residents travelling within Berry and between Berry and surrounding towns and rural residences;
- Major tourist route for key destinations including Berry, Nowra and the NSW south coast;
- Freight and bus route, particularly for the NSW south coast and far South Coast.

In the project area, the Princes Highway is a two lane single carriageway between Toolijooa Road and Schofields Lane, with two short overtaking lanes for southbound traffic only. The existing highway does not meet current road design safety and traffic efficiency requirements.

The project commences at the junction of the existing highway and Toolijooa Road. Toolijooa Road is a local road which eventually provides a connection to Beach Road and Crooked River Road. This road only carries small volumes of traffic (less than 500 vehicles per day), and is primarily used by traffic accessing properties to the east of the highway.

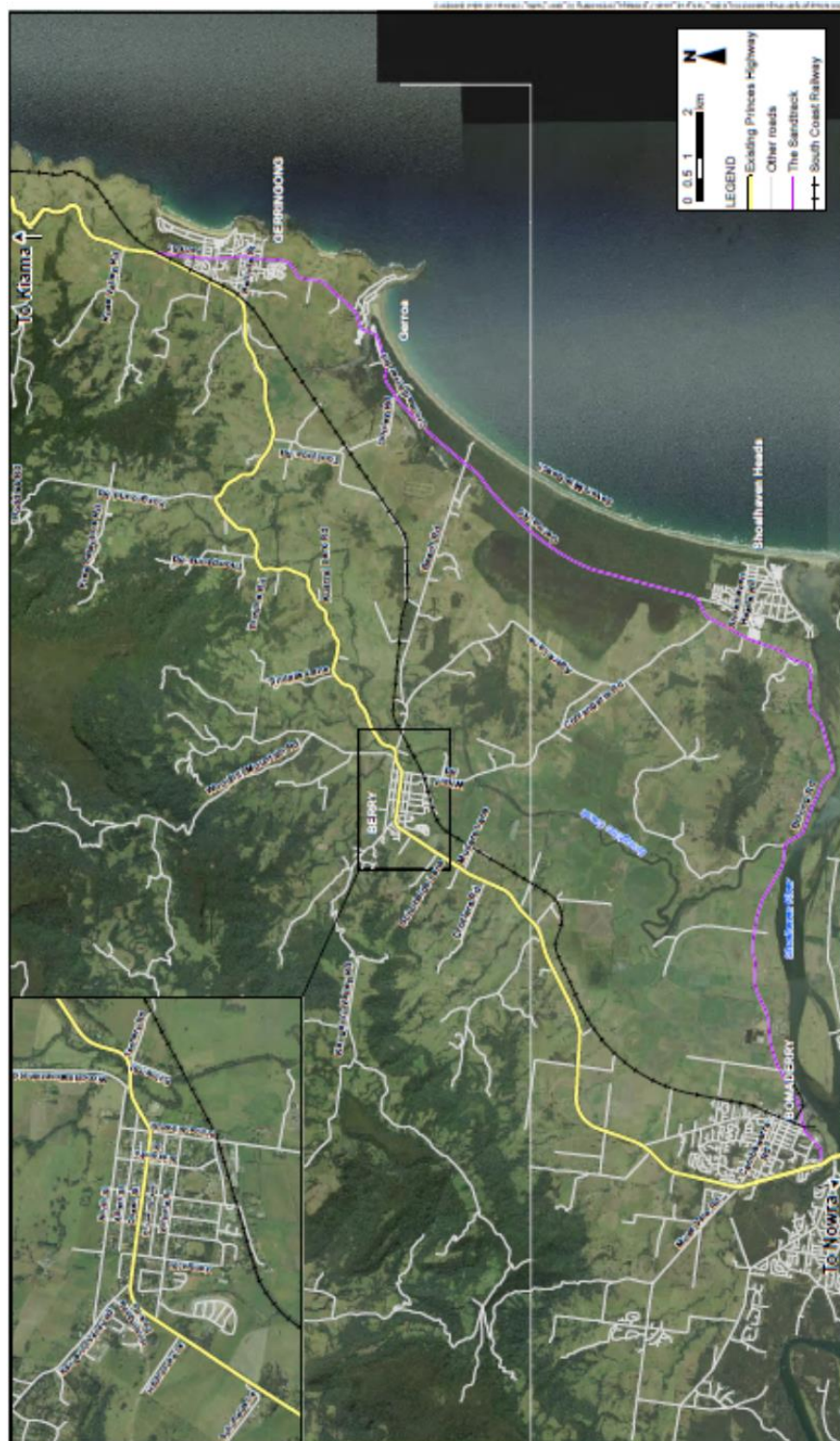
From Toolijooa Road, the highway passes through the Foxground bends, passing Foxground Road and Broughton village. This section of the highway is winding, and there are steep grades, sharp bends and limited overtaking opportunities. Vehicles at the intersection of the highway with Foxground Road can turn either left or right onto or from the highway. Foxground Road is a local road that provides sole access to the highway for rural and rural-residential properties located along Foxground Road, Free Selectors Road and Hoddles Road. Rural properties along the highway have uncontrolled direct accesses to the highway, and are able to turn either left or right onto or from the highway.

After passing through the Foxground bends, the Princes Highway crosses the Broughton Creek floodplain and crosses Broughton Creek once. The highway then travels through the undulating landscape until reaching Berry. There are several at-grade junctions with local roads, including Austral Park Road and Tindalls Lane. These local roads only serve to provide connections to the highway for properties located alongside these roads. Vehicles can turn either left or right to or from the highway from these intersections or from private accesses.

Within Berry, the Princes Highway carries both highway and local traffic through the town centre (refer to the Figure below). The highway follows Queen Street within Berry between Tannery Road and Kangaroo Valley Road. These two roads, as well as Prince Alfred Street, provide access to local and regional areas with:

- Prince Alfred Street and Tannery Road providing connections between Berry and destinations located along the coastline, such as Shoalhaven Heads and Seven Mile Beach. Tannery Road has an annual average daily traffic (AADT) of 1,680 vehicles, of which five per cent consists of heavy vehicles.

- Kangaroo Valley Road providing a connection to Kangaroo Valley, Moss Vale, the Hume Highway and beyond. Kangaroo Valley Road has an AADT of 1,485 vehicles, of which five per cent consists of heavy vehicles.



Source: Princes Highway upgrade – Foxground and Berry Bypass Environmental Assessment (AECOM, 2012)

Figure 13: Transport Network in the Project Area

The Princes Highway (Queen Street) also has numerous intersections with local roads within Berry. These intersections, in particular the Alexandra Street and Queen Street intersection, provide access to residences, businesses and other facilities located within Berry, such as retail, car parking, tourist accommodation, community facilities and recreational areas.

Parallel car parking is provided along Queen Street. This can contribute to congestion as traffic slows down or stops to enable cars to park or parked cars to merge back into the traffic flow. A pedestrian island, located between Prince Alfred Street and Alexandra Street, provides the only refuge for pedestrians crossing Queen Street.

Woodhill Mountain Road provides access to properties and communities directly north of Berry. This includes Broughton and Broughton Vale. It also provides an alternative access to Berry and the Princes Highway from Woodhill and Wattamolla. Woodhill Mountain Road has an AADT of 970 vehicles, of which six per cent consists of heavy vehicles.

North Street provides an alternative route to Queen Street between Kangaroo Valley Road and Woodhill Mountain Road to the north of Berry. However, only a small proportion of through traffic currently uses this route to avoid congestion. Rawlings Lane connects to North Street, and provides property access to properties immediately north of Berry.

Victoria Street, which runs parallel to Queen Street, provides an immediate connection to the Princes Highway, south of the Kangaroo Valley Road intersection with Queen Street. This carries a small volume of traffic, with about 200 vehicles currently turning at the Victoria Street and the Princes Highway intersection during AM and PM peak periods. Huntingdale Park Road connects to Kangaroo Valley Road, and provides the sole access to the Huntingdale Park Estate development.

South of Berry, the existing highway travels along the floodplain on a fairly straight alignment and remains a two lane single carriageway. It has at-grade junctions with Hitchcocks Lane and Schofields Lane, where vehicles can turn left or right. These local roads only serve to provide connections to the highway for properties located alongside these roads. As such, these roads carry only small volumes of traffic. Properties also have direct and uncontrolled access to and from the highway.

Beyond the immediate vicinity of the highway the 'Sandtrack' offers an alternative route for light vehicles between Gerringong and Bomaderry and comprises Fern Street, Crooked River Road, Gerroa Road and Bolong Road (refer to the Figure above). The 'Sandtrack' enables motorists to bypass the project area, avoiding the winding, hilly sections of the Princes Highway and general highway traffic congestion. It also intersects with local roads and provides an important connection to property and businesses within the project area and beyond. It has a five tonne load limit for heavy vehicles.

### Annual Traffic Growth

The closest permanent automatic traffic count site to the project area is on the Princes Highway, near Rose Valley Road, which is north of Gerringong. The average annual growth is 3.2%, or 400 vehicles per year. Although this location is outside the project area, it is indicative of the continuous level of traffic growth along the Princes Highway

North of Berry, surveys showed traffic on the Princes Highway to be around 10,150 vehicles per day, with 8,700 vehicles using the alternative 'Sandtrack' route. This equates to a 54%/ 46% split of traffic using the Princes Highway / 'Sandtrack'. South of Berry, the AADT is 12,575 vehicles on the Princes Highway compared to 6,650 using the 'Sandtrack'. At these locations, the bias of traffic is more heavily weighted towards the Princes Highway, with 65% of the total using the highway, compared to 35% using the 'Sandtrack'.

Overall, origin-destination surveys indicate that during a typical day, non-stopping through traffic contributes around 80% of total traffic travelling through Berry on the Princes Highway. During the 100th highest hour peak periods (e.g. holiday periods or morning and afternoon peak periods), traffic volumes are higher and travel patterns vary. As a result, through traffic fluctuates considerably between 50-75% of total traffic. Local and regional bus and coach services utilise the Princes Highway in the Project area, although the number of routes and frequency of services available to the general public are limited.

### Existing Road Network Performance

Level of service (LoS) is a qualitative measure describing operational conditions within a traffic stream. The desirable maximum capacity of each road section is determined from the 'Guide to Traffic Management, Part 3: Traffic Studies and Analysis' (AUSTROADS, 2009). It is generally described in terms of service measures such as the following:

- Speed and travel time.
- Freedom to manoeuvre.
- Traffic interruptions.
- Comfort and convenience.
- Road safety.

A description of the LoS scale for highway flows and intersection performance is provided in the following tables:

Table 14: LoS for Highway Flows

LoS	Description
A	A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
B	In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with LoS A.
C	Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
D	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
E	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor



LoS	Description
	disturbances within the traffic stream will cause breakdown.
F	In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

Table 15: LoS Criteria for Intersections

LoS	Average delay/vehicle (seconds/vehicle)	Traffic signals/roundabout	Give way/stop signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents would cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

The section of the Princes Highway between Toolijooa Road and Schofields Lane has a poor crash record in comparison to connecting sections of the Princes Highway and other major highways in NSW. Between 1 July 2003 and 30 September 2010 a total of 118 crashes were recorded on the Princes Highway, including three fatal and 61 injury crashes. On the alternative 'Sandtrack' route, five fatal and 81 injury crashes occurred during the same period.

The results of the travel time analysis indicates that the Princes Highway currently has an average travel time of approximately 14-15 minutes within the Project area between Toolijooa Road and Schofields Lane. The equivalent route via the 'Sandtrack' is shorter in length and operates at a higher average speed, taking less than eight minutes on average. Although the 'Sandtrack' is significantly quicker in terms of travel time within the Project area, traffic modelling shows that within the traffic impact footprint (between Gerringong and Bomaderry), the routes are comparable in both length and travel time. Between these towns the Princes Highway is 33.2 kilometres long with a travel time of 32-33 minutes, while the 'Sandtrack' is 32.4 kilometres long with a travel time of 30 minutes.

The Princes Highway, both north and south of Berry, currently operates with a level of service (LoS) D during typical AM peak and PM peak periods, while the alternative 'Sandtrack' route is currently operating at LoS C for both periods. The analysis indicates that during the 100th highest hour (e.g. holiday periods or morning and afternoon peak periods), the operational performance of the Princes Highway deteriorates to an unacceptable LoS E at most locations and at LoS D the 'Sandtrack'.

## Appendix E – Construction Traffic Impacts

The following information on potential impacts on traffic due to the construction of the Project was obtained from the EA.

The performance analysis for the worst-case construction scenario indicates that midblock locations on the Princes Highway would operate at LoS E during both the 100th highest hour northbound and southbound scenarios. Average travel speeds on the Princes Highway would be expected to drop to around 50 km/h or less. Key factors contributing to this deterioration include the expected increase in traffic, speed restrictions, and the prevention of overtaking through construction zones in the Project area. The analysis indicates that despite a poor LoS and low travel speeds during peak hours, the Princes Highway has the capacity to accommodate worst-case traffic volumes during construction.

The results show the roadway LoS on the 'Sandtrack' would remain relatively unchanged despite a reduction in traffic (with traffic expected to transfer to the Princes Highway in the worst-case scenario), operating at LoS C during the 100th highest hour northbound period, and deteriorating to LoS D during the busier 100th highest hour southbound period.

In summary, due largely to the offline construction of the Berry and Foxground bypass, the local road network and intersections in Berry would perform adequately during both the most-likely and worst-case construction scenarios without the provision of additional temporary traffic management measures.

### Construction Traffic

The Project construction would create an increase in construction vehicles travelling to, from, and within the Project area on the existing Princes Highway and local roads. Additional traffic demand would be expected to be generated through:

- Construction workers travelling to and from work sites;
- The delivery of heavy vehicle and machinery, and other equipment required for highway construction;
- The delivery of construction materials including bulk dry such as cement and aggregates, significant quantities of steel, as well as pre-fabricated structures; and
- The movement of spoil generated by earthworks, including the movement of materials within the site, transferred to stockpile sites and / or removed from the Project area.

Based on construction material estimates and staffing requirements, it has been estimated that approximately:

- 45,000 heavy vehicles would be generated during construction (or 90,000 vehicle movements) across the three year construction period. This would equate to an average of around 53 heavy vehicles per day or 106 heavy vehicle movements per day;
- 65 light vehicles per day (or 130 movements per day) would be generated by construction workers. This is based on an assumed average of two construction personnel per vehicle.



As shown in the table below, earthworks haulage and the delivery of dry bulk materials are expected to generate the majority of heavy vehicle movements.

Table 16: Construction Traffic Estimates

Estimated construction traffic generation – heavy vehicles:					
Source	Est. volume of materials for haulage (average/km)	Est. volume of materials for haulage (total)	Vehicle capacity (average)	Est. vehicle generation	
				Total	Daily (average)
Earthworks	-	1,000,000 m <sup>3</sup>	30 m <sup>3</sup>	33,333	39
Dry bulk materials	28,450 m <sup>3</sup>	330,000 m <sup>3</sup>	30 m <sup>3</sup>	11,000	13
Reinforcing steel	460 tonnes	5320 tonnes	10 tonnes	532	1
Pre-fabricated units	18 units	205 units	1 unit	205	< 1
Total-heavy vehicles	-	-	-	45,000	53

## Traffic Delays and Disruptions

Large sections of the Project (6.6 km of the total 11.6 km Project length) would be completed offline from the existing alignment. This includes significant construction operations during the realignment through Foxground including the cutting at Toolijooa Ridge, the three bridges over Broughton Creek and the Berry bypass. The offline location of these major works, as well as a large proportion of construction occurring on either side of the existing alignment, should ensure that construction can be carried out at these sites with minimal impacts to traffic efficiency on the current road network.

During construction, traffic management measures are employed to maintain road safety for all users. Although it is RMS' goal to maintain an 80 km/h construction speed zone (where normal posted speeds are higher than 80 km/h), additional delays for traffic using the Princes Highway would be expected during the construction phase where the Project requires online works and / or tie-ins with the existing highway.

Some temporary disruptions and delays to local and highway traffic would be experienced during construction of the Project due to the narrowing of lanes and temporary speed reductions. There would also be delays to local traffic during periods when other local or private roads are being bridged or tied in with the Project.

## Level of service

To assess the impacts of construction work on the LoS of the highway and key intersections within Berry, the following representative and worst case scenarios have been assessed:

- Representative or the 'most likely' scenario, indicative of construction traffic increasing volumes on the Princes Highway on a typical day, with a proportion of traffic transferring to the 'Sandtrack' to avoid construction works.
- A worst case scenario for the opening year (2017), representing the assessment of the road network during a holiday peak with the expected transfer of 'Sandtrack' traffic predicted following the completion of the Princes Highway upgrade program.

- The worst case scenario would be ameliorated by the implementation of appropriate mitigation measures, as outlined below. Construction traffic during the representative scenario is estimated to consist of:
- 65 light vehicles used by construction workers during AM and PM peak hours; and
- 10 heavy vehicles during AM and PM peak hours, based on the assumption that heavy vehicles would follow a more even distribution throughout a typical day compared to construction workers.

When compared to the total traffic on the Princes Highway, construction traffic is expected to contribute around 7% of total traffic during these peak periods.

### Highway and 'Sandtrack' Performance

Based on predicted 2017 traffic volumes, the highway is expected to operate at a LoS E without the introduction of construction traffic north and south of Berry. This would not change with the addition of construction traffic (refer to the table below). However, travel speeds would marginally decrease as a result of construction traffic. Average travel speeds on the Princes Highway would be around 50-60 km/h, with passing constrained by traffic management measures through construction zones. With the introduction of appropriate traffic management measures, current levels of road safety are not expected to decrease. However, the Road safety on 'the Sandtrack' will be monitored by RMS during construction as part of RMS's commitments (Commitment number TT2). Should additional road safety issues be identified appropriate road safety measures will be implemented by RMS where reasonable and feasible, in consultation with Kiama Municipal Council and Shoalhaven City Council.

The 'Sandtrack' is expected to continue at LoS C during the typical AM and PM peak hours during the representative scenario up to and including the final year of construction, despite the predicted increase in light vehicles using this route to avoid construction delays. This relatively small increase in traffic is not expected to decrease the safety of this route. RMS will not utilise the 'Sandtrack' as a diversion route and will not seek the removal of the existing five tonne limit on the 'Sandtrack'. However, a 3% transfer of traffic to the 'Sandtrack' has been factored in to account for motorist behaviour. The relatively small increase in traffic is not expected to decrease the safety of the 'Sandtrack'.

Table 17: LoS Summary (Representative Construction Scenarios)

Location	AM peak hour (vehicles / hour)		PM peak hour (vehicles / hour)	
	2-way volume	LoS	2-way volume	LoS
Princes Highway: Toolijooa Road – Tannery Road	972	E	1,150	E
Princes Highway: Victoria Street – South of Schofields Lane	1,160	E	1,348	E
'Sandtrack': Dooley Road – Shoalhaven Heads Road	728	C	870	C

For the worst case scenario, two key assumptions have been made:

- Completed portions of the Project have been opened to traffic, resulting in the transfer of traffic from the 'Sandtrack' to the highway. The transfer represents the predicted split of traffic once the Princes Highway upgrade program is complete.
- No construction work would be undertaken during holiday peak periods and as such, no construction vehicles would be travelling during this period. This reflects the RMS commitment to manage the Project to avoid construction work during these times so that disruption to highway flows during holiday peak periods would be minimised.

Despite the removal of construction vehicles from the road network, the modelled 'worst case' scenario reflects the likely period of the poorest performance of the road network. This is a result of the combination of the holiday peak traffic volumes, a 3% transfer of traffic from the 'Sandtrack' and the impact of traffic management measures through construction zones (such as speed restrictions and passing constraints).

The results of the worst case scenario analysis indicate that the highway would operate at LoS E during both the holiday peak northbound and southbound scenarios (refer to the Table below). Average travel speeds would drop to 50 km/h or less. This is attributed to the increase in traffic, speed restrictions and the prevention of overtaking in construction zones. Despite this reduction in performance, the LoS E indicates that the highway would have the capacity to accommodate the worst-case traffic volumes during construction.

On the 'Sandtrack', the LoS would remain relatively unchanged despite the reduction in traffic, with a LoS C during holiday northbound peak and LoS D during the busier holiday southbound peak.

Table 18: LoS Summary (Worst-case Construction Scenarios)

Location	AM peak hour (vehicles / hour)		PM peak hour (vehicles / hour)	
	2-way volume	LoS	2-way volume	LoS
Princes Highway: Toolijooa Road – Tannery Road	1,666	E	1,793	E
Princes Highway: Victoria Street – South of Schofields Lane	1,674	E	1,967	E
'Sandtrack': Dooley Road – Shoalhaven Heads Road	792	C	924	D

## Intersection Level of Service

Construction of the Project does not include any major works within the centre of Berry. The most significant modification to the town's local road network would occur at the new Kangaroo Valley Road interchange, which would require a temporary road closure with an alternative route available via North Street. The online construction of a new roundabout at the intersection of the Princes Highway and Woodhill Mountain Road would also create minor traffic delays at this location. The majority of works in the vicinity of Berry would be constructed offline and although it is likely there would be some adverse effects during the tie in of offline to online sections, these occurrences would only last for short periods of time.

Intersection LoS for both the most-likely and worst-case construction scenarios have been estimated using the assumption that the road network throughout Berry has not been upgraded, and that all traffic travelling on the Princes Highway travels through the town (i.e. the Berry bypass and grade-separated interchanges are not operational). Traffic volumes used for this analysis have been developed based on the assumptions listed in below.

The posted speed limit on Queen Street (Princes Highway) through Berry is currently 50 kilometres per hour; it is assumed this would remain unchanged during construction. The major factors influencing the performance of the road network and intersections in Berry include traffic management during road closures and natural traffic growth.

The Table below provides a summary of the expected intersection LoS in Berry during the most-likely construction period.

The results of the modelling included in the Table below indicate that the local road network would be expected to accommodate forecast traffic, including light and heavy construction vehicles, with minimal delay. Only the intersection approaches from Alexandra Street and Prince Alfred Street would be expected to drop to LoS B during typical 2017 AM and PM peak hours, with a maximum average delay of around 24 seconds.

Table 19: 2017 Intersection Level of Service Summary (Most-likely Construction Scenarios)

Intersection / approach road	AM peak hour			PM peak hour		
	Approach volume (veh/h)	Average delay(s)	LoS	Approach volume (veh/h)	Average delay(s)	LoS
<b>Princes Highway / Victoria Street</b>						
Princes Highway northbound	609	0.0	A	695	0.0	A
Victoria Street westbound	33	0.4	A	37	0.3	A
Princes Highway southbound	565	0.0	A	597	0.0	A
<b>Total</b>	<b>1207</b>	<b>0.0</b>	<b>A</b>	<b>1329</b>	<b>0.0</b>	<b>A</b>
<b>Queen Street (Princes Highway) / Kangaroo Valley Road</b>						
Queen Street eastbound	569	0.0	A	685	0.0	A
Kangaroo Valley Road	282	4.4	A	191	5.7	A
Queen Street westbound	614	0.0	A	796	0.7	A
<b>Total</b>	<b>1465</b>	<b>0.8</b>	<b>A</b>	<b>1672</b>	<b>1.0</b>	<b>A</b>
<b>Queen Street (Princes Highway) / Alexandra Street</b>						
Queen Street eastbound	714	0.2	A	750	0.0	A
Alexandra Street southbound	48	19.1	B	98	23.6	B
Queen Street westbound	620	0.2	A	684	0.1	A
Alexandra Street northbound	33	10.6	A	52	13.9	A
<b>Total</b>	<b>1415</b>	<b>1.1</b>	<b>A</b>	<b>1584</b>	<b>2.0</b>	<b>A</b>
<b>Queen Street (Princes Highway) / Prince Alfred Street</b>						
Queen Street eastbound	612	0.2	A	682	0.2	A
Queen Street westbound	650	2.4	A	622	2.1	A
Prince Alfred Street northbound	137	13.4	A	210	17.6	B

Intersection / approach road	AM peak hour			PM peak hour		
	Approach volume (veh/h)	Average delay(s)	LoS	Approach volume (veh/h)	Average delay(s)	LoS
<b>Total</b>	<b>1399</b>	<b>2.5</b>	<b>A</b>	<b>1514</b>	<b>3.4</b>	<b>A</b>
<b>Queen Street (Princes Highway) / Albert Street</b>						
Queen Street eastbound	609	4.2	A	660	4.2	A
Albert Street	18	2.4	A	18	1.9	A
Queen Street westbound	667	2.7	A	637	2.3	A
<b>Total</b>	<b>1294</b>	<b>3.4</b>	<b>A</b>	<b>1315</b>	<b>3.2</b>	<b>A</b>
<b>Princes Highway / Tannery Road</b>						
Princes Highway northbound	601	2.8	A	683	2.1	A
Princes Highway southbound	503	1.2	A	530	1.2	A
Tannery Road	130	1.4	A	112	0.7	A
<b>Total</b>	<b>1234</b>	<b>2.0</b>	<b>A</b>	<b>1325</b>	<b>1.6</b>	<b>A</b>

The Table below shows the performance of key intersections in Berry for the 2017 worst-case construction scenario. The results in the Table show that the road network in Berry would continue to operate at acceptable performance levels during peak periods; as the majority of intersection approach roads would continue to operate at LoS A. However, the increase in traffic demand on the Princes Highway (Queen Street) would result in additional delays for some of the minor intersection approach roads, notably at Kangaroo Valley Road, Alexandra Street and Prince Alfred Street.

With the majority of traffic demand on the Queen Street approach roads (priority through movements), vehicles using the minor approach roads would find gaps in traffic less frequent and subsequently incur additional delays. The 100th highest hour southbound period modelling scenario indicates that vehicles travelling southbound on Alexandra Street would experience an average delay of about 90 seconds, resulting in LoS F. In addition, vehicles travelling on the Prince Alfred Street northbound approach would experience an average delay of 65 seconds. All other intersection approach roads in Berry would operate at LoS C or better.

In summary, it can be concluded that due largely to the offline construction of the Berry bypass, the local road network and intersections in Berry will perform adequately during both the most-likely and worst-case construction scenarios without the provision of additional temporary traffic management measures.

Table 20: 2017 Intersection Level of Service Summary (Worst-case Construction Scenarios)

Intersection / approach road	AM peak hour			PM peak hour		
	Approach volume (veh / hr.)	Average delay (s)	LoS	Approach volume (veh / hr.)	Average delay (s)	LoS
<b>Princes Highway / Victoria Street</b>						
Princes Highway northbound	1182	0.0	A	743	0.0	A
Victoria Street westbound	73	0.0	A	159	3.7	A
Princes Highway southbound	371	0.0	A	996	0.0	A

Intersection / approach road	AM peak hour			PM peak hour		
	Approach volume (veh / hr.)	Average delay (s)	LoS	Approach volume (veh / hr.)	Average delay (s)	LoS
<b>Total</b>	<b>1626</b>	<b>0.0</b>	<b>A</b>	<b>1898</b>	<b>0.3</b>	<b>A</b>
<b>Queen Street (Princes Highway) / Kangaroo Valley Road</b>						
Queen Street eastbound	1037	0.0	A	650	0.0	A
Kangaroo Valley Road	286	32.7	C	281	8.2	A
Queen Street westbound	483	2.9	A	1084	0.3	A
<b>Total</b>	<b>1806</b>	<b>6.0</b>	<b>A</b>	<b>2015</b>	<b>1.3</b>	<b>A</b>
<b>Queen Street (Princes Highway) / Alexandra Street</b>						
Queen Street eastbound	1178	0.0	A	796	0.3	A
Alexandra Street southbound	76	40.2	C	142	90.3	F
Queen Street westbound	445	0.0	A	1040	0.3	A
Alexandra Street northbound	119	21.7	B	93	41.5	C
<b>Total</b>	<b>1818</b>	<b>3.1</b>	<b>A</b>	<b>2071</b>	<b>8.3</b>	<b>A</b>
<b>Queen Street (Princes Highway) / Prince Alfred Street</b>						
Queen Street eastbound	1163	0.3	A	772	3.6	A
Queen Street westbound	447	2.2	A	1054	3.0	A
Prince Alfred Street northbound	198	23.2	B	214	65.2	E
<b>Total</b>	<b>1808</b>	<b>3.3</b>	<b>A</b>	<b>2040</b>	<b>9.8</b>	<b>A</b>
<b>Queen Street (Princes Highway) / Albert Street</b>						
Queen Street eastbound	1173	4.1	A	764	4.3	A
Albert Street	57	8.4	A	56	2.5	A
Queen Street westbound	495	4.0	A	1124	3.5	A
<b>Total</b>	<b>1725</b>	<b>4.2</b>	<b>A</b>	<b>1944</b>	<b>3.8</b>	<b>A</b>
<b>Princes Highway / Tannery Road</b>						
Princes Highway northbound	1221	1.8	A	798	3.2	A
Princes Highway southbound	401	0.9	A	1034	1.3	A
Tannery Road	74	2.0	A	101	3.5	A
<b>Total</b>	<b>1696</b>	<b>1.6</b>	<b>A</b>	<b>1933</b>	<b>2.2</b>	<b>A</b>