

MIDLAND HIGHWAY SAFETY UPGRADE WORKS PACKAGE – MANGALORE TO BAGDAD STAGE 2 (MANGALORE)

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Authorisation

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1 Introduction

1.1 Background

The Midland Highway Safety Upgrade Works Package – Mangalore to Bagdad Stage 2 (Mangalore) project is a component of the Midland Highway Upgrade Program, a 10-year plan with a commitment of \$500 million from the Australian and Tasmanian Governments to make safety improvements along a 157km length of the Midland Highway between Mangalore and Breadalbane.

The objective of this investment is to lift the safety standard of this strategic Highway to a minimum three star AusRAP¹ safety rating over its entire length.

The crash pattern along the Midland Highway is relatively dispersed, with crashes occurring along its entire length, including locations of multiple crashes. When assessed in 2013 using the AusRAP safety rating methodology, 86% of the Midland Highway rated at one or two stars, on a five-star scale. By the end of 2016-17, the Midland Highway Upgrade Program will have upgraded approximately 35km of highway and projects will be underway to increase that to approximately 50km.

The Highway's absence of adequate safety features in many areas has resulted in this low rating. A lack of safety features is often a contributing factor in the type and severity of road crashes along the Highway. For most of the Midland Highway the predominant crash type is loss of control, most of which are single vehicle crashes with some resulting in head-on crashes and fatalities. 60% of the fatalities on the Highway have been due to head-on crashes.

The section of Highway between Mangalore and Bagdad has been identified for works as part of the safety package. The project has been split into two stages:

- Stage 1 – Bagdad: South of Eddington Road to Swan Street (north), and
- Stage 2 – Mangalore: Pontville Roundabout to south of Eddington Road.

Construction of Stage 1 was completed in March 2017. This Parliamentary Standing Committee on Public Works (PSCPW) Report provides information regarding the Stage 2 works.

1.2 Project Objectives

The objective of the project is to upgrade the Highway to achieve a minimum AusRAP rating of three stars whilst:

- Maximising retention of the existing pavement;
- Avoiding impact on significant environmental features (where possible);
- Minimising the need for land acquisition; and
- Minimising impact on existing public utilities.

¹ AusRAP – the national road safety audit approach indicated by the combined national motoring associations, including the RACT.

1.3 Project Location

The Midland Highway Safety Upgrade Works Package – Mangalore to Bagdad Stage 2 (Mangalore) project extends from the Pontville Roundabout to Eddington Road. The Stage 1 works were from Eddington Road to Swan Street (north). Figure 1 is a locality plan.

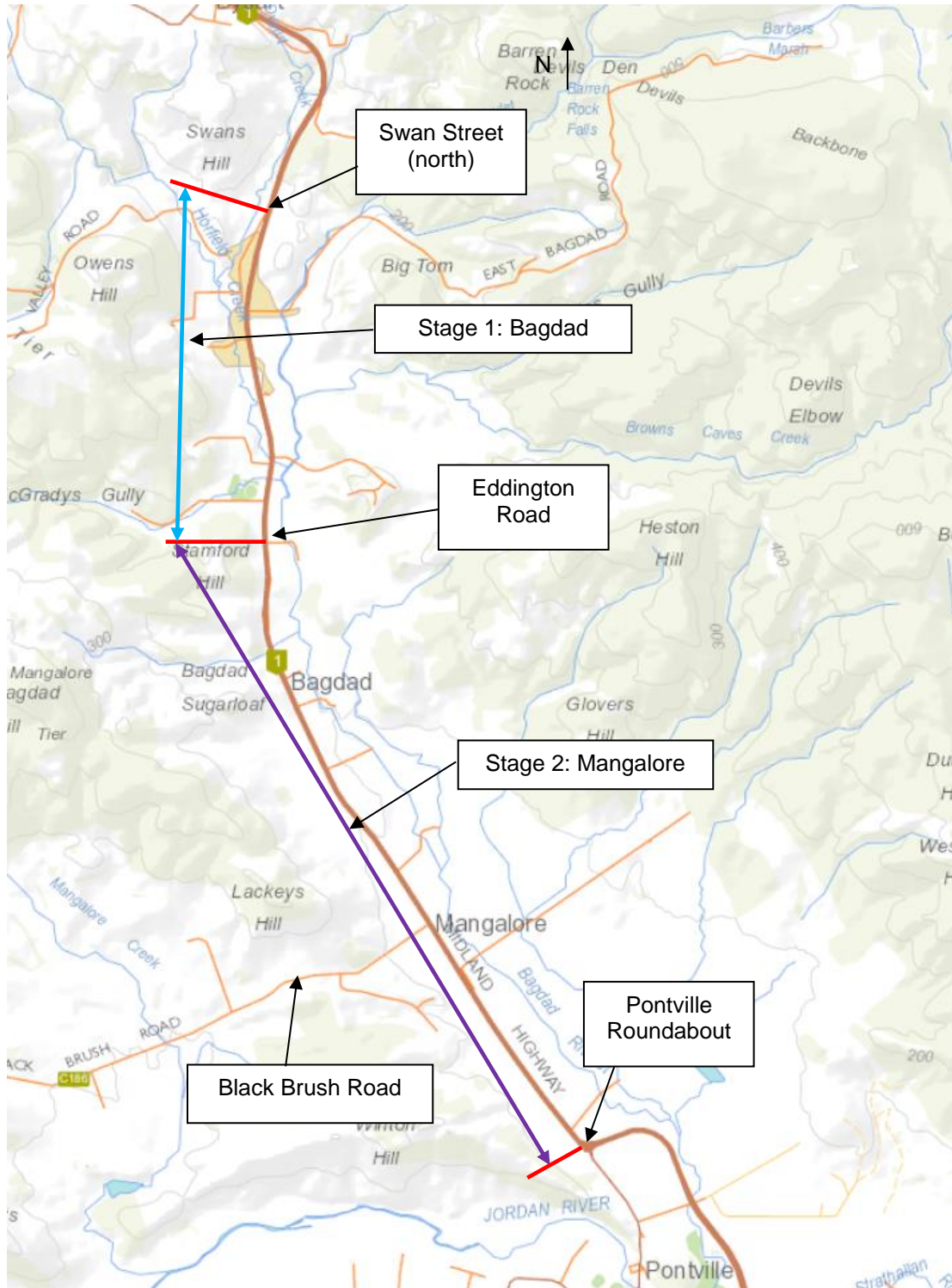


Figure 1 Locality Plan Base image by TASMALP www.tasmap.tas.gov.au © State of Tasmania

1.4 Strategic Context of the Project

1.4.1 Alignment with Approved Strategies

The project is a component of the *Midland Highway Strategic 10 Year Action Plan*, a 10-year plan with a commitment of a total of \$500 million from Australian and Tasmanian Governments to upgrade the Midland Highway. The key objectives of the Action Plan are to undertake safety improvements to provide a minimum of a 3 star AusRAP rating for the entire length of the Midland Highway integrated with additional overtaking opportunities and a staged approach to capacity improvements.

1.4.2 Alignment with Planning Policies and Themes

The AusRAP Star Rating Australia's National Network of Highways 2013 report found that most of the Midland Highway rated either only 1 or 2-star, in its 5-star safety rating scale.

The Midland Highway safety upgrade projects are using the 'Safe System' approach, which has been adopted by all Australian state and territory road authorities to achieve the minimum 3 star AusRAP rating. The approach recognises that people will make mistakes which result in crashes and road infrastructure needs to be designed to take account of these errors, where practical and cost effective.

Several safety treatments will be applied including:

- Lane separation with flexible safety barriers, which can achieve a 90% reduction in serious road trauma caused by head-on and run-off road crashes
- Audible edge lines (rumble strips) alert drivers when they deviate towards the edge of the road and provide time to recover
- Extended sealed shoulders prevent loss of control when a vehicle crosses the edge line
- Clearing roadside hazards or providing roadside barriers where hazards can't be removed
- Upgrading junctions (including large farm accesses) by providing turning lanes to allow turning vehicles to move out of the traffic flow
- Constructing 2 +1 lane arrangements to improve over taking opportunities and avoid driver frustration.

2 Project Details

2.1 Proposed Works

The Stage 2 works involve the upgrading of a 6.6km section of the Midland Highway and will:

- Reduce the potential for head-on collisions by separating opposing north and south bound vehicles;
- Reduce the likelihood of run-off road crashes;
- Provide designated space for right turning vehicles; and
- Provide safer access to properties and side roads.

The upgrade works include:

- A 3.0m central median turn lane to separate northbound and southbound vehicles, and separate vehicles turning right (into property entrances) from through traffic;
- Reduction of the speed limit to 80km/h
- Widening of the sealed shoulders to 2.0m; and
- Removal of road side hazards such as steep side slopes and drains, or protection with safety barrier, to provide a safer road environment.

2.2 Design Speed

To support the installation of the central median turn lane the speed limit will be reduced from 100km/h to 80km/h. Accordingly, a design speed of 80km/h has been adopted for Stage 2. The 80km/h speed limit will be the same as that which applies to the Stage 1 works.

Travel time surveys were undertaken during development of the design to determine the impacts of reducing the speed limit. The travel time surveys were undertaken from the Pontville Roundabout to the southern end of School Road in Bagdad and included approximately 300m of 60km/h speed limit on the northern side of the Pontville Roundabout.

The calculated travel times based on a speed limit of 100km/h and 80km/h over the length of Stage 2 are 3:36mins and 4:26mins respectively. The shortest and longest travel times recorded during the survey were 3:44mins and 4:57mins respectively, with an average time of 3:59mins. Based on the travel time survey, the reduction in speed limit to support the installation of the central median treatment could be expected to result in an increased travel time of approximately 30 seconds.

2.3 Road Cross Section

The cross section which is being applied for Stage 2 is consistent with that which was applied for Stage 1 and consists of:

- 3.5m wide lanes;
- A 3.0m wide centre turn median;
- 2.0m wide shoulders; and
- 0.5m wide verges.

Where roadside safety barrier is required verges have been widened to 1.0m.

2.4 Drainage

The proposed alignment of the Midland Highway does not differ greatly from the existing alignment where major drainage pathways are already established. However, due to the improved road cross-section, the width of the pavement footprint has increased and culvert extensions works will be required along the length of the works.

The Midland Highway is a Category 1 road. The Department's standard flood protection requirement for a Category 1 road is 0.5m of freeboard during a 1 in 100-year rainfall event.

A hydraulic assessment of the existing culverts has been undertaken. Details of the results of the assessment are provided in Appendix C. The capacity of culverts under the highway or where culvert overflow would result in water overtopping the highway were checked for a 1 in 100 year rainfall event and culverts under side roads and property accesses were checked for a 1 in 20 year rainfall event. Culverts under the highway are assessed for a higher recurrence interval than side roads and accesses due to the importance of the Midland Highway as the major road transport route between Hobart and Launceston.

The assessment indicated that there are three culverts under the highway which do not have sufficient capacity for a 1 in 100 year rainfall event and five road side culverts where a 1 in 100 year rainfall event would result in water overtopping the highway. The culverts under the highway that do not have sufficient capacity for a 1 in 100 year rainfall event are only marginally deficient and as to State Growth's knowledge there is no previous history of the culverts causing water to impact on the operation of the highway, it is intended to retain these existing culverts and extend them as required to suit the new highway cross section width. The roadside culverts where overflow would result in water overtopping the highway will be replaced with culverts of sufficient capacity as part of the upgrade works.

Assessment of the 99 culverts under side roads and property accesses indicated that 21 culverts have less capacity than required for a 1 in 20 year rainfall event. As upgrading of the highway predominantly involves widening of the pavement on the eastern side, many of the existing culverts under property accesses on the eastern side of the highway will need to be replaced to suit the alignment of new roadside drains. Where these existing culverts are replaced, culverts with sufficient capacity for a 1 in 20 year rainfall event will be installed.

To protect the highway pavement from water ingress, new open drains will be established where the invert of the existing open drains is less than 150mm below the bottom of the pavement. Where new open drains are required to be constructed and as a consequence culverts under accesses or side roads require replacement to match the new drain invert levels, these culverts will also be replaced with culverts of sufficient capacity for a 1 in 20 year rainfall event.

The combination of the highway widening and the establishment of new roadside drainage to protect the pavement will result in most existing roadside culverts being replaced.

In addition to assessing the capacity of existing culverts, each drainage catchment which crosses the highway has been assessed to determine the impact of the increased impervious area created through upgrading of the highway. The assessment indicated that widening of the highway will have negligible impact on the catchments, primarily due to highway constituting a relatively small component of the overall catchments.

2.5 Utilities

The following public utilities are located within the road reservation:

- Overhead electricity owned by TasNetworks;
- Underground telecommunication cables, owned by Telstra; and
- Water mains, owned by TasWater.

Consultation with the public utility owners is currently being undertaken regarding the relocation and protection requirements for utilities impacted by the upgrade works.

2.5.1 Overhead Power

An overhead electricity line is located parallel to the Highway on the western side. The poles are generally positioned near the fence line. There are several overhead crossings of the Highway associated with side roads and property connections. Several of the poles on the eastern side of the Highway will require relocation to facilitate widening of the road. Consultation has been initiated with TasNetworks regarding the relocation works.

2.5.2 Telecommunications Cables

There are telecommunications cables located in the Highway Reservation which are aligned approximately parallel to the Highway. There are also numerous road crossings. Generally, the parallel cables are located close to the fence lines. Where cables have potential to be impacted by the upgrade works they have been potholed to confirm their location and depth. Informed by this information, consultation has been initiated with Telstra regarding relocation works.

2.5.3 Water

There are trunk water mains which service the Mangalore and Bagdad area located on the western side of the Highway, some of which are in the road reservation. There are also a number of water pipes which cross the Highway associated with side road and property connections. An extensive investigation program involving potholing and surveying of underground water infrastructure has been undertaken to establish the extent of relocation works required to facilitate upgrading of the Highway. Consultation with TasWater has been initiated regarding the water main relocation works.

3 Social, Environmental Impacts and Stakeholder Engagement

3.1 Property Acquisition

Upgrading of the highway requires land acquisition from 28 properties. The acquisition areas range from 90m² to 4877m² with most less than 2000m². Acquisition will proceed under the Land Acquisition Act which provides certainty of process for landowners.

3.2 Property Accesses

There are approximately 90 existing property accesses within the extent of Stage 2. Consultation with landowners regarding modification of their accesses is currently underway.

The Midland Highway is a 'Limited Access Road' under the Roads and Jetties Act. Accordingly, property accesses which connect to the Highway are required to be licensed. All the existing licensed accesses will be modified to suit the new Highway width and levels. Generally, licensed accesses will be sealed to a distance approximately 7m back from the edge of shoulder and gates will be set back where required to enable drivers to be position their vehicles clear of the Highway when entering and exiting their properties. All unlicensed accesses will be closed and new fencing installed to replace gates where required. Consultation with landowners regarding property access modifications is underway.

3.3 Noise

Under the Tasmanian State Road Traffic Noise Management Guidelines 2015, safety upgrades are not eligible for noise mitigation. Notwithstanding this and the nature of the proposed works, the operational noise generated once construction is completed is not considered likely to change significantly.

During construction, there will be short term noise generated by machinery and safety requirements (reverse beepers or squawkers). The construction contract documents will include requirements to ensure that noise generate through construction activities complies with statutory requirements.

3.4 Flora

The site is predominantly agricultural land and urban areas. The Department of State Growth engaged North Barker Ecosystem Services to undertake a flora and fauna survey for the project. Three threatened flora species listed under the Tasmanian Threatened Species Protection Act 1995 (TSP Act) were recorded within the project area and these are listed in Table 1. No species currently listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) were recorded. These threatened species identified were predominantly observed on the western side of the Highway where limited works are proposed.

Table 1 Threatened Flora Species Recorded within the Survey Area

Species	TSP Act Status	EPBC Act Status	Comment
<i>Austrostipa scabra</i> rough speargrass	Rare	-	Recorded at a number of roadside locations. One occurrence of 75 plants was recorded south of Ballyhooly Road and although within the alignment area is avoided by the proposed works. 13 plants located opposite Ballyhooly Rd will be disturbed by the works. A patch of 50 plants will be disturbed at Chainage 6070. Patches of 20 – 25 plants at Chainage 3850 and 6220 appear to be located on the outer edge of the works and will likely be disturbed by construction.
<i>Calocephalus citreus</i> lemon beautyheads	Rare	-	Previously known from the road reserve and adjoining private land south of Ballyhooly Road. One plant was recorded in this locality and although within the alignment area is not within the area to be disturbed by the proposed works.
<i>Vittadinia muelleri</i> narrowleaf new-holland daisy	Rare	-	20 plants were identified on the road side south of Roberts Rd (Chainage 4090) and will be disturbed by the works. A patch of 1500 plants was recorded east of the highway near the northern entrance to School Rd. This appears to be located in the vegetation between the school and the existing highway and is unlikely to be impacted. A larger occurrence of this species on the western side of the highway in this location contained an estimated 3000 plants. This patch will be disturbed by the proposed works.

The North Barker survey report assessed those species previously recorded within 5 km which have a moderate to high potential to occur in the area. Only one species, *Haloragis heterophylla* (variable raspwort) was considered to have any potential to occur. This species has a moderate potential to occur and is unlikely to have been overlooked during survey unless in small numbers. Habitat is present within the study area and can occur in the moist depressions amongst grasses.

After determining final impact numbers, a Permit to Take was sought from DPIPW. Approval from DPIPW was obtained during May 2017.

3.5 Fauna

No targeted fauna surveys were conducted however habitats within the area were assessed for suitability for use by fauna species. One threatened fauna species, the swift parrot (*Lathamus discolor*) listed under the EPBC Act and the TSP Act was recorded within the project area. This species was recorded in non-endemic eucalypts during the survey and nesting and foraging opportunities are present within the survey area. A row of planted *Eucalyptus ovata* (blue gum) was recorded south of Ballyhooly Road which could provide foraging habitat. These trees will not be impacted by the proposed works.

Based on the availability of habitats and records of occurrence within the locality, the species listed in Table 2 are also considered to have the potential to occur within the project area.

Table 2 Fauna Species with Moderate to High Potential to Occur

Species	TSP Act Status	EPBC Act Status	Comment
<i>Aquila audax fleayi</i> wedge-tailed eagle	Endangered	Endangered	High potential for foraging habitat. The study areas are likely to intersect with the territory of at least one pair of eagles. The nearest known nest is no closer than 3.1km north east near Barren Rock Falls, well beyond the range of likely disturbance.
<i>Dasyurus maculatus maculatus</i> spotted-tailed quoll	Rare	Vulnerable	Moderate potential for foraging habitat. There are 2 records within 5 km of the study area.
<i>Perameles gunnii</i> Eastern-barred bandicoot	-	Vulnerable	There are numerous records from the vicinity of the study area.
<i>Sarcophilus harrisii</i> Tasmanian devil	Endangered	Endangered	Moderate potential for foraging habitat. There are 5 road kill records within the study area.
<i>Tyto novaehollandiae castanops</i> Tasmanian masked owl	Endangered	-	Moderate potential for foraging habitat. Requires for nesting. There are no outstanding nesting trees along the roadside although birds are likely to forage in the vicinity of the study areas.

The wedge-tailed eagle, spotted-tailed quoll and Tasmanian devil all exploit the roadside food resource of animal carcasses, putting themselves at risk of vehicle collision. This is an existing situation that will not worsen because of the proposed road works. There are no breeding habitats present for any of these species that will be impacted.

The Eastern-barred bandicoot is likely to be present across the locality favouring the borders of pastures and riparian vegetation. Riparian and other edge vegetation is limited within the upgrade area which is dominated by farmland and residential development. There is a history of road kills along this section of the highway which could potentially improve through the proposed upgrades due to the reduction in speed limit to 80km/h.

The Eastern quoll was listed as endangered under the EPBC Act on 19 November 2015 however there is no suitable den habitat within the upgrade area and there appears to be no recent occurrence.

3.6 Aboriginal Heritage

Aboriginal Heritage Tasmania (AHT) undertook a search of the Aboriginal Heritage Register over the project area and it was determined that there is a number of Aboriginal heritage sites recorded within or close to the proposed works. The majority of recorded sites are artefact scatters and an Aboriginal heritage investigation was required to be carried out. The purpose of this investigation was to determine whether the proposed works will impact on any Aboriginal heritage and to offer mitigation advice. No artefacts were observed during the field survey however there are two known records near the Black Brush Road intersection.

The investigation was undertaken and it was concluded that site and artefact densities within the road corridor study area are likely to be low. It was further concluded that any undetected sites present within the study area will have been subject to high levels of disturbance associated with past land clearing activity and prior road infrastructure construction. The area of the proposed works was assessed as being of low archaeological sensitivity. Only one recorded site is located near the alignment and that is in a residential yard opposite the Black Brush Rd intersection. The site will not be impacted by the proposed works.

As part of a Construction Management Plan, the contractor will be required to implement an Unanticipated Discovery Plan (UDP) should any unexpected finds be encountered during construction.

3.7 Historic Heritage

Historic Heritage Assessments and a separate Historic Plantings Heritage Assessment have been undertaken to assess the significance of buildings and plantings along the highway and to determine likely impacts of the project.

3.7.1 Heritage Buildings

A number of heritage listed buildings are located along the alignment with four of these comprising the Heritage Mile Cultural Landscape Precinct. The significance of this precinct relates to three intact and highly prominent homesteads of the early to mid-nineteenth century (Oakwood, Marlbrook & Woodburn) and a large Federation Queen Anne homestead (Wybra Hall), with their associated rural outbuildings. The properties retain their original land grants as reflected by fencing, and the patterns of land use and remnant vegetation are reflective of the original land uses.

Widening of the Highway cross-section will be undertaken on the eastern side of the existing Highway to avoid impacts on this precinct.

There are a number of additional properties individually listed on the Tasmanian Heritage Register and by the Southern Midlands Council. The only properties impacted, and these impacts relate to acquisition of small areas of land at the highway frontage, are:

- 1546 Midland Highway, Sayes Court – this is a large property comprised of two lots. There is a dwelling and a barn on the property however these are located 140 m and 225 m respectively from the current highway boundary and will not be affected by the acquisition or works.

- 11 Eddington Rd – this is a timber dwelling located approximately 100 m from the current highway boundary. The dwelling will not be affected by the acquisition or works.

These are located at the northern end of the upgrade area and are shown in Figure 2.

In both instances the area to be acquired is located at the highway frontage of the site, well removed from the listed buildings, and is unlikely to impact on the heritage values of the site. The works have been granted an exemption by the Tasmanian Heritage Council (THC) as they satisfy the requirements of the Tasmanian Heritage Council: Works Guidelines 2015.

A relatively recent sandstone entry feature built at the frontage of the heritage listed Cornelian Hill at 1358 Midland Highway is located partly within the road reserve and is required to be relocated to the correct property boundary to allow the upgrade works. This has also been granted an exemption by the THC.

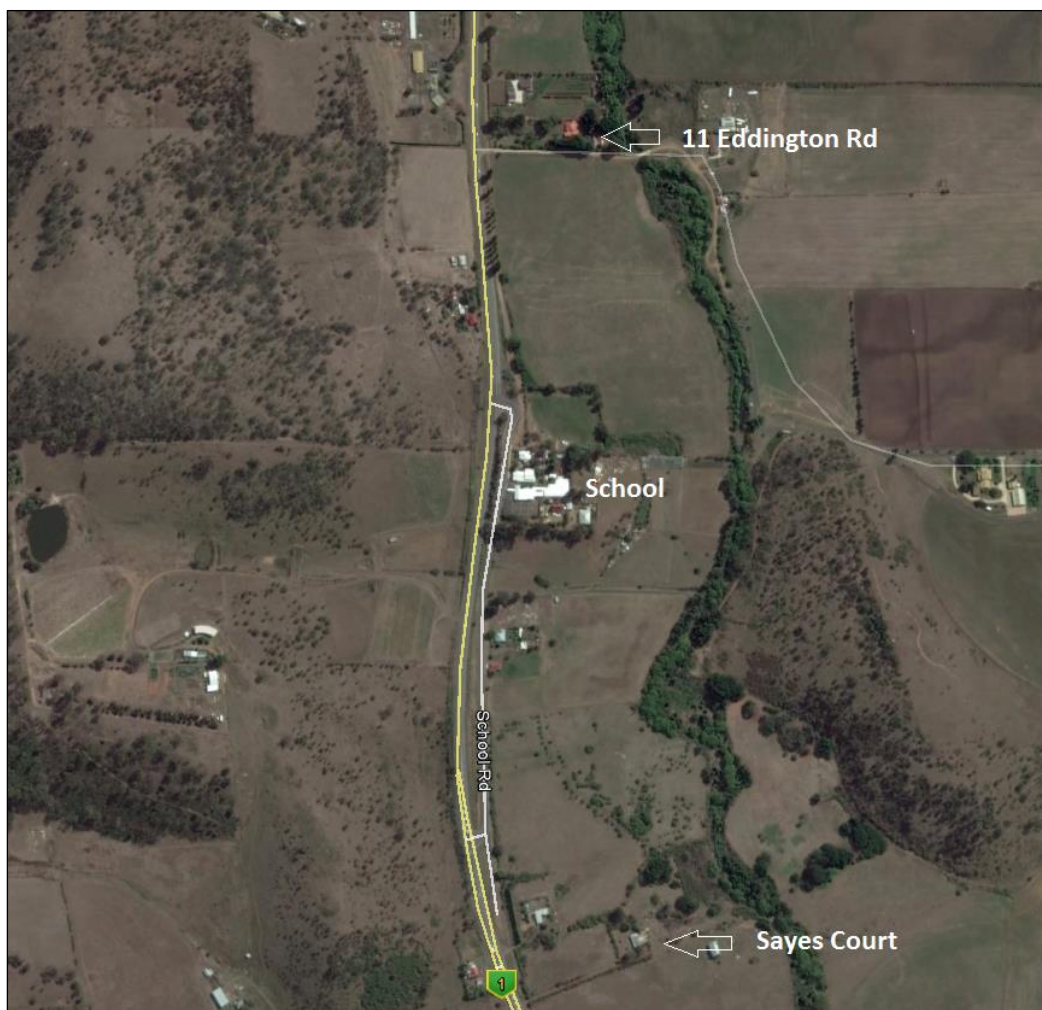


Figure 2 Location of THC listed properties

3.7.2 Heritage Plantings

There are also a number of plantings along the highway associated with individual properties and the Pioneer Memorial Avenue. The Pioneer Avenue is a series of roadside plantings that began in the 1930s, extending between Launceston and Hobart. It was originally intended to be a memorial to early pioneers of Tasmania, and evolved into a carefully planned series of plantings along the Midland Highway to beautify the countryside and encourage tourism. The Pioneer Avenue has been nominated for inclusion on the Tasmanian Heritage Register (THR), and this nomination is still being assessed by the Tasmanian Heritage Council (THC).

The Historic Plantings Heritage Assessments determined that there are 23 likely Pioneer plantings within the entire Stage 2 project area. The assessment determined that the expected survival rate of the trees, regardless of the project, is low (likely less than 10%) and that this section compares poorly with other sections of the Highway recently surveyed. The majority of the surviving trees date to the 1950's replanting works. Although this section of the Highway was not considered to be a significant Pioneer Avenue landscape, the assessment recommends the surviving plantings should be conserved wherever possible and accounted for in any future highway upgrade works.

A review of the alignment against the location of pioneer plantings indicates that 3 of the 23 remaining trees will be removed or trimmed to accommodate the works.

State Growth recognises the significance of the Pioneer Avenue, and is committed to retaining the Pioneer Avenue into the future. Some of the original Pioneer Avenue plantings will be impacted by the footprint of Midland Highway upgrade works. Removal of hazards, including trees, from the road reserve where possible is an important part of the safety upgrade to reduce the severity of road crashes.

State Growth has developed a strategy for Pioneer Avenue plantings. The strategy is based on the following principles:

- Maintain the Pioneer Avenue where practicable and aim for no net loss of trees.
- Consult with relevant local Councils, Heritage Tasmania and affected landowners about appropriate replanting to retain intent of the Pioneer Avenue.
- Replanting to occur outside the road reservation to maintain the safety of the Midland Highway.
- Establishment and management of new plantings must be cost-effective, meet community expectations and maintain the integrity of the Pioneer Avenue.

The Historic Plantings Heritage Assessments also considered the significance of plantings on heritage properties within the project area. For the two heritage listed properties affected by acquisition, the following comments were made:

- 1546 Midland Highway, Sayes Court – potential impacts relate primarily to the hawthorn hedgerow along the southern side of the entrance drive to the dwelling. Replanting was recommended if possible.
- 11 Eddington Road – the eucalypts on the highway frontage are relatively recent plantings and while not of particular heritage significance they do provide screening for the dwelling. If these are to be removed the assessment recommended replanting.

Modification of the property access to Sayes Court will require removal of approximately 40m of the existing hawthorn hedgerow. There is an opportunity to replace a 20m section of the hedgerow once the access upgrade works are completed. Consultation will be undertaken with the landowner regarding partial replacement of the hedgerow, facilitated through the land acquisition process. The Land Acquisition Act allows for replacement or compensation.

Removal of the young eucalypts along the highway frontage of 11 Eddington Road will be avoided if possible. Should it not be possible to retain them, consultation will be undertaken with the landowner regarding their replacement, facilitated through the land acquisition process.

No impacts on any vegetation of heritage significance are likely near the 1358 Midland Highway at Cornelian Hill.

3.8 Landscape and Visual Impacts

The works involve widening of the existing road footprint to allow for a safer road cross-section. No significant changes are proposed to the existing Highway alignment.

Where widening of the road cross-section results in the need to remove vegetation on land that will be acquired, consultation is being undertaken with individual landowners regarding replacement of vegetation as part of the project or compensation through the land acquisition process.

Widening of the road cross-section is predominantly on the eastern side which avoids impacts on heritage properties located on the western side of the Highway between the Pontville Roundabout and Ballyhooly Road.

There are mature trees located within the existing road reserve on the eastern side of the Highway from Wilsons Road to approximately 240m north of De Camera Road, and for a distance approximately 160m south of Eddington Road. The establishment of replacement trees on the adjacent private properties will be discussed with the relevant landowners.

3.9 Stakeholder Engagement

State Growth has undertaken significant engagement with affected stakeholders and feedback from stakeholders has been significant driver of the project. In the early stages of the design development individual meetings were held with adjacent landowners. These meetings provided valuable information regarding the current operation of the properties, particularly with respect to vehicular access.

During November 2016, a public display was held to advise the community of the intention to adopt the 3.0m central turn median treatment and reduce the speed limit to 80km/h. Prior to the display a letter was sent to most landowners adjacent to the Highway inviting them to the public display. Members of the project team were available at the public display to answer questions and listen to feedback.

In parallel with preparation for the public display, the Royal Automobile Club of Tasmania (RACT) and the Tasmanian Transport Association (TTA), a freight industry advocate, were consulted regarding the proposed upgrade treatment and associated reduction in the speed limit to 80km/h. The RACT and TTA did not object to the proposed treatment.

After the public display, the plans were uploaded onto the Department of State Growth's Midland Highway website and a letter sent to all adjacent landowners notifying them that the plans were available online so that any landowners that were not able to attend the public display could view the plans.

Since the public display individual meetings with adjacent landowners have been taking place to discuss specific project details such as the need for land acquisition and modifications required to property accesses and fencing. These meetings will be ongoing through to completion of the detailed design in June 2017 as will consultation with staff from Southern Midlands Council.

The key concerns raised by landowners primarily relate to the need for land acquisition and modifications to property access. State Growth is working with affected landowners to address these issues while not compromising the safety improvement objectives of the project. A summary of stakeholder matters is included in Appendix B.

3.10 Development Approvals

A Development Application has been approved by the Southern Midlands Council for this project. The conditions include typical items such as timing and maintenance of landscaping, traffic management plans, construction in and impact on Council roads and construction impacts on the local community. The conditions are acceptable to State Growth.

4 Project Program and Costs

4.1 Project Program

The key activities and their completion dates are outlined in Table 9.

Table 3 Project Program

Activity	Completion
Scoping PPR Approval	September 2016
Planning Permit	May 2017
PPR (Development and Delivery)	May 2017
Preliminary design	May 2017
PSCPW approval	June 2017
Land acquisition	June 2017
Detailed Design and Preparation of Tender Documents	July 2017
Tender Process	August 2017
Award of Construction Contract	September 2017
Construction	December 2018

4.2 Costs

A cost estimate has been prepared based on the design presented in this report. To inform the estimate, quantities have been taken from the current design model and rates estimated from similar projects and experience. Table 10 indicates the estimated project costs for each phase of the project including contingency.

Table 4 Cost Estimate

Costs	
Scoping and Development Phase	\$2,036,776
Delivery Phase (including service relocations, construction and land acquisition)	\$22,367,895
Total Cost*	\$24,404,671

*Total cost inclusive of P50 contingency and cost escalation.

The Australian Government is contributing 80% of the project funding with the remaining 20% provided by the Tasmanian Government.

5 Conclusion

The Midland Highway Upgrade Works Package – Mangalore to Bagdad Stage 2 (Mangalore) project will improve the safety rating of the Midland Highway through the provision of widened shoulders, a centre median turn lane and improved property access and intersection arrangements.

The Stage 2 works will achieve these benefits whilst:

- Maximising retention of the existing pavement;
- Avoiding impact on significant environmental features (where possible);
- Minimising the need for land acquisition; and
- Minimising impact on existing public utilities.

It is recommended that the project be approved to enable the detailed design to be finalised and tendering and construction to proceed.

Appendix A. Stakeholder Issues and Resolutions

Summary of Concerns

Issue ²	Comment
Retention of grass 'nature strips' in front of properties along the Heritage Mile	Disturbance of the existing grass nature strips along the Heritage Mile has been minimised by widening the Highway on the eastern side. Roadside drains will be constructed on the eastern side of the Highway where necessary to protect the pavement from water ingress. The footprint of the drains will be minimised where possible to minimise impact on the grass nature strips.
Upgrading of property accesses will detract from the heritage curtilage of heritage properties if crossovers like those used in the Bagdad stage are installed.	Concrete vehicular kerb crossings were only installed at Bagdad where it was not possible to construct full depth table drains due to property boundary constraints. Concrete vehicular kerb crossings are not required for Stage 2 (Mangalore). Property accesses will be sealed approximately 7m back from the edge of the Highway shoulder to provide a suitable surface for drivers to safely enter the Highway.
Retention of mile posts	All existing mile posts will be retained. They will be relocated clear of the works.
Protection of heritage structures from vibratory damage	<p>The use of vibratory compaction methods during construction will be prohibited near heritage structures. Department of State Growth contracts require that prior to the commencement of construction, a structural inspection of buildings within 50m of the Highway be undertaken and an existing conditions report prepared which records any existing structural defects. This report will provide a basis for comparison if there is a claim that construction activities have resulted in any structural damage.</p> <p>State Growth contracts mandate that the construction contractor is responsible for ensuring that their construction operations do not cause damage to any structures. Before final payment is made the contractor is required to obtain written clearance from all landowners and occupiers that they have no claim for loss or damage due to the contractor's operations. These requirements are enforced by State Growth.</p>
Ensuring accesses have sufficient width for turning	Consultation with landowners regarding property access modifications is underway. These discussions will be used to establish the common vehicle types that access each property and this information will be used to inform the design of access modifications.
Proximity of traffic island at chainage 1368 to property access	The location of the traffic island will be adjusted based on the turning path of the largest vehicle that uses the adjacent property access.

² As described by stakeholders, commonly during the Development Application process

Issue ²	Comment
Culverts being used for entrance driveways (on other sections of the Midland Highway) are unsympathetic to the heritage vista of the precinct.	The primary selection criteria for culvert end walls is safety. The width of the Highway reservation along the Heritage Mile does not enable some culvert end walls to be located outside the clear zone of the Highway. Where culvert end walls are located within the clear zone they either need to be 'driveable' or protected by road safety barrier. Driveable end walls are more sympathetic to the heritage vista than the installation of road safety barrier.
Consideration of the visual landscape along Heritage Mile and in particular the installation of treatments to minimise impacts.	The visual landscape along the Heritage Mile has been a key consideration in developing the upgrade design. Along the Heritage Mile the Highway has purposely been widened on the eastern side of the Highway to avoid impact on heritage properties located on the eastern side. Where widening of the Highway on the eastern side requires the unavoidable removal of existing trees, State Growth will arrange replacement trees in a safe location on adjacent private land subject to agreement from individual landowners.
Impact on 1172 Midland Highway (past service station) and future commercial operations	<p>The final design proposal in the vicinity of 1172 Midland Highway has considerably reduced impact on this property compared to earlier proposals. The final design does include a safety barrier across the full Midland Highway frontage of the property for safety reasons, as the building is in the clear zone (i.e. significant risk of vehicles running into the building if they leave the road). Access to both titles will be from a local road running parallel to the Midland Highway. One title also has access to Ballyhooly Road, near its intersection with the Midland Highway.</p> <p>The Midland Highway is a limited access highway, meaning that accesses are licensed and can be legally removed at the discretion of the Minister. Where legal accesses are closed by the Crown, compensation may be payable. In this case there will be land acquisition from the property, entitling the owner to compensation under the Land Acquisition Act.</p>

Issue ²	Comment
<p>Impact on 1552 Midland Highway, Lot 1, 1552 Midland Highway and 1546 Midland Highway including:</p> <ol style="list-style-type: none"> 1. Visual and noise impact associated with embankment at the southern end of School Road 2. Water runoff from Midland Highway impacting on 1552 Midland Highway 3. Water runoff from Midland Highway impacting on Lot 1, 1552 Midland Highway 4. Impact to watercourse 1546 Midland Highway 5. Impact to farmland Lot 1, 1552 Midland Highway 	<p>Responses to each of these issues are as follows:</p> <ol style="list-style-type: none"> 1. Widening of the embankment at the southern end of School Road is required due to widening of the Highway cross section and the need to ensure buses which service Bagdad Primary School can negotiate the turn at the southern end of School Road. Widening of the embankment results in the need for land acquisition and will also require the removal of some vegetation. The landowner will be compensated for the loss of vegetation through the land acquisition process. 2. A new open drain will be constructed within the road reservation along the frontage of 1552 Midland Highway to capture run-off from the Highway. The outlet of the drain will be discussed with the adjacent landowner. 3. The drainage regime adjacent to Lot 1, 1552 will be developed in consultation with the adjacent landowner 4. The open channel associated with the watercourse which passes through 1546 Midland Highway needs to be realigned near the property frontage due to the widened cross section of the Highway. The upgrade of the Highway will have negligible impact on the capacity of the watercourse and realignment of the watercourse will not increase the risk of flooding. The open channel associated with the watercourse is currently located parallel to the property frontage. It is not proposed to change this situation. Acquisition from 1546 Midland Highway is required due to the widened highway cross section. 5. The area of acquisition required from Lot 1 1552 Midland Highway is 2450m² which is approximately 5% of the overall 5.28Ha area of the existing title.

Appendix B. Roll Plans

Appendix C. Drainage Assessment Summary

Drainage Assessment Summary

The location of the culverts under the highway, their current size and the culvert size required to provide sufficient capacity for a 1 in 100 year rainfall event is indicated in Table C1. The same information for the roadside culverts is provided in Table C2.

Table C1: Culverts under highway with capacity less than required for a 1 in 100 year rainfall event

Chainage	Flow Rate for 1 in 100 year rainfall event (m ³ /s)	Existing Culvert Size	Size Required for 1 in 100 year rainfall event
2750	1.38	Twin DN600s	Twin DN750s
4980	0.13	DN300	DN375
5580	8.16	1800 x 900 box	1800 x 1200

Table C2: Culverts where overflow would result in water overtopping highway in a 1 in 100 year rainfall event

Chainage	Flow Rate for 1 in 100 year rainfall event (m ³ /s)	Existing Culvert Size	Size Required for 1 in 100 year rainfall event
140	0.255	DN300	Twin DN450s
200	0.21	DN225	Twin DN300
340	0.45	DN300	Triple DN450s
2380	0.25	DN300	Twin DN300s
3600 - 3700	0.22	DN300	DN375

Table C3 indicates the following attributes of the drainage catchments which cross the highway:

- The chainage at which each catchment crosses the highway
- The total area of each catchment
- The area of the total catchment that is impervious accounting for implementation of the highway upgrade works
- The percentage of the catchment that is impervious accounting for implementation of the highway upgrade works
- The percentage increase in impervious area as a result of upgrading the highway
- The design flow rate based on upgrading of the highway, and
- The percentage increase in flow rate as a result of upgrading the highway.

Table C3: Catchment Characteristics

Chainage	Total Catchment Area (ha)	Impervious Area based on Design (ha)	Impervious Area based on Design (%)	Increase in impervious area relative to existing (%)	Design flow for 1 in 100 year rainfall event (m ³ /s)	Increase in flow rate relative to existing for a 1 in 100 year rainfall event (%)
130	12	0.46	3.83	1.00	0.59	0.7
315	15	0.46	3.07	0.89	1.01	0.9
515	27	0.31	1.14	0.33	1.09	1.0
885	17	0.87	5.05	0.19	0.98	0.4
1245	88	0.14	0.16	0.01	2.99	0.3
1580	70	1.83	2.61	0.04	3.78	0.0
1985	44	2.01	4.58	0.34	1.63	0.6
2560	62	1.74	2.81	0.23	2.50	0.8
2750	51	0.84	1.64	0.32	2.26	0.7
3440	55	0.65	1.17	0.10	2.64	0.3
4320	117	1.15	0.98	0.18	5.41	1.3
4880	120	0.83	0.69	0.13	5.59	0.2
4980	0.6	0.30	50.25	2.58	0.10	2.0
5320	8	0.98	12.25	1.38	0.74	1.9
5580	225	1.23	0.54	0.07	7.14	0.0
5910	4	0.17	4.32	0.52	0.43	0.2
6110	35	0.43	1.23	0.00	2.13	0.0
6330	0.4	0.11	27.50	0.00	0.07	0.0
6465	25	1.21	4.83	0.87	1.79	1.7

The catchment assessment indicates that there will be minimal increase in flow as a result of upgrading the highway. Accordingly, upgrading of the highway will have negligible impact downstream of the highway due to the size of the catchments relative to the impervious area associated with the highway.