

Boral Badgerys Creek

Continued Operation of Quarry and Brick Making Facility

 **Volume 1**

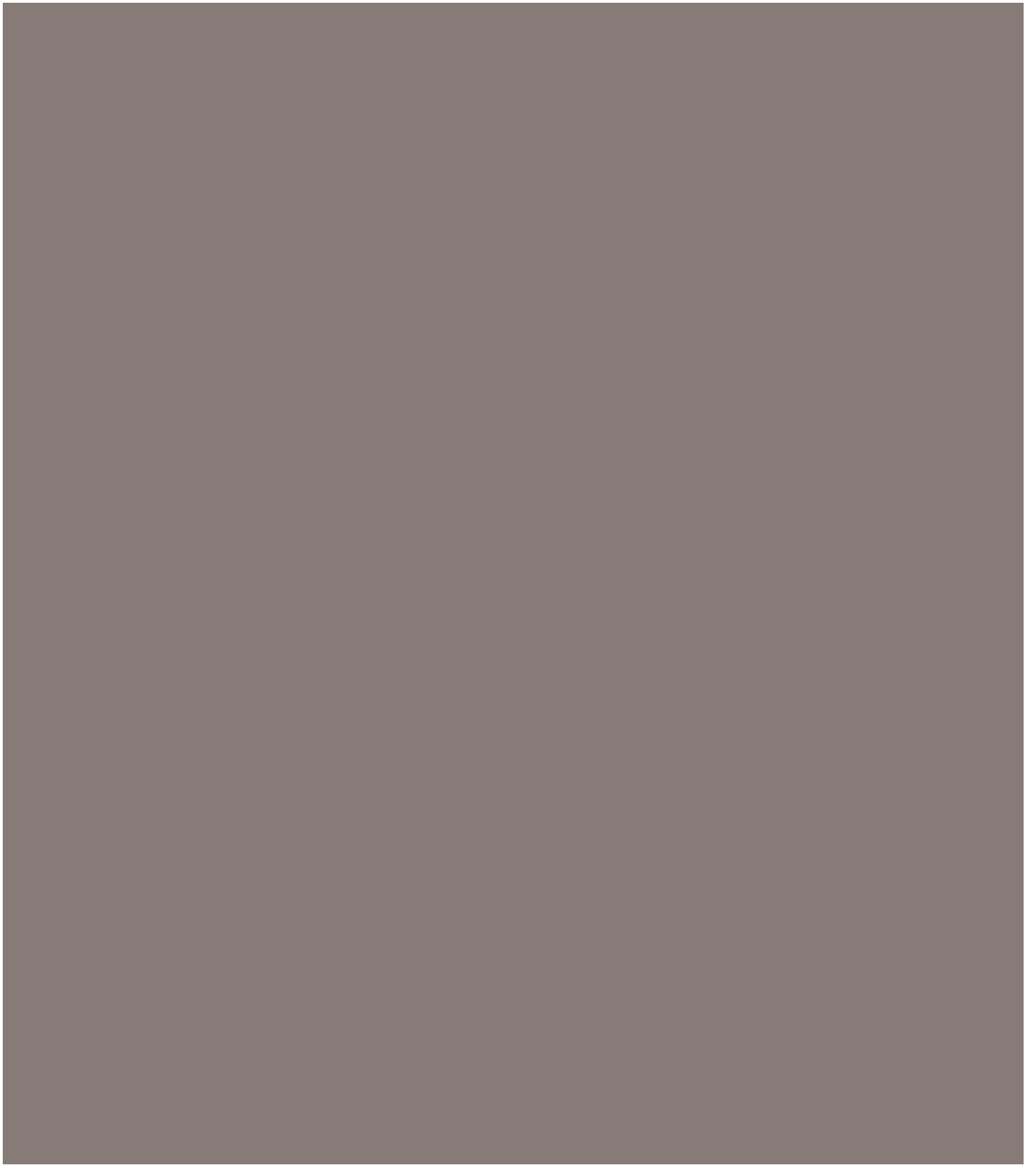
ENVIRONMENTAL ASSESSMENT

Continued Operation of Quarry and Brick Making Facility

Boral, Badgerys Creek

Prepared for Boral Bricks
235 Martin Road | Badgerys Creek | New South Wales | 2555
www.boral.com.au

Prepared by AECOM
Level 8, 17 York Street | Sydney | New South Wales | 2000 | T +61 2 8023 9333 | F +61 2 8023 9399
www.aecom.com



Certification Page

Submission of Environmental Assessment (EA) prepared under the *NSW Environmental Planning and Assessment Act 1979* Section 75F

EA prepared by:

Name	Erin Saunders	Catherine Brady
Qualifications	Bachelor of Environmental Science Diploma of Urban and Regional Planning	Bachelor of Arts (Hons) Geography and Economics Master of Regional and Urban Planning

Title	Principal Planner	Associate Director
-------	-------------------	--------------------

Address	AECOM Level 8, 17 York Street Sydney NSW 2000
---------	---

in respect of	Continuation of operations – Boral Quarry and Brick Making Facility, Badgerys Creek
---------------	--

Project application	CP 10_0014 and CP 10_0033
Applicant name	Boral Bricks Pty Ltd
Applicant address	235 Martin Road, Badgerys Creek NSW

Land to be developed	
lot no., DP/MPS, vol/fol etc	The proposed project is to be carried out on land at 235 Martin Road, Badgerys Creek, as shown in Figure 2 of this EA.
Proposed project	

Environmental Assessment	an Environmental Assessment (EA) is attached
--------------------------	--

Certification	I certify that I have prepared the contents of this Environmental Assessment and to the best of my knowledge it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.
---------------	---

Per:



Signature

Name: Erin Saunders

Date 3 November 2010



Signature

Name: Catherine Brady

Date 3 November 2010

Quality Information

Document	Environmental Assessment
Ref	Job No. 60153311 60153311_Exhibition_EA_3Nov2010
Date	3 November 2010
Prepared by	Erin Saunders Author Signature per: 
Reviewed by	Catherine Brady Technical Peer Reviewer Signature 

Distribution

Copies	Recipient	Copies	Recipient
1	Brendan Simpson General Manager Boral Bricks 235 Martin Road Badgerys Creek NSW		
1	Michael Gow Plant Manager Boral Bricks 235 Martin Road Badgerys Creek NSW		
1	David Kitto Major Development Assessment NSW Department of Planning 23-33 Bridge Street Sydney NSW 2000		

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
1	3/11/2010	EA for Exhibition	Catherine Brady	

Contents

Volume 1

1.0	Introduction	1
1.1	Background.....	1
1.1.1	The Proponent.....	1
1.1.2	Planning History	1
1.1.3	Existing Works and Infrastructure	2
1.2	Project Context	2
1.3	Location	2
1.4	Approvals Process.....	3
1.4.1	Concept Plan Approval.....	3
1.4.2	Concurrent Project Approval	4
1.4.3	Preliminary Environmental Assessment	4
1.4.4	Director-Generals Requirements	4
1.4.5	Planning Focus Meeting.....	4
1.4.6	Stakeholder Consultation	4
1.4.7	EA Exhibition	5
1.5	Purpose of this Report.....	5
1.6	Structure of the EA	5
2.0	Site and Context	7
2.1	Regional Context	7
2.2	Concept Plan and Project Area	7
2.3	Project Site – Existing Environment	7
2.4	Surrounding Land Use.....	8
2.4.1	Existing Environment.....	8
2.4.2	Future Land Use.....	8
3.0	Project Need and Alternatives	9
3.1	Need for the Project.....	9
3.2	Alternatives Considered	10
3.2.1	Location and Depth of Extraction	10
3.2.2	Use of the Project Site.....	10
3.2.3	Do Nothing.....	10
3.3	Consequences of Not Proceeding	11
3.4	Conclusion	11
4.0	Project Description	13
4.1	Existing Development.....	13
4.1.1	Overview.....	13

4.2	The Project.....	14
4.2.1	Overview.....	14
4.2.2	Quarrying Activities	15
4.2.3	Brick Production	17
4.2.4	Deliveries and Dispatch	17
4.2.5	Stockpiles	18
4.2.6	Stormwater Management.....	18
4.2.7	Infrastructure and Servicing	19
4.2.8	Hours of Operation	19
4.2.9	Workforce	19
4.3	Rehabilitation	19
4.3.1	Overview.....	19
4.3.2	Pits.....	20
4.3.3	Stockpiles	21
4.3.4	Creeklines.....	22
4.3.5	Future Land Use.....	22
4.3.6	Final Landform.....	22
4.4	Environmental Controls	23
5.0	Statutory Planning.....	25
5.1	Local Matters	25
5.1.1	Liverpool Local Environmental Plan 2008	25
5.2	State Matters	26
5.2.1	NSW Environmental Planning and Assessment Act 1979	26
5.2.2	State Environmental Planning Policies	29
5.2.3	Other Relevant Acts	35
5.3	Sydney Metropolitan Strategy	37
5.3.1	South West Growth Centres Subregional Strategy	38
5.4	Commonwealth Matters.....	39
5.4.1	Environmental Protection and Biodiversity Conservation Act 1999	39
6.0	Consultation	41
6.1	NSW Formal Procedures.....	41
6.2	Consultation with Stakeholders and Relevant Authorities	43
6.2.1	Statutory and Other Relevant Authorities	43
6.2.2	Community Consultation	44
6.2.3	Aboriginal Community Consultation.....	45
7.0	Issues Prioritisation	47
7.1	Issues Identification	47
7.2	Prioritisation of Issues	47

	7.2.1	Approach	47
	7.2.2	Assessment	48
8.0		Air Quality	53
	8.1	Existing Environment	53
	8.1.1	Existing Air Quality and Meteorological Environment	53
	8.1.2	Sensitive Receptors	54
	8.2	Assessment Methodology and Dispersion Modelling	54
	8.2.1	Pollutants of Concern	55
	8.2.2	Pollutant Sources	55
	8.2.3	Assessment Criteria	56
	8.2.4	Dispersion Modelling	57
	8.3	Potential Impacts	58
	8.3.1	Gaseous Pollutants	58
	8.3.2	Dust Emissions	58
	8.4	Mitigation Measures	59
	8.5	Greenhouse Gas Assessment	59
	8.5.1	Methodology	59
	8.5.2	Estimates	60
	8.5.3	Emissions Summary	63
	8.6	Conclusion	63
9.0		Noise	65
	9.1	Existing Environment	65
	9.1.1	Noise Sensitive Receptors	65
	9.1.2	Existing Noise Environment	65
	9.1.3	Environmental Noise Criteria	66
	9.2	Methodology	68
	9.2.1	Quarry	68
	9.2.2	Brick Making Facility and Storage Yard	68
	9.2.3	Site Access Road	69
	9.3	Potential Impacts	69
	9.3.1	Noise Modelling Results	69
	9.4	Mitigation Measures	71
	9.4.1	Earth mounds	71
	9.4.2	Construction Work Hours	71
	9.4.3	Mobile Plant Noise Reduction	71
	9.4.4	Use of Alternative Vehicle Movement and Warning Alarms	72
	9.5	Conclusion	72
10.0		Surface Water	75

10.1	Existing Environment.....	75
10.1.1	Catchments	75
10.1.2	South Creek.....	75
10.1.3	Badgerys Creek.....	75
10.1.4	Flood Prone Areas	76
10.1.5	On Site Drainage.....	76
10.1.6	Sewage Disposal.....	77
10.1.7	Truck Washing Facility	77
10.2	Potential Impacts	77
10.2.1	Stormwater Runoff	77
10.2.2	Water Quality.....	79
10.2.3	Flooding.....	79
10.3	Mitigation Measures	80
10.4	Conclusion	80
11.0	Groundwater	81
11.1	Existing Environment.....	81
11.1.1	Regional Geology and Geomorphology.....	81
11.1.2	Hydrogeological Setting	82
11.1.3	Project Site	83
11.2	Groundwater Usage	83
11.3	Methodology	83
11.4	Existing Impacts on Groundwater Regime.....	84
11.5	Potential Impacts	84
11.5.1	Aquifer Dewatering.....	84
11.5.2	Impacts to Water Quality	85
11.5.3	Impact to Base Flows and Groundwater Dependant Ecosystems	85
11.6	Mitigation Measures	85
11.6.1	Alluvial Assessment and Groundwater Monitoring Program	86
11.7	Conclusion	87
12.0	Land Use.....	89
12.1	Overview.....	89
12.2	Existing Land Use.....	89
12.3	Future Land Use	90
12.4	Potential Impacts	90
12.4.1	Future Use of the Project Site	90
12.4.2	Compatibility with Existing and Future Land Use	91
12.5	Mitigation Measures	91
12.6	Conclusion	92

13.0	Traffic and Transportation.....	93
13.1	Strategic and Local Road Network.....	93
13.2	Existing Traffic Volumes and Intersection Performance	93
13.2.1	Traffic Volumes.....	93
13.2.2	Current Traffic Generation	94
13.2.3	Intersection Counts	94
13.2.4	Existing Intersection Performance	94
13.2.5	Traffic Safety	95
13.3	Future Transport Conditions (without the Project)	96
13.4	Traffic Generation and Potential Impacts.....	97
13.4.1	Proposed Production and Operations.....	97
13.4.2	Trip Generation.....	97
13.4.3	Martin Road/Elizabeth Drive Intersection	98
13.4.4	Suitability of Martin Road	98
13.5	Mitigation Measures	99
13.6	Conclusion	100
14.0	Geology and Soils.....	103
14.1	Existing Environment.....	103
14.1.1	Landform	103
14.1.2	Geological Context	103
14.1.3	Site Geology.....	106
14.1.4	Soils	108
14.1.5	Clay/Shale Resource.....	109
14.1.6	Geotechnical Assessment.....	110
14.1.7	Historical Land use and Contaminated Land.....	110
14.2	Potential Impacts	110
14.2.1	Soil erosion and sedimentation	111
14.2.2	Sediment laden runoff	111
14.2.3	Poor drainage	111
14.2.4	Interception of Acid Sulfate Soils	111
14.2.5	Potential contamination through fuel and oil spills.....	111
14.3	Mitigation Measures	111
14.4	Conclusion	111
15.0	Visual Impacts.....	113
15.1	Existing Environment.....	113
15.1.1	Landscape Context	113
15.1.2	Project Site	113
15.1.3	Visual Receptors	113

15.2	Potential Impacts	114
15.3	Mitigation Measures	115
15.4	Conclusion	116
16.0	Heritage.....	117
16.1	Existing Environment.....	117
16.1.1	Archaeological context	117
16.1.2	Database investigations	117
16.1.3	Field survey	117
16.1.4	Survey Findings.....	117
16.2	Potential Impacts	118
16.2.1	Construction Impact	118
16.2.2	Cumulative Impacts and Significance	118
16.3	Mitigation Measures	118
16.4	Conclusion	119
17.0	Ecology	121
17.1	Introduction	121
17.2	Existing Environment.....	121
17.2.1	Ecological Communities	121
17.2.2	Flora.....	122
17.2.3	Fauna.....	123
17.2.4	Aquatic Habitats	123
17.2.5	Wildlife Corridors	124
17.2.6	Critical Habitat and Threatened Populations	124
17.3	Potential Impacts	124
17.3.1	Threatened Ecological Communities, Populations and Species	124
17.3.2	Key Threatening Processes	125
17.3.3	Aquatic Habitats	125
17.4	Mitigation Measures	125
17.5	Conclusion	125
18.0	Socio-Economic Impacts	127
18.1	Existing Environment.....	127
18.1.1	Community Profile	127
18.1.2	Predicted Growth in the South West.....	127
18.1.3	Economic Profile	128
18.2	Potential Impacts	129
18.2.1	Social	129
18.2.2	Economic.....	129
18.3	Mitigation Measures	130

	18.4	Conclusion	130
19.0	Waste		131
	19.1	Overview	131
	19.2	Boral Waste Management Plan.....	131
	19.3	Potential Impacts	133
	19.4	Mitigation Measures	133
	19.5	Conclusion	133
20.0	Hazard and Risk		135
	20.1	Introduction	135
	20.2	Existing Environment.....	135
	20.3	Potential Impacts	136
	20.3.1	Spilling of dangerous goods.....	136
	20.3.2	Refuelling of Vehicles and Plant	137
	20.3.3	Storage Areas.....	137
	20.3.4	Stockpile Areas.....	137
	20.3.5	Contaminated Run-off	137
	20.4	Mitigation Measures	137
	20.5	Conclusion	138
21.0	Cumulative Impacts		139
	21.1	Cumulative Impacts of Continued Operations	139
	21.2	Cumulative Impact with Other Projects	139
	21.3	Conclusion	142
22.0	Environmental Management and Commitments		143
	22.1	Introduction	143
	22.2	Summary of Mitigation Measures.....	144
	22.3	Statement of Commitments.....	149
	22.4	Training and Induction	152
	22.5	Inspection, Monitoring and Auditing	153
	22.6	Outline of Environmental Reporting	154
	22.7	Outline of Environmental Auditing	154
23.0	Residual Risk		156
	23.1	Approach.....	156
	23.2	Analysis.....	157
24.0	Project Justification		158
	24.1	Ecologically Sustainable Development	158
	24.1.1	Precautionary Principle	159
	24.1.2	Intergenerational Equity	159
	24.1.3	Biological Diversity and Ecological Integrity	159

	24.1.4	Valuation and Pricing of Environmental Resources	160
	24.1.5	Decision Making Process	160
	24.2	Climate Change	160
	24.3	Conclusion	161
25.0	Conclusion		163
	25.1	The Project.....	163
	25.2	Justification for the Project	163
	25.3	Sustainability of the Project	163
	25.4	Conclusion	163

Volume 2

Appendix A	Existing Consents / Approvals
Appendix B	Director-General's Requirements
Appendix C	Soil and Water Management Plan
Appendix D	Rehabilitation Plan
Appendix E	Air Quality Impact Assessment
Appendix F	Noise Assessment

Volume 3

Appendix G	Traffic Impact Assessment
Appendix H	Road Alignment and Pavement Assessments
Appendix I	Bore log data
Appendix J	Geotechnical Investigations
Appendix K	Aboriginal Heritage Assessment
Appendix L	Ecological Search Tool Results
Appendix M	Waste Management Plan

List of Tables

Body Report

Table 1: Environmental issue prioritisation	x
Table 2: Planning History of Boral Badgerys Creek	1
Table 3: Outline of Report Structure	5
Table 4: Summary of key differences between proposed and existing operations	15
Table 5: Existing and Proposed Pit Lifespans and approximate area	16
Table 6: Current and Proposed Hours of Operation	19
Table 7: Proposed Rehabilitation Works	20
Table 8: Proposed stockpile rehabilitation works	21
Table 9: Objects of the EP&A Act	27
Table 10: Matters for Consideration - Clause 12 of Mining SEPP	30
Table 11: Matters for Consideration – Clause 16 of SEPP (Growth Centres) 2006	33
Table 12: Director-General's Requirements	41
Table 13: Summary of Agency Responses	43
Table 14: Issues Prioritisation Matrix	47
Table 15: Prioritisation Analysis	48
Table 16: Prioritisation of Issues	51
Table 17: Background Concentrations at the Bringelly DECCW Monitoring Station	53
Table 18: Sensitive Receptor Locations	54
Table 19: Relevant Air Quality Impact Assessment Criteria	56
Table 20: Emission Factors – Combustion of Gaseous Fuels	60
Table 21: Emission Estimates – Combustion of Gaseous Fuels	60
Table 22: Emission Estimates - Combustion of Solid Fossil Fuels (excluding coal or coke)	60
Table 23: Emission Factors – Combustion During On-site Transport	61
Table 24: Emission Estimates - Combustion During On-site Transport	61
Table 25: Emission Factors – Electricity Use	61
Table 26: Emission Estimates – Electricity Use	61
Table 27: Scope 3 Emission Factors - Diesel Fuel	62
Table 28: Product Transport Data	62
Table 29: Greenhouse Gas Emissions Summary	63
Table 30: Rating background Levels	65
Table 31: Resultant Operational Noise Criteria for Victor Avenue Receptors	66
Table 32: Resultant Operational Noise Criteria for all Other Receptors	66
Table 33: Construction Noise Management Levels	67
Table 34: Land use developments with the potential to create additional traffic on existing roads traffic noise criteria	68
Table 35: Peak Vehicle Movements Modelled for Each Assessment Period	69

Table 36 Predicted Changes in Noise Level from Martin Road	71
Table 37: Summary of inflows and outflows	78
Table 38: Available site storage capacity required to comply with EPL requirement	78
Table 39: Upper Stratigraphy of the Southern Sydney Basin	82
Table 40: Proposed Groundwater Monitoring Program.....	87
Table 41: Historical Traffic Volumes	93
Table 42: Performance Criteria for Intersections.....	94
Table 43: 2009 AM Peak Intersection Performance.....	95
Table 44: 2009 PM Peak Intersection Performance.....	95
Table 45: Intersection Performance Summary Table (all vehicles)	96
Table 46: Current and Proposed Hours of Operation.....	97
Table 47: Truck Trip Generation Table.....	97
Table 48: Employee Trip Generation Table.....	97
Table 49: Proportion of Project Generated Traffic at Martin Road / Elizabeth Drive Intersection	98
Table 50: Stratigraphic Phases of the Sydney Basin Geology.....	103
Table 51: Wianamatta Group Formations.....	107
Table 52: Mineralogical aspects of the site	107
Table 53: Characteristics of Bringelly Shale.....	107
Table 54: Soil Characteristics and Limitations.....	108

"This page has been left blank intentionally"

Acronyms

Acronym	Definition
AADT	Average Annual Daily Traffic
ABS	Australian Bureau of Statistics
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ANL	Australian Native Landscapes
AQIA	Air Quality Impact Assessment
AQMP	Air Quality Management Plan
ASS	Acid Sulphate Soils
bgs	below ground surface
BoM	Bureau of Meteorology
CBD	Central Business District
CEC	Cation Exchange Capacity
Cl	Chlorine
CLM Act	<i>Contaminated Land Management Act 1997</i>
CPW	Cumberland Plain Woodland
CSM	Coal seam methane
DA	Development Application
DACHA	Darug Aboriginal Cultural Heritage Assessments
DCAC	Darug Custodian Aboriginal Corporation
DCC	Department of Climate Change
DEC (formerly EPA)	Department of Environment and Conservation NSW
DECC	Department of Environment and Climate Change NSW (now DECCW)
DECCW	Department of the Environment, Climate Change and Water NSW
DEWHA	Department of the Environment, Water, Heritage and the Arts
DGPS	Differential Global Positioning System
DGRs	Director-General's Requirements
DII	Department of Industry and Investment NSW
DoP	Department of Planning NSW
DoS	Degree of Saturation
DIPNR	Department of Infrastructure, Planning and Natural Resources NSW (now DoP and DECCW)
DLO	Darug Land Observations
DMR	NSW Department of Mineral Resources

Acronym	Definition
DPI	Department of Primary Industries NSW
DTAC	Darug Tribal Aboriginal Corporation
EA	Environmental Assessment
ECRTN	DECCW's <i>Environmental Criteria for Road Traffic Noise</i>
EEC	Endangered Ecological Community
EMP	Environmental Management Plan
EPA	Environment Protection Agency (Now DEC)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPI	Environmental Planning Instrument
EPL	Environmental Protection License
ESD	Ecologically Sustainable Development
FM Act	<i>Fisheries Management Act 1994</i>
GHG	Greenhouse Gas
GLALC	Gandangara Local Aboriginal Land Council
GLC	Ground Level Concentrations
GPS	Global Positioning System
GSNSW	Geographical Society of NSW
HF	hydrogen fluoride
H ₂ SO ₄ ,	Sulfuric acid
ICCRs	Interim Community Consultation Requirements for Applicants
ICNG	NSW Interim Construction Noise Guideline (DECCW)
IGAE	Intergovernmental Agreement on the Environment
INP	NSW Industrial Noise Policy (DECCW)
Kg	Kilogram
L	Litre
LCC	Liverpool City Council
LGA	Local Government Area
LLEP	<i>Liverpool Local Environmental Plan 2008</i>
LoS	Level of Service
MHRDC	Maximum Harvestable Right Dam Capacity
M4	Western Motorway
NEPM	National Environment Protection Measures
NES	National Environmental Significance

Acronym	Definition
NGA	National Greenhouse Accounts
NO	nitric oxide
NO _x	Nitrogen Oxides
NO ₂	Nitrogen Dioxide
NOW	NSW Office of Water
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NPWS	National Parks and Wildlife Service
NV Act	<i>Native Vegetation Act 2003</i>
NW Act	<i>Noxious Weeds Act 1993</i>
O ₂	Oxygen
OH&S	Occupational Health & Safety
PEA	Preliminary Environmental Assessment
PFM	Planning Focus Meeting
PHA	Preliminary Hazard Analysis
PM ₁₀	Particulate Matter of 10 Microns (diameter)
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PPM	Parts per million
RBL	Rated Background Level
REP	Regional Environmental Plan
RFEF	River Flat Eucalypt Forest
RNE	Register of the National Estate
RP	Rehabilitation Plan
RTA	Roads and Traffic Authority
SAWT	SITA Advanced Waste Treatment Facility
SCRFF	Sydney Coastal River Flat Forest
SEPP 2005	<i>State Environmental Planning Policy (Major Development) 2005</i>
SEPP 2007	<i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i>
SEPP 2006	<i>State Environmental Planning Policy (Sydney Region Growth Centres) 2006</i>
SEPP 33	<i>State Environmental Planning Policy No. 33 – Hazardous and Offensive Industries</i>
SEPP 44	<i>State Environmental Planning Policy No. 44 – Koala Habitat Protection</i>
SEPP 55	<i>State Environmental Planning Policy No. 55. – Remediation of Land</i>
SITA	SITA Environmental Solutions Australia Pty Ltd

Acronym	Definition
SO ₂	Sulfur dioxide
SoC	Statement of Commitments
SPW	Shale Plains Woodland
SREP	Sydney Regional Environmental Plan
SWGC	South West Growth Centre
SWMP	Soil and Water Management Plan
TDS	Total Dissolved Solids
TEOM	Tapered Element Oscillating Microbalance
tpa	tonnes per annum
TSC Act	<i>Threatened Species Conservation Act 1995</i>
TSP	Total suspended particulates
WIRES	Wildlife Information Rescue and Education Service Inc, NSW
WM Act	<i>Water Management Act 2000</i>
WMP	Waste management plan
WONS	Weeds of National Significance
YA	Yarrawalk