

Condition of NSW State Roads



UPDATE SEPTEMBER 2009

About this document

This document provides:

- An overview of the Roads and Traffic Authority's (RTA) approach to managing the condition of road pavements.
- An explanation of key pavement distress measures and how these are managed.
- The latest trends in road pavement condition.
- Notes to assist the reader in interpreting road pavement condition data.

Road management in NSW

The NSW road network is a significant public asset, providing access across the State for commuters, travellers, business and freight. The responsibility for the NSW road network is shared between the RTA and local councils as described in Table 1 and Figures 1 to 3.

TABLE 1 – Road categories

Category of road	Responsibility	Notes
State Roads	RTA	The Federal Government provides a funding contribution for National Highways. Also includes small lengths of privately funded toll roads.
Unincorporated Roads	RTA	Includes Regional and Local Roads in the unincorporated area of NSW. The unincorporated area is the area north of Broken Hill, which is not incorporated into a local government area.
Regional and Local Roads	Council	Regional Roads receive significant RTA grant funds. Local ratepayers and federal road assistance grants fund council managed local access roads.

This report only discusses the performance of the State Road network, under the care and control of the RTA.

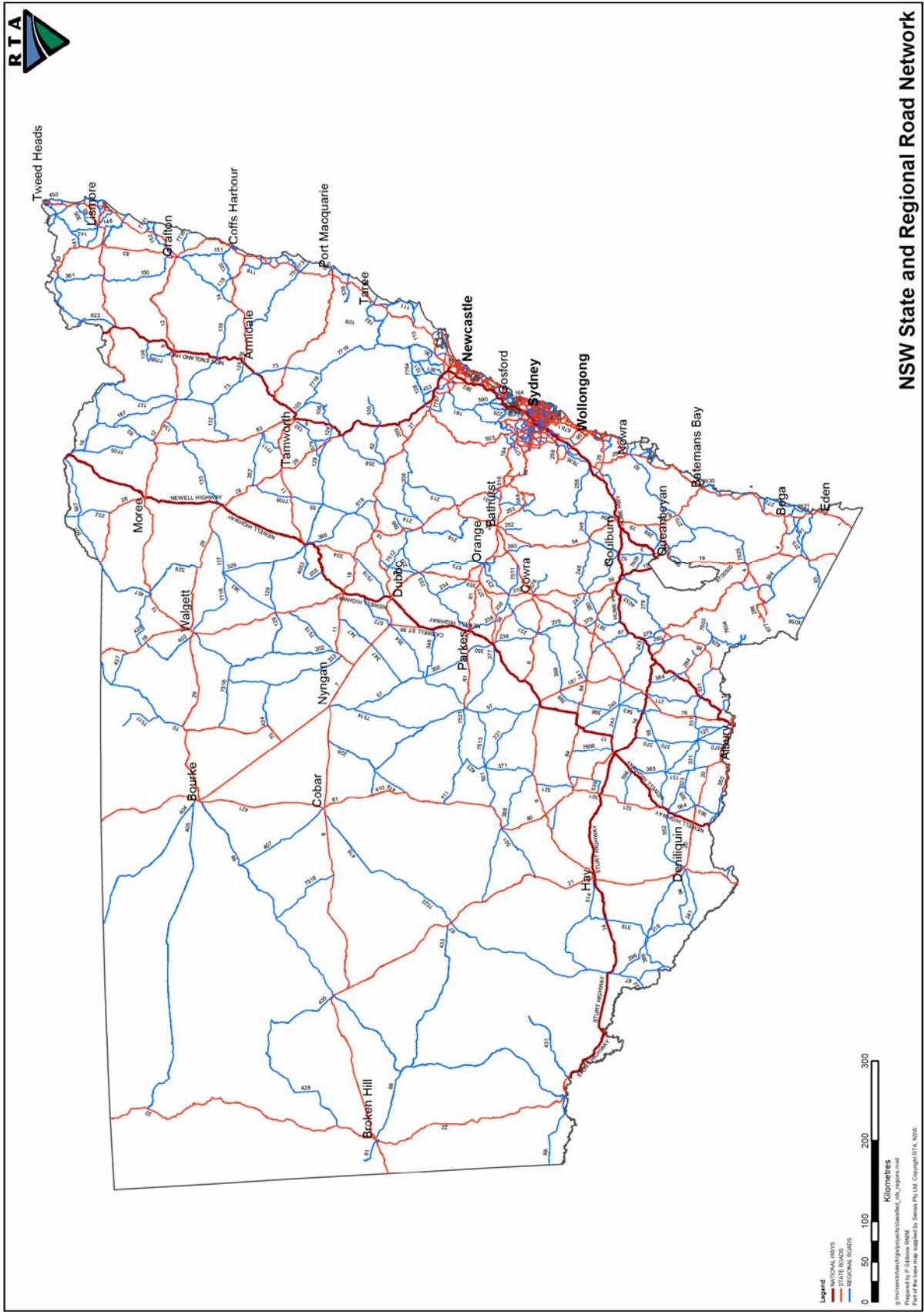


Figure 1 – Map of NSW road network

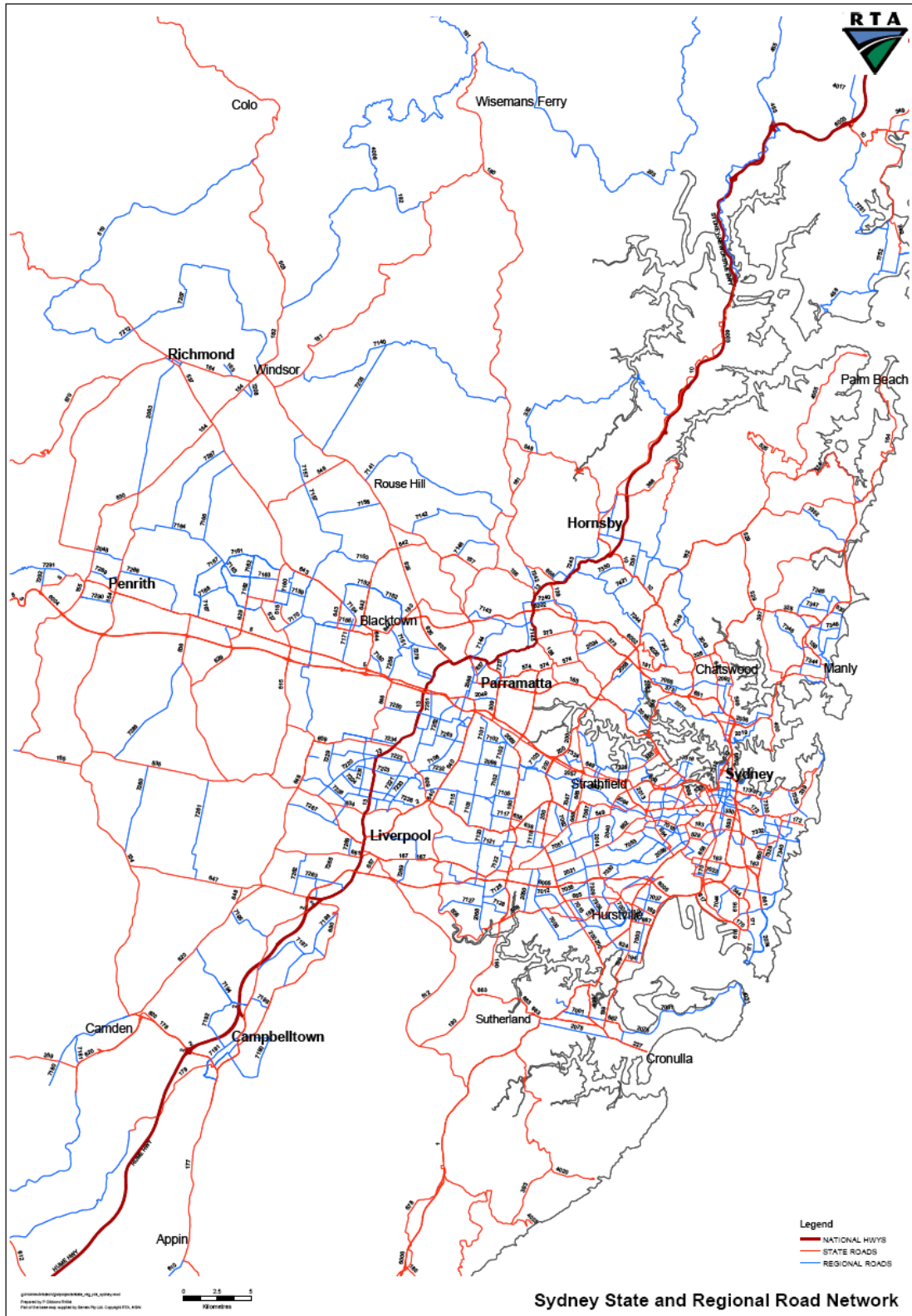


Figure 2 – Map of Sydney road network



Figure 3 – Map of Newcastle and Central Coast road network

The RTA's approach to road pavement preservation

Introduction

Due to wear and tear, road pavements need ongoing maintenance and replacement. Road pavements deteriorate under the action of traffic and heavy vehicle loading. In addition, road pavements naturally age due to environmental factors such as temperature, sunlight and water getting into pavement layers.

The RTA manages the gradual and continuous deterioration of road pavement by employing a proactive approach of preventive maintenance (known as 'pavement preservation'). A pavement preservation strategy:

- Appropriately manages road safety risks.
- Results in longer-lasting and smoother pavements.
- Minimises the cost of maintaining the road network over the life of the asset as timely and regular smaller scale interventions reduce the need for more costly and disruptive road rebuilding activities.

Pavement distresses

The RTA uses a range of condition indicators to manage State Roads. However, two key measures include:

- Pavement durability (the extent of cracking visible in the road surface).
- Ride quality (a measure of the smoothness or roughness of travel).

These measures are reported in the RTA's Annual Report and are described in more detail later in this report.

Is the goal to eliminate all road pavement distress?

The presence of pavement distress reflects the natural and gradual deterioration of road pavements. To ensure public safety, the RTA defines stringent maintenance standards to ensure that it is responsive to critical road pavement defects. However, a pro-active strategy that focuses on preservation and minimises deterioration is more cost effective than a reactive approach involving fixing the worst sections of road first (known as a 'worst-first' strategy). A worst-first strategy is non-optimal over the longer term, as it produces a road network that is more costly and difficult to maintain.

In summary, it is not realistic, affordable or desirable to maintain a road network that is 100 per cent defect or distress-free. Intervening too early and too often is not a good use of public funds and contributes to unnecessary traffic delay and disruption due to roadwork.

Risk management approach

The RTA supports ongoing safe and reliable travel by programming maintenance work and rebuilding activities based on risk assessment. The Auditor-General recognised in his 2006 performance audit on the *Condition of State Roads* that:

“Allocating resources based on risk is a good asset management practice” (p.34) and that the RTA’s practise of considering the strategic importance of roads was also good practice (p.26).¹

The RTA has given priority to the weaker and more sensitive rural granular pavements ahead of urban asphalt roads. Urban asphalt, constructed from manufactured materials, is more resilient to prolonged rainfall than natural gravel roads. Road pavement condition is a less significant factor in overall safety risk on urban roads, which are typically lower speed than high-speed rural roads.

Other considerations

The Auditor-General also found that:

“The RTA’s current approach provides a good balance between central control to manage network-wide risks and allowing local managers to make decisions based on their local knowledge” (p.34).

To ensure best use of available funds local asset managers do not just consider road cracking and ride quality data when determining maintenance treatments and priorities. They consider a multitude of factors and conditions, including the width of road; road structural strength; rate of deterioration; surface irregularities; loss of skid resistance; public complaints; type of traffic loading; and a roads strategic importance.

¹ The Auditor General’s report can be found on The Audit Office of NSW website at www.audit.nsw.gov.au.

Current road condition

The gradual improvement in pavement condition over the past ten years (shown in *Figure 4* and *Figure 5*) supports the pavement preservation approach adopted by the RTA.

However, fluctuations in pavement conditions result from a number of factors, many of which are outside the control of the RTA, such as:

- ☑ Climatic conditions (water saturated pavements may deteriorate very rapidly while periods of dry weather significantly reduce the rate of pavement deterioration).
- ☑ Traffic loading (increasing heavy vehicle movements and vehicle axle loads significantly increase the rate of pavement deterioration).

Pavement durability (road surface cracking)

This is a measure of the amount of surface cracking on the road. The road surface plays an important role in providing both a safe running surface for traffic and a waterproofing layer to protect the underlying pavement from moisture that can seriously reduce the strength and durability of the road. Road pavements are designed assuming that the moisture content will remain constant. However, if the road surface is cracked, moisture will enter the pavement and the design assumptions will be void. The deterioration of a road may be accelerated if the road is cracked. Cracking is one of the most frequent forms of distress and one of the most significant. It is therefore important to measure the cracking of a road.

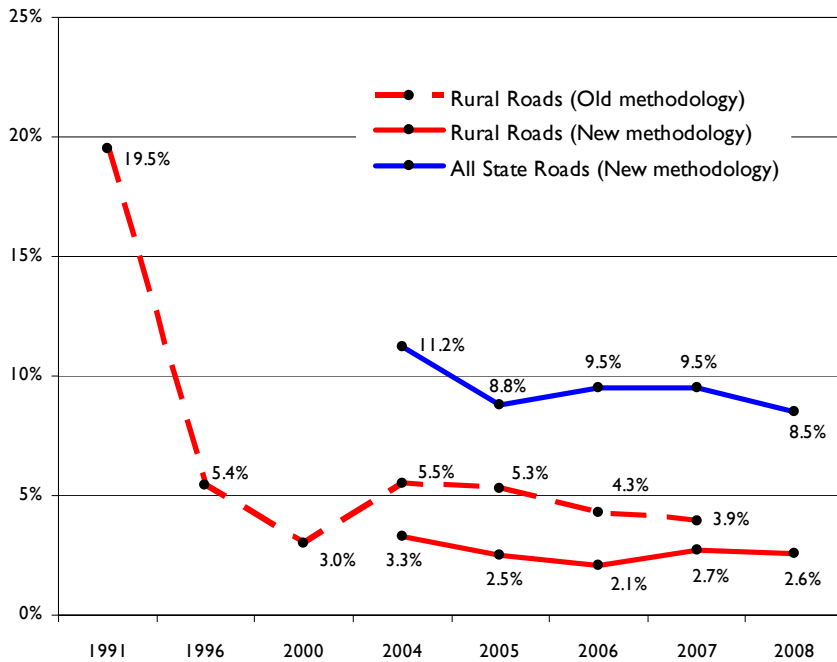
Cracking is measured at highway speed by automated technology using the RTA's Roadcrack vehicle on an annual basis. The severity and extent of cracking for each road section are rated as 'poor', 'fair' or 'good'. The 'poor' category includes:

- ☑ 1 to 2 mm wide cracks over more than 15% of the road surface, and
- ☑ ≥ 2 mm wide cracks over more than 5% of the road surface.

Figure 1 shows the trend in pavement durability dating back to 1991. The overall amount of surface cracking rated as 'poor' has decreased across State Roads and is now at historic lows. This positive result comes in spite of significant increases in heavy vehicle loading over the past decade. *Appendix A*

provides the most recent change in road surface cracking on a road-by-road basis.

Figure 4 - Pavement Durability on State Roads (% 'poor')



Note: Improved road condition is indicated by lower results



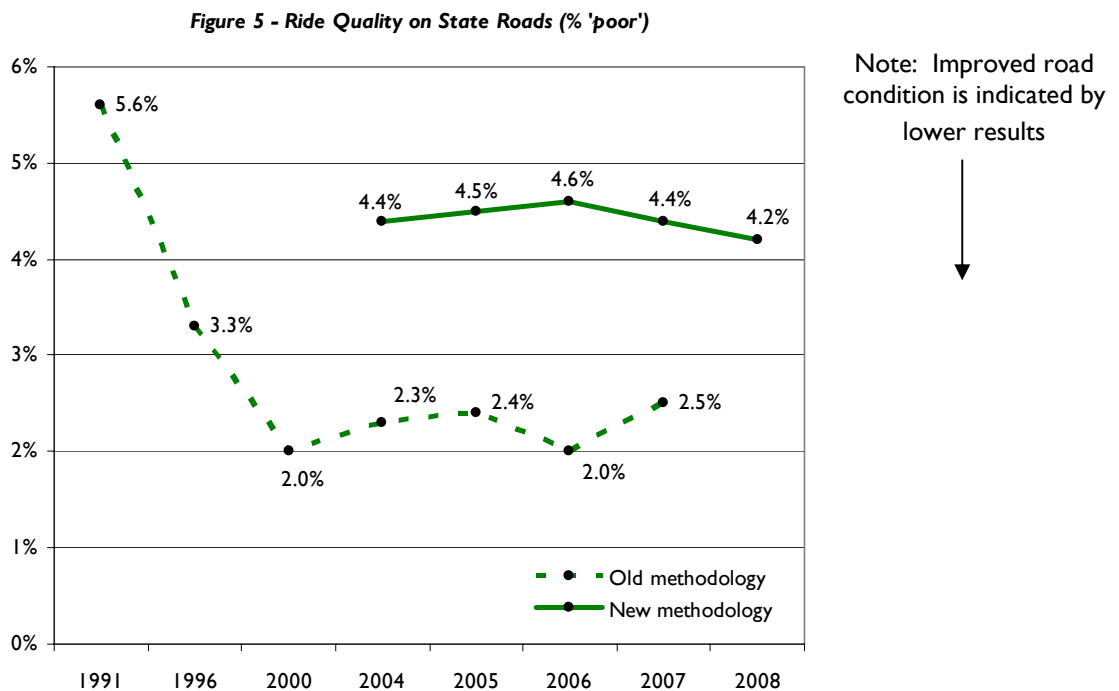
Notes:

- 4.1 The data collection method used in 1991 and 1996 was a visual assessment. Subsequent years used automated data collection methods.
- 4.2 A new reporting methodology was adopted in 2008 and results back-calculated for the previous four year. The new methodology involves creating a more consistent statistical sample of the network and is therefore a more accurate and reliable approach. Results published in the RTA's annual report prior to 2008 are based on the old methodology and should not be compared with results from 2008.
- 4.3 The new methodology also reports cracking for the entire State Road network (see blue line) – not just rural State Roads (see red lines). Pavement durability on the rural State Road network has been relatively stable over the past 5-years, and shows significantly less poor-rated pavement than urban roads. The RTA has previously given priority to the weaker and more sensitive rural granular pavements ahead of the urban asphalt roads made from manufactured materials. Manufactured materials are less sensitive to fluctuations in water content than natural gravel roads. The typical asphalt or concrete urban pavement is more resilient to prolonged rainfall and cracking poses less of a risk to pavement durability.
- 4.4 An analysis of trends clearly shows that the proportion of the overall network that is cracked has improved over the years and is currently at historic lows. The improvement in condition is partly explained by predominantly dry weather conditions. However, over the past 12 months, the RTA has significantly increased the focus on the Sydney network and a substantial improvement in its condition is now evident. This focus will continue in future years and further improvements are expected.

Ride quality

Ride quality measures the undulations in the road and therefore provides an indication of ride comfort experienced by the driver and passengers. Smoother roads also tend to reduce the wear and tear on vehicles and hence minimise road user costs. The ride quality, or longitudinal profile of the road surface, is measured using vehicle mounted laser technology. The resulting road roughness measurements for each road section are rated as 'poor', 'fair' or 'good'. The 'poor' category corresponds to a level of roughness that typically triggers investigation into the need for roadwork.

Figure 2 shows the trend in ride quality dating back to 1991. There has been a gradual improvement in condition over the years and currently the level of 'poor' ride quality is at historic lows. Appendix B provides the most recent change in ride quality on a road-by-road basis.



Notes:

- 5.1 A new reporting methodology was adopted in 2008 and results back-calculated for the previous four year. The new methodology involves creating a more consistent statistical sample of the network and is therefore a more accurate and reliable approach. Results published in the RTA's annual report prior to 2008 are based on the old methodology and should not be compared with results from 2008.
- 5.2 The definition of 'poor' is somewhat arbitrary. By definition, the new methodology includes a larger proportion of the road network in the 'poor' band than the old method. However, this does not indicate deterioration in condition. An analysis of trends clearly indicates that the proportion of the overall network that is rough has improved over the years and is currently at historic lows. The improvement in condition is partly explained by predominantly dry weather conditions.

Appendix A – Pavement durability results by road

DURABILITY	Road Description	Road Number	Length in 'Poor' Condition (km)		Change
			2007	2008	
PACIFIC HIGHWAY		0000010	141.7	125.5	- 16.2
GREAT WESTERN HIGHWAY		0000005	101.3	94.9	- 6.3
PRINCES HIGHWAY		0000001	96.1	80.4	- 15.7
HUME HIGHWAY		0000002	64.3	68.4	4.1
NEW ENGLAND HIGHWAY		0000009	43.8	43.0	- 0.7
MILLERS PT-PARRAMATTA		0000165	32.2	29.5	- 2.7
NORTH SYDNEY-PALM BEACH		0000164	32.0	28.5	- 3.5
PARRAMATTA-MT VICTORIA		0000184	31.4	18.6	- 12.8
NEWELL HIGHWAY		0000017	29.1	18.7	- 10.4
NEWTOWN-MOOREBANK		0000167	28.1	22.6	- 5.5
RYDE-MONA VALE		0000162	25.0	22.6	- 2.3
CUMBERLAND HIGHWAY		0000013	24.0	18.8	- 5.2
LUCAS HEIGHTS-DUNDAS		0000190	23.3	13.7	- 9.6
BLAKEHURST-RYDE		0000200	23.0	24.4	1.5
BULLI HEIGHTS-GLENFIELD		0000177	22.4	22.6	0.2
OXLEY HIGHWAY		0000011	20.6	13.8	- 6.7
NEWCASTLE-MINMI		0000082	19.3	16.2	- 3.1
SNOWY MOUNTAINS HIGHWAY		0000004	17.1	12.3	- 4.9
SYDNEY-NEWCASTLE FREEWAY		0006003	16.6	22.0	5.4
BERESFIELD-CESSNOCK		0000588	16.3	9.6	- 6.7
TRANSITWAY		0008002	16.0	16.3	0.3
NARELLAN-WINDSOR		0000154	15.9	13.7	- 2.2
CHIFLEY-PYRMONT		0000170	14.9	13.9	- 1.0
STANWELL PARK-LOFTUS		0000393	14.7	14.3	- 0.4
HEATHCOTE-LIVERPOOL		0000512	14.5	5.5	- 9.1
BELMONT-BUCHANAN		0000527	14.0	11.1	- 2.9
LA PEROUSE-EAST SYDNEY		0000171	13.9	7.4	- 6.5
CENTRAL COAST HIGHWAY		0000030	13.7	12.6	- 1.0
LUDDENHAM-RICHMOND		0000155	13.5	12.3	- 1.2
CASTLEREAGH HIGHWAY		0000018	13.5	27.5	14.0
HENRY LAWSON DR		0000508	13.3	10.1	- 3.2
LANE COVE-CARLINGFORD		0000373	13.0	6.3	- 6.7
CECIL PARK-LUDDENHAM		0000535	12.7	12.0	- 0.6
YANDERRA-PRESTONS		0000620	12.5	10.0	- 2.5
VILLAWOOD-GRANVILLE		0000640	12.5	11.0	- 1.5
ILLAWARRA HIGHWAY		0000025	11.5	12.2	0.7
KAMILAROI HIGHWAY		0000029	11.4	8.5	- 3.0
LAWRENCE HARGRAVE DR		0000185	11.0	11.5	0.4
DEE WHY-ROSEVILLE		0000328	10.9	6.0	- 4.9
MAYFIELD WEST-SHOAL BAY		0000108	10.8	10.4	- 0.4
LIBERATOR GENERAL SAN MARTIN DR		0000525	10.6	6.2	- 4.5
BAULKHAM HILLS-MARROOTA		0000160	10.5	7.3	- 3.1
NARRANDERA-MOSSGIEL		0000080	10.3	8.0	- 2.3
WOLLONGONG-PHEASANTS NEST		0000095	10.2	7.4	- 2.8
MCGRATHS HILL-NR SINGLETON		0000181	10.2	7.8	- 2.4
MONA VALE-TERREY HILLS		0000174	10.1	11.2	1.1
FEDERAL HIGHWAY		0000003	9.9	13.6	3.8
OLYMPIC HIGHWAY		0000078	9.7	15.1	5.3
SOUTHERN FREEWAY		0006006	9.7	12.7	3.0
SPRINGWOOD-AGNES BANKS		0000570	9.6	10.7	1.0
EASTERN CK-RICHMOND		0000537	9.5	9.9	0.3
MORRISSET-WALLSEND		0000217	9.4	10.7	1.2
BOMADERRY-MOSS VALE		0000261	9.3	7.7	- 1.6
WINDSOR-MT THORLEY		0000503	9.3	3.9	- 5.4
WESTERN FREEWAY		0006004	9.3	11.6	2.3
CARRAMAR-SMITHFIELD		0000609	9.0	7.9	- 1.0
BLACKTOWN-KELLYVILLE		0000642	8.8	< data not available >	#VALUE!
NEWCASTLE WEST-MAYFIELD WEST		0000316	8.7	8.3	- 0.4

DURABILITY	Road Description	Road Number	Length in 'Poor' Condition (km)		Change
			2007	2008	
RYDE-PENNANT HILLS	0000139	8.6	5.3	-	3.3
OLD TOONGABBIE-SEVEN HILLS	0000635	8.6		-	8.6
LEUMEAH-GLENFIELD	0000680	8.5	7.7	-	0.9
CARINGBAH-KOGARAH	0000199	8.4	8.4		0.0
ADAMSTOWN HEIGHTS-MAYFIELD	0000326	8.3	8.7		0.4
ASHFIELD-PUNCHBOWL	0000549	8.1	6.4	-	1.7
BATEMANS BAY-QUEANBEYAN	0000051	7.7	5.8	-	1.9
MITCHELL HIGHWAY	0000007	7.6	9.6		2.0
TORONTO-BRANXTON	0000220	7.4	6.8	-	0.6
CHARLESTOWN-SANDGATE HIGHWAY	0000023	7.4	7.1	-	0.2
SYDNEY AIRPORT-PEAKHURST	0000168	7.3	7.0	-	0.4
SANS SOUCI-BOTANY	0000194	7.2	5.9	-	1.3
DUNMORE-WARRAWONG	0000522	7.1	6.1	-	1.0
WEST HEAD RD (KU-RING-GAI CHASE)	0004005	6.9	0.0	-	6.9
STURT HIGHWAY	0000014	6.8	10.0		3.2
BUNGARRIBEE ROAD	0000643	6.8	8.5		1.7
PROSPECT-SEVEN HILLS	0000644	6.7	2.3	-	4.5
CRINGILA-NORTH WOLLONGONG	0000581	6.7	7.3		0.5
ERSKINE PARK-PLUMPTON	0000629	6.4	7.5		1.1
EAST SYDNEY-NORTH BONDI	0000172	6.3	6.7		0.4
BLACKWALL-NARARA	0000349	6.3	6.3	-	0.1
BURLEY GRIFFIN WAY	0000084	6.3	2.7	-	3.6
BRUXNER HIGHWAY	0000016	6.2	6.4		0.1
CARNARVON HIGHWAY	0000028	6.2	3.1	-	3.1
MALDON-CAMPBELLTOWN	0000179	6.1	5.4	-	0.7
COOMA-CHARLOTTE PASS	0000286	6.1	4.5	-	1.6
EAST SYDNEY-VAUCLUSE	0000173	6.0	6.6		0.6
KINGSFORD-BONDI JUNCTION	0000660	5.9	3.2	-	2.7
FRENCHS FOREST-TERREY HILLS	0000529	5.9	6.1		0.3
BRINGELLY ROAD	0000647	5.8	7.0		1.1
ORANGE-COBAR	0000061	5.7	2.9	-	2.8
PAGEWOOD-MASCOT	0000344	5.7	4.9	-	0.8
MAROUBRA-KINGSFORD	0000661	5.7	2.6	-	3.1
OLD HUME HIGHWAY	0000676	5.5	0.0	-	5.5
PORT KEMBLA-UNANDERRA	0000295	5.3	4.5	-	0.8
CRONULLA-KIRRAWEE	0000227	5.2	5.7		0.5
NORTH SYDNEY-EAST ROSEVILLE	0000599	5.1	5.3		0.2
COBB HIGHWAY	0000021	5.0	9.7		4.6
HOXTON PARK ROAD	0000681	5.0	0.0	-	5.0
SUMMERLAND WAY	0000083	5.0	4.0	-	1.0
GOLDEN HIGHWAY	0000027	4.9	3.3	-	1.7
ASHFIELD-ROZELLE	0000650	4.9	4.8	-	0.0
MID WESTERN HIGHWAY	0000006	4.8	7.9		3.0
RESERVOIR RD, BALMORAL ST, THIRD AV, BLACKTOWN	0000683	4.8	5.2		0.4
TUGGERAH-LONG JETTY (WYONG ROAD)	0000335	4.8	4.9		0.2
BELFIELD-RHODES	0000668	4.6	3.9	-	0.7
MOSS VALE-MITTAGONG	0000260	4.4	3.2	-	1.2
RANDWICK-ST PETERS	0000183	4.4	3.3	-	1.0
NEW LINE ROAD	0000656	4.3	2.4	-	1.9
CABRAMATTA RD	0000534	4.3	4.3	-	0.0
SMITHFIELD-GREYSTANES	0000646	4.3	4.7		0.3
GLADESVILLE BR-LANE COVE	0000166	4.3	3.4	-	0.9
BALGOWLAH-NARRABEEN	0000397	4.3	3.2	-	1.1
BONDI JUNCTION-WATSONS BAY	0000339	4.2	4.5		0.2
EASTWOOD-PARRAMATTA	0000574	4.2	1.8	-	2.4
MASCOT-ZETLAND	0000658	4.2	4.0	-	0.2
GWYDIR HIGHWAY	0000012	4.2	6.4		2.2
NORTH SYDNEY-LANE COVE	0000651	4.1		-	4.1
RIVERINA HIGHWAY	0000020	4.0	5.1		1.1
WARNERVALE-NORAVILLE	0000509	4.0	4.4		0.4

DURABILITY	Road Description	Road Number	Length in 'Poor' Condition (km)		Change
			2007	2008	
SEAFORTH-MANLY-BROOKVALE	0000159	4.0	3.9	-	0.0
JAMES RUSE DR (SOUTH)	0000309	3.9	4.0		0.2
MAYFIELD BIRMINGHAM GARDENS	0000605	3.8	5.3		1.5
WATERFALL WAY	0000076	3.7	4.1		0.5
BELL-BOWENFELS	0000516	3.7	4.0		0.3
THE LINK RD-BULLI HEIGHTS	0000513	3.6	3.8		0.2
SHOWGROUND RD (CASTLE HILL)	0000157	3.6	2.4	-	1.3
HABERFIELD-CONCORD	0000649	3.6	3.0	-	0.6
HURLSTONE PARK-ROZELLE	0000652	3.6	3.0	-	0.6
SILVER CITY HIGHWAY	0000022	3.5	3.1	-	0.4
COWPASTURE ROAD	0000648	3.5	2.3	-	1.1
JERILDERIE-RANKINS SPRINGS	0000321	3.4	3.7		0.3
BRIGHTON-LE-SANDS-CAMPSIE	0000169	3.4	4.8		1.4
CHARLESTOWN-SPEERS POINT	0000674	3.3	1.7	-	1.7
GOULBURN-ILFORD	0000054	3.3	5.1		1.7
NAREMBURN-ROSEVILLE	0000641	3.3	3.4		0.1
CAMDEN-LAKE BURRAGORANG	0000259	3.3	2.4	-	0.9
MULBRING-MAITLAND	0000195	3.2	4.3		1.2
BARRIER HIGHWAY	0000008	3.2	2.6	-	0.6
PYMBLE-BOBBIN HEAD-MT COLAH	0000366	3.1	3.5		0.4
CAMPBELLTOWN-CAMDEN	0000178	3.1	4.9		1.9
KENSINGTON-RANDWICK	0000327	2.9	2.5	-	0.4
MOORE PARK-ST. PETERS	0000528	2.9	3.4		0.5
BEXLEY-PEAKHURST	0000665	2.8	1.7	-	1.1
MIRANDA-SYLVANIA	0000669	2.8	2.6	-	0.2
CARINGBAH-CRONULLA	0000662	2.7	1.7	-	1.1
COOLABAH-NR HEBEL (QLD)	0000070	2.7	3.7		1.1
CANBERRA-CROOKWELL	0000052	2.6	2.7		0.1
MOORE PARK-DARLINGTON	0000330	2.6	2.5	-	0.0
GALSTON RD (HORNSBY-DURAL)	0000161	2.5	3.6		1.0
PYRMONT-CAMPERDOWN	0000523	2.5	2.4	-	0.1
TAMWORTH-YETMAN	0000063	2.4	1.4	-	0.9
PHEASANTS NEST-OAKDALE	0000612	2.3	1.9	-	0.4
OAK FLATS-WARILLA	0000611	2.2	2.5		0.2
CHATSWOOD-NORTH RYDE	0000191	2.2	2.2	-	0.1
ERMINGTON-CARLINGFORD	0000158	2.2	1.6	-	0.5
LIVERPOOL-EASTERN CREEK	0000515	2.1	2.8		0.7
SALT ASH-EAST MAITLAND	0000104	2.0	2.5		0.4
EAST GOSFORD-NR AVOCA BEACH	0000504	2.0	2.0	-	0.0
YASS-FORBES	0000056	2.0	2.2		0.2
JUNO PARADE & BORONIA ROAD	0000636	1.9	0.2	-	1.7
ALBION PARK RAIL-ALBION PARK	0000262	1.9	0.8	-	1.1
BOX HILL-MARSDEN PARK	0000546	1.9	< data not available >		#VALUE!
ANNANDALE-ROZELLE	0000655	1.9	1.9	-	0.0
SPIT JUNCTION-TARONGA PARK	0000400	1.9	2.2		0.3
MONARO HIGHWAY	0000019	1.9	0.9	-	1.0
ALEXANDRIA-NEWTOWN	0000193	1.8	1.9		0.1
JINDABYNE TO KOSCIUSKO NATIONAL PARK BOUNDARY	0000677	1.8	0.0	-	1.8
KEMPS CREEK-ST MARY	0000536	1.7	2.8		1.1
GARIE RD (ROYAL NATIONAL PARK)	0004025	1.6	1.9		0.3
BRIGHTON-LE-SANDS-KOGARAH	0000667	1.6	1.6	-	0.0
CHIPPENDALE-BLACKWATTLE BAY	0000594	1.6	1.1	-	0.5
HILLSDALE-BANKSMEADOW	0000616	1.5	1.7		0.2
ERINA-TERRIGAL	0000505	1.5	1.6		0.1
UPPER CASTLEREAGH-LLANDILO	0000630	1.4	1.4	-	0.0
CASTLE HILL RD (CASTLE HILL)	0000156	1.4	1.5		0.1
FOREST LODGE-ANNANDALE	0000666	1.4	1.4	-	0.0
LISMORE-BANGALOW	0000065	1.4	1.5		0.1
NORTHERN SUBURBS DISTRIBUTOR	0000626	1.4	1.0	-	0.3
RIVERSIDE DR (LANE COVE NAT PK)	0004026	1.3	< data not available >		#VALUE!

DURABILITY		Length in 'Poor' Condition (km)		
Road Description	Road Number	2007	2008	Change
BRADFIELD HIGHWAY (HARBOUR BR)	0000632	1.2	2.0	0.9
BOTANY-PADDINGTON	0000593	1.1	1.5	0.4
WOLLONGONG-NR MT KEIRA	0000186	1.1	1.7	0.6
HENRY PARRY DRIVE	0000673	1.1	0.4	- 0.7
SUTHERLAND-MENAI	0000663	1.0	1.6	0.6
MOOREBANK AVENUE (NORTH)	0000657	1.0	0.9	- 0.1
HARTLEY-JENOLAN CAVES-BATHURST	0000253	1.0	3.0	2.0
TERMINUS ST (LIVERPOOL)	0000578	0.9	0.8	- 0.1
FIVE DOCK-DRUMMOYNE	0000395	0.9	1.6	0.7
JINGELIC-GILMORE	0000085	0.9	2.3	1.4
SYDENHAM-LEWISHAM	0000664	0.9	4.1	3.2
MASCOT-ALEXANDRIA	0000659	0.9	0.9	- 0.0
DOUGHBOY-GOULBURN	0000079	0.8	0.4	- 0.4
LYSAGHTS-FIGTREE	0000602	0.8	1.0	0.2
DARLINGHURST-MILLERS POINT	0000592	0.8	0.8	0.0
BRUNKER ROAD (EASTERN SIDE)	0000638	0.8	0.5	- 0.3
YARRAWONGA-MULWALA	0000314	0.8	0.8	0.0
TRANSITWAY	0008001	0.7	0.7	0.0
COBAR-NR BOURKE	0000421	0.6	0.8	0.2
FORESHORE RD (BOTANY)	0000617	0.5	0.6	0.1
COWRA-CUDAL	0000310	0.5	0.3	- 0.2
BEECH ROAD (CASULA)	0000686	0.4	0.0	- 0.4
WINDSOR-SOUTH MAROOTA	0000182	0.4	0.2	- 0.2
WALLARAH-BLUE HAVEN	0000675	0.4	0.0	- 0.4
MENDOORAN-BELAR CK	0000334	0.4	0.4	0.0
WILLANTHRY BR-THE PRIORY	0000410	0.4	0.5	0.1
PORT KEMBLA RD	0000671	0.4	0.1	- 0.3
OLD JUNEE-NYNGAN	0000057	0.3	0.6	0.3
TOMINGLEY-NARROMINE	0000089	0.3	0.3	0.0
MUSWELLBROOK-DENMAN	0000209	0.3	0.8	0.5
KARIONG-WISEMANS FERRY	0000225	0.3	0.5	0.2
BLAYNEY-ORANGE	0000245	0.3	0.3	0.0
TUMBARUMBA-LITTLE BILLABONG	0000284	0.3	0.3	0.0
WILLIAMTOWN-NR HEXHAM	0000302	0.3	0.5	0.2
PARRAMATTA-NORTH PARRAMATTA WATTAMOLLA RD (ROYAL NATIONAL PK)	0000637 0004020	0.3 0.3	< data not available > 0.0	#VALUE! - 0.3
BOREE-CONDOBOLIN	0000377	0.2	0.2	- 0.0
PALMER STREET / SIR JOHN YOUNG CRES	0000682	0.2	0.2	0.0
GALSTON-MIDDLE DURAL	0000548	0.1	< data not available >	#VALUE!
NR HAMPTON-NR OBERON	0000558	0.1	0.7	0.6
BARTON HIGHWAY	0000015	0.0	0.0	0.0
MURRAY RIVER-COROWA	0000086	0.0	0.0	0.0
NR BOREE-MOLONG	0000359	0.0	0.8	0.8
LAKE CARGELLIGO-BOOLIGAL	0000501	0.0	0.1	0.1
WHILEYS JUNCTION-SHADFORTH	0000559	0.0	0.1	0.1
ROBINVALE-NR EUSTON	0000583	0.0	0.1	0.1
		1,773.5	1,577.5	- 196.0
* excludes cells above where data missing in 2008		with chaining 1,761.1	1,577.5	- 183.5

Notes:

A.1 'Chaining' involves comparing data only where it is available for both 2007 and 2008.

Appendix B – Ride quality results by road

RIDE QUALITY	Road Description	Road Number	Length in 'Poor' Condition (km)		Change
			2007	2008	
CASTLEREAGH HIGHWAY		0000018	38.9	31.4	- 7.5
GWYDIR HIGHWAY		0000012	20.2	18.6	- 1.6
MITCHELL HIGHWAY		0000007	19.2	14.3	- 4.9
MID WESTERN HIGHWAY		0000006	17.8	13.5	- 4.3
OXLEY HIGHWAY		0000011	15.6	14.8	- 0.8
NEWELL HIGHWAY		0000017	14.9	13.5	- 1.5
KAMILAROI HIGHWAY		0000029	14.1	13.0	- 1.1
HUME HIGHWAY		0000002	12.8	13.2	0.4
PACIFIC HIGHWAY		0000010	12.0	11.9	- 0.1
BRUXNER HIGHWAY		0000016	11.9	13.0	1.1
GREAT WESTERN HIGHWAY		0000005	11.7	13.3	1.7
NORTH SYDNEY-PALM BEACH		0000164	11.5	7.0	- 4.5
GOULBURN-ILFORD		0000054	10.9	10.6	- 0.3
STANWELL PARK-LOFTUS		0000393	10.9	10.0	- 0.9
PRINCES HIGHWAY		0000001	10.6	11.0	0.4
COBB HIGHWAY		0000021	9.7	9.4	- 0.3
LIBERATOR GENERAL SAN MARTIN DR		0000525	9.6	5.5	- 4.1
BURLEY GRIFFIN WAY		0000084	9.1	7.0	- 2.1
OLYMPIC HIGHWAY		0000078	8.7	7.1	- 1.6
GOLDEN HIGHWAY		0000027	8.6	6.6	- 2.0
COOLABAH-NR HEBEL (QLD)		0000070	7.7	7.0	- 0.7
WATERFALL WAY		0000076	7.6	10.1	2.5
TAMWORTH-YETMAN		0000063	7.4	7.1	- 0.3
ORANGE-COBAR		0000061	7.3	5.8	- 1.5
STURT HIGHWAY		0000014	7.2	4.7	- 2.5
HARTLEY-JENOLAN CAVES-BATHURST		0000253	6.9	7.2	0.3
OLD JUNEE-NYNGAN		0000057	6.9	6.5	- 0.4
SUMMERLAND WAY		0000083	6.2	6.8	0.6
MCGRATHS HILL-NR SINGLETON		0000181	6.1	3.6	- 2.6
RIVERINA HIGHWAY		0000020	6.1	6.8	0.7
NEW ENGLAND HIGHWAY		0000009	6.1	5.0	- 1.1
MONA VALE-TERREY HILLS		0000174	5.8	3.7	- 2.2
BARRIER HIGHWAY		0000008	5.6	4.3	- 1.4
PARRAMATTA-MT VICTORIA		0000184	5.6	5.7	0.1
SILVER CITY HIGHWAY		0000022	5.5	4.2	- 1.3
CARNARVON HIGHWAY		0000028	5.2	5.5	0.3
WINDSOR-MT THORLEY		0000503	4.8	6.0	1.1
BELFIELD-RHODES		0000668	4.8	3.6	- 1.1
SNOWY MOUNTAINS HIGHWAY		0000004	4.5	4.2	- 0.3
PYMBLE-BOBBIN HEAD-MT COLAH		0000366	3.9	2.7	- 1.2
RIVERSIDE DR (LANE COVE NAT PK)		0004026	3.9	3.3	- 0.6
CUMBERLAND HIGHWAY		0000013	3.6	3.5	- 0.1
CHIFLEY-PYRMONT		0000170	3.6	3.5	- 0.1
ILLAWARRA HIGHWAY		0000025	3.4	2.8	- 0.6
BOMADERRY-MOSS VALE		0000261	3.4	3.3	- 0.1
SYDNEY AIRPORT-PEAKHURST		0000168	3.4	4.1	0.7
GALSTON RD (HORNSBY-DURAL)		0000161	3.1	2.0	- 1.1
YASS-FORBES		0000056	3.1	2.5	- 0.6
NARRANDERA-MOSSGIEL		0000080	3.0	2.2	- 0.9
JINGELIC-GILMORE		0000085	2.9	2.0	- 0.9
BUNGARRIBEE ROAD		0000643	2.9	3.4	0.5
SEAFORTH-MANLY-BROOKVALE		0000159	2.7	2.3	- 0.4
LUCAS HEIGHTS-DUNDAS		0000190	2.6	2.5	- 0.1
CENTRAL COAST HIGHWAY		0000030	2.6	2.2	- 0.4
MENDOORAN-BELAR CK		0000334	2.5	3.0	0.5
BAULKHAM HILLS-MAROOKA		0000160	2.5	2.3	- 0.2
LA PEROUSE-EAST SYDNEY		0000171	2.5	2.0	- 0.5
LUDDENHAM-RICHMOND		0000155	2.4	0.6	- 1.8

RIDE QUALITY		Length in 'Poor' Condition (km)		
Road Description	Road Number	2007	2008	Change
FIVE DOCK-DRUMMOYNE	0000395	2.4	1.8	- 0.6
MILLERS PT-PARRAMATTA	0000165	2.3	1.4	- 1.0
TORONTO-BRANXTON	0000220	2.3	2.0	- 0.3
OLD HUME HIGHWAY	0000676	2.2	1.6	- 0.6
BERESFIELD-CESSNOCK	0000588	2.2	2.0	- 0.2
BLAKEHURST-RYDE	0000200	2.2	2.2	0.0
CARRAMAR-SMITHFIELD	0000609	2.2	3.2	1.0
BATEMANS BAY-QUEANBEYAN	0000051	2.1	1.4	- 0.8
TOMINGLEY-NARROMINE	0000089	2.1	1.8	- 0.3
MAROUBRA-KINGSFORD	0000661	2.0	2.3	0.2
EAST SYDNEY-NORTH BONDI	0000172	1.9	1.7	- 0.3
ASHFIELD-PUNCHBOWL	0000549	1.9	2.5	0.6
BONDI JUNCTION-WATSONS BAY	0000339	1.8	2.2	0.4
ERSKINE PARK-PLUMPTON	0000629	1.8	1.4	- 0.3
JERILDERIE-RANKINS SPRINGS	0000321	1.7	1.4	- 0.3
BELMONT-BUCHANAN	0000527	1.7	1.9	0.2
PORT KEMBLA-UNANDERRA	0000295	1.6	0.8	- 0.8
JINDABYNE TO KOSCIUSKO NATIONAL PARK BOUNDARY	0000677	1.6	1.5	- 0.1
HURLSTONE PARK-ROZELLE	0000652	1.5	1.0	- 0.5
TUGGERAH-LONG JETTY (WYONG ROAD)	0000335	1.4	1.4	0.0
EAST SYDNEY-VAUCLUSE	0000173	1.4	1.8	0.4
CECIL PARK-LUDDENHAM	0000535	1.4	1.2	- 0.2
COBAR-NR BOURKE	0000421	1.4	1.4	0.0
NEWTOWN-MOOREBANK	0000167	1.4	1.9	0.4
SPRINGWOOD-AGNES BANKS	0000570	1.4	1.6	0.2
WEST HEAD RD (KU-RING-GAI CHASE)	0004005	1.4	1.3	- 0.1
LEUMEAH-GLENFIELD	0000680	1.4	1.4	0.0
CABRAMATTA RD	0000534	1.4	1.5	0.1
COWRA-CUDAL	0000310	1.4	0.8	- 0.5
NR HAMPTON-NR OBERON	0000558	1.4	1.7	0.3
DOUGHBOY-GOULBURN	0000079	1.3	0.9	- 0.4
BULLI HEIGHTS-GLENFIELD	0000177	1.3	2.0	0.7
MORRISSET-WALLSEND	0000217	1.3	1.4	0.1
BLACKWALL-NARARA	0000349	1.3	1.0	- 0.3
MOORE PARK-DARLINGTON	0000330	1.2	1.0	- 0.2
NAREMBURN-ROSEVILLE	0000641	1.2	1.0	- 0.2
SANS SOUCI-BOTANY	0000194	1.2	0.8	- 0.4
EASTERN CK-RICHMOND	0000537	1.2	1.5	0.3
NORTH SYDNEY-EAST ROSEVILLE	0000599	1.2	1.2	0.1
NEWCASTLE-MINMI	0000082	1.2	0.8	- 0.3
CRINGILA-NORTH WOLLONGONG	0000581	1.2	0.8	- 0.3
KINGSFORD-BONDI JUNCTION	0000660	1.1	1.5	0.4
TUMBARUMBA-LITTLE BILLABONG	0000284	1.1	1.0	- 0.1
LANE COVE-CARLINGFORD	0000373	1.1	0.2	- 0.9
NARELLAN-WINDSOR	0000154	1.1	2.4	1.3
YANDERRA-PRESTONS	0000620	1.1	1.2	0.1
PROSPECT-SEVEN HILLS	0000644	1.0	0.2	- 0.8
MAYFIELD WEST-SHOAL BAY	0000108	1.0	1.6	0.6
MASCOT-ZETLAND	0000658	1.0	1.0	0.1
HEATHCOTE-LIVERPOOL	0000512	1.0	1.5	0.5
CHARLESTOWN-SPEERS POINT	0000674	1.0	0.7	- 0.4
LIVERPOOL-EASTERN CREEK	0000515	1.0	1.5	0.5
ASHFIELD-ROZELLE	0000650	1.0	1.2	0.2
SALT ASH-EAST MAITLAND	0000104	1.0	1.3	0.3
GARIE RD (ROYAL NATIONAL PARK)	0004025	1.0	0.9	- 0.1
MOORE PARK-ST. PETERS	0000528	1.0	1.7	0.7
BELL-BOWENFELS	0000516	1.0	1.0	0.0
SYDENHAM-LEWISHAM	0000664	1.0	1.8	0.8
VILLAWOOD-GRANVILLE	0000640	1.0	0.7	- 0.3
PYRMONT-CAMPERDOWN	0000523	0.9	1.2	0.3

RIDE QUALITY	Road Description	Road Number	Length in 'Poor' Condition (km)		Change
			2007	2008	
MONARO HIGHWAY		0000019	0.9	1.1	0.2
BRIGHTON-LE-SANDS-CAMPSIE		0000169	0.9	1.9	0.9
DUNMORE-WARRAWONG		0000522	0.9	0.8	- 0.2
OAK FLATS-WARILLA		0000611	0.9	0.6	- 0.3
BRINGELLY ROAD		0000647	0.9	1.1	0.2
BOREE-CONDOBOLIN		0000377	0.8	0.3	- 0.5
SMITHFIELD-GREYSTANES		0000646	0.8	0.7	- 0.1
SPIT JUNCTION-TARONGA PARK		0000400	0.8	0.9	0.1
DEE WHY-ROSEVILLE		0000328	0.8	0.2	- 0.6
LAWRENCE HARGRAVE DR		0000185	0.8	0.6	- 0.2
BLACKTOWN-KELLYVILLE		0000642	0.8	< data not available >	#VALUE!
CRONULLA-KIRRAWEE		0000227	0.8	0.5	- 0.3
ADAMSTOWN HEIGHTS-MAYFIELD		0000326	0.8	0.9	0.1
RANDWICK-ST PETERS		0000183	0.8	0.3	- 0.5
LISMORE-BANGALOW		0000065	0.7	1.2	0.5
SYDNEY-NEWCASTLE FREEWAY		0000603	0.7	0.7	- 0.0
NR BOREE-MOLONG		0000359	0.7	0.8	0.1
WILLANTHRY BR-THE PRIORY		0000410	0.7	0.3	- 0.4
ANNANDALE-ROZELLE		0000655	0.7	0.7	0.0
HENRY PARRY DRIVE		0000673	0.6	0.6	- 0.0
MAYFIELD BIRMINGHAM GARDENS		0000605	0.6	0.6	- 0.0
KEMPS CREEK-ST MARY		0000536	0.6	0.7	0.1
ALEXANDRIA-NEWTOWN		0000193	0.6	0.6	- 0.0
RYDE-MONA VALE		0000162	0.6	0.2	- 0.4
EASTWOOD-PARRAMATTA		0000574	0.6	0.1	- 0.5
HENRY LAWSON DR		0000508	0.5	0.3	- 0.2
COWPASTURE ROAD		0000648	0.5	0.7	0.2
CANBERRA-CROOKWELL		0000052	0.5	0.3	- 0.2
JUNO PARADE & BORONIA ROAD		0000636	0.5	0.4	- 0.1
WARNERVALE-NORAVILLE		0000509	0.5	0.4	- 0.1
NEW LINE ROAD		0000656	0.5	0.5	- 0.0
HABERFIELD-CONCORD		0000649	0.5	0.3	- 0.2
BEXLEY-PEAKHURST		0000665	0.5	0.8	0.3
MUSWELLBROOK-DENMAN		0000209	0.5	1.0	0.5
COOMA-CHARLOTTE PASS		0000286	0.5	0.7	0.3
WILLIAMTOWN-NR HEXHAM		0000302	0.4	0.4	- 0.0
TERMINUS ST (LIVERPOOL)		0000578	0.4	0.3	- 0.1
FOREST LODGE-ANNANDALE		0000666	0.4	0.6	0.2
BRIGHTON-LE-SANDS-KOGARAH		0000667	0.4	0.6	0.2
BRUNKER ROAD (EASTERN SIDE)		0000638	0.4	0.2	- 0.2
PAGEWOOD-MASCOT		0000344	0.4	0.3	- 0.1
EAST GOSFORD-NR AVOCA BEACH		0000504	0.3	0.2	- 0.1
KENSINGTON-RANDWICK		0000327	0.3	0.5	0.1
HILLSDALE-BANKSMEADOW		0000616	0.3	0.2	- 0.1
CARINGBAH-KOGARAH		0000199	0.3	0.4	0.1
MALDON-CAMPBELLTOWN		0000179	0.3	0.7	0.3
YARRAWONGA-MULWALA		0000314	0.3	0.5	0.1
BOX HILL-MARSDEN PARK		0000546	0.3	< data not available >	#VALUE!
CHIPPENDALE-BLACKWATTLE BAY		0000594	0.3	0.5	0.2
PHEASANTS NEST-OAKDALE		0000612	0.3	0.2	- 0.1
WATTAMOLLA RD (ROYAL NATIONAL PK)		0004020	0.3	0.4	0.1
RYDE-PENNANT HILLS		0000139	0.3	0.1	- 0.2
CHARLESTOWN-SANDGATE HIGHWAY		0000023	0.3	0.2	- 0.0
LYSAGHTS-FIGTREE		0000602	0.3	0.1	- 0.2
SUTHERLAND-MENAI		0000663	0.2	0.6	0.3
WINDSOR-SOUTH MAROOTA		0000182	0.2	0.1	- 0.1
MULBRING-MAITLAND		0000195	0.2	0.4	0.2
BLAYNEY-ORANGE		0000245	0.2	0.1	- 0.1
LAKE CARGELLIGO-BOOLIGAL		0000501	0.2	0.2	- 0.1
CAMPBELLTOWN-CAMDEN		0000178	0.2	0.9	0.7

RIDE QUALITY		Length in 'Poor' Condition (km)		
Road Description	Road Number	2007	2008	Change
MOSS VALE-MITTAGONG	0000260	0.2	0.0	- 0.2
MASCOT-ALEXANDRIA	0000659	0.2	0.1	- 0.1
CAMDEN-LAKE BURRAGORANG	0000259	0.2	0.7	0.5
ERMINGTON-CARLINGFORD	0000158	0.2	0.0	- 0.2
FORESHORE RD (BOTANY)	0000617	0.2	0.1	- 0.1
MOOREBANK AVENUE (NORTH)	0000657	0.1	0.2	0.1
JAMES RUSE DR (SOUTH)	0000309	0.1	0.0	- 0.1
MIRANDA-SYLVANIA	0000669	0.1	0.3	0.2
ALBION PARK RAIL-ALBION PARK	0000262	0.1	0.2	0.1
FEDERAL HIGHWAY	0000003	0.1	0.0	- 0.1
BARTON HIGHWAY	0000015	0.1	0.1	- 0.0
MURRAY RIVER-COROWA	0000086	0.1	0.0	- 0.1
CASTLE HILL RD (CASTLE HILL)	0000156	0.1	0.1	- 0.0
GLADESVILLE BR-LANE COVE	0000166	0.1	0.1	- 0.0
WOLLONGONG-NR MT KEIRA	0000186	0.1	0.1	- 0.0
CHATSWOOD-NORTH RYDE	0000191	0.1	0.0	- 0.1
NEWCASTLE WEST-MAYFIELD WEST	0000316	0.1	0.2	0.1
ERINA-TERRIGAL	0000505	0.1	0.2	0.1
THE LINK RD-BULLI HEIGHTS	0000513	0.1	0.0	- 0.1
ROBINVALE-NR EUSTON	0000583	0.1	0.1	- 0.0
CARINGBAH-CRONULLA	0000662	0.1	0.2	0.1
PORT KEMBLA RD	0000671	0.1	0.1	- 0.0
WESTERN FREEWAY	0006004	0.1	0.0	- 0.1
GALSTON-MIDDLE DURAL	0000548	0.1	< data not available >	#VALUE!
DARLINGHURST-MILLERS POINT	0000592	0.1	0.1	0.0
WOLLONGONG-PHEASANTS NEST	0000095	0.0	0.3	0.3
SHOWGROUND RD (CASTLE HILL)	0000157	0.0	0.0	0.0
BALGOWLAH-NARRABEEN	0000397	0.0	0.0	0.0
FRENCHS FOREST-TERREY HILLS	0000529	0.0	0.0	0.0
WHILEYS JUNCTION-SHADFORTH	0000559	0.0	0.0	0.0
BOTANY-PADDINGTON	0000593	0.0	0.2	0.2
NORTHERN SUBURBS DISTRIBUTOR	0000626	0.0	0.0	0.0
UPPER CASTLEREAGH-LLANDILO	0000630	0.0	1.3	1.3
BRADFIELD HIGHWAY (HARBOUR BR)	0000632	0.0	0.3	0.3
OLD TOONGABBIE-SEVEN HILLS	0000635	0.0	< data not available >	#VALUE!
PARRAMATTA-NORTH PARRAMATTA	0000637	0.0	0.0	0.0
NORTH SYDNEY-LANE COVE	0000651	0.0	0.0	0.0
WALLARAH-BLUE HAVEN	0000675	0.0	0.0	0.0
SOUTHERN FREEWAY	0006006	0.0	0.0	0.0
		573.7	522.9	- 50.8
* excludes cells above where data missing in 2008	with chaining	572.5	522.9	- 49.6

Notes:

- B.1 'Chaining' involves comparing data only where it is available for both 2007 and 2008.
- B.2 Appendix B outlines the length of 'poor' roughness by road. This is not the same as 'poor' ride quality. The ride quality indicator is traffic weighted and therefore indicates the proportion of road kilometres travelled on sections of road with 'poor' roughness. In 2007, 3.2% of the sections of road rated as having 'poor' roughness carry 4.4% of State Road traffic.