Gerringong to Bomaderry
Princes Highway upgrade

ROUTE OPTIONS DEVELOPMENT
APPENDIX E - PRELIMINARY PUBLIC UTILITIES AND SERVICES REPORT
NOVEMBER 2007
Gerringong to Bomaderry
Princes Highway Upgrade

Preliminary Public Utilities and Services Report

The Roads and Traffic Authority NSW
October 2007
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RTA acceptance

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<td>Jay Stricker</td>
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1.0 Background

Maunsell was engaged by the RTA in December 2006 to carry out an Options and Route Selection Study, Concept Development and Environmental Assessment (EA) for upgrading the Princes Highway between 42.6 km to 74.6 km south of Wollongong. Maunsell has engaged a number of prominent sub-consultants to contribute to the delivery of this project.

The work includes development of route options and concept development based on the identified preferred route, environmental assessment, public displays and handover period to allow for finalisation of all activities and reports following the announcement and display of the Preferred Route, the Environmental Assessment and the Conditions of Approval.

The project will provide a bypass of Berry. The northern extremity of the project is in the vicinity of the Mount Pleasant Lookout (north of Gerringong at the termination of the four lane configuration) and the southern extremity of the project is the intersection (roundabout) of the Princes Highway with Cambewarra and Moss Vale Roads at Bomaderry.

Community involvement is a key aspect of this project and will afford the broader community the opportunity to make a demonstrable input to the process and to ensure that the requirements and aspirations of the community will be adequately and appropriately addressed. This is particularly relevant to:

a) Any potential impacts on rural and residential areas within the study area;
b) Social and economic impacts;
c) Accessibility of the road network for local and through traffic;
d) Potential impacts on water quality;
e) Potential impacts on wetlands;
f) Potential impact on flooding;
g) Potential impacts on land uses;
h) Threatened flora and fauna species;
i) Indigenous and non-indigenous heritage;
j) Visual impact;
k) Noise; and
l) Air quality.

Several studies have been undertaken since the early 1990s to identify a preferred route to upgrade sections of the Princes Highway between Kiama and Nowra including a bypass around the town of Berry.

These studies include:

m) The 1991 Gerringong to Berry Route Study;
n) 1998 North Street Berry Bypass Corridor; and
o) 2004/05 Quantm Study from Kiama to Nowra.

Sections of the highway between Gerringong and Bomaderry have a poor accident record and limited safe overtaking opportunities.

Due to the significant changes in traffic, land use and population since 1991, the NSW state government, in March 2006 committed to investigating an area where it is likely a preferred route would be located to upgrade the Princes Highway between Mount Pleasant at Gerringong and Moss Vale / Cambewarra Road at Bomaderry to meet current road standards.
2.0 Objective of report

The objective of this report is to provide a preliminary review of the major public utility infrastructure and services located within the study area shown in Figure 2.1. This report addresses the following:

a) Consultation with service and utility providers to date;
b) Locations of utility infrastructure and services;
c) Objectives for the integration of existing and proposed services and public utilities with the short-listed options; and
d) Constraints imposed by services and public utilities on the short-listed options.

This report presents a public utilities and services adjustment strategy. Associated costs have been included in the preliminary concept design cost estimates included in the Route Options Development Report.

The principal objectives relating to the integration of existing and proposed public utilities and services within the route options development process are as follows:

e) Where possible, avoid utility and service relocation and disruption by appropriate consideration and appreciation of the asset during the route selection phase;
f) Provide adequate and required clearance height / depth and lateral offset between the proposed upgrade works and the utility asset to satisfy the utility / service providers requirements;
g) Ensure that the proposed upgrade works, and construction methods, do not result in lateral or vertical deformations that could result in damage to utility and service asset infrastructure; and
h) Where possible, ensure that provision is allowed for future utility and service upgrades through liaison with utility / service providers throughout the route options development and preferred route concept design development process.
Figure 2.1: Study area between Gerringong and Bomaderry

Source: RTA 2007
3.0 Consultation with utility agencies

3.1 Agency contact

The relevant utility / service agencies operating and / or maintaining infrastructure within the study area were consulted as follows:

a) Invited to a Planning Focus Meeting held on 29 September 2006 at the WIN Sports and Entertainment Centre;

b) Attendance and participation at the Planning Focus Meeting to formally introduce the project to a range of key stakeholders including utility agencies and service providers to discuss key issues and concerns; and

c) It was determined that the Dial Before You Dig process is not suited to a large study area and instead direct contact with relevant utility and service provider representatives would be more appropriate.

The relevant contact details of those utility and service providers contacted during the preliminary study are presented in Table 3.1. Electronic copies utility / service layout and network plans were requested during the initial contact phase. Information contained in the electronic plans was transferred via the use of geographical information systems to form various overlays for plans generated by the project team during the planning of this project.

A detailed description of the major utility infrastructure and services located within the study area is provided in Section 4 of this report and illustrated in Figure 3.1.

Table 3.1: Contact details of utility and service providers

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<td>Trent Wray (Distribution)</td>
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<td>Sydney Water</td>
<td>No</td>
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<td>Phil Lee</td>
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<td>Visionstream</td>
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<td>Max Schouten</td>
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<td>Telstra</td>
<td>Yes</td>
<td>.dxf</td>
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<td>OPTUS</td>
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<td>Railcorp</td>
<td>Yes</td>
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*PFM = Planning Focus Meeting

EGP = Eastern Gas Pipeline
3.2 Agency issues and concerns

The Planning Focus Meeting provided the opportunity for utility agencies to give a short presentation and raise any issues or concerns that they have with the route selection process, or needs they have for the preferred route. Telstra and Alinta gave presentations.

Utility agencies listed the following issues as their main area of concern:

a) Minimise relocation of utilities;

b) Minimise construction impacts on utilities. (Particularly Alinta eastern gas pipeline and Telstra Sydney-Melbourne east coast cable); and

c) Provide provision for access to utilities for maintenance.
4.0 Public utility and service infrastructure and asset

A network of major utility and service infrastructure traverses the study area. This infrastructure is described below and shown in Figure 3.1.

4.1 High voltage electricity

4.1.1 Integral Energy

Integral Energy own and operate an overhead 132 kV transmission line that tracks inside the study area on the western side of Bomaderry and Berry. This is a twin line supported on timber poles.

A 33 kV transmission line generally tracks adjacent to the railway line from Gerringong to Berry. North of Gerringong, the line splits in two with one branch following the existing highway and another tracking true north. South of Berry the line diverges from the railway line, crosses the existing highway at Croziers Lane, and tracks between the western side of the existing highway and the edge of the study area to Bomaderry. The 33 kV transmission line is not shown on Figure 3.1 for clarity.

Integral Energy also own and operate an overhead 11 kV network and local low voltage distribution network which corresponds to the local road network over the entire study area. This is also not shown on Figure 3.1 for clarity.

4.2 Water

The study area is bisected by the boundary between Kiama and Shoalhaven Local Government Areas. This boundary also defines the jurisdictions for Sydney Water and Shoalhaven Water. Sydney Water jurisdiction includes Kiama Council. Shoalhaven Water is a business unit of Shoalhaven City Council.

4.2.1 Sydney Water

Sydney Water operates a sewer and water network in Gerringong and Gerroa on the eastern side of the railway line. Water is provided to Gerringong from the Gerringong reservoir located at the northern extremity of the study area. A Sydney Water 375 mm diameter main follows the eastern side of the existing highway from Mount Pleasant to Rose Valley Road. South of Rose Valley Road it crosses to the western side, where it remains until Fern Street, where it again crosses and follows Fern Street into Gerringong and on to Gerroa. There are no other water mains in the study area within the Kiama Local Government Area.

The sewerage network in Gerringong and Gerroa culminates at the Gerringong Gerroa Wastewater Treatment Plant south of Crooked River outside the study area. The Gerringong Gerroa Wastewater Treatment Plant does not discharge to the ocean. Advanced tertiary treated effluent is pumped to Sydney Water owned grazing land between the railway line and the existing Princes Highway where it is used to irrigate pasture. The effluent re-use irrigation scheme covers a substantial area east of Sharpes Lane in the Toolijooa area. The scheme is operated by Veolia Water. The treated effluent pipeline is the only significant sewer line in the study area within the Kiama Local Government Area. Mitigation measures such as alternative sites or compensatory land purchase would have to be considered for any route options which effect the operations of the effluent re-use irrigation scheme.
4.2.2 Shoalhaven Water

Shoalhaven Water operates a sewer and water network in the Shoalhaven Local Government Area. This includes the towns of Berry and Bomaderry. Water is provided to Berry from reservoirs located on Kangaroo Valley Road, approximately 400 m west of the intersection with Bundewallah Road. Two asbestos cement mains leave the reservoir and track Kangaroo Valley Road to the intersection with North Street. They then track North Street to the intersection with George Street. Water is supplied to Bomaderry from a reservoir located outside the study area. A Nowra to Berry trunk main is located between the railway and the eastern side of the Princes Highway. The main is located within the road boundary between Jaspers Brush Road and Meroo Road. There are various PVC (polyvinyl chloride) mains crossing the highway to service properties on the western side.

The sewer network in Berry extends as far east as Pulman Street, as far north as North Street, and up Kangaroo Valley Road. The network culminates at the Berry Wastewater Treatment Plant off Wharf Road, south of Berry. The Wastewater Treatment Plant discharges to Broughton Creek. The sewer network in Bomaderry discharges to the Bomaderry Wastewater Treatment Plant located on Bolong Road, southeast of the study area. Properties outside of the urban centres are not serviced by the sewer network.

4.3 Gas

The most significant gas asset in the study area is the Eastern Gas Pipeline owned and operated by Alinta. The Eastern Gas Pipeline runs from northern Victoria to Western Sydney. It is a 450 mm diameter 15 MPa main buried at a depth between 900 mm and 1200 mm. The main traverses almost the entire study area and crosses the existing highway twice. The Eastern Gas Pipeline follows a similar alignment to the 132 kV transmission line from Bomaderry to north of Berry. Between Berry and Gerringong, the Eastern Gas Pipeline alignment gravitates towards the railway line, tracks along the railway line for a short section, then diverges northward from the railway line and the highway in the vicinity of Belinda Street.

Agility also own and operate a reticulation network in the Bomaderry industrial area. This network is fed by a main from the Bomaderry Offtake of the Eastern Gas Pipeline and crosses the existing highway at Prestells Lane.

4.4 Telecommunications

4.4.1 Optus

A Sydney-Melbourne optic fibre cable traverses the study area on a similar alignment to the Eastern Gas Pipeline and 132 kV transmission line south of Berry. North of Berry, the cable alignment is similar to the Eastern Gas Pipeline alignment.

4.4.2 Telstra

The major Telstra asset located in the study area is a Sydney-Melbourne optic fibre cable which is generally aligned with the railway entering Gerringong. The cable tracks through Gerringong and rejoins the eastern side of the railway in the vicinity of Belinda Street. It then follows the southern side of the railway line to Bomaderry.

Telstra also own and operate Inter-exchange Network cables between telephone exchanges which carry high volumes of data between Berry and Kangaroo Valley and Berry to Nowra. These are also optic fibre cables.
4.4.3 Visionstream

Visionstream own and operate a Sydney-Melbourne optic fibre cable. It has been confirmed that this cable is located approximately 15 km north-west of the study area and will not be affected by the proposed upgrade route.

4.5 Rail

RailCorp’s network terminates at Bomaderry. The line from Kiama to Bomaderry is not electrified and is single track only. Passenger stations are located at Gerringong, Berry, and Bomaderry. The railway is constructed on embankment for much of its length in the study area. Numerous local roads cross the railway. The most significant crossing is Fern Street which crosses the railway at a signalised level crossing.
5.0 Constraints

5.1 High voltage electricity

5.1.1 Integral Energy

As the twin 132 kV transmission lines track near the northern boundary of the study area, it is unlikely that the majority of route options would interact with this asset. If the transmission line was to be crossed, it would be preferable to cross near-perpendicular to the transmission line alignment as the spacing of the transmission poles is in the order of 200 m.

Any route option will be required to interact with the 33 kV transmission line. At least one crossing will be required in the vicinity of Gerringong. At least one other will be required between Berry and Bomaderry. A clearance of 12 m is required from pavement surface to catenary.

Local raising of the 33 kV transmission line to achieve the required clearance has not yet been investigated. The feasibility and financial viability of doing this will be investigated during route option development. It is more likely that significant local raising would be required in flood prone areas where there is a need to raise the road formation above the flood level.

5.2 Water

5.2.1 Sydney Water

One or more crossings of the 375 mm main from the Gerringong Reservoir are likely. Protection requirements for this main have not yet been investigated. It is likely that this main will require concrete encasement where it is inaccessible. New crossing(s) will be required if the finished road surface of the proposed upgrade provides unacceptable cover.

Sydney Water owns a large parcel of land between the railway line and the existing Princes Highway for the purpose of an effluent re-use irrigation scheme. Treated effluent is pumped to this site from the Gerringong Gerroa Wastewater Treatment Plant. Mitigation measures such as alternative sites or compensatory land purchase and a possible partial or full relocating, would have to be considered for any route options which effect the operations of the scheme.

A route option following the railway line will be required to cross the poly pipeline conveying treated effluent from the Gerringong Gerroa Wastewater Treatment Plant to the Sydney Water land between the railway and the existing highway. Although this has not yet been investigated, it is believed that such a crossing would not pose significant issues.

5.2.2 Shoalhaven Water

Any route options traversing to the north of Berry will require a crossing of the trunk main from the Kangaroo Valley Road reservoir. It is not yet known if this crossing would require protection or relocation of the main. Route options traversing to the south of Berry would be constructed on formation and would cross local roads, and hence the water reticulation network.

The 200 mm Berry-Nowra main does not interact with the existing highway until south of Jaspers Brush Road. The main traverses the eastern side of the highway until it diverges at Meroo Road.

Conflict with the sewer network around Berry is likely to be confined to those options traversing to the north of Berry and crossing Kangaroo Valley Road in cutting. Sewer adjustments will be required for these options with potential need for rising mains. Options traversing to the south of Berry will be constructed on formation and are not likely to require adjustment of the sewer network.
A significant rising main services the estate located to the northwest of the intersection of Cambewarra Road and the Princes Highway. Although this is located outside the current road reserve, it is possible that a road widening in this vicinity could impact on this main.

5.3 Gas

All potential route alignments, with the exception of a route running parallel with the southern side of the railway line, will be required to interact with the Eastern Gas Pipeline. The Eastern Gas Pipeline is a significant piece of infrastructure with special care required to avoid damaging or rupturing.

Protection of this main requires more than maintaining adequate cover. There are potential issues with construction vibrations affecting the corrosion protection coating. Construction vibrations can cause this coating to crack. Cover to the pipe may be increased but not to the extent that access is inhibited.

The most significant constraint for route options development is maintaining adequate cover to this asset and avoiding crossing the pipeline in cut. Current cover to the pipeline is 900 mm to 1200 mm. There is no equipment available in Australia to relocate the pipeline. Alinta has intimated that a twelve month lead time is required to source the required equipment and special fittings needed to be manufactured; and relocation of the pipeline could incur costs in the order of $10 million.

The Eastern Gas Pipeline is currently 6 m inside a 20 m wide easement. Alinta has advised that there may be a need to duplicate the pipeline within the 20 m easement in the future. Alinta has also advised that no provision is required during construction for future pipeline. Under-boring would be used to cross any road formation.

5.4 Telecommunications

5.4.1 Optus

South of Berry, the Eastern Gas Pipeline, 132 kV transmission line, and the Optus Sydney-Melbourne optic fibre cable share similar alignments. North of Berry, the Optus optic fibre cable alignment is similar to the Eastern Gas Pipeline alignment. The Optus cable and Eastern Gas Pipeline cross the study area and follow the railway line northward before again crossing and exiting the study area north of Gerringong.

Rerouting of optic fibre cables is not desirable. Where possible, any crossing of the cable would be in embankment with appropriate protection for the cable. In the context of a highway route selection process, the costs for realignment of the cable may not be prohibitive. The feasibility of realignment will be investigated if a selected route option has a requirement to cross below existing surface level.

5.4.2 Telstra

Any route option required to cross to the southern side of the railway line will interact with the Sydney-Melbourne optic fibre cable. This cable follows the southern side of the railway line from Gerringong to Bomaderry. Any route option located on the southern side of the railway line will be constructed on formation in order to provide flood immunity. Where a route option parallels the cable for a significant length, it is likely that the road formation would be constructed to avoid interaction with the cable. The cable is likely to require protection where a route option is required to cross on formation.

Telstra’s Inter-exchange Network cables radiate from the Berry Exchange. They extend up Kangaroo Valley Road, up Woodhill Mountain Road, Tannery Road, and down Wharf Road. Any route option will interact with the Inter-exchange Network cables. These cables are also optic fibre cable and would be relatively costly to adjust.
5.5 Rail

The rail line between Gerringong and Berry is located on relatively low-lying land at the base of the ranges. Here the rail line is elevated above the flood plain. Any crossing of the rail line would require a significant height structure to achieve a vertical clearance to the rail tracks in the order of 6.5 m. It is unlikely that there is scope to cross under the railway line. Any road formation adjacent to the rail line would also need to be located above the flood plain.
6.0 Adjustment strategy

6.1 Impact on utilities

Consideration was given to minimising impact on utilities in the development and selection of the route options. Meetings were held with Optus and Alinta representatives to discuss the specific requirements for their assets. The adjustments required for each utility for various route options, and an indication of cost for each, is presented below.

6.1.1 Alinta - Eastern Gas Pipeline

Existing highway crossings

The Eastern Gas Pipeline currently crosses the existing highway in two locations – west of Belinda Street at Gerringong, and east of Tindalls Lane at Berry. Any route option requiring upgrade of the existing road alignment would be at the same grade or in low to medium fill at these locations.

The Eastern Gas Pipeline was under-bored with medium walled pipe at these locations. Where the formation is to be widened, the Eastern Gas Pipeline would need to be exposed, the pipe coating reapplied, and backfilled with stabilised sand. Alinta has indicated that there are no issues with potentially high fills being placed over the pipeline. Alinta has not provided an indicative cost to recoat and protect the pipe, although this is not expected to be prohibitive. It is likely that Alinta would closely supervise the work and may appoint their own contractor to expose the pipe.

Easement adjacent to rail line

The Eastern Gas Pipeline also follows the northern edge of the railway corridor from the existing highway to approximately Sharpes Lane. The current pipe is located 6 m from the railway boundary. Alinta has taken a 20 m easement from the railway boundary to provide for a future pipe to be located 14 m from the railway boundary. Any new road formation would need to be wholly located outside the 20 m easement over this length.

South saddle

The Eastern Gas Pipeline traverses a saddle in the ridgeline between Toolijooa ridge and Harley Hill. Any route traversing this saddle would be in tunnel perpendicular to the pipeline. It is anticipated that the roof of the tunnel would be at least 10 m below the pipeline. No blasting techniques would be used to excavate the tunnel. Excavating techniques, such as the use of a road header, would not create vibrations in excess of Alinta's peak particle velocity limit of 20 mm/s. Alinta does not foresee any issues with boring a tunnel in rock below the Eastern Gas Pipeline at this location.

6.1.2 Optus – Optic fibre cable

Existing highway crossings

The optic fibre cable currently crosses the existing highway in two locations – near the Crooked River bridge at Gerringong, and approximately 1.5 km east of Tindalls Lane at Berry. Any route option requiring upgrade of the existing road alignment at the Crooked River bridge location would be either at same grade or in low to medium fill. Optus has advised that there could be some looping in the optic fibre cable to allow some re-positioning if necessary. The optic fibre cable is contained in a 100mm diameter PVC (polyvinyl chloride) conduit at road crossings and is direct-buried elsewhere. Where the road formation is widened, the direct-buried optic fibre cable would be exposed and encased in a split conduit.

Prior to the optic fibre cable crossing the highway at approximately 1.5 km east of Tindalls Lane, the optic fibre cable traverses the eastern side of the road corridor for approximately 800 m.
It is likely that the optic fibre cable would need to be exposed and re-laid over this length if this section of the highway was to be upgraded. An additional splice in the optic fibre cable would not be required since an existing splice at this location could be moved. The new section of optic fibre cable would be placed within the new road reserve.

South saddle
The optic fibre cable runs parallel with the Eastern Gas Pipeline at the south saddle. Optus has indicated that tunnelling under the optic fibre cable at this location should not adversely affect the optic fibre cable.

6.1.3 Sydney Water – water main and effluent re-use irrigation scheme

Gerringong water main
A Sydney Water 375 mm diameter main follows the eastern side of the existing highway from Mount Pleasant to Rose Valley Road. South of Rose Valley Road it currently crosses to the western side, where it remains until Fern Street where it again crosses and follows Fern Street into Gerringong. It is likely that the existing highway alignment would be upgraded in this vicinity. The road alignment over this length is currently a three lane configuration. Any upgrade is not likely to significantly alter the existing road alignment from Mount Pleasant to Fern Street. It is likely that the water main is currently concrete encased where it crosses the road. It is therefore also likely that the main would need to be exposed and concrete encased where it was to be covered by any road widening. The costs associated with the protection treatment are not considered prohibitive.

Sydney Water has plans to replace the section of main currently on the western side of the highway, between Rose Valley Road and Fern Street, in the near future. Sydney Water intends to eliminate the two crossings of the highway and route the new main on the eastern side of the highway.

Effluent re-use irrigation scheme
Any route option located between the existing highway and the railway line east of Toolijooa Road, will impact on the Sydney Water owned effluent re-use irrigation scheme. This scheme is located adjacent to the railway line between Gerringong and Toolijooa. The project team is currently investigating the feasibility of accommodating the impact of a route option on the scheme. It is likely that the scheme would need to be partially, or possibly fully, relocated if impacted by an option.

6.1.4 Shoalhaven Water – water and sewer mains

Berry and Bomaderry / Berry water main
The water mains servicing Berry travel along Kangaroo Valley Road and North Street at Berry. It is anticipated that any route option crossing Kangaroo Valley Road will cross under Kangaroo Valley Road in cutting between the existing highway and North Street. It is anticipated that an underpass of Kangaroo Valley Road could be achieved with an at grade or in low fill at the crossing of North Street. These mains are likely to require concrete encasement where the upgrade crosses their alignment on North Street.

The water main between Berry and Bomaderry tracks the eastern side of the existing highway between Jaspers Brush Road and Meroo Road. Where the existing highway is to be upgraded in this vicinity, it is likely that the main will require protection and/or relocation.

Sewer mains servicing properties on Kangaroo Valley Road will require adjustment in order to be redirected around the Kangaroo Valley Road cutting – most likely between Kangaroo Valley Road and North Street.
6.1.5 Minor overhead power and communications

Where sections of the existing highway are to be upgraded, any existing minor utilities will need to be relocated to suit the new alignment.