



Warrell Creek to Urunga Upgrading the Pacific Highway

ENVIRONMENTAL ASSESSMENT

VOLUME 1 ENVIRONMENTAL ASSESSMENT

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Working paper 2 Visual amenity and design

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Working paper 4 Aboriginal heritage (not included due to sensitivity of information to Aboriginal community)

Working paper 5 Water (flooding and water quality)

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Certification

Submission of Environmental Assessment

Prepared under Part 3A of the *Environmental Planning and Assessment Act 1979*

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Proposed development: Upgrading the Pacific Highway Upgrade, Warrell Creek to Urunga,
Environmental Assessment

Land to be developed: Land generally required for the design refinement, construction and
operation of the proposed development, as shown in **Figures 6–1 to
Figure 6–4** of the Environmental Assessment.

Environmental assessment: An environmental assessment is attached which addresses all matters
in accordance with Part 3A of the *Environmental Planning and
Assessment Act 1979*

Declaration: I certify that I have prepared the contents of this Environmental
Assessment with the Director- General's requirements dated 13 October
2009 and that to the best of my knowledge, the information contained in
the environmental assessment is not false or misleading.

Signature:



Name: Ross Jones

Date: 22 January 2010

Signature:



Name: Adam Cameron

Date: 22 January 2010

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Glossary

- **Acid sulphate soils** Naturally acid clays, mud and other sediments usually found in swamps and estuaries. They may become extremely acidic when drained and exposed to oxygen and may produce acidic leachate run-off that can pollute waters and liberate toxins.
- **Alluvial** Sediment deposited by water such as a river or stream.
- **Ambient** The background level at a specified location, being a composite of all sources. Examples of the use of this term include 'ambient noise' or 'ambient air pollutants'.
- **Amenity** Something that contributes to physical or material comfort.
- **Aquaculture** The process of raising and harvesting fresh and saltwater plants and animals.
- **Aquifer** Rock or soil formation containing water in recoverable quantities.
- **Aquifer recharge** The infiltration or injection of natural waters or recycled waters into an aquifer, providing replenishment of the ground water resource.
- **Artefact** An object, normally portable, made or modified by human hands.
- **Average recurrence interval** The average recurrence interval (ARI) (measured in years) is a term used to describe the frequency or probability of floods occurring. Large floods occur rarely, whereas small floods occur more frequently. For example, a 100 year ARI flood is a flood that occurs (or is exceeded) on average once every 100 years.
- **B80** this is a biofuel blend comprising 80% of pure biodiesel comprising fatty acid methyl/ethyl esters and 20% fossil fuel diesel.
- **Background noise** The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the LA90 descriptor.
- **Benthic** The bed of a body of water, including the silt or mud that lies there.
- **Berm** This consists of earth or overburden to serve a specific purpose. For example, stabilising berms are used for stabilising purposes.
- **Biofuels** Fuel that has been derived from biological matter.
- **Biological diversity** The variety of all life forms, comprising genetic diversity (within species), species diversity and ecosystem diversity.
- **Bioregion** An area defined by ecological systems and human communities rather than political boundaries.
- **Bund** A bund is an embankment or wall of brick, stone, concrete or other impervious material, which may form part or all of the perimeter of a compound and provides a barrier to retain liquid.
- **Colluvium** Loose sediment that accumulates at the base of a hill.
- **Combined fauna crossing** A culvert structure that is designed for the dual purpose of facilitating drainage and fauna passage. These structures facilitate fauna passage via the inclusion, within a drainage culvert, of

special features such as a raised bench or lowered central floor for elevated dry passage or a raised outer cell that remains dry during average rainfall events but may take flow during heavy rainfall events.

- **Compensatory habitat** Land acquired to provide a new habitat to offset impacts on key habitat for fauna species.
- **Cone penetrometer** This device is inserted into the ground and is used to measure soil strength and level of compaction.
- **Construction** All work in respect of the proposed upgrade other than that defined as pre-construction activity/work.
- **Core drilling** This procedure is used to obtain soil samples. A drilling machine is used to extract a cylindrical sample so that the strata in the sample remains undisturbed.
- **Culvert** A pipe, drain or channel which allows facilitates drainage and allows water to pass beneath the road.
- **Curvilinear alignment** The alignment is a continuous curve with constant, gradual and smooth changed of direction
- **Dedicated fauna crossing** A structure specifically designed to provide a mechanism for fauna to cross a barrier (i.e. road).
- **Design Peak Hour Level of Service** The design peak hour Level of Service is the Level of Service corresponding to the actual service flow rate in the design peak hour. The actual service flow rate is calculated taking into account factors relating to traffic composition, road geometry, development, environment and driver population.
- **Dicotyledons** are characterised by the presence of two seed leaves of a germinating seed.
- **Dissipation testing** A measure of the rate of dissipation of the pore water pressure.
- **E10** Blend of low levels of conventional fuel with petroleum. E10 comprises 10% ethanol and 90% fossil fuel.
- **Ecologically sustainable development** Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.
- **Ecosystem** A functional unit of energy transfer and nutrient cycling in a given place such as a forest or estuary; it includes all the relationships within the biotic community and between the biotic components of the system.
- **Electrofishing** A technique used to sample fish populations by using electric currents to immobilise fish.
- **Endangered ecological community (EEC)** As defined under the *Threatened Species Conservation Act 1995*, an ecological community that is likely to become extinct or is in immediate danger of extinction.
- **Endemism** Describes species that are native to a particular geographic area or continent. Examples of endemism in Australia are the Koala and the red kangaroo, both of which are not naturally found anywhere else in the world.
- **Ephemeral** Existing for a short duration of time.

- **Erosion** The natural process where wind or water detaches a soil particle and provides energy to move the particle.
- **Estuarine** Relates to the area where the river meets the sea causing freshwater to mix with saltwater.
- **Floodplain** Large flat area of alluvium adjacent to a watercourse, characterised by frequent erosion and aggravated by channelled and overbank stream flow.
- **Fluvial** Produced by the action of a river or stream.
- **Foliovorous** Feeds primarily on leaves and stems.
- **Frugivorous** Feeds primarily on fruit.
- **Fyke netting** A sampling method using nets held open by hoops to capture fish in shallow waters.
- **Greenhouse gases** A gas in Earth's atmosphere that traps heat and can contribute to global warming. Although greenhouse gases are a natural part of the atmosphere, human activity is increasing them mostly through the production and release of carbon dioxide, methane and nitrous oxide.
- **Habitat** The place where an organism lives; habitats are measurable and can be described by their flora and physical components.
- **Hornfels** A type of fine grained, non-foliated metamorphic rock. It is usually formed when heated by a nearby intrusive igneous mass.
- **Incidental fauna crossing** A drainage structure, such as a culvert, that is of an appropriate size to also provide a mechanism for fauna to cross a barrier (i.e. road).
- **Intrusive noise** Refers to noise that intrudes above the background level by more than 5 dB(A).
- **LA(XX)** The LA(XX) refers to statistical indicators that represent the percentage of time that a noise level is exceeded. These levels are commonly the LA₁, LA₁₀, and the LA₉₀, and are graphed to show how these levels change over the course of a 24 hour period.
- **LA90** An important statistical indicator that represents the A-weighted sound pressure level that is exceeded for 90% of the time over which the noise is measured. This is often termed the background noise.
- **LAeq** Although the LAeq is not a statistical indicator, it is probably one of the most important of the noise descriptors. It represents the equivalent continuous A-weighted noise level for the measurement period. This is the level of noise energy averaged over the measurement period.
- **LAmx** Maximum noise level. The highest noise level during a specified time period or during a specified number of events expressed as the absolute maximum value of the root-mean-square (r.m.s.) sound pressure level using time weighting 'F'.
- **LAmn** Minimum noise level. The lowest noise level during a specified time period or during a specified number of events, expressed as the absolute minimum value of the root-mean-square (r.m.s.) sound pressure level using time weighting 'F'.
- **Level of service (LoS)** A performance measure used in planning design and operation of roads. It provides the basis for determining the number of lanes to be provided in the road network. The design peak hour LoS is

the level of service corresponding to the actual service flow rate in the design peak hour. The actual service flow/rate is calculated taking into account factors relating to traffic composition, road geometry, development and driver population.

- **Longitudinal** Along the alignment (of road or bridge).
- **Longitudinal section** A vertical section, usually with an exaggerated vertical, scale, showing the existing and design levels along a road line or another specified line.
- **Macroinvertebrate** Refers to aquatic invertebrates including insects, crustaceans, molluscs and worms which inhabit a river channel, pond, lake, wetland or ocean. They are used as environmental indicators to assess the health of aquatic ecosystems.
- **Macrophytes** Encompass the in-stream flowering plants that may be found attached or floating within a waterway. They include submergent (underwater) and emergent species (such as reeds that emerge out of the water) that inhabit both estuarine and freshwater reaches of a river. Macrophytes are important biological indicators in this study as their distribution depends upon water quality and flow conditions.
- **Mesophilic** Species growing optimally at moderate temperatures.
- **Metamorphism** The process of altering the composition, chemical and structure of a rock by heat and pressure.
- **Microchiropteran bats** Are small bats that use echolocation (emit sound waves and listen for echoes).
- **Monocotyledon** Are characterised by the presence of one seed leaf of a germinating seed.
- **Nectarivorous** Feeds on nectar from flowering plants.
- **Operation** The operation of the Proposal, but not including commissioning trials of equipment, or temporary use of parts of the proposed upgrade during construction.
- **Overpass** A road which spans over another roadway (in this case usually the highway).
- **PAD** See Potential archaeological deposits.
- **Particulates** Dust and other fine particles.
- **pH** A measure of how acidic or alkaline a solution is. The pH scale is 0-14 with a score of 7 representing a neutral value. Values less than 7 indicate an acid solution, greater than 7 an alkaline solution. Most freshwater and estuarine biota have a tolerance range of between approximately 6.5 and 8.
- **Phyllites** A fine grained metamorphic rock formed from low grade metamorphism of claystones.
- **Photogrammetry** The process of extracting three-dimensional coordinate information from imagery, typically aerial stereo imagery.
- **Potential archaeological deposit (PAD)** A potential archaeological deposit, or PAD, is defined as any location where the potential for subsurface archaeological material is considered to be moderate or high, relative to the surrounding study area landscape. The potential for subsurface material to be present is assessed using criteria developed from the results of previous surveys and excavations relevant to the region.

- **Pre-construction** Work in respect of the proposed upgrade that includes design, survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or ecological communities would be affected), establishing ancillary facilities such as site compounds, or other relevant activities determined to have minimal environmental impact (e.g. minor access roads).
- **Proponent** The person or body proposing to carry out a development or activity.
- **Pyritic mineralisation** The geothermal deposition of pyrite minerals in a body of rock.
- **Receiving water** A body of water such as a stream, river, lake, or ocean, which receives stormwater and wastewater.
- **Recharge zone** A recharge zone is where water flows into the ground to become groundwater through the recharge system.
- **Referral** This is used to determine whether a proposed action would need formal assessment and approval by a government department or statutory authority. The referral is usually the principal basis for the Minister's decision as to whether approval is necessary. For example, under the *Environmental Protection and Biodiversity Conservation Act 1999*, a referral is a description of a proposed action that allows the Environment Minister to determine if environmental assessment and approval is required under the Act.
- **Rehabilitation** The restoration of a landscape and especially the vegetation following its disturbance.
- **Relic** The *NSW Heritage Act 1977* defines a 'relic' as any deposit, object or material evidence: which relates to settlement of that area that comprises NSW, not being an aboriginal settlement; and which is 50 or more years old.
- **Remnant** Vegetation Native vegetation remaining after widespread clearing has taken place.
- **Riparian** Relating to the banks of a natural water way.
- **Riparian vegetation** In the context of this study riparian vegetation encompasses the woody and non-woody vegetation that inhabits the riverine riparian zone of the Hawkesbury-Nepean River and its tributaries.
- **Riparian zone** The riparian zone is defined as "the stream channel between the high and low water mark towards the uplands where vegetation may be influenced by elevated water tables and flooding and by the ability of soils to hold water".
- **Sag curve** A concave vertical curve in the longitudinal profile of a road.
- **Schists** A type of medium-grained metamorphic rock formed by high temperature and high pressure. This rock has well-developed foliation (layered structure) and is usually formed from mica-bearing rocks.
- **Sclerophyll** Vegetation that is characterised by hard, tough leaves.
- **Sediment** Material of varying sizes that has been or is being moved from its site of origin by the action of wind, water or gravity.
- **Seismic** Relates to movement subject to or caused by an earthquake or other vibration of the Earth.

- **Seismic refraction survey** This method is used for investigating subsurface geological conditions and structures using seismic waves. Using the seismic velocity, different layers of the subsurface conditions can be determined.
- **Select Fill Soil** that is placed directly onto geosynthetic materials.
- **SEPP 14** State Environmental Planning Policy No 14 – Coastal Wetlands. This policy aims to ensure the protection and preservation of coastal wetlands in NSW.
- **Shear vane testing** This in-situ method is used to determine the shear strength of the soil.
- **Site compound** Area enclosing construction machinery, stockpiles and site offices.
- **SPOCAS** Suspended Peroxide Oxidation Combined Acidity and Sulphate testing is carried out to determine actual or potential acidity of acid sulphate soils.
- **Spoil** Soil or materials arising from excavation activities.
- **Stakeholder** An individual or group that has an interest in the project.
- **Standpipe piezometer** These instruments are used to monitor pore water pressure and water levels.
- **Stockpile** Temporarily stored materials, e.g. soil, sand, gravel, spoil/waste.
- **Stormwater** All surface water runoff from rainfall, predominantly in urban catchments; such areas may include rural residential zones.
- **Tectonic movements** Movement resulting from or causing deformation of the earth's crust.
- **Transverse** Perpendicular to the alignment (of road or bridge)
- **Veining** Mineral matter deposited in a fissure or crack of a rock which has been precipitated from a fluid. They may also form when magma is injected into fissures created by intrusion of igneous rock.
- **Vertical alignment** The longitudinal profile along the design of a road.
- **Vertical curve** A curve (generally parabolic) in the longitudinal profile of a carriageway to provide for a change of grade at a specified vertical acceleration.
- **Water quality** The chemical, physical and biological condition of water.
- **Wick drains** These drains remove excess pore water from saturated compressible soils. The drains create paths to which the pore water flows and decreases the time of soil consolidation.

Executive summary

What is proposed?

The Australian and New South Wales (NSW) governments have been jointly upgrading the Pacific Highway since 1996. Together, \$3.6 billion has been committed to continue the upgrade of the highway over five years to mid 2014 as part of the Nation Building Program and Building Australia Fund.

It is planned to complete the upgrading of the Pacific Highway in three stages.

Stage one involves completing dual carriageway by mid 2014 in three key areas:

- From the F3 Freeway near Hexham to Port Macquarie.
- From Ballina to the Queensland border.
- Sections to the north and south of Coffs Harbour.

Stage two involves completing dual carriageway from Port Macquarie to Raleigh, south of Coffs Harbour. The Warrell Creek to Urunga project is one of three projects to complete the Stage 2 link. The other projects are the Oxley Highway to Kempsey upgrade and the Frederickton to Eungai upgrade. The completion of these projects would ultimately provide a four lane divided highway from Hexham to Woolgoolga.

Stage three involves completion of dual carriageway from north of Coffs Harbour to Ballina.

The Warrell Creek to Urunga upgrade is referred to as the "Proposal" in this environmental assessment report.

The NSW Roads and Traffic Authority (RTA) proposes to upgrade a section of the Pacific Highway between the existing Allomera deviation and Raleigh dual carriageway sections on the Mid North Coast of NSW. The Proposal involves bypasses of Warrell Creek, Macksville, Bellwood and Urunga and an upgrade of the existing highway between Nambucca Heads and south Urunga.

The general features of the Proposal are:

- A 42 kilometre motorway style (class M) upgrade comprising of four-lane divided carriageways (two lanes each way), with a wide median allowing for the future addition of a third lane in each direction and a 110 kilometre per hour posted speed limit.
- Controlled access to the upgrade from four new grade separated interchanges and an upgrade to the existing Waterfall Way interchange at Raleigh.
- New major highway bridges across the Nambucca River at Macksville, the Kalang River at Urunga and Warrell Creek.
- Retention of the existing highway as a local access road between Warrell Creek and Urunga.

- Floodplain bridges and culverts across sections of the Gumma floodplain at Macksville and the Kalang floodplain at Urunga.
- Noise barriers and low noise pavements at various locations.
- At residence noise treatments to houses in locations where required.
- Permanent spill containment basins at environmentally significant watercourse crossings.
- Combined fauna underpasses/drainage structures at river and creek crossings and key habitat locations.
- A dedicated fauna underpass structure, combined drainage/underpass structures and a wide vegetated median for overhead fauna movement in sections of the Nambucca and Newry State Forests.
- A major rest area for heavy and light vehicles at the Nambucca interchange.
- Ancillary construction facilities, including compound sites, batching plant sites and stockpile sites.

Why is it needed?

The Pacific Highway is the major transport link between Sydney and Brisbane, and also serves a growing population on the Mid North Coast of NSW. The section of the existing highway between Warrell Creek and Urunga requires upgrading to the standard that is being applied to all Pacific Highway upgrade projects.

The existing Pacific Highway between Warrell Creek and Urunga is primarily a two-lane single carriageway road with occasional overtaking lanes. Accident histories show unacceptably high levels of traffic incidents in many areas. In particular, areas of accident concentration include Macksville and along the Pacific Highway in the vicinity of Hungry Head Road between Wenonah Head and South Urunga. The majority of crashes occur at intersections and as a result of the large number of private accesses onto the existing highway. The combination of these factors contributes to unacceptable road conditions on the Pacific Highway between Warrell Creek and Urunga.

The Proposal would provide substantial road safety benefits by separating local and through-traffic and improve travel times and traffic efficiency throughout the study area and add to the overall cumulative benefits of the Pacific Highway Upgrade Program.

What alternatives were considered?

The route development process evolved over time and in response to suggestions from the community. It initially started with the intent of developing and assessing route options between Macksville and Urunga, based on geographical constraints. The Proposal was initially divided into four sections, with route options developed as follows:

- Five options that traversed east of the existing highway between Albert Drive Donnellyville and the Nambucca River at Macksville (Section 1).
- Three options that traversed west of the existing highway were considered between the northern bank of the Nambucca River at Macksville to where the existing Pacific Highway crosses the Main North Coast Railway Line, west of Nambucca Heads (Section 2).

- One route option was considered adjacent to the western side of the existing highway due to topographical constraints between the southern end of Section 2, and Ballards Road at south Urunga (Section 3).
- Three options that traversed west of the existing highway were considered between Ballards Road and the existing Waterfall Way interchange at Raleigh (Section 4).

In response to a request from some sections of the Macksville community, two options were developed that traversed west of the existing highway between Warrell Creek and Nambucca Heads. The RTA also investigated options north of the Nambucca River in the vicinity of Old Coast Road that were suggested by the community.

Route options to the east and west of Macksville were publicly displayed for comment in November 2004. The preferred route for the Macksville to Urunga section was announced in November 2005.

When the preferred route was identified for the Macksville to Urunga section, it necessitated a review of the previously approved route at Warrell Creek. This review was undertaken on the basis of changes in RTA road design standards and environmental requirements and resulted in the subsequent inclusion of that section in the overall Proposal. Four route options were developed for the Warrell Creek section between the existing dual carriageway highway south of Warrell Creek (the Allgomera Deviation) and Albert Drive Donnellyville. The route options were publicly displayed for comment in September 2007 with the preferred route being announced in June 2008.

All route options were developed through an iterative process involving a range of environmental, community, engineering, urban design, safety and cost considerations. The preferred route was a combination of the options that on balance, best met these considerations.

What are the main beneficial outcomes expected?

The Proposal would result in a range of benefits such as:

- Improved road safety and travel times.
- Greater transport efficiency and safety for intra-state and inter-state movements.
- Improved regional access.
- Retention of the existing highway as an alternate route to the new highway for local access.
- Safer access to the highway from new grade separated interchanges located strategically along the upgrade.
- Improved amenity in the Warrell Creek Village, Macksville, Bellwood and through Urunga.
- Reduced noise impact on communities such as Bellwood, Nambucca Heads, Macksville and Urunga.
- Reducing greenhouse gas emissions in the longer term, relative to the base case of 'no upgrade'.

What are the main adverse outcomes expected?

The Proposal would result in some impacts, such as:

- Impacts on Aboriginal heritage.
- Impacts on private property.
- Loss of forestry land.
- Loss of native vegetation and threatened species.
- Potential for noise impacts on some residences.
- Impact on endangered ecological communities.
- Potential for indirect impacts on native vegetation and habitat.
- Minor disruption during construction.

How will the likely impacts be managed?

Measures to mitigate and/or manage the impacts have been proposed. The mitigation measures aim to remove or minimise potential impacts through design in the first instance. Where a potential impact is unable to be mitigated through design, further management measures are outlined.

The impacts, and measures to minimise those impacts, are discussed in Chapters 10 to 18. A *Draft Statement of Commitments*, that lists the intended outcomes and actions proposed to be achieved, is provided in Appendix D.

How can I comment on the proposed upgrade and/or the environmental assessment?

The NSW Department of Planning will make the environmental assessment publicly available for a minimum period of 30 days. During this period, it will be available for inspection at the department's website (www.planning.nsw.gov.au), on the project website www.rta.nsw.gov.au/pacific (click on Warrell Creek to Urunga), at selected RTA offices and in other locations.

The RTA will also be conducting community information sessions. A project information line will also be available throughout the exhibition period – 1800 800 612 (toll free).

Any person may make a written submission to the Director-General of the NSW Government Planning Department during the exhibition period. Submissions should be made to:

The Director, Department of Planning
Pacific Highway Assessment Team, Major Projects Assessment
GPO Box 39
Sydney NSW 2001