List of tables

Table 3-1	Description of sections within the context of the three upgrade projects
Table 3-2	Description of route options for sections B and C
Table 3-3	Initial design refinement options
Table 4-1	Proposed changes to local roads
Table 4-2	Proposed bridge structures
Table 4-3	Dimensions of fauna underpasses
Table 4-4	Street furniture
Table 4-5	Design criteria
Table 4-6	Potential pre-contruction and construction activities
Table 4-7	Indicative sources of construction material
Table 4-8	Indicative resource quantities required for construction
Table 4-9	Indicative water volumes required for construction
Table 4-10	Selection criteria for ancillary facility sites
Table 4-11	Temporary creek crossings
Table 4-12	Possible out-of-hours construction work
Table 6-1	Overview of consultation process and activities to date
Table 6-2	Issues raised by government agencies
Table 6-3	Issues raised by local government
Table 6-4	Issues raised by the community
Table 6-5	Issues raised by the Aboriginal community and Local Aboriginal Land Councils
Table 6-6	Issues raised by specialist interest groups
Table 7-1	Operational assessment scenarios
Table 7-2	Construction assessment scenarios
Table 7-3	AADT traffic growth summary (1990-2010)
Table 7-4	Daily peak period traffic volume summary (2009-2011)
Table 7-5	Princes Highway travel times through Berry (holiday peak periods)
Table 7-6	LoS for highway flows
Table 7-7	LoS criteria for intersections
Table 7-8	2011 highway (miblock) LoS summary (current situation)
Table 7-9	2037 highway (midblock) LoS summary ('Do nothing' scenario)
Table 7-10	2011 intersection LoS summary (current situation)
Table 7-11	2037 intersection LoS summary ('Do nothing' scenario)
Table 7-12	Description of bus routes within the project area
Table 7-13	Construction traffic estimates
Table 7-14	2017 midblock LoS summary (representative construction scenario)
Table 7-15	2017 midblock LoS summary (worst-case construction scenario)
Table 7-16	2017 intersection LoS summary (representative construction scenario)
Table 7-17	2017 intersection LoS summary (worst-case construction scenario)
Table 7-18	2037 midblock LoS summary ('the project' scenario)

Table 7-19	2037 midblock LoS summary ('the Princes Highway upgrade program' scenario)
Table 7-20	2037 intersection LoS summary ('the Princes Highway upgrade program' scenario)
Table 7-21	Summary of traffic impacts for the Victoria Street design options
Table 7-22	Existing and proposed crash statistics (1 July 2003 – 30 September 2010)
Table 7-23	Management and mitigation measures
Table 7-24	Background noise levels dB(A)
Table 7-25	Day and night time road traffic noise levels
Table 7-26	Noise management levels for residneces for airborne noise
Table 7-27	Noise management levels for the project
Table 7-28	Morning shoulder assessment levels
Table 7-29	Noise management levels at sensitive land uses (other than residential) that are applicable to the project
Table 7-30	Standards/guidelines used for assessing construction vibration
Table 7-31	Structural damage vibration limits
Table 7-32	Preferred and maximum vibration levels for continuous vibration
Table 7-33	Preferred and maximum vibration levels for impulsive vibration
Table 7-34	Preferred and maximum vibration levels for intermittent vibration
Table 7-35	Recommended ground-borne noise goals for construction activities
Table 7-36	Air blast overpressure criteria and peak particle velocity criteria
Table 7-37	Noise assessment criteria for residential receivers
Table 7-38	Noise assessment criteria for other sensitive land uses
Table 7-39	Relative increase noise assessment criteria for residential receivers
Table 7-40	Construction equipment for general construction work
Table 7-41	Predicted levels of construction noise during standard construction hours (daytime)
Table 7-42	Construction ancillary facilities
Table 7-43	Recommended safe working distances for vibration intensive plant
Table 7-44	Minimum offset distances for overpressure and blast limits
Table 7-45	Standard and secondary overpressure and peak particle velocity (PPV) criteria
Table 7-46	Secondary minimum setback distances for overpressure and blast limits
Table 7-47	Mitigation and management levels
Table 7-48	Noxious weeds recorded in the study area
Table 7-49	Area of each plant community potentially impacted by the project
Table 7-50	Mitigation and management measures
Table 7-51	Concentration limits for the Gerringong-Gerroa sewage treatment system as contained in the EPL
Table 7-52	Concentration limits for the Berry sewage treatment system as contained in the EPL
Table 7-53	MUSIC model pollutant loadings (without water quality treatment)
Table 7-54	Construction mitigation and management measures
Table 7-55	Operation mitigation and management measures

Table 7-56	Description of project structures
Table 7-57	Mitigation and management measures
Table 7-58	Landscape character and visual impact grading matrix
Table 7-59	Mitigation and management measures
Table 7-60	Summary of anticipated construction related impacts to recorded archaeological deposits
Table 7-61	Mitigation and management measures
Table 7-62	Summary of non-Aboriginal significance assessments
Table 7-63	Summary of identified heritage items and potential impacts
Table 7-64	Mitigation and management measures
Table 7-65	Kiama LEP and Shoalhaven LEP – minimum lot sizes
Table 7-66	Directly affected and residual land, classified by land use
Table 7-67	Property impacts and percentage of directly affected property as at September 2012
Table 7-68	Agricultural land impacted by the project, by class classification
Table 7-69	Mitigation and management measures
Table 7-70	Economic impact: agriculture sector
Table 7-71	Economic impact on highway reliant businesses
Table 7-72	Mitigation and management measures
Table 8-1	Mitigation and management measures
Table 8-2	EPA air quality assessment criteria
Table 8-3	Predicted maximum carbon monoxide ground-level concentrations at the most affected sensitive receiver in 2017 and 2027
Table 8-4	Predicted maximum nitrogen dioxide ground-level concentrations at the most affected sensitive receiver in 2017 and 2027
Table 8-5	Predicted maximum ground-level concentrations for particulates at the most affected sensitive receiver in 2017 and 2027
Table 8-6	Mitigation and management measures
Table 8-7	Mitigation and management measures
Table 8-8	Mitigation and management measures
Table 8-9	Construction GHG emission sources
Table 8-10	Operation and maintenance GHG emission sources
Table 8-11	Operaiton and maintenance GHG emissions assessment results
Table 8-12	Climate change risks and potential impacts
Table 8-13	Mitigation and management measures
Table 9-1	Environmental risk category criteria for identified environmental issues
Table 9-2	Environmental risk analysis summary
Table 10-1	Draft statement of commitments
Table 11-1	Objects of the EP&A Act and relevance to the project
Table 11-2	Application of the principles of ESD to the project

List of figures

Figure 1-1	Overview of the project
Figure 1-2	Regional context of the project
Figure 2-1	Princes Highway upgrade between Waterfall and Jervis Bay Road
Figure 3-1	Route options development process
Figure 3-2	Preferred project route withiin the context of the Princes Highway between Gerringong and Bomaderry
Figure 3-3	Geographical sections within the context of the three upgrade projects between Gerringong and Bomaaderry
Figure 3-4	Bridge at Berry and North Street study area
Figure 3-5	Long list of options
Figure 3-6	Short listed route options
Figure 3-7	Modified orange option and the orange option
Figure 3-8	Southern bypass of Berry
Figure 3-9	North and southbound off-ramp options B1 to B5
Figure 3-10	North and southbound off-ramp options B6 to B9
Figure 3-11	Bypass options north of Berry and the preferred option
Figure 3-12	The revised preferred option north of Berry
Figure 3-13	Victoria Street option 1
Figure 3-13	Victoria Street option 2
Figure 3-13	Victoria Street option 3
Figure 4-1	Section 1 (Toolijooa to Austral Park Road)
Figure 4-2	Section 2 (Austral Park Road to the northern interchange for Berry)
Figure 4-3	Section 3 (Northern interchange for Berry to Mullers Lane)
Figure 4-4	Cross section of typical four lane configuration on embankment
Figure 4-5	Cross section of a typical bridge
Figure 4-6	A typical cross section of Toolijooa Ridge cutting
Figure 4-7	Toolijooa Road interchange
Figure 4-8	Austral Park Road interchange
Figure 4-9	Tindalls Lane interchange
Figure 4-10	Northern interchange for Berry
Figure 4-11	Southern interchange for Berry
Figure 4-12	Bird's eye view and cross section of the Kangaroo Valley Road bridge at the southern interchange
Figure 4-13	Artist's impression of Kangaroo Valley Road and southern interchange precinct
Figure 4-14	Schofields Lane junction
Figure 4-15	Typical rural property access
Figure 4-16	Property access arrangements between Austral Park Road and Tindalls Lane
Figure 4-17	Property access arrangements between Tindalls Lane and the northern interchange for Berry
Figure 4-18	Property access arrangements between the southern interchange for Berry and Schofields Lane
Figure 4-19	Major utilities within the project corridor
Dain a se Liliada com	up meda Equation and Damy humans

Figure 4-20	Locations of potential construction ancillary facilities
Figure 5-1	Environmental assessment process for the project
Figure 6-1	Community consultation process undertaken during the review of the Berry bypass alignment August 2011 to June 2012
Figure 7-1	Overview of the three stage modelling approach
Figure 7-2	Transport network in project area
Figure 7-3	Noise catchment areas, background noise levels and noise logger locations
Figure 7-4	Receivers predicted to exceed criteria in areas from Toolijooa Road interchange to just east of the Austral Park Road interchange
Figure 7-5	Receivers predicted to exceed criteria in areas between Austral Park Road interchange and Tindalls Lane interchange
Figure 7-6	Receivers predicted to exceed criteria in areas between Tindalls Lane interchange and Schofields Lane junction
Figure 7-7	Noise barrier locations at Berry
Figure 7-8	Vegetation communities within the study area
Figure 7-9	Wildlife corridors within the study area
Figure 7-10	Location of catchments within the project area
Figure 7-11	Location and impacts on farm dams within the project area
Figure 7-12	Location of construction sediment basins
Figure 7-13	Areas of residual high risk of sedimentation and erosion
Figure 7-14	Proposed permanent operational sediment basin locations
Figure 7-15	Indicative 100 year flood extents along the project alignment
Figure 7-16	Catchment map
Figure 7-17	Broughton Creek overbank flowpaths without the project
Figure 7-18	Broughton Creek overbank flowpaths with the project
Figure 7-19	Changes to flood levels at Berry in the 1 in 100 year flood event
Figure 7-20	Landscape character units
Figure 7-21	Landscape character sub units around Berry
Figure 7-22	Artists impression of the concept design within the Toolijooa Ridge landscape character unit
Figure 7-23	Artists impression of the concept design within the Broughton Creek landscape character unit
Figure 7-24	Artists impression of the proposed refined and elegant bridge form within the Broughton Creek landscape character unit
Figure 7-25	Artists impression of the concept design within the North Berry landscape character unit
Figure 7-26	Artist's impression of the concept design with proposed southern interchange for Berry to the left
Figure 7-27	Artists impression of the northern interchange concept design at Berry from the west.
Figure 7-28	Artist's impression of the concept design looking south from Bong Bong Road towards the bridge at Berry
Figure 7-29	Artist's impression of the concept design looking south from Woodhill Mountain Road towards the proposed bridge at Berry
Figure 7-30	Existing view from North Street looking north west

Figure 7-31	Artist's impression of the concept design looking north west from North Street, following the establishment of landscaping
Figure 7-32	North Street cross sections as illustrated in Figure 7-33
Figure 7-33	North street cross sections with the project and associated noise attenuation structures
Figure 7-34	Relative impact intensity map for views to the ridges and escarpment from Berry
Figure 7-35	Before and after illustration from observer location A on North Street, zone 1
Figure 7-36	Before and after illustration from observer location B on Albert Street, zone 2
Figure 7-37	Before and after illustration from observer location C on Queen Street, zone 3 $$
Figure 7-38	Artist's impression of the Kangaroo Valley Road and southern interchange precinct
Figure 7-39	Artist's impression of the expected view from the southbound lanes of the upgrade to the Kangaroo Valley Road overbridge following the establishment of landscaping
Figure 7-40	Artist's impression of the pedestrian view looking east across the Kangaroo Valley Road overbridge following the establishment of landscaping
Figure 7-41	General location of Aboriginal culturally significant places and landscapes in relation to the project
Figure 7-42	General location of non-Aboriginal heritage recordings
Figure 7-43	Previously defined landscape conservation areas which include the project
Figure 7-44	Overview of land use zones as shown in the Shoalhaven LEP 1985 and Kiama LEP 2011
Figure 7-45	Overview of land use zones as shown in the Shoalhaven LEP 1985 (Berry detail)
Figure 7-46	Land uses within Berry
Figure 7-47	Overview of land uses (Toolijooa Road interchange to Tindalls Lane interchange)
Figure 7-48	Overview of land uses (Tindalls Lane interchange to Schofields Lane intersection)
Figure 8-1	Soil landscape units according to <i>Soil Landscapes of the Kiama 1:100,000 Sheet</i> (Hazelton, 1992)
Figure 8-2	Acid sulfate soils in the project area
Figure 8-3	Additional areas of potential acid sulfate soil risk
Figure 8-4	Residual high risk erosion and sedimentation area
Figure 8-5	Location of sensitive receivers in the vicinity of the project
Figure 8-6	GHG emission quantification steps
Figure 8-7	Construction GHG emission assessment results
Figure 8-8	Construction GHG emissions by scope
Figure 8-9	Cumulative GHG emissions savings including construction and operational emissions (not including major road maintenance)
Figure 8-10	Projected change in the mean maximum temperature by season, for the Illawarra region in 2050
Figure 8-11	Projected change in the mean minimum temperature by season, for the Illawarra region in 2050
Figure 8-12	Projected change in seasonal rainfall for the Illawarra region in 2050