APPENDIX 4: SURVEY RESULTS

Family	Common Name	*Scientific Name*	Stratum (weed)	Stratum (Native)	*Weed*	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Recorded
	Cat Head	*Emex australis*	Lower			x	x	x	x	x	x	x	x
Myrsinaceae	Scarlet/ Blue Pimpernal	*Anagallis arvensis* *	Lower		*								
Scrophulariaceae	Broomrape	*Orobanche minor* *	Lower		*								
Asteraceae	Cape Weed	*Arctotheca calendula* *	Lower		*	x		x					x
	Khaki Weed	*Alternanthera pungens*	Lower		*	x	x		x	x	x	x	x
Asteraceae	Nodding Thistle	*Carduus nutans subsp. nutans*	Lower		*#			x					x
Asteraceae	Saffron Thistle	*Carthamus lanatus* *	Lower		*			x	x	x	x	x	x
Asteraceae	Maltese Cockspur	*Centaurea melitensis**	Lower		*	x				x	x	x	x
Asteraceae	Spear Thistle	*Cirsium vulgare* *	Lower		*								
Asteraceae	Flax-leaf Fleabane	*Conyza bonariensis*	Lower		*		x	x	x	x	x		x
	Lucerne	*Medicago sativa* *	Lower			x	x	x			x	x	x
Asteraceae		*Hedypnois rhagadioloides ssp. cretica* *	Lower		*								
Asteraceae	Flat weed	*Hypochaeris glabra* *	Lower		*					x	x		x
Asteraceae	Flat weed hairy	*Hypochaeris radicata**	Lower		*		x						x
Asteraceae	Hawkweed	*Leotodon taraxacoides**	Lower		*								
Asteraceae	Varigated Thistle	*Silybum marianum* *	Lower		*						x		x
Asteraceae		*Sisymbrium erysimoides*	Lower		*								
Asteraceae	Scourweed	*Sisyrinchium sp. A sensu*	Lower		*								
Asteraceae	Prickley Cow Thistle	*Sonchus asper*	Lower		*								
Asteraceae	Common Sow Thistle	*Sonchus oleraceus*	Lower		*								
Asteraceae	Stagger Weed	*Stachys arvensis*	Lower		*								
Asteraceae	Skeleton Weed	*Chondrilla juncea*	Lower		*		x	x	x		x	x	x
Boraginaceae		*Amsinckia intermedia*	Lower		*								
Boraginaceae	Paterson's Curse	*Echium plantagineum* *	Lower		*								
Boraginaceae	Vipers Bugloss	*Echium vulgare**	Lower		*								
Boraginaceae	Potato Weed	*Heliotropium europaeum**	Lower		*								
Brassicaceae	Turnip	*Brassica rapa subsp. sylvestris**	Lower		*								
Brassicaceae	Brassica	*Brassica tournefortii* *	Lower		*								
Brassicaceae	Shepherd's Purse	*Capsella bursa-pastoris**	Lower		*		x		x	x	x	x	x
Brassicaceae	Argentine Peppercress	*Lepidium africanum**	Lower		*								
Brassicaceae	Peppercress	*Lepidium bonariense**	Lower		*	x		x			x		x
Caryophyllaceae		*Silene gallica var. gallica* *	Lower		*								

Caryophyllaceae		*Stellaria media* *	Lower		*				x				x
Caryophyllaceae	Proliferous Pink	*Petrorhagia nanteuilii*	Lower		*	x	x	x	x	x			x
Cucurbitaceae	Paddy Melon	*Cucumis myriocarpus subsp. leptodermis*	Lower		*						x		x
Fabaceae - Faboideae	Haresfoot clover	*Trifolium arvense* *	Lower		*	x	x	x	x	x		x	x
Fabaceae - Faboideae		*Trifolium campestre* *	Lower		*	x							x
Fabaceae - Faboideae		*Trifolium dubium* *	Lower		*								
Fabaceae - Faboideae	White Clover	*Trifolium repens* *	Lower		*	x	x	x			x		x
Fabaceae - Faboideae		*Trifolium subterraneum* *	Lower		*								
Fabaceae (Faboideae)		*Medicago arabica**	Lower		*								
Fabaceae (Faboideae)		*Medicago minima* *	Lower		*								
Geraniaceae		*Geranium spp.**	Lower		*	x							x
Juncaceae		*Juncus bufonius* *	Lower		*								
Lamiaceae		*Lamium amplexicaule* *	Lower		*								
Lamiaceae	White Horehound	*Marrubium vulgare**	Lower		*								
Lamiaceae	Pennyroyal	*Mentha pulegium**	Lower		*								
Lamiaceae	Vervain	*Salvia verbenaca**	Lower		*								
Malvaceae	Spiked Malvastrum	*Malvastrum americanum*	Lower		*								
Oxalidaceae	Oxalis	*Oxalis corniculata**	Lower		*	x		x	x	x	x	x	x
Solanaceae	Blackberry Nightshade	*Solanum nigram*	Lower		*	x					x		x
Urticaceae	Small Nettle	*Urtica urens**	Lower		*								
Verbenaceae	Purpletop	*Verbena bonariensis**	Lower		*								
Asteraceae.	Nagoora Burr	*Xanthium pungens**	Lower		*#								
Asteraceae	Tall Fleabane	*Conzya alibida*	Lower								x		x
Cyperaceae	Bull Rush	*Typha*	Lower (sedge)										
Papaveraceae	Mexican Poppy	*Argemone ochroleuca**	Lower		*								
	African Lovegrass	*Eragrostis curvula*	Lower (Grass)		*	x	x	x	x	x	x		x
Poaceae	Great Brome	*Bromus diandrus*	Lower (Grass)		*								
Poaceae	Praire Grass	*Bromus cartharticus**	Lower (Grass)		*								
Poaceae	Soft Brome	*Bromus molliformis* *	Lower (Grass)		*								
Poaceae	Small Quaker Grass	*Briza minor**	Lower (Grass)		*								
Poaceae	Quaker Grass	*Briza major**	Lower (Grass)		*								
Poaceae	Stinkgrass	*Eragrostis cilianensis**	Lower (Grass)		*	x	x	x	x		x		x
Poaceae	Barley Grass	*Hordeum leporinum* *	Lower (Grass)		*			x			x		x
Poaceae	Oats	*Avena fatua**	Lower (Grass)		*		x	x	x		x		x
Poaceae	Golden Top	*Lamarckia aurea* *	Lower (Grass)		*								
Poaceae	Perennial Rye	*Lolium perennens*	Lower (Grass)		*						x		x
Poaceae	Wimera Ryegrass	*Lolium rigidum**	Lower (Grass)		*						x		x

Poaceae	Squirrel Tail Fescue	*Vulpia bromoides* *	Lower (Grass)		*								
Poaceae	Rhodes Grass	*Chloris virgata*	Lower (Grass)		*								
Poaceae		*Vulpia myuros* *	Lower (Grass)		*								
Cactaceae	Prickley Pear	*Opuntia stricta**	Mid		*#								
Solanaceae	African Boxthorn	*Lycium ferocissimum**	Mid		*#		x				x		x
Anacardiaceae	Pepper Tree	Schinus molle	Upper										x
Apiaceae	Native Carrot	*Daucus glochidiatus*		Lower									
Amaranthaceae	Hairy Joyweed	*Alternanthera nana*		Lower									
Anthericaceae	Twining Fringe Lily	*Thysanotus patersonii*		Lower				x					x
Anthericaceae	Common Fringe Lily	*Thysanotus tuberosus*		Lower									
Asparagaceae		*Dichopogon fimbriatus*		Lower				x		x		x	x
Asphodelaceae		*Bulbine bulbosa*		Lower									
Asphodelaceae	Leek Lily	*Bulbine semibarbata*		Lower									
Asteraceae		*Asteraceae sp.*		Lower									
Asteraceae	Purple Burr-daisy	*Calotis cuneifolia*		Lower									
Asteraceae	Showy Burr-daisy	*Calotis cymbacantha*		Lower									
Asteraceae	Yellow Burr-daisy	*Calotis lappulacea*		Lower									
Asteraceae	Bogan Flea	*Calotis hispidula*		Lower		x	x					x	x
Asteraceae		*Cassinia arcuata*		Lower									
Asteraceae		*Cassinia arculeata*		Lower				x				x	x
Asteraceae		*Cassinia leavis*		Lower									
Asteraceae	Common Sneezeweed	*Centipeda cunninghamii*		Lower									
Asteraceae		*Chrysocephalum apiculatum*		Lower									
Asteraceae	Bears Ear	*Cymbonotus preissianus*		Lower									
Asteraceae		*Cynoglossum australe*		Lower			x	x	x	x		x	x
Asteraceae	Small Orange Sunray	*Hyalosperma semisterile*		Lower									
Asteraceae		*Hydrocotyle laxiflora*		Lower									
Asteraceae	Yam Daisy	*Microseris lanceolata*		Lower									
Asteraceae	Sunray	*Rhodanthe diffusa ssp. leucactina*		Lower									
Asteraceae	Tall Grounsel	*Senecio quadridentatus*		Lower									
Asteraceae	Common Sunray	*Triptilodiscus pygmaeus*		Lower									
Asteraceae		*Vittadinia cervicularis var. cervicularis*		Lower									
Asteraceae		*Vittadinia cuneata var. cuneata*		Lower		x	x			x		x	x
Asteraceae		*Vittadinia cuneata var. hirsute*		Lower								x	
Asteraceae	Golden Everlasting	*Xerochrysum bracteata*		Lower									
Asteraceae	Sticky Everlasting	*Xerochrysum viscosa*		Lower									

Asteraceae	Fuzzy New Holland Daisy	*Vittadinia cuneata var. cuneata*		Lower									
Boraginaceae		*Cynoglossum suaveolens*		Lower									
Brassicaceae		*Brassica nigra*		Lower									
Brassicaceae		*Lepdiium sp.*		Lower									
Campanulaceae		*Wahlenbergia communis*		Lower									
Campanulaceae		*Wahlenbergia gracilis*		Lower									
Campanulaceae		*Wahlenbergia stricta ssp stricta*		Lower									
Caryophyllaceae	Mouse-ear Chickweed	*Cerastium glomeratum*		Lower		x							x
Centrolepidaceae		*Centrolepis strigosa subsp. strigosa*		Lower							x		x
Colchicaceae	Early nancy	*Wurmbea dioica*		Lower									
Convolvulaceae	Kidney Weed	*Dichondra repens*		Lower									
Crassulaceae	Dense Stonecrop	*Crassula colorata*		Lower			x	x		x	x	x	x
Crassulaceae	Australian Stonecrop	*Crassula sieberiana*		Lower									
Cyperaceae		*Cyperus sp.*		Lower									
Cyperaceae		*Carex inversa*		Lower		x							x
Cyperaceae	Tall sedge	*Carex appressa*		Lower									
Cyperaceae	Rough Sas Sedge	*Gahnia aspera*		Lower									
Cyperaceae	Common Bog Rush	*Shoenus apogon*		Lower									
Dilleniaceae	Guinea flower	*Hibbertia sp.*		Lower		x		x				x	x
Droseraceae	Sundew	*Drosera peltata*		Lower									
Euphorbiaceae	Caustic Weed	*Euphorbia drummondii*		Lower									
Fabaceae - Faboideae	Slender Tick-trefoil	*Desmodium varians*		Lower									x
Fabaceae - Faboideae	Kneed Swainson-pea	*Swainsona reticulata*		Lower									
Fabaceae - Faboideae	Leafy Stenophylla	*Templetonia stenophylla*		Lower		x	x					x	x
Fabaceae - Faboideae	Woolly Clover	*Trifolium tomentosum*		Lower									
Fabaceae - Faboideae	Twining Glycine	*Glycine clandestina*		Lower									
Fabaceae - Faboideae		*Glycine latifolia*		Lower									
Fabaceae - Faboideae		*Glycine tabacina*		Lower			x						x
Fabaceae - Faboideae		*Glycine tomentosa / canescens*		Lower									
Fabaceae - Faboideae	Burr Medic	*Medicago polymorpha*		Lower		x							
Fumariaceae	Narrow-leaved Fumitory	*Fumaria densiflora*		Lower		x							x
Geraniaceae	Blue Crowfoot	*Erodium crinitum*		Lower									x
Geraniaceae		*Geranium homeanum*		Lower									
Geraniaceae		*Geranium retorsum*		Lower									
Geraniaceae		*Geranium solanderi var. solanderi*		Lower									
Geraniaceae	Native Storkebill	*Pelagonium australe*		Lower									

Goodeniaceae		*Goodenia hederacea ssp. hederacea*		Lower										
Haloragaceae		*Gonocarpus elatus [Hill Raspwort]*		Lower										
Haloragaceae	Toothed Raspwort	*Halogaris odontocarpa*		Lower										
Hypoxidaceae	Tiny Star	*Hypoxis glabella var. glabella*		Lower										
Juncaceae		*Juncas arcutus*		Lower										
Juncaceae		*Juncas arculeata*		Lower										
Juncaceae		*Juncus aridicola*		Lower										
Juncaceae		*Juncas sp.*		Lower										
Junaginaceae	Water Ribbons	*Triglochin procera*		Lower								x		
Lamiaceae	Austral Bugle	*Ajuga australis*		Lower										x
Lamiaceae	Native Pennyroyal	*Mentha satureioides*		Lower										
Linaceae		*Linum marginale*		Lower										
Lobeliaceae	Rock Isotome	*Isotoma axillaris*		Lower										
Lomandraceae		*Lomandra filiformis ssp. coriacea*		Lower										
Lomandraceae	Spiky-headed Matt Rush	*Lomandra longifolia*		Lower										
Lomandraceae	Many-flowered matt Rush	*Lomandra multiflora subsp. Multiflora*		Lower										
Malvaceae	Small-flowered mallow	*Malva parvifolia*		Lower										
Malvaceae		*Sida corrugata*		Lower										
Myoporaceae	Winter Apple	*Eremophila debilis*		Lower										
Orchidaceae	Pink Fingers	*Caladenia carnea*		Lower										
Orchidaceae	Tiger Orchid	*Diuris sulphurea*		Lower										
Orchidaceae		*Microtis unifolia*		Lower										
Orchidaceae		*Pterostylis bicolor*		Lower								x		
Orchidaceae	Midget Greenhood	*Pterostylis mutica*		Lower										x
Orchidaceae	Dwarf Greenhood	*Pterostylis nana*		Lower										
Orchidaceae	Autumn Greenhood	*Pterostylis revoluta*		Lower										
Oxalidaceae		*Oxalis perennans*		Lower										
Oxalidaceae		*Oxalis radicosa*		Lower (grass)									x	
Phormiaceae		*Daniella revoluta subsp.*		Lower (grass)							x	x		
Plantaginaceae	Small Sago Weed	*Plantago turrifera*		Lower (grass)										
Poaceae	Purple Wiregrass	*Aristida jerichoensis*		Lower (grass)							x			
Poaceae	Plains Grass	*Austrostipa aristiglumis*		Lower (grass)			x							x
Poaceae	Tall Speargrass	*Austrostipa bigeniculata*		Lower (grass)		x		x	x	x	x	x	x	x
Poaceae	Three awned Grass	*Aristida ramosa*		Lower (grass)						x				x
Poaceae	Wallaby Grass	*Austrodanthonia erianthia*		Lower (grass)									x	x
Poaceae	Common Wallaby Grass	*Austrodanthonia caespitosa*		Lower (grass)							x			

Poaceae		*Austrodanthonia sp.*		Lower (grass)			x	x	x	x		x	x
Poaceae	Wallaby Grass	*Austrodanthonia bipartita*		Lower (grass)								x	x
Poaceae	Dense Foxtail Grass	*Austrostipa densiflora*		Lower (grass)		x	x		x	x		x	
Poaceae	Rough Spear Grass	*Austrostipa scabra subs scabra*		Lower (grass)					x	x	x	x	x
Poaceae		*Austrostipa ramosa*		Lower (grass)		x	x	x	x	x	x	x	x
Poaceae	Spear Grass	*Austrostipa sp.*		Lower (grass)		x	x	x	x	x		x	x
Poaceae	Slender Bamboo Grass	*Austrostipa verticillata*		Lower (grass)		X			x			x	x
Poaceae	Red-Leg Grass	*Bothriochloa macra*		Lower (grass)									x
Poaceae	Short Chloris	*Chloris truncata*		Lower (grass)					x		x		
Poaceae	Tall Chloris	*Chloris ventricosa*		Lower (grass)									x
Poaceae		*Cynodon dactylon*		Lower (grass)		x	x						
Poaceae	Queensland Bluegrass	*Dichanthium serecium*		Lower (grass)									x
Poaceae		*Dichelachne micrantha*		Lower (grass)									
Poaceae	Cotton Panic	*Digitaria brownii*		Lower (grass)									
Poaceae		*Digitaria sp.*		Lower (grass)									
Poaceae	Awnless barnyard Grass	*Echinochloa colona*		Lower (grass)		x		x	x	x	x		
Poaceae	Common Wheatgrass	*Elymus scaber*		Lower (grass)									x
Poaceae	Slender bottlewashers	*Ennaepogon gracilis*		Lower (grass)					x				
Poaceae	Curly Windmill Grass	*Enteropogon acicularis*		Lower (grass)		x	x	x	x	x	x	x	x
Poaceae	Brown Lovegrass	*Eragrostis brownii*		Lower (grass)									x
Poaceae	Purple Love Grass	*Eragrostis lacunaria*		Lower (grass)					x				
Poaceae	Hairy Panic	*Panicum effusum*		Lower (grass)									x
Poaceae		*Poa sieberiana*		Lower (grass)									
Poaceae	Western Rat's Tail Grass	*Sporobolus crebra*		Lower (sedge)									
Poaceae		*Thyridolepis mitchelliana*		Lower (sedge)									
Poaceae	Five-minute Grass	*Tripogon loliformis*		Lower (sedge)							x		
Polygonaceae	Slender Dock	*Rumex brownii*		Lower (sedge)									x
Portulacaceae	Pigweed	*Portulaca loeracea*		Lower (sedge)							x		
Pteridaceae	Rock Fern	*Cheilanthes austrotenuifolia*		Lower (sedge)									x
Pteridaceae	Mulga Fern	*Cheilanthes sieberi*		Lower (sedge)									
Rubiaceae		*Pomax umbellata*		Lower (sedge)							x		
Solanaceae	Narrawa Burr	*Solanum cinereum*		Lower (sedge)									x
Violaceae	Slender violet-bush	*Hybanthus monopetalus*		Lower (aquatic)									
Casuarinaceae	Hill Oak	*Allocasuarina verticillata*		Mid									
Chenopodiaceae	Climbing Saltbush	*Einadia hastata*		Mid									
Chenopodiaceae	Creeping Saltbush	*Einadia nutans subs. Nutans*		Mid			x			x	x		
Chenopodiaceae		*Enchylaena tomentosa*		Mid									x
Chenopodiaceae	Eastern Cotton Bush	*Maireana microphylla.*		Mid							x		

Chenopodiaceae	Galvanised Burr	*Sclerolaena birchii*		Mid							x	x	x
Fabaceae - Mimosoideae		*Acacia cheelii*		Mid						x			x
Fabaceae - Mimosoideae		*Acacia deanei subsp. deanei*		Mid									x
Fabaceae - Mimosoideae	Western Golden Wattle	*Acacia decora*		Mid									
Fabaceae - Mimosoideae	Currawang	*Acacia doratoloxyn*		Mid									
Fabaceae - Mimosoideae		*Acacia implexa?*		Mid									
Fabaceae - Mimosoideae	Boree	*Acacia vestita*		Mid									
Fabaceae - Mimosoideae		*Acacia lineata*		Mid									
Fabaceae - Mimosoideae	Mudgee Wattle	*Acacia spectabilis*		Mid									
Fabaceae - Mimosoideae	Sword-leaf Wattle	*Acacia gladiformis*		Mid									
Fabaceae (Caesalpinioideae)	Pepper-leaved Senna	*Senna barclayana*			*					x	x		
Fabaceae (Faboideae)		*Mirbelia pungens*		Mid									
Fabaceae (Faboideae)	Small-leaf Bush-pea	*Pultenaea foliolosa*		Mid									
Fabaceae (Faboideae)		*Pultenaea microphylla*		Mid									
Fabaceae (Faboideae)	Senna	*Senna artemisioides subsp. zygophylla*		Mid									
Fabaceae (Faboideae)	Silver cassia	*Senna artemisioides*		Mid									
Pittosporaceae	Butterbush	*Pittosporum angustifolium*		Mid									
Proteaceae	Hooked Needlewood	*Hakea tephrosperma*		Mid									
Sapindaceae		*Dodonaea boroniifolia*		Mid									
Sapindaceae	Hopbush	*Dodonaea sp.*		Mid									
Sapindaceae	Narrow-leafed hopbush	*Dodonaea viscosa subsp. augustissim*		Mid									
Sapindaceae		*Dodonaea viscosa subsp. cuneata*		Mid									
Santalaceae	Cherry Ballart	*Exocarpus cupressiformis*		Mid									
Cupressaceae	White Cypress Pine	*Callitris endlicheri*		Upper									
Cupressaceae	Black Cypress Pine	*Callitris glaucophylla*		Upper									
Myrtaceae	White Box	*Eucalyptus albens*		Upper									x
Myrtaceae	Fuzzy Box	*Eucalyptus conica*		Upper									
Myrtaceae	Tumbledown Red Gum	*Eucalyptus dealbata*		Upper									
Myrtaceae	Dwyer's Red Gum	*Eucalyptus Dwyeri*		Upper									
Myrtaceae	Yellow Box	*Eucalyptus melliodora*		Upper									
Myrtaceae	Inland Grey Box	*Eucalyptus microcarpa*		Upper									
Malvaceae	Kurrajong	*Brachychiton populneus subs. populneus*		Upper									x

TOTAL Species / Plot											
Total species	*76*				*30*	*27*	*27*	*25*	*28*	*41*	*29*
Native Plant Species (NPS)	44			Natives	16	14	12	13	18	19	21
No. Non-native	46			Weeds	14	13	15	12	10	22	8
% NPS	57.89		Green = > 50% natives	% Natives	53.3%	51.9%	44.4%	52.0%	64.3%	46.3%	72.4%
% non-native	60.53			% Weeds	46.7%	48.1%	55.6%	48.0%	35.7%	53.7%	27.6%

Plot	Dominate stratum	U1	BB Score	U2	BB Score	U3	BB Score	M1	BB Score	M2	BB Score	M3	BB Score	L 1	BB Score	L 2	BB Score	L3	BB Score	*Biometric* community (best fit) First Choice	*Biometric* community (best fit) Second Choice
1	Lower													*Chloris truncata*	4	*Enteropogon acicularis*	2	*Eragrostis cilianensis**	2	CW130 Derived tussock grasslands of the central western plains and lower slopes of NSW (Benson 250)	Formerly CW144 Inland Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion (Benson 82)
2	Lower							Lycium ferocissimum*	0.1					*Enteropogon acicularis*	3	Chloris truncata	2	*Eragrostis cilianensis**	2	CW130 Derived tussock grasslands of the central western plains and lower slopes of NSW (Benson 250)	Formerly CW144 Inland Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion (Benson 82)
3	Lower													*Bothrichloa macra*	3	*Enteropogon acicularis*	2	*Eragrostis cilianensis**	2	CW130 Derived tussock grasslands of the central western plains and lower slopes of NSW (Benson 250)	Formerly CW144 Inland Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion (Benson 82)
4	Lower													*Austrostipa sp.*	3	*Enteropogon acicularis*	2	Chloris truncata	2	CW130 Derived tussock grasslands of the central western plains and lower slopes of NSW (Benson 250)	Formerly CW213 White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
5	Lower													*Austrostipa sp.*	3	*Enteropogon acicularis*	2	Chloris truncata	2	CW130 Derived tussock grasslands of the central western plains and lower slopes of NSW (Benson 250)	Formerly CW213 White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
6	Lower							Lycium ferocissimum*	0.1					*Austrostipa aristiglumis*	3	*Enteropogon acicularis*	2	Chloris truncata	2	CW130 Derived tussock grasslands of the central western plains and lower slopes of NSW (Benson 250)	Formerly CW138 Fuzzy Box - Inland Grey Box on alluvial brown loam soils of the NSW South Western Slopes Bioregion and southern BBS Bioregion (Benson 201)

Plot	Dominate stratum	U1	BB Score	U2	BB Score	U3	BB Score	M1	BB Score	M2	BB Score	M3	BB Score	L 1	BB Score	L 2	BB Score	L3	BB Score	*Biometric* community (best fit) First Choice	*Biometric* community (best fit) Second Choice
7	Lower													*Chloris truncata*	5	*Enteropogon acicularis*	4	Austrostipa sp.	2	CW130 Derived tussock grasslands of the central western plains and lower slopes of NSW (Benson 250)	Formerly CW138 Fuzzy Box - Inland Grey Box on alluvial brown loam soils of the NSW South Western Slopes Bioregion and southern BBS Bioregion (Benson 201)

Key to Table

BB Score: Braun Banquet Score
L: Lower stratum
U: Upper Stratum
M: Middle stratum

Braun Banquet Score	Cover
0	Absent from quadrant
0.1	Represented by a solitary item (<5% cover)
0.5	Represented by a few (<5) items (<5% cover)
1	Represented by >5 items (<5% cover)
2	Represented by many (>5) items (5-25% cover)
3	Represented by many (>5) items (25 - 50% cover)
4	Represented by many (>5) items (50-75% cover)
5	Represented by many (>5) items (75-100% cover)

Family	Class	Scientific Name	Common Name	Legal Status	Subject Site	Native	Non-native
Mammalia	Carnivora	Vulpes vulpes	Red Fox		**x**		x
Amphibia	Myobatrachidae	Crinia signifera	Common Eastern Froglet	P	x	x	
Amphibia	Myobatrachidae	Limnodynastes peroni	Striped Marsh Frog	P	x	x	
Reptilia	Agamidae	Pogona barbata	Bearded Dragon	P	x	x	
Reptilia	Elapidae	Pseudonaja textilis	Eastern Brown Snake	P	x	x	
Reptilia	Scincidae	Ctenotus taeniolatus	Copper-tailed Skink	P	x	x	
Reptilia	Scincidae	Menetia greyii	Dwarf Skink	P	x	x	
Reptilia	Scincidae	Morethia boulengeri	South-eastern Morethia Skink	P	x	x	
Aves	Suliformes	Great Cormorant	Phalacrocorax carbo	P	x	x	
Aves	Suliformes	Little Black Cormorant	Phalacrocorax sulcirostris	P	x	x	
Aves	Motacillidae	Anthus australis	Australasian Pipit	P	x	x	
Aves	Artamidae	Gymnorhina tibicen	Australian Magpie	P	x	x	
Aves	Corvidae	Corvus coronoides	Australian Raven	P	x	x	
Aves	Anatidae	Tadorna tadornoides	Australian Shelduck	P	x	x	
Aves	Campephagidae	Coracina novaehollandiae	Black-faced Cuckoo-shrike	P	x	x	
Aves	Anatidae	Anas castanea	Chestnut Teal	P	x	x	
Aves	Sturnidae	Sturnus vulgaris	Common Starling	P	x	x	
Aves	Cacatuidae	Eolophus roseicapilla	Galah	P	x	x	
Aves	Anatidae	Anas gracilis	Grey Teal	P	x		x
Aves	Passeridae	Passer domesticus	House Sparrow		x	x	
Aves	Monarchidae	Grallina cyanoleuca	Magpie-lark	P	x	x	
Aves	Charadriidae	Vanellus miles	Masked Lapwing	P	x	x	
Aves	Sturnidae	Aplornis metallica	Metallic Starling		x		x
Aves	Falconidae	Falco cenchroides	Nankeen Kestrel	P	x	x	
Aves	Anatidae	Anas superciliosa	Pacific Black Duck	P	x	x	
Aves	Artamidae	Cracticus nigrogularis	Pied Butcherbird	P	x	x	
Aves	Threskiornithidae	Threskiornis spinicollis	Straw-necked Ibis	P	x	x	
Aves	Cacatuidae	Cacatua galerita	Sulphur-crested Cockatoo	P	x	x	
Aves	Ptilonorhynchidae	Amblyornis newtonianus	Superb Fairy-wren	P	x	x	
Aves	Ardeidae	Egretta novaehollandiae	White-faced Heron	P	x	x	
Aves	Rhipiduridae	Rhipidura leucophrys	Willie Wagtail	P	x	x	
					31	28	3

APPENDIX 5: ASSESSMENTS OF SIGNIFICANCE

7-PART TEST CRITERIA

7-Part Test Criteria	Fuzzy Box Woodland White Box Woodland Inland Grey Box Woodland	Barking Owl	Black Falcon Grey Falcon Little Eagle Spotted Harrier Square-tailed Kite	Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River EEC (NSW FM Act).
a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.	Not relevant.	Local population: Barking Owls occur in the Dubbo area, with breeding habitat known to occur in large hollow bearing trees adjacent to watercourses. As no impact will occur to suitable riparian large hollow bearing trees known to be used for breeding, the proposal is unlikely to disrupt a local population of Barking Owls.	Local population: These species of bird of prey are known to occur in the Dubbo area. Due to the mobile nature of these species, hunting grounds in cleared (semi-suburban) and riparian habitat cannot be considered critical to the survival of this species, as similar habitat along the riparian zone is abundant in the locality (Macquarie River). It is likely that these birds of prey may hunt on open ground associated with the floodplain. Vehicle movement and noise associated with the Proposal may impact birds hunting, however the short nature of this noise is unlikely to disrupt a viable local population of the species such that they are placed at a risk of extinction Breeding sites for these birds of prey are likely to occur in tall trees associated with riparian environments outside the Subject Site near the Macquarie or Talbragar River. No likely breeding trees would be removed. Furthermore, no breeding sites have been	Not relevant

7-Part Test Criteria	Fuzzy Box Woodland White Box Woodland Inland Grey Box Woodland	Barking Owl	Black Falcon Grey Falcon Little Eagle Spotted Harrier Square-tailed Kite	Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River EEC (NSW FM Act).
			previously recorded by the species in the Subject Site. Habitat critical to the survival of these species \is unlikely to occur in the Subject Site given the less disturbed habitats are available in the locality. Thus a viable local population of the species is unlikely to be placed at risk of extinction.	
b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.	Not relevant.	Not relevant	Not relevant	Not relevant
c) in the case of an endangered ecological community or CE ecological community, whether the action proposed: (i) is likely to have an adverse effect on the extent of the ecological community such that its occurrence is likely to be placed at risk of extinction, or (ii) is likely to substantially	Although no EEC exists in the Subject Site, this 7-Part test has been provided as a 'precautionary approach' to characterise the impacts to derived grassland that would have formally comprised part of all three EECs. The Proposal would not place this EEC at risk of local extinction. Existing agricultural practises including ploughing and grazing have already reduced the extent and viability of this community.	Not relevant	Not relevant	Eulomogo Creek drains into the Macquarie River that forms part of the listing for this aquatic EEC. The EEC will not become locally extinct as the works will only affect small areas of its extent.

7-Part Test Criteria	Fuzzy Box Woodland White Box Woodland Inland Grey Box Woodland	Barking Owl	Black Falcon Grey Falcon Little Eagle Spotted Harrier Square-tailed Kite	Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River EEC (NSW FM Act).
and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,				
d) in relation to habitat of a threatened species, population or ecological community: (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The Subject Site has already had habitat removed, fragmented and now exists in a derived grassland state.	Any component of habitat/resource is considered important. The Subject Site contains likely hunting grounds for the Barking Owl. It is unlikely that the Proposal would isolate and decrease the availability of quality habitat to the extent that the species is likely to decline. It is unlikely that the action will adversely affect habitat critical to the survival of the species.	Any component of habitat / resource is considered important. The Subject Site contains likely hunting grounds and potential breeding resources. Due to grassy habitat within the Subject Site, no roost or breeding sites will be impacted. It is unlikely that the Proposal would isolate and decrease the availability of quality habitat to the extent that the species is likely to decline. It is unlikely that the action will adversely affect habitat critical to the survival of the species	The EEC extends beyond the Subject Site and is in a degraded state. Recovery of this EEC will occur once the works have completed.
e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).	Critical habitat does not occur in the locality.	Critical habitat has not been declared for this species and at present there are no habitats listed as critical in the locality.	Critical habitat has not been declared for these species and at present there are no habitats listed as critical in the locality.	Critical habitat does not occur in the locality.
f) whether the actions proposed is consistent	There are no recovery or threat abatement plans for this EEC.	Two recovery plans relevant to this species exist:	There are no recovery or threat abatement plans for these	There is no recovery plan for this EEC.

7-Part Test Criteria	Fuzzy Box Woodland White Box Woodland Inland Grey Box Woodland	Barking Owl	Black Falcon Grey Falcon Little Eagle Spotted Harrier Square-tailed Kite	Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River EEC (NSW FM Act).
with the objectives or actions of a recovery plan or threat abatement plan.		Draft Recovery Plan for the Barking Owl Recovery Plan for the Large Forest Owls Seven large hollow bearing trees suitable as a breeding site will be removed, however as noted its location next to a busy road make it highly unlikely to be used. Impact will occur in the short term to likely hunting territory.	species. Vegetation removal contributes to the threats facing this species. However habitat restoration and rehabilitation is consistent with the recovery plans for these species.	
g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	KTPs such as clearing of native vegetation, will be exacerbated by the Proposal. Predation by the European red fox (*Vulpes vulpes*) and Predation by the feral cat (*Felis catus*), have or are currently occurring with Subject Site.	As per left hand column	As per left hand column	The alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands has been listed as a KTP in Schedule 3 of the TSC Act. Even though the creek flow will not be altered in the long-term, construction works in the vicinity of the creek may impact its viability in the short term. Degradation of native riparian vegetation along NSW waterways has been listed as a KTP in Schedule 6 of the FM Act. The clearing of riparian vegetation and machinery access to the riparian zone increases erosion and siltation, and may impact habitat including reproductive sites for species in this aquatic ecological community. This clearing is however minimal. The clearing of native vegetation has been listed as a KTP in

7-Part Test Criteria	Fuzzy Box Woodland White Box Woodland Inland Grey Box Woodland	Barking Owl	Black Falcon Grey Falcon Little Eagle Spotted Harrier Square-tailed Kite	Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River EEC (NSW FM Act).
				Schedule 3 of the TSC Act
Conclusion	The proposal will remove a component of a derived grassland that would have formally comprised this EEC. The Proposal is not likely to significantly impact a locally occurring population of this EEC such that it is placed at risk of local extinction. A SIS is not warranted. It would however be appropriate to offset the loss of vegetation following recommendations in this report.	A local population being placed at risk of extinction is unlikely due to the large amount of surrounding analogous habitat adjoining the Subject Site. A Species Impact Statement is not required	A local population being placed at risk of extinction is unlikely due to the large amount of surrounding analogous habitat adjoining the Subject Site. A Species Impact Statement is not required.	Recommendations in this report will ensure a high level of soil and sediment controls are implemented. A SIS is not required.

DoE Assessments of Significance - migratory species

Criteria: An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:	White-throated Needletail, Fork-tailed Swift, Rainbow Bee-eater, Cattle Egret, Great Egret.
substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	All species are predicted to have occasional habitat in the Subject Site. **Fork-tailed Swift (Apus pacificus) and White-throated Needletail (Hirundapus caudacutus)** The White-throated Needletail and Fork-tailed Swift are aerial species for which the Subject Site will not represent 'important habitat' and no impacts are expected due to the ability of this species to forage over a wide variety of land use, including human infrastructure and large water bodies and wetland areas in Dubbo. **Great Egret (Ardea alba) and Cattle Egret (Bubulcus ibis)** These species are predicted to occur, within or nearby to the Subject Site during periods of inundation. Furthermore the Cattle Egret is predicted to occur during the non-breeding period when cattle are stocked. There is no record of either in the Subject Site. Any such impacts involving habitat would be minor and may be mitigated by the habitat creation and enhancement activities noted above for other wetland species. The proposed action would have minimal effects on any local population of these species. **Rainbow Bee-eater Merops ornatus** The Macquarie River is a known place for congregation of flocks and is core breeding habitat for the species. The Rainbow Bee-eater is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will use disturbed sites with sandy soils such as river banks, quarries, cuttings and mines or exposed sites on cleared flats to build its nesting tunnels. Providing that recommendations in this report are followed there will be no impact to individual birds or a long term decrease in the population.
result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	The local area has a history of clearing and habitat modification, which has benefited a number of feral and invasive flora and fauna species. The proponent proposes to ensure the spread of weeds and feral fauna is not enhanced by the project that will contribute to the overall enhancement of habitat for all species.
seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that the Proposal would interfere with an ecologically significant proportion of any of these species. It is unlikely that these species would be significantly impacted by the Project. Referral to the DoE is not required.

Preliminary contamination investigation

Hillview Estate Lot 399 DP1199356 and Lot 503 DP1152321, Dubbo NSW

Ref: R5737c1
Date: 8 September 2016

Envirowest Consulting *Pty Ltd* ABN 18 103 955 246
• 9 Cameron Place, PO Box 8158, Orange NSW 2800 • Tel (02) 6361 4954 •
• Fax (02) 6360 3960 • Email admin@envirowest.net.au • Web www.envirowest.net.au •

Environmental
Geotechnical
Asbestos
Services

Client:	Geolyse Pty Ltd PO Box 1842 Dubbo NSW 2830
Assessor:	Ashleigh Pickering BSc Environmental Scientist
Checked by:	Leah Desborough BNatRes (Hons) Senior Environmental Scientist
Authorising Officer:	Greg Madafiglio PhD Senior Environmental Scientist
Interested authorities:	Dubbo City Council
Report number:	R5737c1
Date:	8 September 2016

Executive summary

Background

A residential subdivision with parkland is proposed for *Hillview Estate* Lot 399 DP1199356 and Lot 503 DP1152321, Dubbo NSW. The site has an agricultural land-use history of grazing. An investigation of the site is required to determine the soil contamination status and suitability for residential and recreational land-use.

Objectives of the investigation

A preliminary site investigation was conducted in accordance with the contaminated land management planning guidelines State Environmental Planning Policy No. 55 (SEPP 55) to determine the soil contamination status of *Hillview Estate* Lot 399 DP1199356 and Lot 503 DP1152321, Dubbo NSW.

Investigation and conclusions

An inspection of the site was made on 22 and 23 April 2015. The site is located in a developing residential area on the south eastern fringes of Dubbo and has an area of approximately 140ha.

The site has an agricultural land-use history of grazing. There is no evidence of orchards, mines, sheep dips, mixing sheds or contaminating industrial activities on the site from the review of site history or site walkover. The use of agricultural pesticides over the area in the past is expected to be low.

The contamination status of the site was assessed from a soil sampling and laboratory analysis program. Two-hundred and eighty discrete soil samples were collected over the site and combined to form seventy composite samples. The soil samples were analysed for arsenic, cadmium, chromium, copper, lead, nickel, zinc and organochlorine pesticides (OCP). Three discrete samples were collected from a nursery area in the south western section. The discrete soil samples were analysed for arsenic, cadmium, chromium, copper, lead, nickel, zinc, OCP, total recoverable hydrocarbons (TRH) (C6-C40), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN).

The soil sampling program did not detect elevated levels of the analysed metals, OCP or TRH. The levels of all substances evaluated were below the EPA investigation threshold for residential and recreational land-use with access to soil. In conclusion, no contamination was found.

Several stockpiles were located across the site. The stockpiles consisted of soil and timber and trace general refuse. No asbestos was identified in the stockpiles on site. The stockpiles are an amenity hazard.

Recommendations

The site is suitable for residential and recreational activities.

The stockpiles require removal and an assessment of the stockpile footprint is recommended following removal.

Contents

page

1. Introduction

A residential subdivision with parkland is proposed for *Hillview Estate* Lot 399 DP1199356 and Lot 503 DP1152321, Dubbo NSW. The site has an agricultural land-use history of grazing. An investigation of the site is required to determine the soil contamination status and suitability for residential and recreational land-use.

A desktop study and a review of the available history were undertaken of the site. A walkover and site inspection for evidence of contamination from past activities was conducted on 22 and 23 April 2015. Soil samples were collected and analysed for metals, persistent pesticides and hydrocarbons.

2. Scope of work

Envirowest Consulting Pty Ltd was commissioned by Geolyse Pty Ltd to undertake a preliminary contamination investigation, in accordance with the contaminated land management planning guidelines, from the *Contaminated Land Management Act 1997* and the *State Environmental Policy No. 55 (SEPP 55)*, of *Hillview Estate* Lot 399 DP1199356 and Lot 503 DP1152321, Dubbo NSW. The objective was to identify past potentially contaminating activities, identify potential contamination types, discuss the site condition, provide a preliminary assessment of site contamination and assess the need for further investigation or suitability for residential and recreational land-use.

3. Site identification

Address	*Hillview Estate* Dubbo NSW
Client	Geolyse Pty Ltd
Deposited plans	Lot 399 DP1199356 and Lot 503 DP1152321
Locality map	Figure 1
Site plan	Figure 2
Photographs	Figure 4
Area	Approximately 140ha

4. Site history

4.1 Zoning

The site is zoned R2 Low Density Residential and RE1 Public Recreation under the Dubbo Local Environmental Plan (2011).

4.2 Land-use

The site is currently used for grazing of stock on improved pastures. The site is located in a developing residential area on the south eastern fringes of the city of Dubbo.

4.3 Summary of council records

None expected

4.4 Sources of information

Site inspection 22 and 23 April 2015 by Leah Desborough and Ashleigh Pickering
NSW OEH records of public notices under the CLM Act 1997
Soil and geological maps
Spatial information exchange historic parish maps
Historical aerial photographs
Dubbo LEP 2011

4.5 Chronological list of site uses

The Historical Parish Maps (1884 and 1893) identify the owner of the site as J. O. Norton. Historical Parish Maps (1895 to 1958) list The Corporation of the Bank of Australasia as the owner of the property.

The 1964, 1980, 2006, 2009, 2010, 2012 and 2013 aerial photographs depict the site as grazing land. Two dams are visible on the site in the 2006, 2012 and 2013 aerial photographs in the central and north eastern section. A nursery area is visible in the aerial photographs from 2006. The nursery area was being used to propagate trees for landscaping on the adjoining subdivision.

No orchards, mines, sheep dips or contaminating industrial activities are known to have been located on the site from the site inspection and site history.

4.6 Buildings and infrastructure

No buildings were located on the site at the time of site inspection or identified from historical photographs. A site office and gravel earthworks compound for nearby ongoing earthworks was located in the western section of Lot 399 at the time of inspection.

The nursery area contained an irrigation pump with irrigation lines to the trees. A concrete slab was identified on the western side of the nursery.

4.7 Contaminant sources

No known contaminants have been applied to the site. The historic agricultural land-use may have resulted in application of pesticides.

The nursery area may have been used for the storage of machinery and chemicals. Contamination may have occurred from leaking chemical and fuel storage containers.

4.8 Contaminants of concern

Based on historical activities and site inspection the contaminants of concern are:

- Heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc)
- Organochlorine pesticides (OCP)
- Total Recoverable Hydrocarbons (TRH C6-C40)

4.9 Relevant complaint history

Nil

4.10 Contaminated site register

The investigation area is not listed on the NSW EPA register of contaminated sites.

4.11 Previous investigations

No previous investigations are known to have been undertaken on the site.

4.12 Neighbouring land-use

North – Rural
South – Rural
East – Rural
West – Residential

Historical and present neighbouring land-uses not expected to impact of the site.

4.13 Integrity assessment

The site history was obtained from a site inspection and history review. The information is consistent with the current site condition and to the best of the assessor's knowledge is accurate.

5. Site condition and environment

5.1 Surface cover

Surface cover on the site consisted of improved pasture including native and introduced pasture species with weeds. The weed species include Paterson's curse, cat head, fleabane, clover, saffron thistle, couch grass, flatweed, galvanised burr and khaki weed. Pasture species include windmill grass, love grass, paspalum, shepherds purse, red grass. A stand of white cedar was located along the western edge of the nursery.

5.2 Topography

The site is a mid-slope with a gentle inclination of less than 6% and a predominant south west aspect. The site has several raised rocky outcrops located in the eastern and northern section of the site. The site drops off in the south eastern corner of the site to a wet drainage area. Eulomogo Creek traverses the south eastern corner of the site.

5.3 Soils and geology

The site is within the Bunglegumbie and Wongarbon Soil Landscape (Murphy *et al.* 1998). Soil in the Bunglegumbie landscape consists of red-brown earths comprises dark brown sandy loam topsoil with bleached silty loam to reddish brown medium clay subsoil. Red earths comprise dark reddish brown loamy sands over a reddish brown fine sandy clay loam. The soil has a moderate fertility and generally low erodibility.

Soil in the Wongarbon Soil Landscape (Muphy et al. 1998) consists of Euchrozems and red and brown crack clays. The soil has a moderate to high fertility and a moderate to high erodibility

The site is underlain by Ballimore formation which comprises quartz sandstone, lithic sandstone, conglomerate, ferruginous sandstone, siltstone and undifferentiated olivine basalt and dolerite (Murphy *et al.* 1998).

5.4 Water

5.4.1 Surface water

The Eulomogo Creek traverses the southern section of the site. The drainage line empties into the Macquarie River approximately 1.1km west of the site. Two dams have been formed within the site and fed by the natural slope of the site and contour banks.

Surface water over the remainder of the site predominantly flows south east and into the Eulomogo Creek.

5.4.2 Groundwater

Five groundwater bores were located on the site. The bores were licensed for stock and domestic supplies and monitoring. Stock and domestic bores had water bearing zones from 20m in gravel and coarse sand. Standing water levels were 19.8m. Monitoring bores were up to 10m deep and installed to monitor the unconfined groundwater. The standing water level in one bore was 8.6m and was not encountered in two.

5.5 Evidence of contamination checklist

Site layout showing industrial processes	None present
Sewer and service plans	None known
Manufacturing processes	None known
Underground tanks	None known
Product spills and loss history	Pesticide mixing or storage of chemicals may have occurred in the nursery area.
Discharges to land, water and air	None known
Disposal locations, presence of drums, wastes and fill materials	Several stockpiles were located on the site at the time of inspection. The stockpiles included timber from tree removal, soil, building rubble and general refuse. Empty 20L chemical drums were identified in the nursery area on the western boundary.
Soil staining	Nil
Visible signs of plant stress, bare areas	Bare area located in southern section of lot from recent spread of fill material. A bare area was identified in the north western crner from recent topsoil removal.
Odours	Nil
Ruins	Nil
Other	Nil

6. Conceptual site model

Potential contamination sources, exposure pathways and receptors are presented below.

Contamination source	Potential exposure pathways	Receptors
Stockpiles with general refuse Chemical drums Hydrocarbon spills Pesticides	Direct contact (ingestion and absorption)	*On-site* Residential Site workers Terrestrial environment *Off-site* Residential Rural

7. Sampling analysis plan and sampling methodology

7.1 Sampling strategy

Two main land-uses were identified on the site at the time of inspection. These land-uses include agricultural paddocks used for grazing and a small nursery area used for propagating trees for nearby subdivisions.

7.1.1 Sampling design

7.1.1.1 Paddocks

A systematic sampling pattern was adopted to assess the probable location of contamination in the paddocks. Uniform management practices are expected to have occurred on the site. The site has been historically managed as part of a single unit and is expected to have been treated similarly.

7.1.1.2 Nursery area

A judgmental sampling pattern was adopted to assess the probably location of contamination in the nursery area. Potential hotspot locations were identified in the nursery area and discrete samples were taken.

7.1.2 Sampling locations

7.1.2.1 Paddocks

Discrete soil samples were collected from the site on an approximate 70m grid pattern across the paddocks. Four discrete samples were combined to form a composite soil sample. A total of 280 discrete soil samples were collected and combined to form 70 composite samples for analysis.

The sampling locations are described in Figure 2.

A visual inspection of the site for asbestos including stockpiles was undertaken.

7.1.2.2 Nursery area

Three discrete soil samples were collected from the nursery area.

The sampling locations are described in Figure 2.

7.1.3 Sampling density

7.1.3.1 Paddocks

The sampling density can detect a potential hot spot with a radius of 41m at a 95% level of confidence. Uniform management practices have been undertaken on the site and the soil sampling and laboratory analysis is considered indicative of the site as a whole. The sampling frequency is

slightly less than the minimum recommended by EPA (1995) but justified due to the uniform management of the site.

The stockpiles in the investigation area were inspected for asbestos. One cement sheeting sample was submitted for analysis.

7.1.3.2 Nursery area

Potential hot spot areas were identified within the nursery area. The sampling frequency is considered adequate for the nursery area.

7.1.4 Sampling depth

Any heavy metals or persistent pesticides present are generally immobile and expected to be contained in the 0-100mm soil layer which was the target sampling depth as soil disturbance has not occurred.

The stockpile surfaces were inspected for asbestos.

7.2 Analytes

7.2.1 Paddocks

The paddock composite soil samples were evaluated for OCP, arsenic, cadmium, chromium, copper, lead, nickel and zinc as these were identified as the contaminants of concern possibly present as a result of previous activities. Two representative samples were analysed for chromium speciation (VI) and (total) (Table 1).

One sample of cement sheeting fragment was analysed for asbestos identification.

7.2.2 Nursery area

The nursery discrete soil samples were evaluated for OCP, arsenic, cadmium, chromium, copper, lead, nickel, zinc, TRH and BTEXN as these were identified as the contaminants of concern possibly present as a result of previous activities (Table 1).

Table 1. Schedule of samples and analyses

Sample ID	Discrete sample ID (Figure 2)	Location	Depth	Analysis undertaken
HR1	11, 12, 13, 14	Paddock	0-100mm	Organochlorine pesticides (OCP), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn)
HR2	21, 22, 23, 24	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR3	31, 32, 33, 34	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR4	41, 42, 43, 44	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR5	51, 52, 53, 54	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR6	61, 62, 63, 64	Paddock	0-100mm	OCP, As, Cd, Cr (total), Cr (VI), Cu, Pb, Ni, Zn
HR7	71, 72, 73, 74	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR8	81, 82, 83, 84	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR9	91, 92, 93, 94	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn

Table 1 cont. Schedule of samples and analyses

Sample ID	Discrete sample ID (Figure 2)	Location	Depth	Analysis undertaken
HR10	101, 102, 103, 104	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR11	111, 112, 113, 114	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR12	121, 122, 123, 124	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR13	131, 132, 133, 134	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR14	141, 142, 143, 144	Paddock	0-100mm	OCP, As, Cd, Cr (total), Cr (VI), Cu, Pb, Ni, Zn
HR15	151, 152, 153, 154	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR16	161, 162, 163, 164	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR17	171, 172, 173, 174	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR18	181, 182, 183, 184	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR19	191, 192, 193, 194	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR20	201, 202, 203, 204	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR21	211, 212, 213, 214	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR22	221, 222, 223, 224	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR23	231, 232, 233, 234	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR24	241, 242, 243, 244	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR25	251, 252, 253, 254	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR26	261, 262, 263, 264	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR27	271, 272, 273, 274	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR28	281, 282, 283, 284	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR29	291, 292, 293, 294	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR30	301, 302, 303, 304	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR31	311, 312, 313, 314	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR32	321, 322, 323, 324	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR33	331, 332, 333, 334	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR34	341, 342, 343, 344	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR35	351, 352, 353, 354	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR36	361, 362, 363, 364	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR37	371, 372, 373, 374	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR38	381, 382, 383, 384	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR39	391, 392, 393, 394	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR40	401, 402, 403, 404	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR41	411, 412, 413, 414	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR42	421, 422, 423, 424	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR43	431, 432, 433, 434	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR44	441, 442, 443, 444	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR45	451, 452, 453, 454	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR46	461, 462, 463, 464	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn

Table 1 cont. Schedule of samples and analyses

Sample ID	Discrete sample ID (Figure 2)	Location	Depth	Analysis undertaken
HR47	471, 472, 473, 474	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR48	481, 482, 483, 484	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR49	491, 492, 493, 494	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR50	501, 502, 503, 504	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR51	511, 512, 513, 514	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR52	521, 522, 523, 524	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR53	531, 532, 533, 534	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR54	541, 542, 543, 544	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR55	551, 552, 553, 554	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR56	561, 562, 563, 564	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR57	571, 572, 573, 574	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR58	581, 582, 583, 584	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR50	501, 502, 503, 504	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR59	591, 592, 593, 594	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR60	601, 602, 603, 604	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR61	611, 612, 613, 614	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR62	621, 622, 623, 624	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR63	631, 632, 633, 634	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR64	641, 642, 643, 644	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR65	651, 652, 653, 654	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR66	661, 662, 663, 664	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR67	671, 672, 673, 674	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR68	681, 682, 683, 684	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR69	691, 692, 693, 694	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HR70	701, 702, 703, 704	Paddock	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn
HRD1	HRD1	Nursery area	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn, Total Recoverable Hydrocarbons (TRH) (C6-C40), Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene (BTEXN)
HRD2	HRD2	Nursery area	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn, TRH, BTEXN
HRD3	HRD3	Nursery area	0-100mm	OCP, As, Cd, Cr, Cu, Pb, Ni, Zn, TRH, BTEXN
HR1asb	-	Stockpile in central paddock	Surface	Asbestos identification

7.3 Sampling methods

Soil samples were taken using a stainless steel soil push corer. Soil was taken at each individual sampling location below the vegetated and detrital layer.

The soil was transferred to a stainless steel bucket, mixed and transferred to a solvent rinsed glass jar with a Teflon lid. Combining 4 discrete samples made a composite sample for chemical analysis.

Discrete soil samples were transferred directly to a solvent rinsed glass jar with a Teflon lid.

Tools were decontaminated between sampling locations to prevent cross contamination by: brushing to remove caked or encrusted material, washing in detergent and tap water, rinsing in an organic solvent, rinsing with clean tap water and allowing to air dry or using a clean towel.

A visual inspection was undertaken to determine the presence of asbestos in the stockpiles. One fragment of cement sheeting was submitted for analysis.

8. Quality assurance and quality control

8.1 Sampling design

The sampling program is intended to provide data as to the presence and levels of contaminants.

Discrete soil samples were collected on a systematic pattern across the paddocks on an approximate grid pattern of 70 metres. This sampling density will enable the detection of an area with an elevated concentration on a radius of 41 metres with a 95% confidence level.

Three discrete samples were collected from the nursery area. The samples were taken in potential hotspot areas and the frequency is considered adequate.

The number of sampling locations is slightly less than the recommended density in the EPA sampling guidelines but justified due to the uniform management practices on the site. No “hot spots” smaller than the sampled grid are expected over the site.

One cement sheeting fragment from the surface of the central stockpile was collected and submitted for identification.

8.2 Field

The collection of samples was undertaken in accordance with accepted standard protocols (NEPC 1999). Composite sampling was undertaken to reduce the cost of chemical analysis. Combining equal amounts from four discrete samples created the composite samples. A composite sample represents the average concentration of the sub-sample.

The rules for composite sampling were observed (EPA 1995). All composite samples were analysed for OCP, arsenic, cadmium, chromium, copper, lead, nickel and zinc.

Sampling equipment was decontaminated between each sampling event. The appropriate storage conditions and duration were observed between sampling and analysis. A chain of custody form accompanied the samples to the laboratory (Appendix 2).

A single sampler was used to collect the samples using standard methods. Soil collected was a fresh sample from a hand shovel. After collection the samples were immediately placed in new glass sampling jars and placed in a cooler.

Four duplicate samples were collected. No field blank, rinsate, trip blank or matrix spikes were submitted for analysis. Some samples from all batches did not contain contaminants which confirm the absence of cross contamination during transport and storage.

A field sampling log is presented in Appendix 3.

8.3 Laboratory

8.3.1 Soil

Chemical analysis was conducted by ALS Laboratories, Smithfield, which is NATA accredited for the tests undertaken. The laboratories have quality assurance and quality control programs in place, which include internal replication and analysis of spike samples and recoveries.

Method blanks, matrix duplicates and laboratory control samples were within acceptance criteria. The quality assurance and quality control report is presented together with the laboratory report as Appendix 2.

8.3.2 Asbestos cement sheeting

Asbestos identification was undertaken at AEC Environmental, South Australia, which is NATA accredited for the test undertaken.

8.4 Data evaluation

The laboratory quality control report indicates the data variability is within acceptable industry limits. The data is considered representative and usable for the purposes of the investigation. Data quality indicators are presented in Appendix 1.

9. Assessment criteria

9.1 Soil

The laboratory results were assessed against the proposed land-use of residential (*HIL C*). The health-based investigation levels of contaminants in the soil for residential sites, for the substances for which criteria are available, are listed in Table 2, as recommended in the NEPC (1999).

The appropriate comparison for the proposed recreational land-use is *Public open space (HIL C)*. This is considered appropriate for the proposed parkland around the residential estate.

The NEPC (1999) also provides health screening levels (HSL) for hydrocarbons in soil. The HSLs have been developed to be protective of human health for soil types, depths below surface and apply to exposure to hydrocarbons through the predominant vapour exposure pathway. The appropriate HSL for the site is listed in Table 3. TRH>16 have physical properties which make the TRH fractions non-volatiles and therefore these TRH fractions are not applicable for vapour intrusion.

Ecological investigation levels (EIL) have been developed for the protection of terrestrial ecosystems for selected metals and organic substances in the soil in the guideline (NEPC 1999). Ecological screening levels (ESL) assess the risk to terrestrial ecosystems from petroleum hydrocarbons in the soil. The EILs and ESLs consider the properties of the soil and contaminants and the capacity of the local ecosystem to accommodate increases in contaminant levels.

EILs vary with land-use and apply to contaminants up to 2m depth below the surface. The EILs for residential and recreational land-use are listed in Table 3.

ESLs are dependent on land-use, soil types and are applicable to contaminants up to 2m below the surface. The appropriate ESL for the site is residential and recreational in fine soil as listed in Table 3.

Management limits have been developed to assess petroleum hydrocarbons following evaluation of human health and ecological risks (NEPC 1999). Management units are applicable as screening

levels after consideration of relevant ESLs and HSLs. The appropriate management limit for the site is listed in Table 3.

The investigation threshold was adjusted to enable the detection of an individual location being diluted in the composting process (EPA 1995). For composite sampling, the analyte result was divided against the number of discrete samples making up the composite. This is based on a worst-case scenario in which one sample has a high concentration whilst other discrete samples have zero concentration. This is a conservative approach.

Chromium is analysed as total chromium which is the sum of chromium (III) and chromium (VI). Chromium (VI) is a potential contaminant from industrial processes including ferrochrome production, electroplating, pigment production and tanning (WHO 1998) and is not expected to occur in agricultural sites. Chromium (VI) is reduced to chromium (III) when it comes into contact with organic matter in biota, soil and water. No threshold has been set for total chromium on agricultural sites as it is ubiquitous in the environment and is almost always present in the trivalent state (WHO 1998). Chromium (III) is poorly absorbed by any route therefore toxicity of chromium is mainly attributable to chromium (VI) (ATSDR 2013).

Table 2. Soil assessment criteria metals and OCPs (mg/kg)

Analyte	Residential land-use with access to soil threshold (NEPC 1999)		Public open space- HIL C Recreational (NEPC 1999)	
	Discrete Samples (mg/kg)	Composite Samples (mg/kg)	Discrete Samples (mg/kg)	Composite Samples (mg/kg)
Arsenic	100	25	300	75
Cadmium	20	5	90	22.5
Chromium (total)	-*	-*	-*	-*
Chromium (VI)	100	25	300	75
Copper	6,000	1,500	17,000	4,250
Lead	300	75	600	150
Nickel	400	100	1,200	300
Zinc	7,400	1,850	30,000	7,500
OCP	-	-	-	-
DD's	240	60	-	-

* Not applicable due to low human toxicity of Cr(III) and non-industrial site

Table 3. Soil assessment criteria hydrocarbons (mg/kg)

Analyte	HSL Residential / clay soil				HSL Recreational / clay soil				ESL Residential/ recreational-fine soil	Management limits for TRH in soil – residential/ recreational
	0m to <1m	1m to <2m	2m to <4m	>4m	0m to <1m	1m to <2m	2m to <4m	>4m		
TRH (C6-C10) (F1)	50	90	150	290	NL	NL	NL	NL	180	800
TRH (>C10-C16) (F2)	280	NL	NL	NL	NL	NL	NL	NL	120	1,000
TRH (>C16-C34)	NA	NA	NA	NA	NL	NL	NL	NL	1,300	3,500
TRH (>C34-C40)	NA	NA	NA	NA	NL	NL	NL	NL	5,600	10,000
Benzene	0.7	1	2	3	NL	NL	NL	NL	65	-
Toluene	480	NL	NL	NL	NL	NL	NL	NL	105	-
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	125	-
Xylenes	110	310	NL	NL	NL	NL	NL	NL	45	-
Naphthalene	5	NL	NL	NL	NL	NL	NL	NL	-	-
Benzo(a)pyrene	-	-	-	-	-	-	-	-	0.7	-

HSL – health screening level, ESL – ecological screening level, NL – non limiting, NA – not applicable,

8.2 Asbestos

One piece of cement sheeting were sent to AEC environmental for asbestos identification by Polarised Light Microscopy including Dispersion Staining (AS4964-2004).

10. Results and discussion

10.1 Paddocks

Surface cover on the site consisted of improved pasture including native and introduced pasture species with weeds. The weed species include Paterson's curse, cat head, fleabane, clover, saffron thistle, couch grass, flatweed, galvanised burr and khaki weed. Pasture species include windmill grass, love grass, paspalum, shepherds purse, red grass. A stand of white cedar was located along the western edge of the nursery. Bare areas on the site are a result of recent earthworks activities. No vegetation stunting was observed. No soil staining or evidence of contamination was detected on the site.

An area of fill material (0-10cm) was identified south of the nursery area on the site. The area was approximately 200m by 70m in size. The fill material was red sandy clay with lime and trace bitumen and bricks. A soil sample was collected from the area of fill (HR38).

The levels of all metals and OCPs analysed in the soil samples (Table 4) were not detected or at environmental background levels and below the residential and recreational land-use thresholds (NEPC 1999).

Table 4. Analytical results and threshold concentrations (mg/kg)

Sample ID	Sample type	Arsenic	Cadmium	Chromium (total)	Chromium (VI)	Copper	Lead	Nickel	Zinc	OCP
HR1	Composite	ND	ND	52	-	22	8	35	38	ND
HR2	Composite	ND	ND	38	-	17	8	23	28	ND
HR3	Composite	ND	ND	82	-	25	9	55	41	ND
HR4	Composite	ND	ND	78	-	26	8	56	45	ND
HR5	Composite	ND	ND	45	-	16	8	25	27	ND
HR6	Composite	ND	ND	127	ND	31	8	89	63	ND
HR7	Composite	ND	ND	90	-	20	8	41	38	ND
HR8	Composite	ND	ND	39	-	17	8	21	29	ND
HR9	Composite	ND	ND	29	-	12	7	22	25	ND
HR10	Composite	ND	ND	20	-	7	ND	12	17	ND
HR11	Composite	ND	ND	37	-	13	6	23	25	ND
HR12	Composite	ND	ND	82	-	37	5	73	80	ND
HR13	Composite	ND	ND	47	-	23	7	36	46	ND
HR14	Composite	ND	ND	93	ND	40	5	97	73	ND
HR15	Composite	ND	ND	59	-	27	8	50	43	ND
HR16	Composite	ND	ND	30	-	23	5	34	82	ND
HR17	Composite	5	ND	29	-	26	7	33	99	ND
HR18	Composite	ND	ND	24	-	23	8	27	77	ND
HR19	Composite	ND	ND	24	-	16	6	19	50	ND
HR20	Composite	ND	ND	20	-	8	7	9	23	ND
HR21	Composite	ND	ND	19	-	ND	ND	4	8	ND
HR22	Composite	ND	ND	24	-	ND	ND	5	8	ND
HR23	Composite	ND	ND	27	-	7	5	8	14	ND
HR24	Composite	ND	ND	32	-	9	6	10	18	ND
HR25	Composite	ND	ND	22	-	ND	ND	5	12	ND
HR26	Composite	ND	ND	21	-	9	6	10	22	ND
HR27	Composite	ND	ND	19	-	9	6	9	27	ND
HR28	Composite	ND	ND	19	-	5	ND	6	10	ND
HR29	Composite	ND	ND	22	-	6	5	6	12	ND
HR30	Composite	ND	ND	19	-	5	ND	5	10	ND
HR31	Composite	ND	ND	22	-	9	6	9	18	ND
HR32	Composite	ND	ND	22	-	6	ND	7	15	ND
HR33	Composite	ND	ND	23	-	6	ND	6	17	ND
Residential land-use threshold (NEPC 1999)										
Discrete		*100*	*20*	*-**	*100*	*6,000*	*300*	*400*	*7,400*	-
Composite		*25*	*5*	*-**	*25*	*1,500*	*75*	*100*	*1,850*	-
Recreational land-use threshold (NEPC 1999)										
Discrete		*300*	*90*	*-**	*300*	*17,000*	*600*	*1,200*	*30,000*	-
Composite		*75*	*21.5*	*-**	*75*	*4,250*	*150*	*300*	*7,500*	-

ND = not detected at the detection limit, * Not applicable due to low human toxicity of Cr(III) and non-industrial site

Table 4 cont. Analytical results and threshold concentrations (mg/kg)

Sample ID	Sample type	Arsenic	Cadmium	Chromium (total)	Chromium (VI)	Copper	Lead	Nickel	Zinc	OCP
HR34	Composite	ND	ND	18	-	6	ND	6	17	ND
HR35	Composite	ND	ND	17	-	7	5	7	19	ND
HR36	Composite	ND	ND	31	-	6	5	7	16	ND
HR37	Composite	ND	ND	22	-	6	ND	6	12	ND
HR38	Composite	ND	ND	38	-	14	9	16	19	ND
HR39	Composite	ND	ND	21	-	7	5	7	18	ND
HR40	Composite	ND	ND	28	-	7	5	8	16	ND
HR41	Composite	ND	ND	33	-	8	ND	9	18	ND
HR42	Composite	ND	ND	24	-	10	6	12	25	ND
HR43	Composite	ND	ND	28	-	14	7	18	26	ND
HR44	Composite	ND	ND	25	-	12	7	14	22	ND
HR45	Composite	ND	ND	27	-	14	8	16	24	ND
HR46	Composite	ND	ND	37	-	18	9	23	30	ND
HR47	Composite	ND	ND	31	-	13	7	17	24	ND
HR48	Composite	ND	ND	28	-	15	8	19	27	ND
HR49	Composite	ND	ND	31	-	15	9	20	26	ND
HR50	Composite	ND	ND	33	-	14	7	19	26	ND
HR51	Composite	ND	ND	36	-	14	7	18	24	ND
HR52	Composite	ND	ND	33	-	14	7	19	24	ND
HR53	Composite	ND	ND	31	-	11	6	17	28	ND
HR54	Composite	ND	ND	43	-	23	7	27	50	ND
HR55	Composite	ND	ND	60	-	16	6	42	32	ND
HR56	Composite	ND	ND	81	-	24	6	60	43	ND
HR57	Composite	ND	ND	30	-	8	6	11	11	ND
HR58	Composite	ND	ND	83	-	20	7	55	33	ND
HR59	Composite	ND	ND	36	-	9	8	14	13	ND
HR60	Composite	ND	ND	29	-	6	5	9	11	ND
HR61	Composite	ND	ND	26	-	8	6	10	15	ND
HR62	Composite	ND	ND	24	-	10	6	11	20	ND
HR67	Composite	ND	ND	34	-	11	6	19	19	ND
HR68	Composite	ND	ND	52	-	19	8	33	29	ND
HR69	Composite	ND	ND	42	-	17	7	28	30	ND
HR70	Composite	ND	ND	49	-	22	6	35	40	ND
Residential land-use threshold (NEPC 1999)										
Discrete		*100*	*20*	*-**	*100*	*6,000*	*300*	*400*	*7,400*	-
Composite		*25*	*5*	*-**	*25*	*1,500*	*75*	*100*	*1,850*	-
Recreational land-use threshold (NEPC 1999)										
Discrete		*300*	*90*	*-**	*300*	*17,000*	*600*	*1,200*	*30,000*	-
Composite		*75*	*21.5*	*-**	*75*	*4,250*	*150*	*300*	*7,500*	-

ND = not detected at the detection limit, * Not applicable due to low human toxicity of Cr(III) and non-industrial site

9.2 Nursery Area

A nursery area was located in the central section of the site. The area was being used to grow trees for nearby street scapes.

The levels of all metals and OCPs analysed in the nursery soil samples (Table 5) were not detected or at environmental background levels and below the residential and recreational land-use thresholds (NEPC 1999).

The levels of all hydrocarbons analysed in the nursery soil samples (Table 6) were not detected and below the residential and recreational land-use thresholds (NEPC 1999).

Table 5. Analytical results and threshold concentrations (mg/kg)

Sample ID	Sample type	Arsenic	Cadmium	Chromium (total)	Chromium (VI)	Copper	Lead	Nickel	Zinc	OCP
HRD1	Discrete	ND	ND	26	-	10	7	9	29	ND
HRD2	Discrete	ND	ND	16	-	31	ND	18	95	ND
HRD3	Discrete	ND	ND	21	-	9	ND	8	16	ND
Residential land-use threshold (NEPC 1999)										
Discrete		*100*	*20*	*-**	*100*	*6,000*	*300*	*400*	*7,400*	*-*
Recreational land-use threshold (NEPC 1999)										
Discrete		*300*	*90*	*-**	*300*	*17,000*	*600*	*1,200*	*30,000*	*-*

ND = not detected at the detection limit, * Not applicable due to low human toxicity of Cr(III) and non-industrial site

Table 6. Analytical results and threshold concentrations hydrocarbons (mg/kg)

Sample id.	Sample type		TRH (C6-C10)	TRH (>C10-C16)	TRH (>C16-C34)	TRH (>C34-C40)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
HRD1	Discrete		ND	ND	ND	ND	ND	ND	ND	ND	ND
HRD2	Discrete		ND	ND	ND	ND	ND	ND	ND	ND	ND
HRD3	Discrete		ND	ND	ND	ND	ND	ND	ND	ND	ND
HSL A– Residential/ clay soil		0m to <1m	50	280	NA	NA	0.7	480	NL	110	NL
EIL – residential/recreational			*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*170*
ESL – residential/ recreational / fine soil			*180*	*120*	*1,300*	*5,600*	*65*	*105*	*125*	*45*	*-*
Management limits for TRH fractions in soil / residential/recreational			*800*	*1,000*	*5,000*	*10,000*	*-*	*-*	*-*	*-*	*-*
HSL C– Recreational/ clay soil		0m to <1m	*NL*	*NL*	*NA*	*NA*	*NL*	*NL*	*NL*	*NL*	*NL*

ND = not detected at the detection limit

9.3 Stockpiles

Several large stockpiles were identified near the northern boundary of the site. The stockpiles consisted of timber, soil and building refuse including bricks, poly-piping, iron, glass, steel and gravel.

Several small stockpiles were located in the central section of the site. The stockpiles contained red sandy clay, timber, trace metal piping and cement sheeting fragments. No asbestos was identified in the stockpiles.

General refuse including tyres, iron, empty drums, wire, bricks and timber were identified on the western boundary.

All stockpiles are an amenity hazard require removal.

10. Site characterisation

10.1 Environmental contamination

No soil contamination was detected.

10.2 Chemical degradation production

Not applicable as no contamination was detected.

10.3 Exposed population

Not applicable as no contamination was detected.

11. Conclusions and recommendations

11.1 Summary

An inspection of the site was made on 22 and 23 April 2015. The site is located in a developing residential area on the south eastern fringes of Dubbo and has an area of approximately 140ha.

The site has an agricultural land-use history of grazing. There is no evidence of orchards, mines, sheep dips, mixing sheds or contaminating industrial activities on the site from the review of site history or site walkover. The use of agricultural pesticides over the area in the past is expected to be low.

The contamination status of the site was assessed from a soil sampling and laboratory analysis program. Two-hundred and eighty discrete soil samples were collected over the site and combined to form seventy composite samples. The soil samples were analysed for arsenic, cadmium, chromium, copper, lead, nickel, zinc and organochlorine pesticides (OCP). Three discrete samples were collected from a nursery area in the south western section. The discrete soil samples were analysed for arsenic, cadmium, chromium, copper, lead, nickel, zinc, OCP, total recoverable hydrocarbons (TRH) (C6-C40), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN).

The soil sampling program did not detect elevated levels of the analysed metals, OCP or TRH. The levels of all substances evaluated were below the EPA investigation threshold for residential and recreational land-use with access to soil. In conclusion, no contamination was found.

Several stockpiles were located across the site. The stockpiles consisted of soil and timber and trace general refuse. No asbestos was identified in the stockpiles on site. The stockpiles are an amenity hazard.

11.2 Assumptions in reaching the conclusions

It is assumed the sampling sites are representative of the site. An accurate history has been obtained and typical past farming practices were adopted.

11.3 Extent of uncertainties

The analytical data relate only to the locations sampled. Soil conditions can vary both laterally and vertically and it cannot be excluded that unidentified contaminants may be present. The sampling density was designed to detect a 'hot spot' in the field area within a radius of approximately 41 metres and with a 95% level of confidence.

11.4 Suitability for proposed use of the site

The site is suitable for residential and recreational activities.

11.5 Limitations and constraints on the use of the site

Stockpiles identified on-site require removal. The stockpile footprint requires validation.

11.6 Recommendation for further work

The stockpiles require removal and an assessment of the stockpile footprint is recommended following removal.

12. Report limitations and intellectual property

This report has been prepared for the use of the client to achieve the objectives given the clients requirements. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing is interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the contamination, it's likely impact on the proposed development and appropriate remediation measures. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus important to understand the limitations of the investigation and recognise that we are not responsible for these limitations.

13. References

DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditors Scheme* (NSW Department of Environment and Conservation, Chatswood)

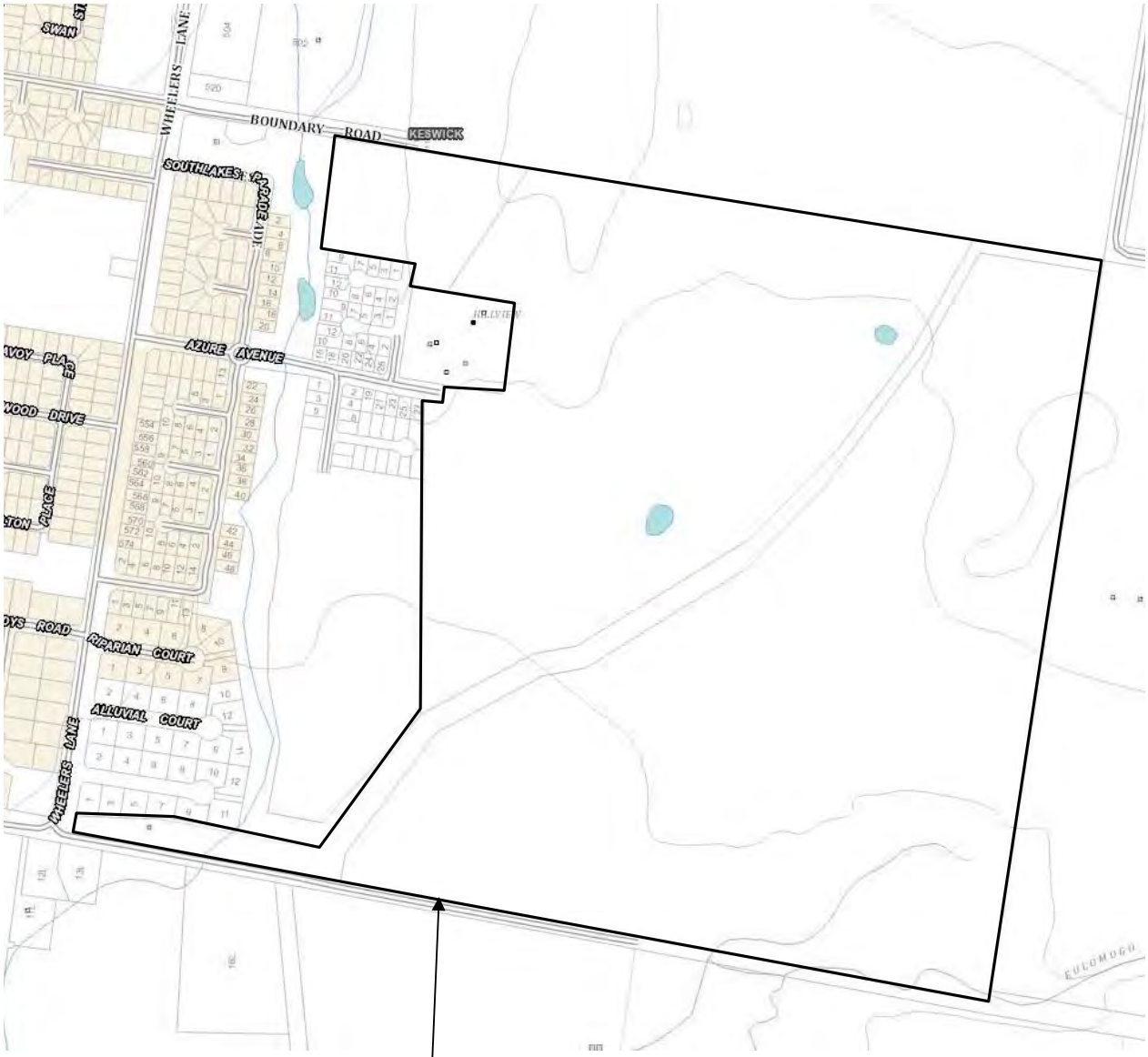
Environment Protection Authority (1995) *Contaminated sites: Sampling Design Guidelines* (NSW Environment Protection Authority, Chatswood)

Murphy BW and Lawrie, JW (1990) *Soil Landscapes of the Dubbo 1:250,000 Sheet* (Soil Conservation Service of NSW, Sydney)

NEPC (1999 revised 2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999* (National Environment Protection Council Service Corporation, Adelaide)

Figures

North



Investigation area

Figure 1: Locality map		
Hillview Estate Lot 399 DP1199356 and Lot 503 DP1152321, Dubbo NSW		
	Envirowest Consulting Pty Ltd	
Job: R5737c1	Drawn by: AP	Date: 29/05/2015

North

Legend

- Sampling location
- Lot boundary
- Dam
- Nursery area
- Council infrastructure
- Fence
- Stockpile
- Gravel earthworks compound
- Wet area
- Fill (0-10cm)

Approximate Scale 1: 9,500

0 95 190 380m

Figure 2: Site plan

Hillview Estate Lot 399 DP1199356 and Lot 503 DP1152321, Dubbo NSW

Envirowest Consulting Pty Ltd

Job: R5737c1	Drawn by: AP	Date: 3/06/2015

Legend

⊗ Sampling location

Lot boundary

Approximate Scale 1: 7,000

0 70 140 280m

Figure 3: Sampling locations

Hillview Estate Lot 399 DP1199356 and Lot 503 DP1152321, Dubbo NSW

Envirowest Consulting Pty Ltd

Job: R5737c1	Drawn by: AP	Date: 3/06/2015

Figure 4. Photographs of the site

Looking north east across paddocks

Looking west across paddocks

Stockpile in northern section of site

Nursery area

Area of fill in southern section of site (0-10cm)

General refuse on western boundary of site

Appendices

Appendix 1. Sample analysis, quality assurance and quality control (QAQC) report
Appendix 2. Soil analysis results –
ALS report number ES1520581 and chain of custody form
Appendix 3. Field sampling log

Appendix 1. Sample analysis, quality assurance and quality control (QAQC) report

1. Data quality indicators (DQI) requirements

1.1 Completeness

A measure of the amount of usable data for a data collection activity. Greater than 95% of the data must be reliable based on the quality objectives. Where greater than two quality objectives have less reliability than the acceptance criterion the data may be considered with uncertainty.

1.1.1 Field

Consideration	Requirement
Locations and depths to be sampled	Described in the sampling plan. The acceptance criterion is 95% data retrieved compared with proposed. Acceptance criterion is 100% in crucial areas.
SOP appropriate and compiled	Described in the sampling plan.
Experienced sampler	Sampler or supervisor
Documentation correct	Sampling log and chain of custody completed

1.1.2 Laboratory

Consideration	Requirement
Samples analysed	Number according to sampling and quality plan
Analytes	Number according to sampling and quality plan
Methods	EPA or other recognised methods with suitable PQL
Sample documentation	Complete including chain of custody and sample description
Sample holding times	Metals 6 months, OCP, PAH, TPH, PCB 14 days

1.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event. The data must show little or no inconsistencies with results and field observations.

1.2.1 Field

Consideration	Requirement
SOP	Same sampling procedures to be used
Experienced sampler	Sampler or supervisor
Climatic conditions	Described as may influence results
Samples collected	Sample medium, size, preparation, storage, transport

1.2.2 Laboratory

Consideration	Requirement
Analytical methods	Same methods, approved methods
PQL	Same
Same laboratory	Justify if different
Same units	Justify if different

1.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

1.3.1 Field

Consideration	Requirement
Appropriate media sampled	Sampled according to sampling and quality plan or in accordance with the EPA (1995) sampling guidelines.
All media identified	Sampling media identified in the sampling and quality plan. Where surface water bodies on the site sampled.

1.3.2 Laboratory

Consideration	Requirement
Samples analysed	Blanks

1.4 Precision

A quantitative measure of the variability (or reproduced of the data). Is measured by standard deviation or relative percent difference (RPD). A RPD analysis is calculated and compared to the practical quantitation limit (PQL) or absolute difference AD.

- Levels greater than 10 times the PQL the RPD is 50%
- Levels between 5 and 10 times the PQL the RPD is 75%
- Levels between 2 and 5 times the PQL the RPD is 100%
- Levels less than 2 times the PQL, the AD is less than 2.5 times the PQL

Data not conforming to the acceptance criterion will be examined for determination of suitability for the purpose of site characterisation.

1.4.1 Field

Consideration	Requirement
Field duplicates	Frequency of 5%, results to be within RPD or discussion required indicate the appropriateness of SOP

1.4.2 Laboratory

Consideration	Requirement
Laboratory and inter lab duplicates	Frequency of 5%, results to be within RPD or discussion required. Inter laboratory duplicates will be one sample per batch.
Field duplicates	Frequency of 5%, results to be within RPD or discussion required
Laboratory prepared volatile trip spikes	One per sampling batch, results to be within RPD or discussion required

1.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value.

1.5.1 Field

Consideration	Requirement
SOP	Complied
Inter laboratory duplicates	Frequency of 5%. Analysis criterion 60% RPD for levels greater than 10 times the PQL 85% RPD for levels between 5 to 10 times the PQL 100% RPD at levels between 2 to 5 times the PQL Absolute difference, 3.5 times the PQL where levels are, 2 times PQL

1.5.2 Laboratory

Recovery data (surrogates, laboratory control samples and matrix spikes) data subject to the following control limits:

- 60 to 140% acceptable data
- 20-60% discussion required, may be considered acceptable
- 10-20% data should considered as estimates
- 10% data should be rejected

Consideration	Requirement
Field blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Method blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Frequency of 5%, results to be within +/-40% or discussion required
Matrix duplicates	Sample injected with a known concentration of contaminants with tested. Frequency of 5%, results to be within +/-40% or discussion required
Surrogate spikes	QC monitoring spikes to be added to samples at the extraction process in the laboratory where applicable. Surrogates are closely related to the organic target analyte and not normally found in the natural environment. Frequency of 5%, results to be within +/-40% or discussion required
Laboratory control samples	Externally prepared reference material containing representative analytes under investigation. These will be undertaken at one per batch. It is to be within +/-40% or discussion required
Laboratory prepared spikes	Frequency of 5%, results to be within +/-40% or discussion required

2. Laboratory analysis summary

One analysis batch was undertaken over the preliminary investigation program. Samples were collected on 22 and 23 April 2015. A total of seventy-three samples were submitted for analytical testing. The samples were collected in the field by an environmental scientist from Envirowest Consulting Pty Ltd, placed into laboratory prepared receptacles as recommended in NEPC (1999). The samples preservation and storage was undertaken using standard industry practices (NEPC 1999). A chain of custody form accompanied transport of the samples to the laboratory.

The samples were analysed at the laboratories of ALS, Smithfield, NSW which is National Association of Testing Authorities (NATA) accredited for the tests undertaken. The analyses undertaken, number of samples tested and methods are presented in the following tables:

Field duplicate frequency

Sample id.	Number of samples	Duplicate	Frequency (%)	Date collected	Substrate	Laboratory report
HR1, HR2. HR3, HR4, HR5, HR6, HR7, HR8, HR9, HR10, HR11, HR12, HR13, HR14, HR15, HR16, HR17, HR18, HR19, HR20, HR21, HR22, HR23, HR24, HR25, HR26, HR27, HR28, HR29, HR30, HR31, HR32, HR33, HR34, HR35, HR36, HR37, HR38, HR39, HR40, HR41, HR42, HR43, HR44, HR45, HR46, HR47, HR48, HR49, HR50, HR51, HR52, HR53, HR54, HR55, HR56, HR57, HR58, HR59, HR60, HR61, HR62, HR63, HR64, HR65, HR66, HR67, HR68, HR69, HR70, HRD1, HRD2, HRD3	73	4	5.5	22/04/2015 23/04/2015	Soil	ES1520581

Laboratory analysis schedule

Sample id. (sampling location)	Number of samples	Duplicate	Analyses	Date collected	Substrate	Laboratory report
HR1, HR2. HR3, HR4, HR5, HR7, HR8, HR9, HR10, HR11, HR12, HR13, HR15, HR16, HR17, HR18, HR19, HR20, HR21, HR22, HR23, HR24, HR25, HR26, HR27, HR28, HR29, HR30, HR31, HR32, HR33, HR34, HR35, HR36, HR37, HR38, HR39, HR40, HR41, HR42, HR43, HR44, HR45, HR46, HR47, HR48, HR49, HR50, HR51, HR52, HR53, HR54, HR55, HR56, HR57, HR58, HR59, HR60, HR61, HR62, HR63, HR64, HR65, HR66, HR67, HR68, HR69, HR70	68	4	As, Cd, Cr (total), Cu, Pb, Ni, Zn, OCP	22/04/2015 23/04/2015	Soil	ES1520581
HR6, HR14	2	0	As, Cd, Cr (total), Cr (VI), Pb, Ni, Zn, OCP	22/23/2015	Soil	ES1520581
HRD1, HRD2, HRD3	3	0	As, Cd, Cr (total), Cu, Pb, Ni, Zn, OCP, TRH (C6-C40), BTEXN	23/4/2015	Soil	ES1520581

Analytical methods

Analyte	Extraction	Laboratory methods
Metals	USEPA 200.2 Mod	APHA USEPA SW846-6010
Chromium (III)	-	APHA 3500 CR-A&B & 3120 and USEPA SW846-3060A
Chromium (VI)	USEPA SW846-3060A	USEPA SW846-3060A
Mercury	USEPA 200.2 Mod	APHA 3112
TPH(C6-C9)	USPEA SW846-5030A	USPEA SW 846-8260B
TPH(C10-C36), PAH	Tumbler extraction of solids	USEPA SW 846-8270B
PCB	Tumbler extraction of solids	USEPA SW 846-8270B
OC Pesticides	Tumbler extraction of solids	USEPA SW 846-8270B
BTEX	Tumbler extraction of solids	USEPA SW 846-8260B

3. Field quality assurance and quality control

Four intra laboratory duplicate sample was collected for the investigation. The frequency was greater than the recommended frequency of 5%. Table A5.1 outlines the samples collected and differences in replicate analyses. Relative differences were deemed to pass if they were within the acceptance limits of +/- 40% for replicate analyses or less than 5 times the detection limit.

Table A5.1. Relative differences for intra laboratory duplicates

	HR1, HRA		HR23, HRB		HR40, HRC		HR66, HRD	
	Relative difference (%)	Pass/Fail	Relative difference (%)	Pass/Fail	Relative difference (%)	Pass/Fail	Relative difference (%)	Pass/Fail
Arsenic	NA	-	NA	-	NA	-	NA	-
Cadmium	NA	-	NA	-	NA	-	NA	-
Chromium	17	Pass	40	Pass	38	Pass	4	Pass
Copper	14	Pass	15	Pass	15	Pass	0	Pass
Lead	0	Pass	NA	-	NA	-	0	Pass
Nickel	19	Pass	28	Pass	28	Pass	10	Pass
Zinc	20	Pass	33	Pass	13	Pass	10	Pass
OCP	NA	-	NA	-	NA	-	NA	-

NA – relative difference unable to be calculated as results are less than laboratory detection limit

No trip blanks or spikes were submitted for analysis. This is not considered to create significant uncertainty in the analysis results because of the following rationale:

- The fieldwork was completed within a short time period and consistent methods were used for soil sampling.
- Soil samples were placed in insulated cooled containers after sampling to ensure preservation during transport and storage.
- The samples were placed in single use jars using clean sampling tools and disposable gloves from material not in contact with other samples. This reduces the likelihood of cross contamination.
- Samples in the analysis batch contain analytes below the level of detection. It is considered unlikely that contamination has occurred as a result of transport and handling.

4. Laboratory quality assurance and quality control

Sample holding times are recommended in NEPC (1999). The time between collection and extraction for all samples was less than the criteria listed below:

Analyte	Maximum holding time
Metals, cyanide	6 months
OCP, TPH, PCB, BTEX, PAH	14 days

The laboratory interpretative reports are presented with individual laboratory report. Assessment is made of holding time, frequency of control samples and quality control samples. No significant outliers exist for the sampling batches. The laboratory report also contains a detailed description of preparation methods and analytical methods.

The results, quality report, interpretative report and chain of custody are presented in the attached appendices. The quality report contains the laboratory duplicates, spikes, laboratory control samples, blanks and where appropriate matrix spike recovery (surrogate).

5. Data quality indicators (DQI) analysis

5.1 Completeness

A measure of the amount of usable data for a data collection activity (total to be greater than 95%).

The data set was found to be complete based on the scope of work. No critical areas of contamination were omitted from the data set.

5.1.1 Field

Consideration	Accepted	Comment
Locations to be sampled	Yes	In accordance with sampling methodology, described in the report. Sampling locations described in figures.
Depth to be sampled	Yes	In accordance with sampling methodology
SOP appropriate and compiled	Yes	In accordance with sampling methodology Sampled with stainless steel spade into lab prepared containers, decontamination between samples, latex gloves worn by sampler
Experienced sampler	Yes	Same soil sampler, environmental scientist
Documentation correct	Yes	Sampling log completed Chain of custody completed

5.1.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	All critical samples analysed in accordance with chain of custody and analysis plan
Analytes	Yes	All analytes in accordance with chain of custody and analysis plan
Methods	Yes	Analysed in NATA accredited laboratory with recognised methods and suitable PQL
Sample documentation	Yes	Completed including chain of custody and sample results and quality results report for each batch
Sample holding times	Yes	Metals less than 6 months. OCP, TPH, PCB, BTEX less than 14 days

5.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event.

The data sets were found to be acceptable.

5.2.1 Field

Consideration	Accepted	Comment
SOP	Yes	Same sampling procedures used and sampled on one date
Experienced sampler	Yes	Experienced scientist
Climatic conditions	Yes	Described in field sampling log
Samples collected	Yes	Suitable size, storage and transport

5.2.2 Laboratory

Consideration	Accepted	Comment
Analytical methods	Yes	Same methods all samples, in accordance with NEPC(1999) or USEPA
PQL	Yes	Suitable for analytes
Same laboratory	Yes	ALS Environmental is NATA accredited for the test
Same units	Yes	-

5.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

The data sets were found to be acceptable.

5.3.1 Field

Consideration	Accepted	Comment
Appropriate media sampled	Yes	Sampled according to sampling and quality plan
All media identified	Yes	Soil Sampling media identified in the sampling and quality plan

5.3.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	Undertaken in NATA accredited laboratory. No blanks analysed. Samples in the analysis batch contain analytes below the level of detection. It is considered unlikely that contamination has occurred as a result of transport and handling.

5.4 Precision

A quantitative measure of the variability (or reproduced of the data).
The data sets were found to be acceptable.

5.4.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field duplicates	Yes	Collected.

5.4.2 Laboratory

Consideration	Accepted	Comment
Laboratory and inter lab duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Field duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Laboratory prepared volatile trip spikes	NA	Volatiles analytes were not analysed

5.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value.

The data sets were found to be acceptable.

5.5.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field blanks	NA	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	NA	Frequency of 5%, <5 times the PQL, PQL may be adjusted

5.5.2 Laboratory

Consideration	Accepted	Comment
Method blanks	Yes	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Matrix duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Surrogate spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Laboratory control samples	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Laboratory prepared spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required

No trip blanks, field spikes or sample rinsates were submitted for analysis. This is not considered to create significant uncertainty in the analysis results because of the following rationale:

- The fieldwork methods used for soil sampling were consistent throughout the project with all in situ samples collected from material which had not been subject to exposure.
- The fieldwork was completed within a short time period and consistent methods were used for soil sampling.
- Soil samples were placed in insulated cooled containers as quickly as possible, with the containers filled to minimize headspace. The sample containers were sealed immediately after the sample was collected and chilled in an esky containing ice.
- The samples were stored in a refrigerator and transported with ice bricks to ensure preservation during transport and storage.
- The samples were placed in single use jars using clean sampling tools and disposable gloves from material not in contact with other samples. This reduces the likelihood of cross contamination.
- Samples in the analysis batches contained analytes below the level of detection. It is considered unlikely that contamination has occurred as a result of transport and handling.

6. Conclusion

All media appropriate to the objectives of this investigation have been adequately analysed and no area of significant uncertainty exist. It is concluded the data is usable for the purposes of the investigation.

Appendix 2. Soil analysis results – ALS report number ES1520581 and chain of custody form

Appendix 3. Field sampling log

Sampling log

Client	Geolyse Pty Ltd
Contact	Steven Guy
Job number	R5737c1
Location	*Hillview Estate*, Lot 399 DP1199356 and Lot 503 DP1152321, Dubbo NSW
Date	22 and 23 April 2015
Investigator(s)	Leah Desborough and Ashleigh Pickering
Weather conditions	Fine

Sample id	Matrix	Date	Analysis required	Observations/comments
HR1	Soil	22/4/2015	Arsenic (As), cadmium (Ca), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn), organochlorine pesticides (OCP)	
HR2	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR3	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR4	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR5	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR6	Soil	22/4/2015	As, Ca, Cr (total), Cr (VI), Cu, Pb, Ni, Zn, OCP	
HR7	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR8	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR9	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR10	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR11	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR12	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR13	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR14	Soil	22/4/2015	As, Ca, Cr (total), Cr (VI), Cu, Pb, Ni, Zn, OCP	
HR15	Soil	22/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR16	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR17	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR18	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR19	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR20	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR21	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR22	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR23	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR24	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR25	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR26	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR27	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR28	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR29	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR30	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR31	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR32	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR33	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR34	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR35	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR36	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR37	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR38	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	Area of fill (0-10cm) south of nursery area

HR39	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR40	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR40	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR41	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR42	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR43	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR44	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR45	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR46	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR47	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR48	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR49	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR50	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR51	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR52	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR53	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR54	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR55	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR56	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR57	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR58	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR59	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR60	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR61	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR62	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR63	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR64	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR65	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR66	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR67	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR68	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR69	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HR70	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	
HRD1	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP, Total Recoverable Hydrocarbons (C6-C40) (TRH), Benzene, Toluene, Xylenes, Ethylbenzene, Naphthalene (BTEXN)	Western section of nursery area
HRD2	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP, TRH, BTEXN	Around pump in nursery area
HRD3	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP, TRH, BTEXN	Along rows of trees in nursery area
HRA	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	Duplicate of HR1
HRB	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	Duplicate of HR23
HRC	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	Duplicate of HR40
HRD	Soil	23/4/2015	As, Ca, Cr, Cu, Pb, Ni, Zn, OCP	Duplicate of HR66
HR1asb	Asbestos	23/4/2015	Asbestos identification	Cement sheeting in central stockpile

CERTIFICATE OF ANALYSIS

Work Order	: **ES1520581**	Page	: 1 of 53
Amendment	: **1**		
Client	: **ENVIROWEST CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MS ASHLEIGH PICKERING	Contact	:
Address	: 9 CAMERON PLACE PO BOX 8158 ORANGE NSW, AUSTRALIA 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ashleigh@envirowest.net.au	E-mail	:
Telephone	: +61 02 63614954	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 63603960	Facsimile	: +61-2-8784 8500
Project	: 5737	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: 5737	Date Samples Received	: 28-Apr-2015 08:00
C-O-C number	: 5737	Date Analysis Commenced	: 29-Apr-2015
Sampler	: LEAH DESBOROUGH	Issue Date	: 21-May-2015 17:35
Site	: 5737		
		No. of samples received	: 81
Quote number	: 3333	No. of samples analysed	: 81

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
! nkit Joshi	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- EG048G: LOR raised for Hexavalent Chromium analysis by Alkaline Digestion on a few samples due to matrix interferences.
- This report has been amended and re-released to allow the reporting of additional analytical data.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl (Method 15G1) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR1	HR2	HR3	HR4	HR5
			Client sampling date / time	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-001	ES1520581-002	ES1520581-003	ES1520581-004	ES1520581-005
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	17.2	15.4	15.0	14.8	13.3
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	52	38	82	78	45
Copper	7440-50-8	5	ˆ E5	22	17	25	26	16
Lead	7439-92-1	5	ˆ E5	8	8	9	8	8
Nickel	288131031	0	ˆ E5	35	23	55	56	25
Zinc	288137737	5	ˆ E5	38	28	41	45	27
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR1	HR2	HR3	HR4	HR5
				Client sampling date / time	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-001	ES1520581-002	ES1520581-003	ES1520581-004	ES1520581-005
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR1	HR2	HR3	HR4	HR5
				Client sampling date / time	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-001	ES1520581-002	ES1520581-003	ES1520581-004	ES1520581-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	^ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	^ E5		----	----	----	----	----
^ Sum of BTEX	3333	1;0	^ E5		----	----	----	----	----
^ Total Xylenes	1330-20-7	0.5	^ E5		----	----	----	----	----
Naphthalene	91-20-3	1	^ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		93.8	102	90.0	97.7	108
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		104	109	85.9	86.2	82.1
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR6	HR7	HR8	HR9	HR10
			Client sampling date / time	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-006	ES1520581-007	ES1520581-008	ES1520581-009	ES1520581-010
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	22.7	17.5	14.9	18.7	13.4
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	127	90	39	29	20
Copper	7440-50-8	5	ˆ E5	31	20	17	12	7
Lead	7439-92-1	5	ˆ E5	8	8	8	7	<5
Nickel	288131031	0	ˆ E5	89	41	21	22	12
Zinc	288137737	5	ˆ E5	63	38	29	25	17
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	<3.9	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	127	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR6	HR7	HR8	HR9	HR10
				Client sampling date / time	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-006	ES1520581-007	ES1520581-008	ES1520581-009	ES1520581-010
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	ˆ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	ˆ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	ˆ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	ˆ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	ˆ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	ˆ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	ˆ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	ˆ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	ˆ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	ˆ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	ˆ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	ˆ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	ˆ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	ˆ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	ˆ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	ˆ E5		----	----	----	----	----
Toluene	108-88-3	0.5	ˆ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	ˆ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR6	HR7	HR8	HR9	HR10
				Client sampling date / time	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-006	ES1520581-007	ES1520581-008	ES1520581-009	ES1520581-010
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	ˆ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	ˆ E5		----	----	----	----	----
^ Sum of BTEX	3333	1;0	ˆ E5		----	----	----	----	----
^ Total Xylenes	1330-20-7	0.5	ˆ E5		----	----	----	----	----
Naphthalene	91-20-3	1	ˆ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		94.8	86.2	74.5	91.1	96.5
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		95.1	88.0	69.5	94.5	101
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR11	HR12	HR13	HR14	HR15
			Client sampling date / time	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-011	ES1520581-012	ES1520581-013	ES1520581-014	ES1520581-015
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	12.0	17.2	16.5	18.2	14.4
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	37	82	47	93	59
Copper	7440-50-8	5	ˆ E5	13	37	23	40	27
Lead	7439-92-1	5	ˆ E5	6	5	7	5	8
Nickel	288131031	0	ˆ E5	23	73	36	97	50
Zinc	288137737	5	ˆ E5	25	80	46	73	43
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	G8;1	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	93	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR11	HR12	HR13	HR14	HR15
				Client sampling date / time	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-011	ES1520581-012	ES1520581-013	ES1520581-014	ES1520581-015
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR11	HR12	HR13	HR14	HR15
				Client sampling date / time	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]	[22-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-011	ES1520581-012	ES1520581-013	ES1520581-014	ES1520581-015
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	^ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	^ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	^ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	^ E5		----	----	----	----	----
Naphthalene	91-20-3	1	^ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**96.5**	**91.0**	**92.8**	**88.4**	**90.2**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**96.6**	**81.2**	**89.4**	**87.2**	**86.4**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR16	HR17	HR18	HR19	HR20
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-016	ES1520581-017	ES1520581-018	ES1520581-019	ES1520581-020
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	18.8	22.0	23.5	19.4	14.9
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	30	29	24	24	20
Copper	7440-50-8	5	ˆ E5	23	26	23	16	8
Lead	7439-92-1	5	ˆ E5	5	7	8	6	7
Nickel	288131031	0	ˆ E5	34	33	27	19	9
Zinc	288137737	5	ˆ E5	82	99	77	50	23
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR16	HR17	HR18	HR19	HR20
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-016	ES1520581-017	ES1520581-018	ES1520581-019	ES1520581-020
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR16	HR17	HR18	HR19	HR20
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-016	ES1520581-017	ES1520581-018	ES1520581-019	ES1520581-020
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	^ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	^ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	^ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	^ E5		----	----	----	----	----
Naphthalene	91-20-3	1	^ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**98.2**	**95.0**	**101**	**92.6**	**78.7**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**99.7**	**98.2**	**102**	**96.4**	**73.8**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR21	HR22	HR23	HR24	HR25
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-021	ES1520581-022	ES1520581-023	ES1520581-024	ES1520581-025
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	8.9	9.4	10.6	14.4	9.5
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	19	24	27	32	22
Copper	7440-50-8	5	ˆ E5	<5	<5	7	9	<5
Lead	7439-92-1	5	ˆ E5	<5	<5	5	6	<5
Nickel	288131031	0	ˆ E5	4	5	8	10	5
Zinc	288137737	5	ˆ E5	8	8	14	18	12
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR21	HR22	HR23	HR24	HR25
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-021	ES1520581-022	ES1520581-023	ES1520581-024	ES1520581-025
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR21	HR22	HR23	HR24	HR25
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-021	ES1520581-022	ES1520581-023	ES1520581-024	ES1520581-025
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	^ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	^ E5		----	----	----	----	----
^ Sum of BTEX	3333	1;0	^ E5		----	----	----	----	----
^ Total Xylenes	1330-20-7	0.5	^ E5		----	----	----	----	----
Naphthalene	91-20-3	1	^ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		82.2	75.4	76.8	71.0	92.7
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		70.0	82.1	88.1	100	118
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR26	HR27	HR28	HR29	HR30
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-026	ES1520581-027	ES1520581-028	ES1520581-029	ES1520581-030
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	12.0	16.2	11.7	12.1	11.8
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	21	19	19	22	19
Copper	7440-50-8	5	ˆ E5	9	9	5	6	5
Lead	7439-92-1	5	ˆ E5	6	6	<5	5	<5
Nickel	288131031	0	ˆ E5	10	9	6	6	5
Zinc	288137737	5	ˆ E5	22	27	10	12	10
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR26	HR27	HR28	HR29	HR30
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-026	ES1520581-027	ES1520581-028	ES1520581-029	ES1520581-030
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR26	HR27	HR28	HR29	HR30
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-026	ES1520581-027	ES1520581-028	ES1520581-029	ES1520581-030
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	ˆ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	ˆ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	ˆ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	ˆ E5		----	----	----	----	----
Naphthalene	91-20-3	1	ˆ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**79.2**	**79.2**	**86.0**	**72.2**	**83.4**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**75.6**	**105**	**74.3**	**72.0**	**81.6**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR31	HR32	HR33	HR34	HR35
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-031	ES1520581-032	ES1520581-033	ES1520581-034	ES1520581-035
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	12.9	11.6	12.9	11.4	11.7
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	22	22	23	18	17
Copper	7440-50-8	5	ˆ E5	9	6	6	6	7
Lead	7439-92-1	5	ˆ E5	6	<5	<5	<5	5
Nickel	288131031	0	ˆ E5	9	7	6	6	7
Zinc	288137737	5	ˆ E5	18	15	17	17	19
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR31	HR32	HR33	HR34	HR35
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-031	ES1520581-032	ES1520581-033	ES1520581-034	ES1520581-035
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR31	HR32	HR33	HR34	HR35
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-031	ES1520581-032	ES1520581-033	ES1520581-034	ES1520581-035
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	ˆ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	ˆ E5		----	----	----	----	----
^ Sum of BTEX	3333	1;0	ˆ E5		----	----	----	----	----
^ Total Xylenes	1330-20-7	0.5	ˆ E5		----	----	----	----	----
Naphthalene	91-20-3	1	ˆ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		74.6	88.0	85.6	88.2	81.3
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		86.4	81.6	128	80.4	71.5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR36	HR37	HR38	HR39	HR40
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-036	ES1520581-037	ES1520581-038	ES1520581-039	ES1520581-040
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	14.0	11.4	14.4	12.7	12.2
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	31	22	38	21	28
Copper	7440-50-8	5	ˆ E5	6	6	14	7	7
Lead	7439-92-1	5	ˆ E5	5	<5	9	5	5
Nickel	288131031	0	ˆ E5	7	6	16	7	8
Zinc	288137737	5	ˆ E5	16	12	19	18	16
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR36	HR37	HR38	HR39	HR40
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-036	ES1520581-037	ES1520581-038	ES1520581-039	ES1520581-040
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR36	HR37	HR38	HR39	HR40
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-036	ES1520581-037	ES1520581-038	ES1520581-039	ES1520581-040
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	ˆ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	ˆ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	ˆ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	ˆ E5		----	----	----	----	----
Naphthalene	91-20-3	1	ˆ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**94.0**	**82.2**	**87.4**	**72.3**	**78.4**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**125**	**88.9**	**64.9**	**92.3**	**84.4**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR41	HR42	HR43	HR44	HR45
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-041	ES1520581-042	ES1520581-043	ES1520581-044	ES1520581-045
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	12.2	13.7	13.4	13.2	15.3
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	33	24	28	25	27
Copper	7440-50-8	5	ˆ E5	8	10	14	12	14
Lead	7439-92-1	5	ˆ E5	<5	6	7	7	8
Nickel	288131031	0	ˆ E5	9	12	18	14	16
Zinc	288137737	5	ˆ E5	18	25	26	22	24
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR41	HR42	HR43	HR44	HR45
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-041	ES1520581-042	ES1520581-043	ES1520581-044	ES1520581-045
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR41	HR42	HR43	HR44	HR45
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-041	ES1520581-042	ES1520581-043	ES1520581-044	ES1520581-045
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	ˆ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	ˆ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	ˆ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	ˆ E5		----	----	----	----	----
Naphthalene	91-20-3	1	ˆ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**107**	**89.0**	**99.2**	**96.0**	**89.0**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**119**	**97.3**	**111**	**102**	**95.1**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR46	HR47	HR48	HR49	HR50
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-046	ES1520581-047	ES1520581-048	ES1520581-049	ES1520581-050
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	16.5	12.7	15.2	14.1	17.7
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	37	31	28	31	33
Copper	7440-50-8	5	ˆ E5	18	13	15	15	14
Lead	7439-92-1	5	ˆ E5	9	7	8	9	7
Nickel	288131031	0	ˆ E5	23	17	19	20	19
Zinc	288137737	5	ˆ E5	30	24	27	26	26
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR46	HR47	HR48	HR49	HR50
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-046	ES1520581-047	ES1520581-048	ES1520581-049	ES1520581-050
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR46	HR47	HR48	HR49	HR50
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-046	ES1520581-047	ES1520581-048	ES1520581-049	ES1520581-050
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	^ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	^ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	^ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	^ E5		----	----	----	----	----
Naphthalene	91-20-3	1	^ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**86.9**	**95.3**	**94.6**	**78.6**	**95.5**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**88.0**	**101**	**101**	**80.1**	**102**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR51	HR52	HR53	HR54	HR55
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-051	ES1520581-052	ES1520581-053	ES1520581-054	ES1520581-055
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	13.9	15.5	13.1	13.4	15.8
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	36	33	31	43	60
Copper	7440-50-8	5	ˆ E5	14	14	11	23	16
Lead	7439-92-1	5	ˆ E5	7	7	6	7	6
Nickel	288131031	0	ˆ E5	18	19	17	27	42
Zinc	288137737	5	ˆ E5	24	24	28	50	32
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR51	HR52	HR53	HR54	HR55
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-051	ES1520581-052	ES1520581-053	ES1520581-054	ES1520581-055
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR51	HR52	HR53	HR54	HR55
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-051	ES1520581-052	ES1520581-053	ES1520581-054	ES1520581-055
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	ˆ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	ˆ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	ˆ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	ˆ E5		----	----	----	----	----
Naphthalene	91-20-3	1	ˆ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**83.5**	**96.8**	**105**	**86.9**	**96.7**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**87.2**	**99.2**	**107**	**90.1**	**99.1**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR56	HR57	HR58	HR59	HR60
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-056	ES1520581-057	ES1520581-058	ES1520581-059	ES1520581-060
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	22.4	10.3	18.6	13.9	12.1
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	81	30	83	36	29
Copper	7440-50-8	5	ˆ E5	24	8	20	9	6
Lead	7439-92-1	5	ˆ E5	6	6	7	8	5
Nickel	288131031	0	ˆ E5	60	11	55	14	9
Zinc	288137737	5	ˆ E5	43	11	33	13	11
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR56	HR57	HR58	HR59	HR60
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-056	ES1520581-057	ES1520581-058	ES1520581-059	ES1520581-060
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR56	HR57	HR58	HR59	HR60
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-056	ES1520581-057	ES1520581-058	ES1520581-059	ES1520581-060
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	ˆ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	ˆ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	ˆ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	ˆ E5		----	----	----	----	----
Naphthalene	91-20-3	1	ˆ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**90.5**	**77.5**	**99.5**	**94.1**	**90.2**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**92.7**	**71.2**	**111**	**99.7**	**94.8**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR61	HR62	HR63	HR64	HR65
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-061	ES1520581-062	ES1520581-063	ES1520581-064	ES1520581-065
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	12.3	14.0	12.8	11.3	14.4
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	26	24	23	23	38
Copper	7440-50-8	5	ˆ E5	8	10	8	5	13
Lead	7439-92-1	5	ˆ E5	6	6	6	<5	7
Nickel	288131031	0	ˆ E5	10	11	9	7	21
Zinc	288137737	5	ˆ E5	15	20	16	11	24
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR61	HR62	HR63	HR64	HR65
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-061	ES1520581-062	ES1520581-063	ES1520581-064	ES1520581-065
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR61	HR62	HR63	HR64	HR65
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-061	ES1520581-062	ES1520581-063	ES1520581-064	ES1520581-065
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	ˆ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	ˆ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	ˆ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	ˆ E5		----	----	----	----	----
Naphthalene	91-20-3	1	ˆ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**85.2**	**97.7**	**77.8**	**84.1**	**95.6**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**85.5**	**102**	**87.3**	**91.3**	**92.8**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR66	HR67	HR69	HR70	HRD1
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-066	ES1520581-067	ES1520581-069	ES1520581-070	ES1520581-071
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	18.5	15.3	17.9	15.0	13.4
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	48	34	42	49	26
Copper	7440-50-8	5	ˆ E5	17	11	17	22	10
Lead	7439-92-1	5	ˆ E5	8	6	7	6	7
Nickel	288131031	0	ˆ E5	28	19	28	35	9
Zinc	288137737	5	ˆ E5	30	19	30	40	29
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR66	HR67	HR69	HR70	HRD1
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-066	ES1520581-067	ES1520581-069	ES1520581-070	ES1520581-071
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	<10
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	<50
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	<100
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	<100
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	<10
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	<50
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	<100
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	<50
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	G1;0
Toluene	108-88-3	0.5	^ E5		----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR66	HR67	HR69	HR70	HRD1
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-066	ES1520581-067	ES1520581-069	ES1520581-070	ES1520581-071
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	^ E5		----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	^ E5		----	----	----	----	<0.5
^ **Sum of BTEX**	3333	1;0	^ E5		----	----	----	----	G1;0
^ **Total Xylenes**	1330-20-7	0.5	^ E5		----	----	----	----	<0.5
Naphthalene	91-20-3	1	^ E5		----	----	----	----	<1
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**85.4**	**91.1**	**93.9**	**88.1**	**89.8**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**93.7**	**93.3**	**93.9**	**96.0**	**101**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	**84.4**
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	**104**
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	**107**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HRD2	HRD3	HRA	HRB	HRC
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-072	ES1520581-073	ES1520581-075	ES1520581-076	ES1520581-077
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	14.6	12.4	17.3	10.2	12.1
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	<10	10	<10	<10
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	20	<10	10	<10
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	ˆ E5	<1	<1	<1	<1	<1
Chromium	7440-47-3	0	ˆ E5	16	21	62	46	19
Copper	7440-50-8	5	ˆ E5	31	9	19	6	6
Lead	7439-92-1	5	ˆ E5	<5	<5	8	<5	<5
Nickel	288131031	0	ˆ E5	18	8	29	6	6
Zinc	288137737	5	ˆ E5	95	16	31	10	14
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	273883,	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HRD2	HRD3	HRA	HRB	HRC
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-072	ES1520581-073	ES1520581-075	ES1520581-076	ES1520581-077
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	203013,	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	1;0	^ E5		G1;0	G1;0	G1;0	G1;0	G1;0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	<0.05	<0.05	<0.05	<0.05
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		<10	<10	----	----	----
C10 - C14 Fraction	3333	50	^ E5		<50	<50	----	----	----
C15 - C28 Fraction	3333	100	^ E5		<100	<100	----	----	----
C29 - C36 Fraction	3333	100	^ E5		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		<10	<10	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		<50	<50	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		<100	<100	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		G1;0	G1;0	----	----	----
Toluene	108-88-3	0.5	^ E5		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HRD2	HRD3	HRA	HRB	HRC
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-072	ES1520581-073	ES1520581-075	ES1520581-076	ES1520581-077
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	^ E5		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	^ E5		<0.5	<0.5	----	----	----
^ **Sum of BTEX**	3333	1;0	^ E5		G1;0	G1;0	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	^ E5		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	^ E5		<1	<1	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**87.5**	**76.0**	**92.8**	**70.4**	**87.1**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**104**	**75.0**	**99.6**	**71.4**	**94.8**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		**88.1**	**92.7**	----	----	----
Toluene-D8	2037-26-5	1;0	O		**103**	**110**	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		**107**	**110**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HRD	BH20-100	BH20-1500	HR56-100	HR56-1000
			Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit	ES1520581-078	ES1520581-079	ES1520581-080	ES1520581-081	ES1520581-082
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	17.6	12.4	13.4	18.3	7.5
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	4.1	6.7	10.4	10.3
Exchangeable Magnesium	3333	0.1	meq/100g	----	1.4	9.0	3.8	4.3
Exchangeable Potassium	3333	0.1	meq/100g	----	0.4	0.7	2.1	0.4
Exchangeable Sodium	3333	0.1	meq/100g	----	0.5	4.8	<0.1	<0.1
Cation Exchange Capacity	3333	0.1	meq/100g	----	6.4	21.2	16.3	15.1
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	10	70	250	50	<10
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	150	80	1750	740	20
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	----	----	----	----
Cadmium	7440-43-9	1	ˆ E5	<1	----	----	----	----
Chromium	7440-47-3	0	ˆ E5	50	----	----	----	----
Copper	7440-50-8	5	ˆ E5	17	----	----	----	----
Lead	7439-92-1	5	ˆ E5	8	----	----	----	----
Nickel	288131031	0	ˆ E5	31	----	----	----	----
Zinc	288137737	5	ˆ E5	27	----	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	----	----	----	----
Heptachlor	273883,	0.05	ˆ E5	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	ˆ E5	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	----	----	----	----
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HRD	BH20-100	BH20-1500	HR56-100	HR56-1000
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-078	ES1520581-079	ES1520581-080	ES1520581-081	ES1520581-082
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	^ E5		<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	----	----	----	----
Endrin	203013,	0.05	^ E5		<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	----	----	----	----
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	----	----	----	----
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	----	----	----	----
Methoxychlor	72-43-5	1;0	^ E5		G1;0	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HRD	BH20-100	BH20-1500	HR56-100	HR56-1000
				Client sampling date / time	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]	[23-Apr-2015]
Compound	CAS Number	LOR	Unit		ES1520581-078	ES1520581-079	ES1520581-080	ES1520581-081	ES1520581-082
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	ˆ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	ˆ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	ˆ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	ˆ E5		----	----	----	----	----
Naphthalene	91-20-3	1	ˆ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**90.2**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**97.1**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HR68	----	----	----	----
			Client sampling date / time	[23-Apr-2015]	3333	3333	3333	3333
Compound	CAS Number	LOR	Unit	ES1520581-083	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	3333	1	O	16.2	----	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	3333	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	3333	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	3333	0.1	meq/100g	----	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	ˆ E5	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	ˆ E5	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	ˆ E5	<5	----	----	----	----
Cadmium	7440-43-9	1	ˆ E5	<1	----	----	----	----
Chromium	7440-47-3	0	ˆ E5	52	----	----	----	----
Copper	7440-50-8	5	ˆ E5	19	----	----	----	----
Lead	7439-92-1	5	ˆ E5	8	----	----	----	----
Nickel	288131031	0	ˆ E5	33	----	----	----	----
Zinc	288137737	5	ˆ E5	29	----	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	ˆ E5	----	----	----	----	----
EG049: Trivalent Chromium								
^ Trivalent Chromium	16065-83-1	0	ˆ E5	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	ˆ E5	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	ˆ E5	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	ˆ E5	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	ˆ E5	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	ˆ E5	<0.05	----	----	----	----
Heptachlor	273883,	0.05	ˆ E5	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	ˆ E5	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	ˆ E5	<0.05	----	----	----	----
^ Total Chlordane (sum)	3333	0.05	ˆ E5	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	ˆ E5	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR68	----	----	----	----
				Client sampling date / time	[23-Apr-2015]	3333	3333	3333	3333
Compound	CAS Number	LOR	Unit		ES1520581-083	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	^ E5		<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	^ E5		<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	^ E5		<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	^ E5		<0.05	----	----	----	----
Endrin	203013,	0.05	^ E5		<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	^ E5		<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	^ E5		<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	^ E5		<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	^ E5		<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	^ E5		<0.05	----	----	----	----
4.4`-DDT	50-29-3	1;0	^ E5		G1;0	----	----	----	----
Endrin ketone	53494-70-5	0.05	^ E5		<0.05	----	----	----	----
Methoxychlor	72-43-5	1;0	^ E5		G1;0	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	^ E5		<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	3333	0.05	^ E5		<0.05	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	3333	10	^ E5		----	----	----	----	----
C10 - C14 Fraction	3333	50	^ E5		----	----	----	----	----
C15 - C28 Fraction	3333	100	^ E5		----	----	----	----	----
C29 - C36 Fraction	3333	100	^ E5		----	----	----	----	----
^ C10 - C36 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	^ E5		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	^ E5		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	^ E5		----	----	----	----	----
>C16 - C34 Fraction	3333	100	^ E5		----	----	----	----	----
>C34 - C40 Fraction	3333	100	^ E5		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	3333	50	^ E5		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	3333	50	^ E5		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1;0	^ E5		----	----	----	----	----
Toluene	108-88-3	0.5	^ E5		----	----	----	----	----
Ethylbenzene	100-41-4	0.5	^ E5		----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HR68	----	----	----	----
				Client sampling date / time	[23-Apr-2015]	3333	3333	3333	3333
Compound	CAS Number	LOR	Unit		ES1520581-083	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	0.5	^ E5		----	----	----	----	----
ortho-Xylene	95-47-6	0.5	^ E5		----	----	----	----	----
^ **Sum of BTEX**	3333	1;0	^ E5		----	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	^ E5		----	----	----	----	----
Naphthalene	91-20-3	1	^ E5		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	O		**124**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	2,38,3,	0.05	O		**104**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	1;0	O		----	----	----	----	----
Toluene-D8	2037-26-5	1;0	O		----	----	----	----	----
4-Bromofluorobenzene	87131138	1;0	O		----	----	----	----	----

6/5/15

Chain of Custody Form – Ref 5737

Ref: 5737
Investigator: Envirowest Consulting
9 Cameron Place
PO Box 8158
ORANGE NSW 2800
Telephone: (02) 6361 4954
Facsimile: (02) 6360 3960
Email: ashleigh@envirowest.net.au
Contact Person: Ashleigh Pickering
Cc invoice: martine@envirowest.net.au

Laboratory: Australian Laboratory Services
277 Woodpark Road
SMITHFIELD NSW 2164

Quotation #: SY-542-14
Courier/CN:

	Sample ID	Container*	Sampling Date/Time	Sample matrix: Water	Soil	Sludge	Sample preservation: Cool	HNO3/HCl	Unpre-served	Analysis: ALS Method Code S-1 As, Cd, Cr, Cu, Ni, Pb, Zn,	EP068A OCP		
1	HR1	A	22/04/2015		X		X		X	X	X		
2	HR2	A	22/04/2015		X		X		X	X	X		
3	HR3	A	22/04/2015		X		X		X	X	X		
4	HR4	A	22/04/2015		X		X		X	X	X		
5	HR5	A	22/04/2015		X		X		X	X	X		
6	HR6	A	22/04/2015		X		X		X	X	X		
7	HR7	A	22/04/2015		X		X		X	X	X		
8	HR8	A	22/04/2015		X		X		X	X	X		
9	HR9	A	22/04/2015		X		X		X	X	X		
10	HR10	A	22/04/2015		X		X		X	X	X		
11	HR11	A	22/04/2015		X		X		X	X	X		
12	HR12	A	22/04/2015		X		X		X	X	X		

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.

Sampler name: Leah Desborough
Date: 22/04/2015 Time:

Relinquished by: (print and signature) Ashleigh Pickering Apickering Date: 27/04/2015 Time 17:00

Received by: (print and signature) Dan.J Date 28/4 Time 0800

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and orange label, B = 2x40mL vials solvent rinsed Teflon lined septum caps, C 1x500mL glass bottles , solvent rinsed, Teflon lined cap, D= 200mL plastic bottle with nitric acid.

(68) (74)

HR68, HR74 – Not Received

Chain of Custody Form – Ref 5737

Ref:	**5737**		**Sample matrix**			**Sample preservation**			**Analysis**				
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800												
Telephone:	(02) 6361 4954								**ALS Method Code**				
Facsimile:	(02) 6360 3960								**S-1**	**EP068A**			
Email:	**ashleigh@envirowest.net.au**												
Contact Person:	Ashleigh Pickering												
Cc invoice:	martine@envirowest.net.au												
Laboratory:	Australian Laboratory Services 277 Woodpark Road SMITHFIELD NSW 2164		Water	Soil	Sludge	Cool	HNO3/HCl	Unpre-served	As, Cd, Cr, Cu, Ni, Pb, Zn,	OCP			
Quotation #:	**SY-542-14**												
Courier/CN:													
	Sample ID	**Container***	**Sampling Date/Time**										
13	HR13	A	22/04/2015		X		X		X	X	X		
14	HR14	A	22/04/2015		X		X		X	X	X		
15	HR15	A	22/04/2015		X		X		X	X	X		
16	HR16	A	23/04/2015		X		X		X	X	X		
17	HR17	A	23/04/2015		X		X		X	X	X		
18	HR18	A	23/04/2015		X		X		X	X	X		
19	HR19	A	23/04/2015		X		X		X	X	X		
20	HR20	A	23/04/2015		X		X		X	X	X		
21	HR21	A	23/04/2015		X		X		X	X	X		
22	HR22	A	23/04/2015		X		X		X	X	X		
23	HR23	A	23/04/2015		X		X		X	X	X		
24	HR24	A	23/04/2015		X		X		X	X	X		
Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.						Sampler name: Leah Desborough Date : 23/04/2015			Time:				
Relinquished by: (print and signature)	Ashleigh Pickering		Date: 27/04/2015		Time 17:00	Received by: (print and signature) Dan			Date 28/4		Time 0830		

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and orange label, B = 2x40mL vials solvent rinsed Teflon lined septum caps, C 1x500mL glass bottles , solvent rinsed, Teflon lined cap, D= 200mL plastic bottle with nitric acid.

Chain of Custody Form – Ref 5737

Ref:	**5737**		**Sample matrix**			**Sample preservation**			**Analysis**				
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800												
Telephone:	(02) 6361 4954								**ALS Method Code**				
Facsimile:	(02) 6360 3960								**S-1**	**EP068A**			
Email:	**ashleigh@envirowest.net.au**												
Contact Person:	Ashleigh Pickering												
Cc invoice:	martine@envirowest.net.au												
Laboratory:	Australian Laboratory Services 277 Woodpark Road SMITHFIELD NSW 2164		Water	Soil	Sludge	Cool	HNO3/HCl	Unpre-served	As, Cd, Cr, Cu, Ni, Pb, Zn,	OCP			
Quotation #:	**SY-542-14**												
Courier/CN:													
	Sample ID	**Container***	**Sampling Date/Time**										
25	HR25	A	23/04/2015		X		X		X	X	X		
26	HR26	A	23/04/2015		X		X		X	X	X		
27	HR27	A	23/04/2015		X		X		X	X	X		
28	HR28	A	23/04/2015		X		X		X	X	X		
29	HR29	A	23/04/2015		X		X		X	X	X		
30	HR30	A	23/04/2015		X		X		X	X	X		
31	HR31	A	23/04/2015		X		X		X	X	X		
32	HR32	A	23/04/2015		X		X		X	X	X		
33	HR33	A	23/04/2015		X		X		X	X	X		
34	HR34	A	23/04/2015		X		X		X	X	X		
35	HR35	A	23/04/2015		X		X		X	X	X		
36	HR36	A	23/04/2015		X		X		X	X	X		
Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.						Sampler name: Leah Desborough Date : 23/04/2015 Time:							
Relinquished by: (print and signature)	Ashleigh Pickering		Date: 27/04/2015		Time 17:00	Received by: (print and signature)			Date 28/4		Time 08a		

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and orange label, B = 2x40mL vials solvent rinsed Teflon lined septum caps, C 1x500mL glass bottles , solvent rinsed, Teflon lined cap, D= 200mL plastic bottle with nitric acid.

Chain of Custody Form – Ref 5737

	Ref:	**5737**		**Sample matrix**			**Sample preservation**			**Analysis**			
	Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800											
	Telephone:	(02) 6361 4954								**ALS Method Code**			
	Facsimile:	(02) 6360 3960											
	Email:	**ashleigh@envirowest.net.au**								**S-1**	**EP068A**		
	Contact Person:	Ashleigh Pickering											
	Cc invoice:	martine@envirowest.net.au											
	Laboratory:	Australian Laboratory Services 277 Woodpark Road SMITHFIELD NSW 2164		Water	Soil	Sludge	Cool	HNO3/HCl	Unpre-served	As, Cd, Cr, Cu, Ni, Pb, Zn,	OCP		
	Quotation #:	**SY-542-14**											
	Courier/CN:												
	Sample ID	**Container***	**Sampling Date/Time**										
37	HR37	A	23/04/2015		X		X		X	X	X		
38	HR38	A	23/04/2015		X		X		X	X	X		
39	HR39	A	23/04/2015		X		X		X	X	X		
40	HR40	A	23/04/2015		X		X		X	X	X		
41	HR41	A	23/04/2015		X		X		X	X	X		
42	HR42	A	23/04/2015		X		X		X	X	X		
43	HR43	A	23/04/2015		X		X		X	X	X		
44	HR44	A	23/04/2015		X		X		X	X	X		
45	HR45	A	23/04/2015		X		X		X	X	X		
46	HR46	A	23/04/2015		X		X		X	X	X		
47	HR47	A	23/04/2015		X		X		X	X	X		
48	HR48	A	23/04/2015		X		X		X	X	X		
	Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.						Sampler name: Leah Desborough Date : 23/04/2015			Time:			
	Relinquished by: (print and signature)	Ashleigh Pickering	Date: 27/04/2015	Time 17:00			Received by: (print and signature)			Date 28/4	Time 08a		

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and orange label, B = 2x40mL vials solvent rinsed Teflon lined septum caps, C 1x500mL glass bottles , solvent rinsed, Teflon lined cap, D= 200mL plastic bottle with nitric acid.

Chain of Custody Form – Ref 5737

Ref:	**5737**		**Sample matrix**			**Sample preservation**			**Analysis**				
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800												
Telephone:	(02) 6361 4954								**ALS Method Code**				
Facsimile:	(02) 6360 3960								**S-1**	**EP068A**			
Email:	**ashleigh@envirowest.net.au**												
Contact Person:	Ashleigh Pickering												
Cc invoice:	martine@envirowest.net.au												
Laboratory:	Australian Laboratory Services 277 Woodpark Road SMITHFIELD NSW 2164		Water	Soil	Sludge	Cool	HNO3/HCl	Unpre-served	As, Cd, Cr, Cu, Ni, Pb, Zn,	OCP			
Quotation #:	**SY-542-14**												
Courier/CN:													
	Sample ID	**Container***	**Sampling Date/Time**										
49	HR49	A	23/04/2015		X		X		X	X	X		
50	HR50	A	23/04/2015		X		X		X	X	X		
51	HR51	A	23/04/2015		X		X		X	X	X		
52	HR52	A	23/04/2015		X		X		X	X	X		
53	HR53	A	23/04/2015		X		X		X	X	X		
54	HR54	A	23/04/2015		X		X		X	X	X		
55	HR55	A	23/04/2015		X		X		X	X	X		
56	HR56	A	23/04/2015		X		X		X	X	X		
57	HR57	A	23/04/2015		X		X		X	X	X		
58	HR58	A	23/04/2015		X		X		X	X	X		
59	HR59	A	23/04/2015		X		X		X	X	X		
60	HR60	A	23/04/2015		X		X		X	X	X		
	Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.					Sampler name: Leah Desborough Date : 23/04/2015 Time:							
	Relinquished by: (print and signature) Ashleigh Pickering		Date: 27/04/2015	Time 17:00		Received by: (print and signature) Daniel			Date 28/4	Time 08:00			

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and orange label, B = 2x40mL vials solvent rinsed Teflon lined septum caps, C 1x500mL glass bottles , solvent rinsed, Teflon lined cap, D= 200mL plastic bottle with nitric acid.

Chain of Custody Form – Ref 5737

Ref:	**5737**		**Sample matrix**			**Sample preservation**			**Analysis**				
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800												
Telephone:	(02) 6361 4954												
Facsimile:	(02) 6360 3960												
Email:	**ashleigh@envirowest.net.au**												
Contact Person:	Ashleigh Pickering												
Cc invoice:	martine@envirowest.net.au												
									ALS Method Code				
									S-1	**EP068A**	**S-4**		
Laboratory:	Australian Laboratory Services 277 Woodpark Road SMITHFIELD NSW 2164		Water	Soil	Sludge	Cool	HNO3/HCl	Unpre-served	As, Cd, Cr, Cu, Ni, Pb, Zn,	OCP	TRH (C6-C40), BTEXN		
Quotation #:	**SY-542-14**												
Courier/CN:													
	Sample ID	**Container***	**Sampling Date/Time**										
61	HR61	A	23/04/2015		X		X		X	X	X		
62	HR62	A	23/04/2015		X		X		X	X	X		
63	HR63	A	23/04/2015		X		X		X	X	X		
64	HR64	A	23/04/2015		X		X		X	X	X		
65	HR65	A	23/04/2015		X		X		X	X	X		
66	HR66	A	23/04/2015		X		X		X	X	X		
67	HR67	A	23/04/2015		X		X		X	X	X		
SNR. 68	HR68 (*)	A	23/04/2015		X		X		X	X	X		
69	HR69	A	23/04/2015		X		X		X	X	X		
70	HR70	A	23/04/2015		X		X		X	X	X		
71	HRD1	A	23/04/2015		X		X		X	X	X	X	
72	HRD2	A	23/04/2015		X		X		X	X	X	X	
Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.						Sampler name: Leah Desborough Date : 23/04/2015 Time:							
Relinquished by: (print and signature)	Ashleigh Pickering	Date: 27/04/2015	Time 17:00			Received by: (print and signature) Dan. J			Date 28/4	Time 08a			

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and orange label, B = 2x40mL vials solvent rinsed Teflon lined septum caps, C 1x500mL glass bottles , solvent rinsed, Teflon lined cap, D= 200mL plastic bottle with nitric acid.

(*) to be sent in by client.

Chain of Custody Form – Ref 5737

Ref:	**5737**		**Sample matrix**			**Sample preservation**			**Analysis**					
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800													
Telephone:	(02) 6361 4954											**ALS Method Code**		
Facsimile:	(02) 6360 3960								**S-1**	**EP068A**	**S-4**	**NT-S**	**NT-2S**	
Email:	**ashleigh@envirowest.net.au**													
Contact Person:	Ashleigh Pickering													
Cc invoice:	martine@envirowest.net.au													
Laboratory:	Australian Laboratory Services 277 Woodpark Road SMITHFIELD NSW 2164		Water	Soil	Sludge	Cool	HNO3/HCl	up preserved CEC	~~Sulphates & chlorides~~	OCP	TRH (C6-C40), BTEXN	ED007 CEC	Sulphates & chlorides	
Quotation #: **Courier/CN:**	**SY-542-14**													
Sample ID	**Container***	**Sampling Date/Time**												
73 HRD3	A	23/04/2015		X		X		X	X	X	X			
SMR — 74 HRD4	A	23/04/2015		X		X		X	X	X	X			
75 HRA	A	23/04/2015		X		X		X	X	X				
76 HRB	A	23/04/2015		X		X		X	X	X				
77 HRC	A	23/04/2015		X		X		X	X	X				
78 HRD	A	23/04/2015		X		X		X	X	X				
79 BH20-100	A	23/04/2015		X		X		X				X	X	
80 BH20-1500	A	23/04/2015		X		X		X				X	X	
81 HR56-100	A	23/04/2015		X		X		X				X	X	
82 HR56-1000	A	23/04/2015		X		X		X				X	X	

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.	Sampler name: Leah Desborough Date : 23/04/2015 Time:
Relinquished by: (print and signature) Ashleigh Pickering Date: 27/04/2015 Time 17:00	Received by: (print and signature) Date 28/4 Time 08:45

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and orange label, B = 2x40mL vials solvent rinsed Teflon lined septum caps, C 1x500mL glass bottles , solvent rinsed, Teflon lined cap, D= 200mL plastic bottle with nitric acid.

QUALITY CONTROL REPORT

Work Order	: **ES1520581**	Page	: 1 of 19
Amendment	: **1**		
Client	: **ENVIROWEST CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MS ASHLEIGH PICKERING	Contact	:
Address	: 9 CAMER) N PLACE P) *)+ , 15,) RANGE NS-. A/ STRALIA 0,	Address	: 02230,9 - ood4ar5 Road Smit6field NS- Australia 0178
˝ 3mail	: as6leig69 enviro: est.net.au	˝ 3mail	:
Tele46one	: <71 00 7+718958	Tele46one	: <71303,2,8 , 555
Facsimile	: <71 00 7+70397	Facsimile	: <71303,2,8 , 500
Project	: 52+2	QC Level	: NEPM 0013 Sc6edule * (3) and ALS QCS3 requirement
) rder number	: 52+2	Date Sam4les Received	: 0,3$4r300 15
ˇ 3)3C number	: 52+2	Date Analysis Commenced	: 093$4r300 15
Sam4ler	: LEAH DES*)))/ '%	Issue Date	: 013May300 15
Site	: 52+2	No. of sam4les received	: , 1
Quote number	: 3333	No. of sam4les analysed	: , 1

T6is re4ort su4ersedes any 4revious re4ort(s) : it6 t6is reference. Results a44ly to t6e sam4le(s) as submitted.

T6is Quality Control Re4ort contains t6e follo: ing information:

- Laboratory Du4licate (D/ P) Re4ort; Relative Percentage Difference (RPD) and Acce4tance Limits
- Met6od * lan5 (M*) and Laboratory Control S4˚5e (LCS) Re4ort; Recovery and Acce4tance Limits
- Matrix S4˚5e (MS) Re4ort; Recovery and Acce4tance Limits

NATA Accredited Laboratory ,0 5

Accredited for com4liance : it6 &) /IEC 12 05.

Signatories

T6is document 6as been electronically signed by t6e aut6orized signatories indicated belo: . Electronic signing 6as been carried out ˆ˜ com4liance : it6 4rocedures s4ecified in 01 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
$ · 5it Jos6ˆ	Inorganic C6emist	Sydney Inorganics
Pabi Subba	Senior) rganic C6emist	Sydney Inorganics
Pabi Subba	Senior) rganic C6emist	Sydney) rganics
6ob6na C6andra	Metals Coordinator	Sydney Inorganics
- isam Marassa	Inorganics Coordinator	Sydney Inorganics

General Comments

T6e analytical 4rocedures used by t6e Environmental Division 6ave been develo4ed from establis6ed internationally recognized 4rocedures suc6 as t6ose 4ublis6ed by t6e / SEPA. APHA. $S and NEPM. In 6ouse develo4ed 4rocedures are em4loyed in t6e absence of documented standards or by client request.

-6 ere moisture determination 6as been 4erformed. results are re4orted on a dry : eig6t basis.

-6 ere a re4orted less t6an (<) result is 6ig6er t6an t6e L)) . t6is may be due to 4rimary sam4le extract/digestate dilution and/or insufficient sam4le for analysis. -6 ere t6e L) R of a re4orted result differs from standard L)) . t6is may be due to 6ig6

Key : Anonymous = Refers to sam4les :6 ^"6 are not s4ecifically 4art of t6is : or5 order but formed 4art of t6e QC 4rocess lot
CAS Number = CAS registry number from database maintained by C6emical Abstracts Services. T6e C6emical Abstracts Service is a division of t6e American C6emical Society.
L) R = Limit of re4orting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

T6e quality control term Laboratory ˜ 4licate refers to a randomly selected intralaboratory s4lit. Laboratory ! 4licates 4rovide information regarding met6od 4recision and sam4le 6eterogeneity. T6e 4ermitted ranges for t6e Relative Percent Deviation (RPD) of Laboratory ˜ 4licates are s4ecified in ALS Met6od , - 8˜*5+ , and are de4endent on t6e magnitude of results in com4arison to t6e level of re4orting: Result < 10 times L) R: No Limit; Result bet: een 10 and 00 times L) R:30% 350%; Result > 00 times L) R:0% 300%.

Sub3Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 89711)									
ES150 + 223 +	Anonymous	EA0553103: Moisture Content (dried 9 103°C)	3333	1	:	13.0	10.1	, .12	0% 350%
ES15005, 13011	HR11	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	10.0	10.0	0.00	0% 350%
EA055: Moisture Content (QC Lot: 89712)									
ES15005, 13 0	%) 00	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	18.9	18.0	7.30	0% 350%
ES15005, 13031	HR31	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	10.9	11.2	9.25	0% 350%
EA055: Moisture Content (QC Lot: 89713)									
ES15005, 13 8	%) 80	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	10.0	10.0	0.07	0% 350%
ES15005, 13051	HR51	EA0553103: Moisture Content (dried 9 103°C)	3333	1	:	13.9	18.3	0.,2	0% 350%
EA055: Moisture Content (QC Lot: 89714)									
ES15005, 13 7	%) 70	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	10.1	10.3	0.35	0% 350%
ES15005, 13 20	%)˜ 0	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	18.7	18.5	0.207	0% 350%
EA055: Moisture Content (QC Lot: 89715)									
ES15005, 13 ,0	HR5731000	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	2.5	2.3	3.8+	No Limit
ES150 7593009	Anonymous	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	+2.8	+8.,	2 .12	0% 30 :
EA055: Moisture Content (QC Lot: 91895)									
ES150 2193 0	Anonymous	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	00.,	0 0.1	5.29	0% 30 :
ES150 ,873035	Anonymous	EA0553103: Moisture Content (dried 9 103°C)	3333	1	%	, .0	2.2	5.95	No Limit
ED040S: Soluble Major Anions (QC Lot: 92458)									
ES15005, 13 22	HRC	˜˜ 80S: Sulfate as S)8 03	18, ,3293,	10	mg/5g	<10	<10	0.00	0% 30 :
ES150 , 093013	Anonymous	˜˜ 80S: Sulfate as S)8 03	18, ,3293,	10	mg/5g	7	7	0.00	0% 30 :
ED045G: Chloride by Discrete Analyser (QC Lot: 92459)									
ES15005, 13 2+	HRD3	˜˜ 85G: C6loride	17,,23 37	10	mg/5g	0	0	0.00	No Limit
ES150 , 093001	Anonymous	˜˜ 85G: C6loride	17,,23 37	10	mg/5g	110	100	0.00	0% 350%
EG005T: Total Metals by ICP-AES (QC Lot: 89526)									
ES15005, 13001	HR1	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823+	0	mg/5g	50	50	0.00	0% 30 :
		EG005T: Nic5el	288 3 03	0	mg/5g	35	+8	3.8,	0% 350%
		EG005T: Arsenic	288 3+,30	5	mg/5g	75	75	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	00	01	0.00	No Limit
		EG005T: Lead	28393903 1	5	mg/5g	,	9	0.00	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	3,	+2	0.00	No Limit
ES15005, 13011	HR11	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823+	0	mg/5g	32	09	08.5	0% 350%
		EG005T: Nic5el	288 3 03	0	mg/5g	03	1,	0 5.1	0% 350%

Sub3Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 89526) - continued									
ES15005, 13011	HR11	EG005T: Arsenic	288 3+,30	5	mg/5g	75	75	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	1+	11	12.3	No Limit
		EG005T: Lead	28393 9031	5	mg/5g	7	7	0.00	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	05	01	1, .,	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 89527)									
ES15005, 13 01	%) 01	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823-	0	mg/5g	19	17	19.1	No Limit
		EG005T: Nic5el	288 3 03	0	mg/5g	8	8	0.00	No Limit
		EG005T: Arsenic	288 3+,30	5	mg/5g	75	75	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	75	75	0.00	No Limit
		EG005T: Lead	28393 9031	5	mg/5g	75	75	0.00	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	,	,	0.00	No Limit
ES15005, 13031	HR31	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823-	0	mg/5g	00	00	0.00	0% 350%
		EG005T: Nic5el	288 3 03	0	mg/5g	9	9	0.00	No Limit
		EG005T: Arsenic	288 3+,30	5	mg/5g	75	75	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	9	9	0.00	No Limit
		EG005T: Lead	28393 9031	5	mg/5g	7	2	0.00	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	1,	1,	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 90181)									
ES15005, 13 81	%) 81	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823-	0	mg/5g	3+	08	0, .9	0% 350%
		EG005T: Nic5el	288 3 03	0	mg/5g	9	9	0.00	No Limit
		EG005T: Arsenic	288 3+,30	5	mg/5g	75	75	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	,	,	0.00	No Limit
		EG005T: Lead	28393 9031	5	mg/5g	75	75	0.00	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	1,	1,	0.00	No Limit
ES15005, 13051	HR51	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823-	0	mg/5g	37	31	13.9	0% 350%
		EG005T: Nic5el	288 3 03	0	mg/5g	1,	12	2.77	No Limit
		EG005T: Arsenic	288 3+,30	5	mg/5g	75	75	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	18	18	0.00	No Limit
		EG005T: Lead	28393 9031	5	mg/5g	2	7	05.,	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	08	0+	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 90182)									
ES15005, 13 71	%) 71	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823-	0	mg/5g	07	02	8.88	0% 350%
		EG005T: Nic5el	288 3 03	0	mg/5g	1	11	0.00	No Limit
		EG005T: Arsenic	288 3+,30	5	mg/5g	75	75	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	,	,	0.00	No Limit

Sub3Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 90182) - continued									
ES15005, 13 71	%) 71	EG005T: Lead	28393903l	5	mg/5g	7	7	0.00	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	15	15	0.00	No Limit
ES15005, 13 20	%)˜ 0	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823+	0	mg/5g	17	05	88.3	0% 350%
		EG005T: Nic5el	288 3 03	0	mg/5g	1,	0	, ., 9	No Limit
		EG005T: Arsenic	288 3+,30	5	mg/5g	75	75	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	31	+5	10.1	No Limit
		EG005T: Lead	28393903l	5	mg/5g	75	75	0.00	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	95	101	5.7	0% 30 :
EG005T: Total Metals by ICP-AES (QC Lot: 91391)									
ES15005, 13 , +	%) 7,	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823+	0	mg/5g	50	82	11.7	0% 30 :
		EG005T: Nic5el	288 3 03	0	mg/5g	3+	+0	3.25	0% 350%
		EG005T: Arsenic	288 3+,30	5	mg/5g	75	75	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	19	1,	0.00	No Limit
		EG005T: Lead	28393903l	5	mg/5g	,	,	0.00	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	09	0,	0.00	No Limit
ES150 , 573005	Anonymous	EG005T: Cadmium	288 38+39	1	mg/5g	71	71	0.00	No Limit
		EG005T: C6romium	288 3823+	0	mg/5g	00	1,	12.1	0% 350%
		EG005T: Nic5el	288 3 03	0	mg/5g	1	9	0.00	No Limit
		EG005T: Arsenic	288 3+,30	5	mg/5g	2	2	0.00	No Limit
		EG005T: Co44er	288 3503,	5	mg/5g	1,	17	10.1	No Limit
		EG005T: Lead	28393903l	5	mg/5g	3	07	15.8	No Limit
		EG005T: Zinc	288 37737	5	mg/5g	59	5+	10.7	0% 350%
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 102975)									
ES1500118300l	Anonymous	˝ 8, G: Hexavalent C6romium	1, 58 30939	0.5	mg/5g	0.2	0.2	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 89273)									
ES15005, 13001	HR1	EP07, : 8.8>3˝˝	203583,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>3˝˝	2035539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3*%˘	3193,837	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3*%˘	3193,532	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3Endosulfan	++0133753 9	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : cis3˙ 6lordane	510332139	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : delta3*%˘	3193,73,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	<0.05	0.00	No Limit

Sub3Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 89273) - continued									
ES15005, 13001	HR1	EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : gamma3*%ˇ	5,3, 939	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>3DDT	503093+	.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
ES15005, 13011	HR11	EP07, : 8.8>3˝˝	203583,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>3˝˝	2035539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3*%ˇ	3193,837	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3*%ˇ	3193,532	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3Endosulfan	++01337539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : delta3*%ˇ	3193,73,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : gamma3*%ˇ	5,3, 939	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>3DDT	503093+	.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 89274)									
ES15005, 13 01	%) 01	EP07, : 8.8>3˝˝	203583,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>3˝˝	2035539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3*%ˇ	3193,837	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3*%ˇ	3193,532	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3Endosulfan	++01337539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : delta3*%ˇ	3193,73,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	<0.05	0.00	No Limit

Sub3Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 89274) - continued									
ES15005, 13 01	%) 01	EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : gamma3*%ˇ	5,3, 939	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor e4oxide	1008352 3+	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>83DDT	503093+	.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
ES15005, 13031	HR31	EP07, : 8.8>8˝˝	203583,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>8˝˝	2035539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3*%ˇ	3193,837	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3*%ˇ	3193,532	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3Endosulfan	++0133539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : delta3*%ˇ	3193,73,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : gamma3*%ˇ	5,3, 939	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor e4oxide	1008352 3+	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>83DDT	503093+	.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 89275)									
ES15005, 13 81	%) 81	EP07, : 8.8>8˝˝	203583,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>8˝˝	2035539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3*%ˇ	3193,837	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3*%ˇ	3193,532	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3Endosulfan	++0133539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit

Sub3Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 89275) - continued									
ES15005, 13 81	%) 81	EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : delta3*%˘	3193,73,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : gamma3*%˘	5,3, 939	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>8DDT	503093+	.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
ES15005, 13051	HR51	EP07, : 8.8>8˝˝˝	203583,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>8˝˝˝	2035539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3*%˘	3193,837	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3*%˘	3193,532	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3Endosulfan	++01337539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : delta3*%˘	3193,73,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : gamma3*%˘	5,3, 939	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>8DDT	503093+	.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 89276)									
ES15005, 13 21	HRD1	EP07, : 8.8>8˝˝˝	203583,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>8˝˝˝	2035539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3*%˘	3193,837	0.05	mg/5g	<0.05	<0.05	0.00	No Limit

Sub3Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 89276) - continued									
ES15005, 13 21	HRD1	EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3*%˘	3193,532	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3Endosulfan	++01337539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : delta3*%˘	3193,73,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : gamma3*%˘	5,3, 939	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>3DDT	503093+	.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
ES15005, 13 20	%)˘ 0	EP07, : 8.8>3˝˝	203583,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>3˝˝	203539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3*%˘	3193,837	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3*%˘	3193,532	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3Endosulfan	++01337539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : delta3*%˘	3193,73,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : gamma3*%˘	5,3, 939	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>3DDT	503093+	.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 91253)									
ES150 , 523001	Anonymous	EP07, : 8.8>3˝˝	203583,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit

Sub3Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 91253) - continued									
ES150 , 523001	Anonymous	EP07, : 8.8>3˝˝	2035539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3*%˘	3193,837	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3*%˘	3193,532	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : beta3Endosulfan	++01337539	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : delta3*%˘	3193,73,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin alde6yde	28013938	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : gamma3*%˘	5,3, 939	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	<0.05	0.00	No Limit
		EP07, : 8.8>3DDT	503093+	.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 89277)									
ES15005, 13 21	HRD1	EP021: C15 3C0, Fraction	3333	100	mg/5g	<100	<100	0.00	No Limit
		EP021: C09 3C37 Fraction	3333	100	mg/5g	<100	<100	0.00	No Limit
		EP021: C10 3C18 Fraction	3333	50	mg/5g	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 89286)									
ES150 + 223001	Anonymous	EP0, 0: C7 3C9 Fraction	3333	10	mg/5g	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 89277)									
ES15005, 13 21	HRD1	EP021: >C17 3C38 Fraction	3333	100	mg/5g	<100	<100	0.00	No Limit
		EP021: >C38 3C80 Fraction	3333	100	mg/5g	<100	<100	0.00	No Limit
		EP021: >C10 3C17 Fraction	>C10_C17	50	mg/5g	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 89286)									
ES150 + 223001	Anonymous	EP0, 0: C7 3C10 Fraction	˘ 7_C10	10	mg/5g	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 89286)									
ES150 + 223001	Anonymous	EP0, 0: * enzene	2138+30	0.0	mg/5g	<0.0	<0.0	0.00	No Limit
		EP0, 0: Et6ylbenzene	10038138	0.5	mg/5g	<0.5	<0.5	0.00	No Limit
		EP0, 0: meta3R 4ara3+ylene	10,3+,33 1073803+	0.5	mg/5g	<0.5	<0.5	0.00	No Limit
		EP0, 0: ort6o3+ylene	9538237	0.5	mg/5g	<0.5	<0.5	0.00	No Limit
		EP0, 0: Toluene	10,3,,3 +	0.5	mg/5g	<0.5	<0.5	0.00	No Limit
		EP0, 0: Na46t6alene	9130 3+	1	mg/5g	71	71	0.00	No Limit

Sub3Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*

Method Blank (MB) and Laboratory Control Spike (LCS) Report

T6e quality control term Met6od / Laboratory * lan5 refers to an analyte free matrix to :6 ˆ"6 all reagents are added in t6e same volumes or 4ro4ortions as used in standard sam4le 4re4aration. T6e 4ur4ose of t6is QC 4arameter is to monitor 4otential laboratory contamination. T6e quality control term Laboratory Control Sam4le (LCS) refers to a certified reference material. or a 5no: n interference free matrix s4ˆ5ed : it6 target analytes. T6e 4ur4ose of t6is QC 4arameter is to monitor met6od 4recision and accuracy inde4endent of sam4le matrix. Dynamic Recovery Limits are based on statistical evaluation of 4rocessed LCS.

Sub3Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED040S: Soluble Major Anions (QCLot: 92458)								
˜˜ 80S: Sulfate as S)8 03	18, ,3293,	10	mg/5g	<10	150 mg/5g	93.0	,	10
ED045G: Chloride by Discrete Analyser (QCLot: 92459)								
˜˜ 85G: C6loride	17,,23 37	10	mg/5g	<10	50 mg/5g	10,	25	105
				<10	5000 mg/5g	110	29	112
EG005T: Total Metals by ICP-AES (QCLot: 89526)								
EG005T: Arsenic	288 3+,30	5	mg/5g	<5	01.2 mg/5g	101	90	130
EG005T: Cadmium	288 38+39	1	mg/5g	<1	8.78 mg/5g	1 2	,2	101
EG005T: C6romium	288 3823-	0	mg/5g	<0	83.9 mg/5g	108	,	1+7
EG005T: Co44er	288 3503,	5	mg/5g	75	+0 mg/5g	115	93	102
EG005T: Lead	28393903 1	5	mg/5g	75	80 mg/5g	111	,7	108
EG005T: Nic5el	288 3 03	0	mg/5g	<0	55 mg/5g	11,	93	131
EG005T: Zinc	288 37737	5	mg/5g	<5	70., mg/5g	112	, 1	133
EG005T: Total Metals by ICP-AES (QCLot: 89527)								
EG005T: Arsenic	288 3+,30	5	mg/5g	75	01.2 mg/5g	119	90	130
EG005T: Cadmium	288 38+39	1	mg/5g	<1	8.78 mg/5g	1 7	,2	101
EG005T: C6romium	288 3823-	0	mg/5g	<0	83.9 mg/5g	10	,	1+7
EG005T: Co44er	288 3503,	5	mg/5g	75	+0 mg/5g	115	93	102
EG005T: Lead	28393903 1	5	mg/5g	<5	80 mg/5g	117	,7	108
EG005T: Nic5el	288 3 03	0	mg/5g	<0	55 mg/5g	115	93	131
EG005T: Zinc	288 37737	5	mg/5g	75	70., mg/5g	119	, 1	133
EG005T: Total Metals by ICP-AES (QCLot: 90181)								
EG005T: Arsenic	288 3+,30	5	mg/5g	<5	01.2 mg/5g	108	90	130
EG005T: Cadmium	288 38+39	1	mg/5g	<1	8.78 mg/5g	110	,2	101
EG005T: C6romium	288 3823-	0	mg/5g	<0	83.9 mg/5g	109	,	1+7
EG005T: Co44er	288 3503,	5	mg/5g	75	+0 mg/5g	113	93	102
EG005T: Lead	28393903 1	5	mg/5g	75	80 mg/5g	109	,7	108
EG005T: Nic5el	288 3 03	0	mg/5g	<0	55 mg/5g	112	93	131
EG005T: Zinc	288 37737	5	mg/5g	75	70., mg/5g	119	, 1	133
EG005T: Total Metals by ICP-AES (QCLot: 90182)								
EG005T: Arsenic	288 3+,30	5	mg/5g	<5	01.2 mg/5g	112	90	130
EG005T: Cadmium	288 38+39	1	mg/5g	71	8.78 mg/5g	105	,2	101
EG005T: C6romium	288 3823-	0	mg/5g	<0	83.9 mg/5g	105	,	1+7
EG005T: Co44er	288 3503,	5	mg/5g	75	+0 mg/5g	113	93	102
EG005T: Lead	28393903 1	5	mg/5g	<5	80 mg/5g	1 7	,7	108

Sub3Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EG005T: Total Metals by ICP-AES (QCLot: 90182) - continued								
EG005T: Nic5el	288 3 03	0	mg/5g	<0	55 mg/5g	110	93	131
EG005T: Zinc	288 37737	5	mg/5g	<5	70., mg/5g	1 ,	, 1	133
EG005T: Total Metals by ICP-AES (QCLot: 91391)								
EG005T: Arsenic	288 3+,30	5	mg/5g	<5	01.2 mg/5g	9, .3	90	130
EG005T: Cadmium	288 38+39	1	mg/5g	71	8.78 mg/5g	103	,2	101
EG005T: C6romium	288 3823+	0	mg/5g	<0	83.9 mg/5g	99.9	,	1+7
EG005T: Co44er	288 3503,	5	mg/5g	<5	+0 mg/5g	1 7	93	102
EG005T: Lead	28393903 1	5	mg/5g	75	80 mg/5g	100	,7	108
EG005T: Nic5el	288 3 03	0	mg/5g	<0	55 mg/5g	10,	93	131
EG005T: Zinc	288 37737	5	mg/5g	<5	70., mg/5g	1 0	, 1	133
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 102975)								
˜" 8, G: Hexavalent C6romium	1, 58 30939	0.5	mg/5g	<0.5	80 mg/5g	,8 .3	70	100
EP068A: Organochlorine Pesticides (OC) (QCLot: 89273)								
EP07, : 8.8×3˜˜˜	203583,	0.05	mg/5g	<0.05	0.5 mg/5g	97.0	27	10
EP07, : 8.8×3˜˜˜	2035539	0.05	mg/5g	<0.05	0.5 mg/5g	92.1	79	112
EP07, : 8.8×3DDT	503093+	.0	mg/5g	<0.0	0.5 mg/5g	9, .8	72	102
EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	0.5 mg/5g	90.,	7,	11,
EP07, : al46a3*%ˇ	3193,837	0.05	mg/5g	<0.05	0.5 mg/5g	91.1	21	113
EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	0.5 mg/5g	98.3	79	119
EP07, : beta3*%ˇ	3193,532	0.05	mg/5g	<0.05	0.5 mg/5g	90.5	79	119
EP07, : beta3Endosulfan	++0133753 9	0.05	mg/5g	<0.05	0.5 mg/5g	97.,	27	10
EP07, : cis3˙ 6lordane	5103321 39	0.05	mg/5g	<0.05	0.5 mg/5g	90.8	72	101
EP07, : delta3*%ˇ	3193,73,	0.05	mg/5g	<0.05	0.5 mg/5g	, 1.9	75	113
EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	0.5 mg/5g	, 9.3	77	11,
EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	0.5 mg/5g	, 5.0	7	108
EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	0.5 mg/5g	92.1	72	10+
EP07, : Endrin alde6yde	28013 9338	0.05	mg/5g	<0.05	0.5 mg/5g	9, .7	52	115
EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	0.5 mg/5g	93.2	75	10+
EP07, : gamma3*%ˇ	5,3, 939	0.05	mg/5g	<0.05	0.5 mg/5g	, 9.1	21	115
EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	0.5 mg/5g	92.8	7,	117
EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	0.5 mg/5g	90.8	7,	117
EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	0.5 mg/5g	91.2	77	100
EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	0.5 mg/5g	90.3	75	109
EP07, : trans3˙ 6lordane	5103328 30	0.05	mg/5g	<0.05	0.5 mg/5g	90.9	7,	10
EP068A: Organochlorine Pesticides (OC) (QCLot: 89274)								
EP07, : 8.8×3˜˜˜	203583,	0.05	mg/5g	<0.05	0.5 mg/5g	, 5.,	27	10
EP07, : 8.8×3˜˜˜	2035539	0.05	mg/5g	<0.05	0.5 mg/5g	,8 .8	79	112
EP07, : 8.8×3DDT	503093+	.0	mg/5g	<0.0	0.5 mg/5g	95.8	72	102

Sub3Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 89274) - continued								
EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	0.5 mg/5g	93.0	7,	11,
EP07, : al46a3*%˘	3193,837	0.05	mg/5g	<0.05	0.5 mg/5g	95.,	21	113
EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	0.5 mg/5g	, 5.2	79	119
EP07, : beta3*%˘	3193,532	0.05	mg/5g	<0.05	0.5 mg/5g	, 5.3	79	119
EP07, : beta3Endosulfan	++01337539	0.05	mg/5g	<0.05	0.5 mg/5g	, 1.2	27	10
EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	0.5 mg/5g	, 3.5	72	101
EP07, : delta3*%˘	3193,73,	0.05	mg/5g	<0.05	0.5 mg/5g	,2 .1	75	113
EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	0.5 mg/5g	,7 .8	77	11,
EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	0.5 mg/5g	, 3.1	7	108
EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	0.5 mg/5g	90.8	72	10+
EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	0.5 mg/5g	91.8	52	115
EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	0.5 mg/5g	2, .7	75	10+
EP07, : gamma3*%˘	5,3, 939	0.05	mg/5g	<0.05	0.5 mg/5g	95.9	21	115
EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	0.5 mg/5g	,0 .0	7,	117
EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	0.5 mg/5g	, 5.2	7,	117
EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	0.5 mg/5g	98.0	77	100
EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	0.5 mg/5g	7, .8	75	109
EP07, : trans3˝ 6lordane	510332830	0.05	mg/5g	<0.05	0.5 mg/5g	, 3.3	7,	10
EP068A: Organochlorine Pesticides (OC) (QCLot: 89275)								
EP07, : 8.8×3˝˝˝	203583,	0.05	mg/5g	<0.05	0.5 mg/5g	,7 .2	27	10
EP07, : 8.8×3˝˝˝	203553 9	0.05	mg/5g	<0.05	0.5 mg/5g	, 5.5	79	112
EP07, : 8.8×3DDT	503093+	.0	mg/5g	<0.0	0.5 mg/5g	101	72	102
EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	0.5 mg/5g	103	7,	11,
EP07, : al46a3*%˘	3193,837	0.05	mg/5g	<0.05	0.5 mg/5g	95.0	21	113
EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	0.5 mg/5g	, 5.1	79	119
EP07, : beta3*%˘	3193,532	0.05	mg/5g	<0.05	0.5 mg/5g	100	79	119
EP07, : beta3Endosulfan	++01337539	0.05	mg/5g	<0.05	0.5 mg/5g	,0 .,	27	10
EP07, : cis3˝ 6lordane	510332139	0.05	mg/5g	<0.05	0.5 mg/5g	, 3.0	72	101
EP07, : delta3*%˘	3193,73,	0.05	mg/5g	<0.05	0.5 mg/5g	, 0.0	75	113
EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	0.5 mg/5g	, 0.8	77	11,
EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	0.5 mg/5g	101	7	108
EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	0.5 mg/5g	, 3.,	72	10+
EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	0.5 mg/5g	103	52	115
EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	0.5 mg/5g	100	75	10+
EP07, : gamma3*%˘	5,3, 939	0.05	mg/5g	<0.05	0.5 mg/5g	98.8	21	115
EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	0.5 mg/5g	99.8	7,	117
EP07, : He4tac6lor e4oxide	10083523+	0.05	mg/5g	<0.05	0.5 mg/5g	, 5.7	7,	117
EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	0.5 mg/5g	90.2	77	100
EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	0.5 mg/5g	98.7	75	109

Sub3Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP068A: Organochlorine Pesticides (OC) (QCLot: 89275) - continued								
EP07, : trans3˙ 6lordane	510332830	0.05	mg/5g	<0.05	0.5 mg/5g	, 5.0	7,	10
EP068A: Organochlorine Pesticides (OC) (QCLot: 89276)								
EP07, : 8.8×8˜˝	203583,	0.05	mg/5g	<0.05	0.5 mg/5g	95.0	27	10
EP07, : 8.8×8˜˝	2035539	0.05	mg/5g	<0.05	0.5 mg/5g	101	79	112
EP07, : 8.8×8DDT	503093+	.0	mg/5g	<0.0	0.5 mg/5g	92.9	72	102
EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	0.5 mg/5g	100	7,	11,
EP07, : al46a3*%ˇ	3193,837	0.05	mg/5g	<0.05	0.5 mg/5g	91.5	21	113
EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	0.5 mg/5g	101	79	119
EP07, : beta3*%ˇ	3193,532	0.05	mg/5g	<0.05	0.5 mg/5g	97.0	79	119
EP07, : beta3Endosulfan	++0133753 9	0.05	mg/5g	<0.05	0.5 mg/5g	91.,	27	10
EP07, : cis3˙ 6lordane	5103321 39	0.05	mg/5g	<0.05	0.5 mg/5g	92.0	72	101
EP07, : delta3*%ˇ	3193,73,	0.05	mg/5g	<0.05	0.5 mg/5g	92.9	75	113
EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	0.5 mg/5g	95.9	77	11,
EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	0.5 mg/5g	95.1	7	108
EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	0.5 mg/5g	98.9	72	10+
EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	0.5 mg/5g	97.,	52	115
EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	0.5 mg/5g	97.7	75	10+
EP07, : gamma3*%ˇ	5,3, 939	0.05	mg/5g	<0.05	0.5 mg/5g	98.1	21	115
EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	0.5 mg/5g	108	7,	117
EP07, : He4tac6lor e4oxide	1008523+	0.05	mg/5g	<0.05	0.5 mg/5g	95.8	7,	117
EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	0.5 mg/5g	90.1	77	100
EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	0.5 mg/5g	102	75	109
EP07, : trans3˙ 6lordane	510332830	0.05	mg/5g	<0.05	0.5 mg/5g	97.2	7,	10
EP068A: Organochlorine Pesticides (OC) (QCLot: 91253)								
EP07, : 8.8×8˜˝	203583,	0.05	mg/5g	<0.05	0.5 mg/5g	9, .8	27	10
EP07, : 8.8×8˜˝	2035539	0.05	mg/5g	<0.05	0.5 mg/5g	97.1	79	112
EP07, : 8.8×8DDT	503093+	.0	mg/5g	<0.0	0.5 mg/5g	, 7.1	72	102
EP07, : Aldrin	3093 30	0.05	mg/5g	<0.05	0.5 mg/5g	,, .8	7,	11,
EP07, : al46a3*%ˇ	3193,837	0.05	mg/5g	<0.05	0.5 mg/5g	,, .,	21	113
EP07, : al46a3Endosulfan	95939,3,	0.05	mg/5g	<0.05	0.5 mg/5g	93.,	79	119
EP07, : beta3*%ˇ	3193,532	0.05	mg/5g	<0.05	0.5 mg/5g	93.1	79	119
EP07, : beta3Endosulfan	++0133753 9	0.05	mg/5g	<0.05	0.5 mg/5g	92.3	27	10
EP07, : cis3˙ 6lordane	5103321 39	0.05	mg/5g	<0.05	0.5 mg/5g	98.5	72	101
EP07, : delta3*%ˇ	3193,73,	0.05	mg/5g	<0.05	0.5 mg/5g	91.7	75	113
EP07, : Dieldrin	7 35231	0.05	mg/5g	<0.05	0.5 mg/5g	92.0	77	11,
EP07, : Endosulfan sulfate	10313 23,	0.05	mg/5g	<0.05	0.5 mg/5g	,0 .8	7	108
EP07, : Endrin	2030 3,	0.05	mg/5g	<0.05	0.5 mg/5g	101	72	10+
EP07, : Endrin alde6yde	280139338	0.05	mg/5g	<0.05	0.5 mg/5g	,0 .5	52	115
EP07, : Endrin 5etone	5389832 35	0.05	mg/5g	<0.05	0.5 mg/5g	,0 .3	75	10+

Sub3Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP068A: Organochlorine Pesticides (OC) (QCLot: 91253) - continued								
EP07, : gamma3*%ˇ	5,3, 939	0.05	mg/5g	<0.05	0.5 mg/5g	90.1	21	115
EP07, : He4tac6lor	273883,	0.05	mg/5g	<0.05	0.5 mg/5g	27.1	7,	117
EP07, : He4tac6lor e4oxide	1008352 3+	0.05	mg/5g	<0.05	0.5 mg/5g	,, .7	7,	117
EP07, : Hexac6lorobenzene (HC* .	11,32831	0.05	mg/5g	<0.05	0.5 mg/5g	,, .,	77	100
EP07, : Met6oxyc6lor	2038+35	0.0	mg/5g	<0.0	0.5 mg/5g	25.1	75	109
EP07, : trans3ˇ 6lordane	510332830	0.05	mg/5g	<0.05	0.5 mg/5g	93.3	7,	10
EP080/071: Total Petroleum Hydrocarbons (QCLot: 89277)								
EP021: C10 3C18 Fraction	3333	50	mg/5g	<50	000 mg/5g	111	21	131
EP021: C15 3C0, Fraction	3333	100	mg/5g	<100	050 mg/5g	117	28	1+,
EP021: C09 3C37 Fraction	3333	100	mg/5g	<100	000 mg/5g	110	78	10,
EP080/071: Total Petroleum Hydrocarbons (QCLot: 89286)								
EP0, 0: C7 3C9 Fraction	3333	10	mg/5g	<10	07 mg/5g	93.5	7,	10,
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 89277)								
EP021: >C10 3C17 Fraction	>C10_C17	50	mg/5g	<50	050 mg/5g	109	2	130
EP021: >C17 3C38 Fraction	3333	100	mg/5g	<100	350 mg/5g	117	28	1+,
EP021: >C38 3C80 Fraction	3333	100	mg/5g	<100	000 mg/5g	92.5	7+	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 89286)								
EP0, 0: C7 3C10 Fraction	ˇ 7_C10	10	mg/5g	<10	31 mg/5g	93.5	7,	10,
EP080: BTEXN (QCLot: 89286)								
EP0, 0: * enzene	2138+30	0.0	mg/5g	<0.0	1 mg/5g	, 9.0	70	117
EP0, 0: Et6ylbenzene	10038138	0.5	mg/5g	<0.5	1 mg/5g	, 3.0	5,	11,
EP0, 0: meta3R 4ara3+ylene	10,3+,33 1073803-	0.5	mg/5g	<0.5	0 mg/5g	,, .,	7	10
EP0, 0: Na46t6alene	9130 3+	1	mg/5g	71	1 mg/5g	90.,	70	1+,
EP0, 0: ort6o3+ylene	9538237	0.5	mg/5g	<0.5	1 mg/5g	, 9.1	7	10
EP0, 0: Toluene	10,3,,3 +	0.5	mg/5g	<0.5	1 mg/5g	, 5.0	70	10,

Matrix Spike (MS) Report

T6e quality control term Matrix 4ˇ5e -#) refers to an intralaboratory s4lit sam4le s4ˇ5ed : it6 a re4resentative set of target analytes. T6e 4ur4ose of t6is QC 4arameter is to monitor 4otential matrix effects on analyte recoveries. Static Recovery Limits as 4er laboratory Data Quality) bjectives (DQ) s). Ideal recovery ranges stated may be : aived in t6e event of sam4le matrix interference.

Sub3Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
ED045G: Chloride by Discrete Analyser (QCLot: 92459)							
ES15005, 13 2+	HRD3	‘‘‘ 85G: C6loride	17,,23 37	1050 mg/5g	111	2	130
EG005T: Total Metals by ICP-AES (QCLot: 89526)							
ES15005, 13 0	%) 0	EG005T: Arsenic	288 3+,30	50 mg/5g	109	2	130

Sub3Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 89526) - continued							
ES15005, 13 0	%) 0	EG005T: Cadmium	288 38+39	50 mg/5g	110	2	130
		EG005T: C6romium	288 3823-	50 mg/5g	107	2	130
		EG005T: Co44er	288 3503,	050 mg/5g	115	2	130
		EG005T: Lead	283939031	050 mg/5g	10,	2	130
		EG005T: Nic5el	288 3 03	50 mg/5g	109	2	130
		EG005T: Zinc	288 37737	50 mg/5g	109	2	130
EG005T: Total Metals by ICP-AES (QCLot: 89527)							
ES15005, 13 00	%) 00	EG005T: Arsenic	288 3+,30	50 mg/5g	118	2	130
		EG005T: Cadmium	288 38+39	50 mg/5g	111	2	130
		EG005T: C6romium	288 3823-	50 mg/5g	102	2	130
		EG005T: Co44er	288 3503,	050 mg/5g	115	2	130
		EG005T: Lead	283939031	050 mg/5g	110	2	130
		EG005T: Nic5el	288 3 03	50 mg/5g	113	2	130
		EG005T: Zinc	288 37737	50 mg/5g	111	2	130
EG005T: Total Metals by ICP-AES (QCLot: 90181)							
ES15005, 13 80	%) 80	EG005T: Arsenic	288 3+,30	50 mg/5g	11,	2	130
		EG005T: Cadmium	288 38+39	50 mg/5g	113	2	130
		EG005T: C6romium	288 3823-	50 mg/5g	10+	2	130
		EG005T: Co44er	288 3503,	050 mg/5g	115	2	130
		EG005T: Lead	283939031	050 mg/5g	109	2	130
		EG005T: Nic5el	288 3 03	50 mg/5g	10,	2	130
		EG005T: Zinc	288 37737	050 mg/5g	10,	2	130
EG005T: Total Metals by ICP-AES (QCLot: 90182)							
ES15005, 13 70	%) 70	EG005T: Arsenic	288 3+,30	50 mg/5g	10	2	130
		EG005T: Cadmium	288 38+39	50 mg/5g	113	2	130
		EG005T: C6romium	288 3823-	50 mg/5g	111	2	130
		EG005T: Co44er	288 3503,	050 mg/5g	115	2	130
		EG005T: Lead	283939031	050 mg/5g	110	2	130
		EG005T: Nic5el	288 3 03	50 mg/5g	118	2	130
		EG005T: Zinc	288 37737	050 mg/5g	110	2	130
EG005T: Total Metals by ICP-AES (QCLot: 91391)							
ES150 ,873010	Anonymous	EG005T: Arsenic	288 3+,30	50 mg/5g	102	2	130
		EG005T: Cadmium	288 38+39	50 mg/5g	107	2	130
		EG005T: C6romium	288 3823-	50 mg/5g	102	2	130
		EG005T: Co44er	288 3503,	050 mg/5g	107	2	130
		EG005T: Lead	283939031	050 mg/5g	105	2	130
		EG005T: Nic5el	288 3 03	50 mg/5g	102	2	130
		EG005T: Zinc	288 37737	050 mg/5g	103	2	130

Sub3Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 102975)							
ES15001183001	Anonymous	˝ 8, G: Hexavalent C6romium	1, 58 30939	80 mg/5g	90.0	2	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 89273)							
ES15005, 13001	HR1	EP07, : 8.8>3DDT	503093+	0 mg/5g	,7 .8	2	130
		EP07, : Aldrin	3093 30	0.5 mg/5g	90.7	2	130
		EP07, : Dieldrin	7 35231	0.5 mg/5g	,2 .0	2	130
		EP07, : Endrin	2030 3,	0 mg/5g	90.9	2	130
		EP07, : gamma3*%ˇ	5,3, 939	0.5 mg/5g	93.5	2	130
		EP07, : He4tac6lor	273883,	0.5 mg/5g	,7 .1	2	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 89274)							
ES15005, 13 01	%) 01	EP07, : 8.8>3DDT	503093+	0 mg/5g	2, .1	2	130
		EP07, : Aldrin	3093 30	0.5 mg/5g	,0 .3	2	130
		EP07, : Dieldrin	7 35231	0.5 mg/5g	,7 .0	2	130
		EP07, : Endrin	2030 3,	0 mg/5g	9, .3	2	130
		EP07, : gamma3*%ˇ	5,3, 939	0.5 mg/5g	, 3.7	2	130
		EP07, : He4tac6lor	273883,	0.5 mg/5g	,8 .8	2	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 89275)							
ES15005, 13 81	%) 81	EP07, : 8.8>3DDT	503093+	0 mg/5g	,7 .5	2	130
		EP07, : Aldrin	3093 30	0.5 mg/5g	95.0	2	130
		EP07, : Dieldrin	7 35231	0.5 mg/5g	,7 .3	2	130
		EP07, : Endrin	2030 3,	0 mg/5g	90.3	2	130
		EP07, : gamma3*%ˇ	5,3, 939	0.5 mg/5g	, 9.5	2	130
		EP07, : He4tac6lor	273883,	0.5 mg/5g	29.,	2	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 89276)							
ES15005, 13 21	HRD1	EP07, : 8.8>3DDT	503093+	0 mg/5g	, 5.9	2	130
		EP07, : Aldrin	3093 30	0.5 mg/5g	, 5.8	2	130
		EP07, : Dieldrin	7 35231	0.5 mg/5g	2, .5	2	130
		EP07, : Endrin	2030 3,	0 mg/5g	,, .2	2	130
		EP07, : gamma3*%ˇ	5,3, 939	0.5 mg/5g	,8 .5	2	130
		EP07, : He4tac6lor	273883,	0.5 mg/5g	, 0.5	2	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 91253)							
ES150 , 523001	Anonymous	EP07, : 8.8>3DDT	503093+	0 mg/5g	22.8	2	130
		EP07, : Aldrin	3093 30	0.5 mg/5g	, 0.,	2	130
		EP07, : Dieldrin	7 35231	0.5 mg/5g	90.0	2	130
		EP07, : Endrin	2030 3,	0 mg/5g	90.0	2	130
		EP07, : gamma3*%ˇ	5,3, 939	0.5 mg/5g	, 5.2	2	130
		EP07, : He4tac6lor	273883,	0.5 mg/5g	, 0.7	2	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 89277)							

Sub3Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 89277) - continued							
ES15005, 13 21	HRD1	EP021: C10 3C18 Fraction	3333	503 mg/5g	93.7	2+	1+2
		EP021: C15 3C0, Fraction	3333	0319 mg/5g	108	53	131
		EP021: C09 3C37 Fraction	3333	1218 mg/5g	105	50	1+0
EP080/071: Total Petroleum Hydrocarbons (QCLot: 89286)							
ES150 + 223001	Anonymous	EP0, 0: C7 3C9 Fraction	3333	+0.5 mg/5g	93.,	2	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 89277)							
ES15005, 13 21	HRD1	EP021: >C10 3C17 Fraction	>C10_C17	,7 0 mg/5g	90.9	2+	1+2
		EP021: >C17 3C38 Fraction	3333	+003 mg/5g	119	53	131
		EP021: >C38 3C80 Fraction	3333	105, mg/5g	109	50	1+0
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 89286)							
ES150 + 223001	Anonymous	EP0, 0: C7 3C10 Fraction	ˇ 7_C10	+2.5 mg/5g	90.9	2	130
EP080: BTEXN (QCLot: 89286)							
ES150 + 223001	Anonymous	EP0, 0: * enzene	2138+30	0.5 mg/5g	22.5	2	130
		EP0, 0: Et6ylbenzene	10038138	0.5 mg/5g	29.8	2	130
		EP0, 0: meta3R 4ara3+ylene	10,3+,33 1073803-	0.5 mg/5g	,0 .7	2	130
		EP0, 0: Na46t6alene	9130 3+	0.5 mg/5g	, 3.8	2	130
		EP0, 0: ort6o3+ylene	9538237	0.5 mg/5g	,0 .8	2	130
		EP0, 0: Toluene	10,3,,3 +	0.5 mg/5g	,0 .7	2	130

QA/QC Compliance Assessment for DQO Reporting

Work Order	: **ES1520581**	Page	: of 10
Amendment	: **1**		
Client	: **ENVIROWEST CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MS ASHLEIGH PICKERING	Telephone	: +61-2-8784 8555
Project	: 0.2.	Date Samples Received	: 28-Apr-2015
Site	: 0.2.	Issue Date	: 21-May-2015
Sampler	: LEAH DESBOROUGH	No. of samples received	: -
Order number	: 0.2.	No. of samples analysed	: -

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type / Method	Count		Rate 8> 9		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Control Samples (LCS)					
Exchangeable Cations	0	8	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW -/* , APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameter˙6

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
!% C !%,C !%2C !%/C !%0C !%*C !%.C !%-C !%GC HR10, !% C !% ,C !% 2C !% /C !% 0	**22-Apr-2015**	**----**	++++	++++	**30-Apr-2015**	06-May-2015	✓
Soil Glass Jar - Unpreserved (EA055-103)							
!%*-	**23-Apr-2015**	**----**	++++	++++	**04-May-2015**	07-May-2015	✓
Soil Glass Jar - Unpreserved (EA055-103)							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content - Continued								
!% *C	!% .C	**23-Apr-2015**	**----**	++++	++++	**30-Apr-2015**	07-May-2015	✓
!% -C	!% GC							
HR20,	!%, C							
!%,,C	!%,2C							
!%,/C	!%,0C							
!%,*C	!%,.C							
!%,-C	!%,GC							
HR30,	!%2 C							
!%2,C	!%22C							
!%2/C	!%20C							
!%2*C	!%2.C							
!%2-C	!%2GC							
HR40,	!%/ C							
!%/,C	!%/2C							
!%//C	!%/0C							
!%/*C	!%/.C							
!%/-C	!%/GC							
HR50,	!%0 C							
!%0,C	!%02C							
!%0/C	!%00C							
!%0*C	!%0.C							
!%0-C	!%0GC							
HR60,	!%* C							
!%*,C	!%*2C							
!%*/C	!%*0C							
!%**C	!%*.C							
!%*GC	HR70,							
!%^ C	!%^,C							
!%^2C	!% C							
!%3C	HRC,							
!%^C	BH20-100,							
BH20-1500,	HR56-100,							
HR56-1000								
ED007: Exchangeable Cations								
Soil Glass Jar - Unpreserved (ED007)								
BH20-100,	BH20-1500,	**23-Apr-2015**	**04-May-2015**	21-May-2015	✓	**06-May-2015**	21-May-2015	✓
HR56-100,	HR56-1000							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED040S : Soluble Sulfate by ICPAES							
Soil Glass Jar - Unpreserved (ED040S)							
!%^2C !%3C !%^C BH20-1500, HR56-1000	!% C HRC, BH20-100, HR56-100,	**23-Apr-2015**	**05-May-2015**	21-May-2015	✓	**05-May-2015**	02-Jun-2015	✓
ED045G: Chloride by Discrete Analyser							
Soil Glass Jar - Unpreserved (ED045G)							
!%^2C !%3C !%^C BH20-1500, HR56-1000	!% C HRC, BH20-100, HR56-100,	**23-Apr-2015**	**05-May-2015**	21-May-2015	✓	**06-May-2015**	02-Jun-2015	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
!% C	!%,C	**22-Apr-2015**	**30-Apr-2015**	19-Oct-2015	✓	**01-May-2015**	19-Oct-2015	✓
!%2C	!%/C							
!%0C	!%*C							
!%.C	!%-C							
!%GC	HR10,							
!% C	!% ,C							
!% 2C	!% /C							
!% 0								
Soil Glass Jar - Unpreserved (EG005T)							
!%/ C	!%/,C	**23-Apr-2015**	**01-May-2015**	20-Oct-2015	✓	**01-May-2015**	20-Oct-2015	✓
!%/2C	!%//C							
!%/0C	!%/*C							
!%/.C	!%/-C							
!%/GC	HR50,							
!%0 C	!%0,C							
!%02C	!%0/C							
!%00C	!%0*C							
!%0.C	!%0-C							
!%0GC	HR60,							
!%* C	!%*,C							
!%*2C	!%*/C							
!%*0C	!%**C							
!%*.C	!%*GC							
HR70,	!%^ C							
!%^,C	!%^2C							
!% C	!%3C							
HRC,	!%^							
Soil Glass Jar - Unpreserved (EG005T)							
!%*-		**23-Apr-2015**	**04-May-2015**	20-Oct-2015	✓	**04-May-2015**	20-Oct-2015	✓
Soil Glass Jar - Unpreserved (EG005T)							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES - Continued								
!% *C	!% .C	**23-Apr-2015**	**30-Apr-2015**	20-Oct-2015	✓	**01-May-2015**	20-Oct-2015	✓
!% -C	!% GC							
HR20,	!%, C							
!%,,C	!%,2C							
!%,/C	!%,0C							
!%,*C	!%,.C							
!%,-C	!%,GC							
HR30,	!%2 C							
!%2,C	!%22C							
!%2/C	!%20C							
!%2*C	!%2.C							
!%2-C	!%2GC							
HR40								
EG048: Hexavalent Chromium (Alkaline Digest)								
Soil Glass Jar - Unpreserved (EG048G)								
!%*C	!% /	**22-Apr-2015**	**19-May-2015**	20-May-2015	✓	**19-May-2015**	26-May-2015	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
!% C	!%,C	**22-Apr-2015**	**29-Apr-2015**	06-May-2015	✓	**30-Apr-2015**	08-Jun-2015	✓
!%2C	!%/C							
!%0C	!%*C							
!%.C	!%-C							
!%GC	HR10,							
!% C	!% ,C							
!% 2C	!% /C							
!% 0								
Soil Glass Jar - Unpreserved (EP068)								
!%*-		**23-Apr-2015**	**04-May-2015**	07-May-2015	✓	**05-May-2015**	13-Jun-2015	✓
Soil Glass Jar - Unpreserved (EP068)								
!%/ C	!%/,C	**23-Apr-2015**	**29-Apr-2015**	07-May-2015	✓	**01-May-2015**	08-Jun-2015	✓
!%/2C	!%//C							
!%/0C	!%/*C							
!%/.C	!%/-C							
!%/GC	HR50,							
!%0 C	!%0,C							
!%02C	!%0/C							
!%00C	!%0*C							
!%0.C	!%0-C							
!%0GC	HR60,							
!%* C	!%*,C							
!%*2C	!%*/C							
!%*0C	!%**C							
!%*.C	!%*GC							
HR70,	!%^ C							
!%^,C	!%^2C							
!% C	!%3C							
HRC,	!%^							
Soil Glass Jar - Unpreserved (EP068)								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC) - Continued								
!% *C	!% .C	**23-Apr-2015**	**29-Apr-2015**	07-May-2015	✓	**30-Apr-2015**	08-Jun-2015	✓
!% -C	!% GC							
HR20,	!%, C							
!%,,C	!%,2C							
!%,/C	!%,0C							
!%,*C	!%,.C							
!%,-C	!%,GC							
HR30,	!%2 C							
!%2,C	!%22C							
!%2/C	!%20C							
!%2*C	!%2.C							
!%2-C	!%2GC							
HR40								
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071)								
!%^ C	!%^,C	**23-Apr-2015**	**29-Apr-2015**	07-May-2015	✓	**30-Apr-2015**	08-Jun-2015	✓
!%^2								
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
!%^ C	!%^,C	**23-Apr-2015**	**29-Apr-2015**	07-May-2015	✓	**30-Apr-2015**	07-May-2015	✓
!%^2								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control fre?uency not within s' ecification E✓ = Quality Control fre?uency within s' ecification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chloride Soluble By Discrete Analyser	ED045G	,	, 0	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations	ED007		-	**12.50**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G		-	**12.50**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	,	, 0	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	,	, 0	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	,	, 0	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	,	, 0	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071		2	**33.33**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080		-	**12.50**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Chloride Soluble By Discrete Analyser	ED045G	,	, 0	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations	ED007	0	8	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G		-	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071		2	**33.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080		-	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride Soluble By Discrete Analyser	ED045G		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations	ED007		-	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G		-	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071		2	**33.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080		-	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride Soluble By Discrete Analyser	ED045G		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G		-	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T		, 0	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071		2	**33.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080		-	**12.50**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	In-house. A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Major Anions - Soluble	ED040S	SOIL	In-house. Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Chloride Soluble By Discrete Analyser	ED045G	SOIL	In house: Referenced to APHA 21st edition 4500-Cl- E. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm. Analysis is performed on a 1:5 soil / water leachate.
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060A. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Trivalent Chromium by Alkaline Digestion and DA Finish	EG049G-Alk	SOIL	In house: Referenced to APHA 3500 Cr-A&B & 3120 and USEPA USEPA SW846, Method 3060A. The difference between Total and Hexavalent Chromium. The total Chromium is determined by ICPAES and the Hexavalent chromium is extracted by alkaline digestion and the digest is determined by photometrically by automatic discrete analyser. The instrument uses colour development using dephenylcarbazide. This method is compliant with NEPM (2013) Schedule B(3)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40.
TRH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve.

Preparation Methods	Method	Matrix	Method Descriptions
Methanolic Extraction of Soils for Purge and Trap	K4%# *	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	4%# .	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

PHOTOGRAPH OF LOT 399 DP 199356 BOUNDARY ROAD, DUBBO NSW.

ABORIGINAL ARCHAEOLOGICAL ASSESSMENT

SUBDIVISION OF LOT 399 DP 1199356 AND LOT 503 DP 1152321 BOUNDARY ROAD, DUBBO NSW

DUBBO LOCAL GOVERNMENT AREA

JUNE 2015

REPORT PREPARED BY

OZARK ENVIRONMENTAL & HERITAGE MANAGEMENT PTY LTD

FOR GEOLYSE PTY LTD

ON BEHALF OF MAAS GROUP PROPERTIES PTY LTD

Environmental and Heritage Management P/L

OzArk EHM
145 Wingewarra St
(PO Box 2069)
Dubbo NSW 2830

Phone: (02) 6882 0118
Fax: (02) 6882 0630
jodie@ozarkehm.com.au
phil@ozarkehm.com.au
www.ozarkehm.com.au

This page has intentionally been left blank.

DOCUMENT CONTROLS

Proponent	MAAS Group Properties Pty Ltd		
Client	Geolyse Pty Ltd		
Project No / Purchase Order No			
Document Description	Aboriginal Archaeological Assessment: *Subdivision of Lot 399 DP 1199356 and Lot 503 DP 1152321, Boundary Road, Dubbo NSW*.		
	Name	Signed	Date
Clients Reviewing Officer			
Clients Representative Managing this Document		OzArk Person(s) Managing this Document	
Steven Guy		Phil Cameron	
Location		OzArk Job No.	
OzArk EHM Data\Clients\Geolyse (Terra) Consulting - Dubbo\Boundary Rd Lot399DP1199356_Dubbo_Nov2014\AbH_Resources\Report		#1183	
Document Status **V3.0**		Date	
Draft V1.1 Author to Editor OzArk 1st Internal (Series V1._ = OzArk internal edits)		V1.0 CL to JB 29.4.15 V1.1 JB to CL 8.5.15	
Draft V2.0 Report Draft for release to client (Series V2._ = OzArk and Client edits)		V2.0 CL to Geolyse 9.5.15	
FINAL V3._once latest version of draft approved by client		V3.0 to Geolyse 4.6.15	
Prepared For		Prepared By	
Steven Guy Senior Town Planner Geolyse Pty Ltd 1st Floor, 62 Wingewarra Street Dubbo NSW 2830 E: sguy@geolyse.com		Chris Lovell Senior Archaeologist OzArk Environmental & Heritage Management Pty. Limited 145 Wingewarra Street (PO Box 2069) Dubbo NSW 2830 P: 02 6882 0118 F: 02 6882 6030 E: chris@ozarkehm.com.au	

Acknowledgement

OzArk acknowledge Traditional Owners of the area on which this assessment took place and pay respect to their beliefs, cultural heritage and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

EXECUTIVE SUMMARY

OzArk Environmental & Heritage Management (OzArk) was commissioned by Geolyse (the Client) on behalf of MAAS Group Properties (MAAS) (the Proponent) to complete an Aboriginal Heritage Assessment of Lot 399 in DP 1199356 and Lot 503 DP 1152321, Boundary Road, Dubbo NSW, to support a Development Application for the residential subdivision of this land. The Study Area encompasses approximately 140 hectares of semi-rural land comprising Lot 399 DP 1199356 and Lot 503 DP 1152321. The subdivision intends to subdivide the lot into a low-density housing development named "Keswick Estate - Hill View".

On Thursday 16th April 2015 OzArk Senior Archaeologist, Chris Lovell, conducted pedestrian and vehicular surveys across the Study Area. High amounts of vegetation prevented ground surface visibility (GSV) across the majority of the Study Area. All areas of exposure were checked for archaeological material and no new sites were recorded within the Study Area. Previously recorded site K-OS-4 (#36-1-0189) was unable to be relocated.

Recommendations concerning the Study Area are as follows:

1. No further archaeological investigation is warranted at site K-OS-4;
2. Avoid impacts to site K-OS-4 and provide a clearly demarcated 15m buffer around the site boundaries identified in **Figure 1.4** (relative to coordinates GDA94 Zone 55 653903, 6427014) to avoid inadvertent impacts during the completion of any works;
3. Long-term management of site K-OS-4 should entail its protection and preservation;
4. Should impacts to K-OS-4 be unavoidable, the area encompassing the location of the site should be cleared of vegetation to allow for better ground surface visibility followed by a targeted pedestrian survey by someone with expertise in locating and identifying Aboriginal objects;
5. It is recommended that Aboriginal community consultation and fieldwork participation occur during the attempted relocation of K-OS-4;
6. If K-OS-4 is relocated, an Aboriginal Heritage Impact Permit (AHIP) must be sought from the OEH and Aboriginal community consultation must be undertaken. Archaeological recommendations for the AHIP application would be:
    a. Under supervision of an archaeologist or trained cultural heritage monitors from the Aboriginal community, site K-OS-4 should be salvaged through surface collection of artefacts;
    b. No program of sub-surface salvage is recommended for K-OS-4 as OzArk have assessed the site as possessing low potential for associated potential archaeological deposits;
7. Upon completion of salvage works, artefacts may be moved to a place of safekeeping agreed upon by Aboriginal stakeholders, or should it be elected that the artefacts be

reburied on site in an area not to be impacted, or subsequent to the completion of proposed works, the coordinates of the re-located artefacts should be recorded on AHIMS;

8. All land-disturbing activities must be confined to within the assessed Study Area.
9. Work crews involved in the initial and all subsequent ground breaking construction should be made aware of the legislative protection requirements for all Aboriginal sites and objects.
10. In the unlikely event that objects are encountered that are suspected to be of Aboriginal origin (including skeletal material), the Unanticipated Finds Protocol (**Appendix 2**) should be followed.

CONTENTS

FIGURES

TABLES

PLATES

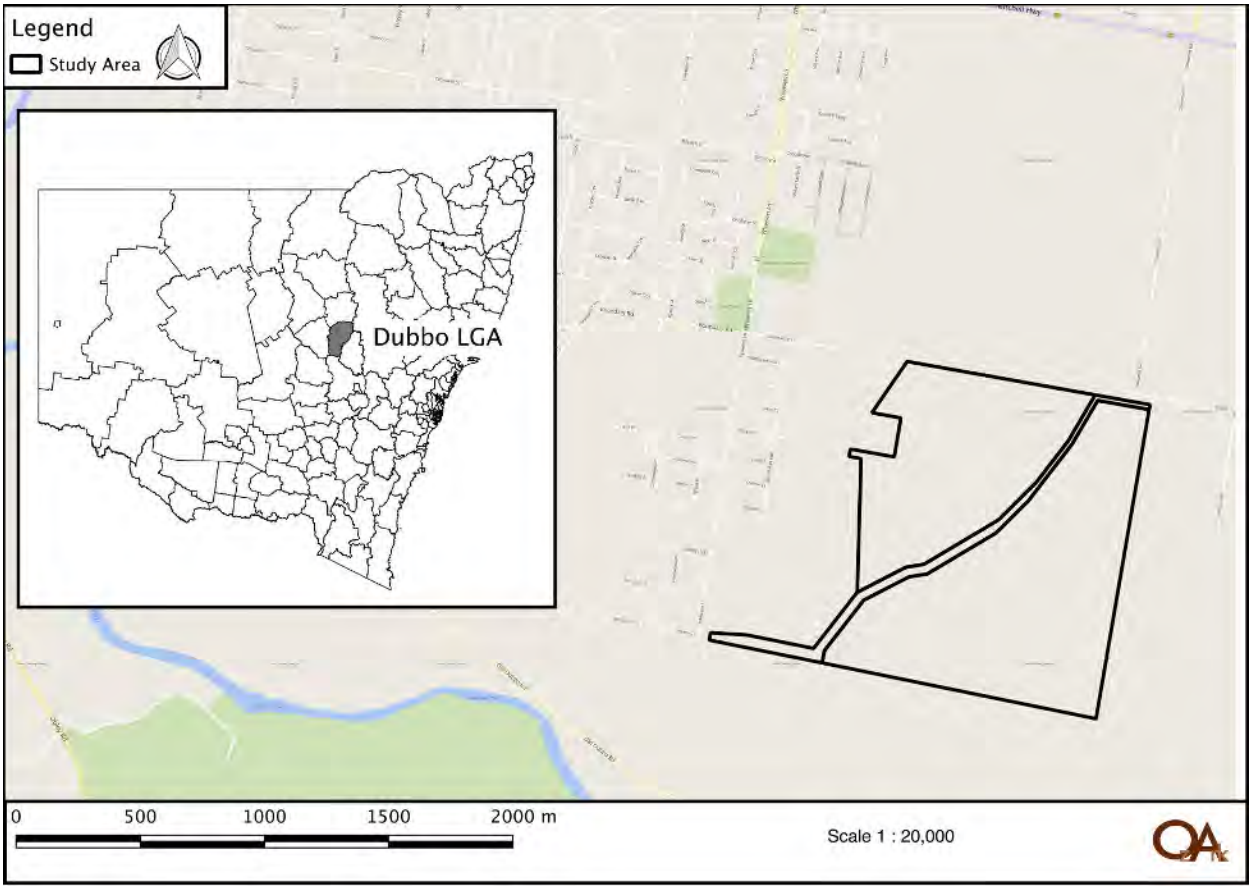
APPENDICES

1 INTRODUCTION

1.1 BRIEF DESCRIPTION OF THE PROPOSAL

OzArk Environmental and Heritage Management (OzArk) have been engaged by Geolyse (the Client), on behalf of MAAS Property Group (the Proponent) to complete an Aboriginal archaeological assessment at the site of a proposed subdivision of approximately 140 hectares of semi-rural land (Lot 399 DP 1199356 and Lot 503 DP 1152321) located on Boundary Road, Dubbo) within the Dubbo Local Government Area (LGA) into a low-density housing development (see **Figure 1.1**).

Figure 1.1: Location map and Study Area.



1.2 STUDY AREA

The Study Area includes an area of ca. 140 hectares encompassing Lot 399 of DP 1199356 and Lot 503 DP 1152321, Boundary Road, Dubbo NSW (**Figure 1.2** and **Figure 1.3).** The Study Area is situated on the south eastern outskirts of Dubbo township adjacent to Boundary Road and Hennessy Drive. The northern, eastern and southern boundaries adjoin low intensity agricultural properties and the western boundary is adjacent to a large construction site encompassing a new residential housing development. A drainage easement runs from the southwest to northeast corner of the Study Area following an ephemeral secondary drainage line. This area is omitted from the current assessment.

Figure 1.2: Aerial view of the Study Area in relation to Dubbo township

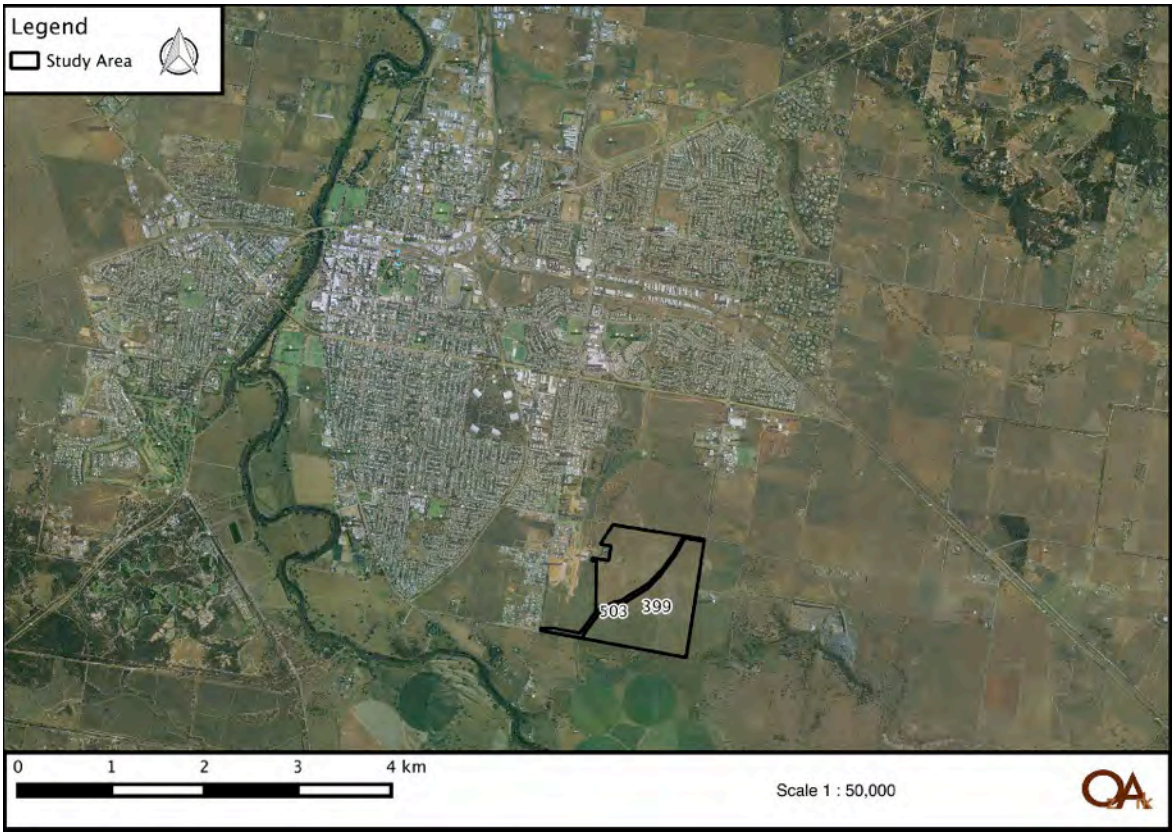
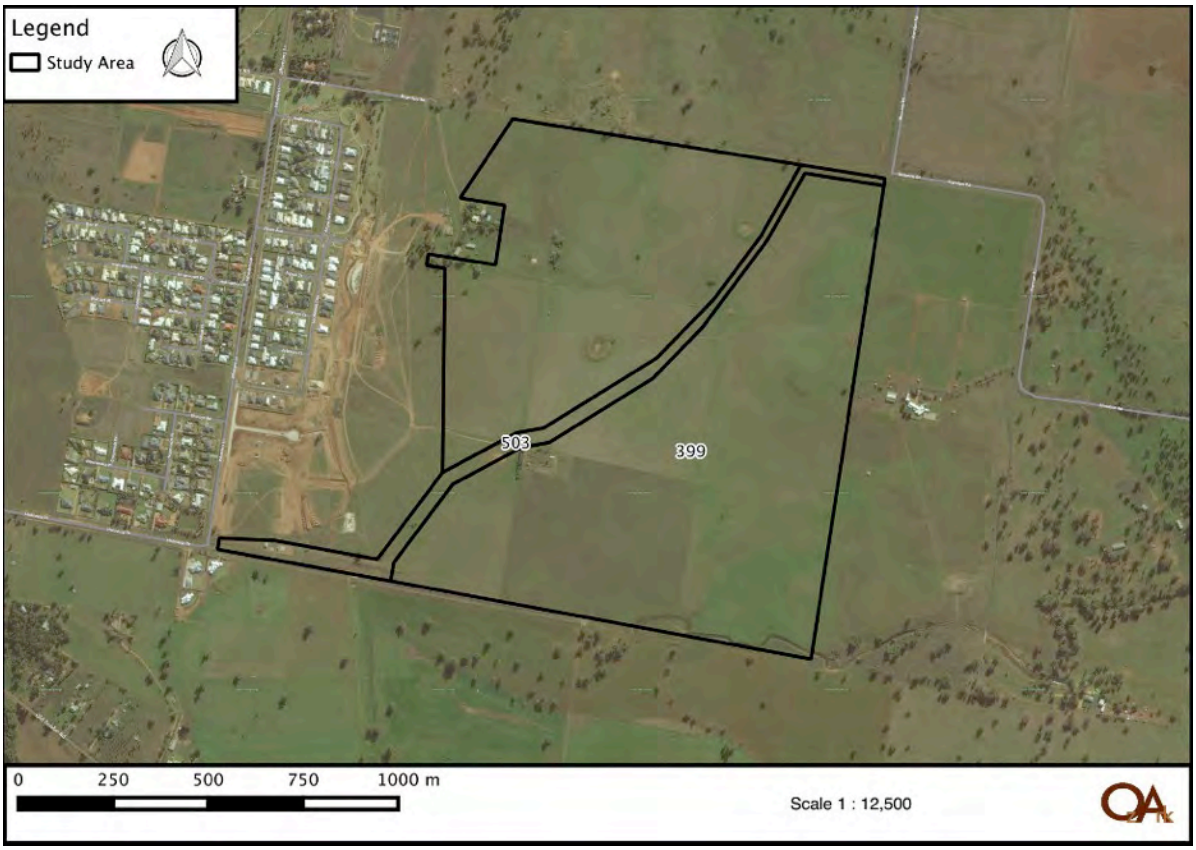


Figure 1.3: Aerial view of the Study Area



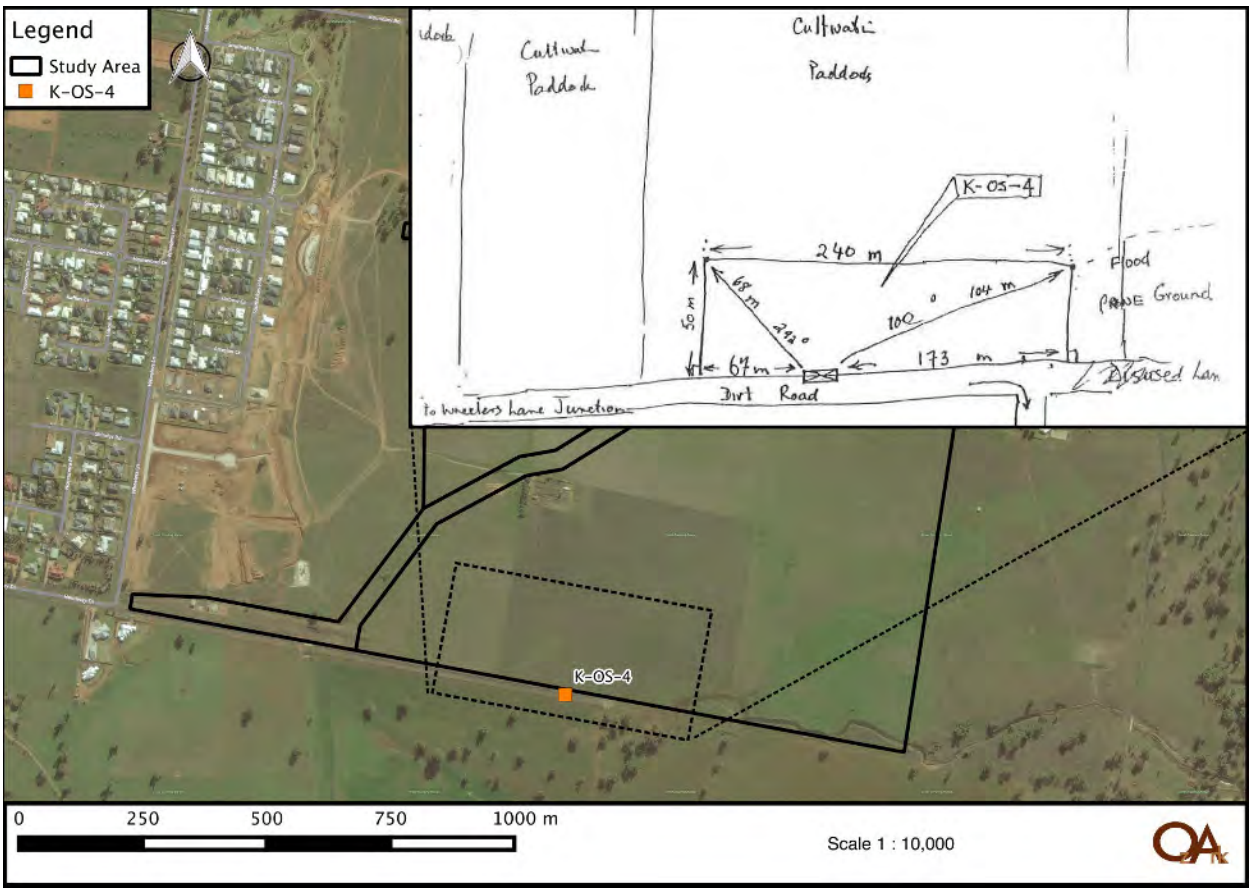
1.3 PROPOSED WORKS

The Proponent is preparing a Development Application for the residential subdivision of Lot 399 in DP 1199356, Boundary Road, Dubbo NSW. The Proponent seeks to subdivide 140 hectares of semi-rural land into a low-density housing development named “Keswick Estate - Hill View”. For the purpose of this report, the proposed subdivision will be assessed as causing total destruction to the environment within the Study Area.

1.4 BACKGROUND

Archaeological field surveys of Lot 399 DP 1199356 and Lot 503 DP 1152321 were conducted by Jim Kelton and Matthew Delaney of West Central Archaeological Services between the 17th and 19th July 1995 for the then proposed “Keswick housing subdivision” (Kelton 1995:1). One Aboriginal site was identified and recorded within the current Study Area: open artefact scatter site K-OS-4 (#36-1-0189), described as a 240m x 50m (i.e. 12,000m^2) scatter of between 50 and 100 stone artefacts within a heavily disturbed cultivation paddock (Kelton 1995:40-42) – see **Figure 1.4**. Site integrity was considered to be extremely low due to high levels of past disturbance concomitant with intensive agricultural activities since the late nineteenth century. Seven artefacts were recorded including bifacially knapped basalt axe blank, three ‘multipurpose hammerstones’ and quartzite and chert flakes or flaked pieces. The site was accorded low scientific and educational significance due to the high level of disturbance and scarcity of surface material. Kelton (1995:50) recommended that impacts to site K-OS-4 be avoided, if possible, and that a 15m buffer zone be established around the identified site boundary – see **Figure 1.4**.

Figure 1.4: Location of K-OS-4 and Kelton's (1995) original location sketch showing site dimensions, relative to coordinates: GDA94 Zone 55 653903, 6427014.



1.5 RELEVANT LEGISLATION

Cultural heritage is managed by a number of state and national acts. Baseline principles for the conservation of heritage places and relics can be found in the *Burra Charter* (Australia ICOMOS 2013). The *Burra Charter* has become the standard of best practice in the conservation of heritage places in Australia, and heritage organisations and local government authorities have incorporated the inherent principles and logic into guidelines and other conservation planning documents. The *Burra Charter* generally advocates a cautious approach to changing places of heritage significance. This conservative notion embodies the basic premise behind legislation designed to protect our heritage, which operates primarily at a state level.

A number of Acts of parliament provide for the protection of heritage at various levels of government.

1.5.1 State Legislation

Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act establishes requirements relating to land use and planning. The framework governing environmental and heritage assessment in NSW is contained within the following parts of the Act:

- **Part 4:** Local government development assessments, including heritage. May include schedules of heritage items;
- **Part 4.1:** Approvals process for state significant development;
- **Part 5:** Environmental impact assessment on any heritage items which may be impacted by activities undertaken by a state government authority or a local government acting as a self-determining authority; and
- **Part 5.1:** Approvals process for state significant infrastructure.

National Parks and Wildlife Act 1974 (NPW Act)

Amended during 2010, the NPW Act provides for the protection of Aboriginal objects (sites, objects and cultural material) and Aboriginal places. Under the Act (S.5), an Aboriginal object is defined as: any deposit, object or material evidence (not being a handicraft for sale) relating to indigenous and non-European habitation of the area that comprises NSW, being habitation both prior to and concurrent with the occupation of that area by persons of European extraction, and includes Aboriginal remains.

An Aboriginal place is defined under the NPW Act as an area that has been declared by the Minister administering the Act as a place of special significance for Aboriginal culture. It may or may not contain physical Aboriginal objects.

As of 1 October 2010, it is an offence under Section 86 of the NPW Act to 'harm or desecrate an object the person knows is an Aboriginal object'. It is also a strict liability offence to 'harm an Aboriginal object' or to 'harm or desecrate an Aboriginal place', whether knowingly or unknowingly. Section 87 of the Act provides a series of defences against the offences listed in Section 86, viz.:

- The harm was authorised by and conducted in accordance with the requirements of an Aboriginal Heritage Impact Permit (AHIP) under Section 90 of the Act;
- The defendant exercised 'due diligence' to determine whether the action would harm an Aboriginal object; or
- The harm to the Aboriginal object occurred during the undertaking of a 'low impact activity' (as defined in the regulations).

Under Section 89A of the Act, it is a requirement to notify the OEH Director-General of the location of an Aboriginal object. Identified Aboriginal items and sites are registered on AHIMS.

1.5.2 Commonwealth Legislation

Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Amendments in 2003 established the National Heritage List and the Commonwealth Heritage List, both administered by the Commonwealth Department of the Environment. Ministerial approval is required under the EPBC Act for proposals involving significant impacts to National/Commonwealth heritage places.

1.5.3 Applicability to the Project

The current project will be assessed under Part 4 of the EP&A Act. Any Aboriginal sites within the Study Area are afforded legislative protection under the NPW Act. There are no Commonwealth or National heritage listed places within the Study Area, and as such, the EPBC Act does not apply.

1.6 ASSESSMENT APPROACH

The current assessment will blend use of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010b) and the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a).

The current assessment will apply *Due Diligence* (DECCW 2010b) to those portions of the Study Area to which it is determined appropriate based on levels of prior disturbance, and ensure that those areas which require further investigation as per the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a) are examined as such.

2 THE ARCHAEOLOGICAL ASSESSMENT

2.1 PURPOSE AND OBJECTIVES

The purpose of the current study is to identify and assess heritage constraints relevant to the proposed works.

2.1.1 Aboriginal Archaeological Assessment Objectives

The current assessment will apply the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010b) and/or the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a), in the completion of an Aboriginal archaeological assessment, in order to meet the following objectives:

Objective One: Relocate previously recorded site K-OS-4 (#36-1-0189) in order to assess and record its current status and distribution;

Objective Two: Identify and record Aboriginal objects, sites and sensitive landforms within the Study Area;

Objective Three: Assess the likely impacts of the proposed works to any recorded sites and provide management recommendations.

2.2 DATE OF ARCHAEOLOGICAL ASSESSMENT

The fieldwork component of this assessment was undertaken by OzArk on Thursday 16th April 2015.

2.3 ABORIGINAL COMMUNITY INVOLVEMENT

At the request of the Proponent, Aboriginal community consultation was not undertaken as part of this study.

2.4 OZARK INVOLVEMENT

2.4.1 Field Assessment

The fieldwork component of the current project was undertaken by:

- Fieldwork Director: Phil Cameron (BSc, Ass Dip App Sci, MECANSW, Macquarie University); and
- Archaeologist: Chris Lovell (PhD, BA [Hons], BSc, University of Queensland).

2.4.2 Reporting

The reporting component of the current project was undertaken by:

- Report Author: Dr Chris Lovell (PhD, BA [Hons], BSc, University of Queensland); and
- Reviewer: Dr Jodie Benton (PhD, BA [Hons], BSc, University of Sydney);

3 LANDSCAPE CONTEXT

An understanding of the environmental contexts of a Study Area is requisite in any Aboriginal archaeological investigation (DECCW 2010a). It is a particularly important consideration in the development and implementation of survey strategies for the detection of archaeological sites. In addition, natural geomorphic processes of erosion and/or deposition, as well as humanly activated landscape processes, influence the degree to which these material culture remains are retained in the landscape as archaeological sites; and the degree to which they are preserved, revealed and/or conserved in present environmental settings.

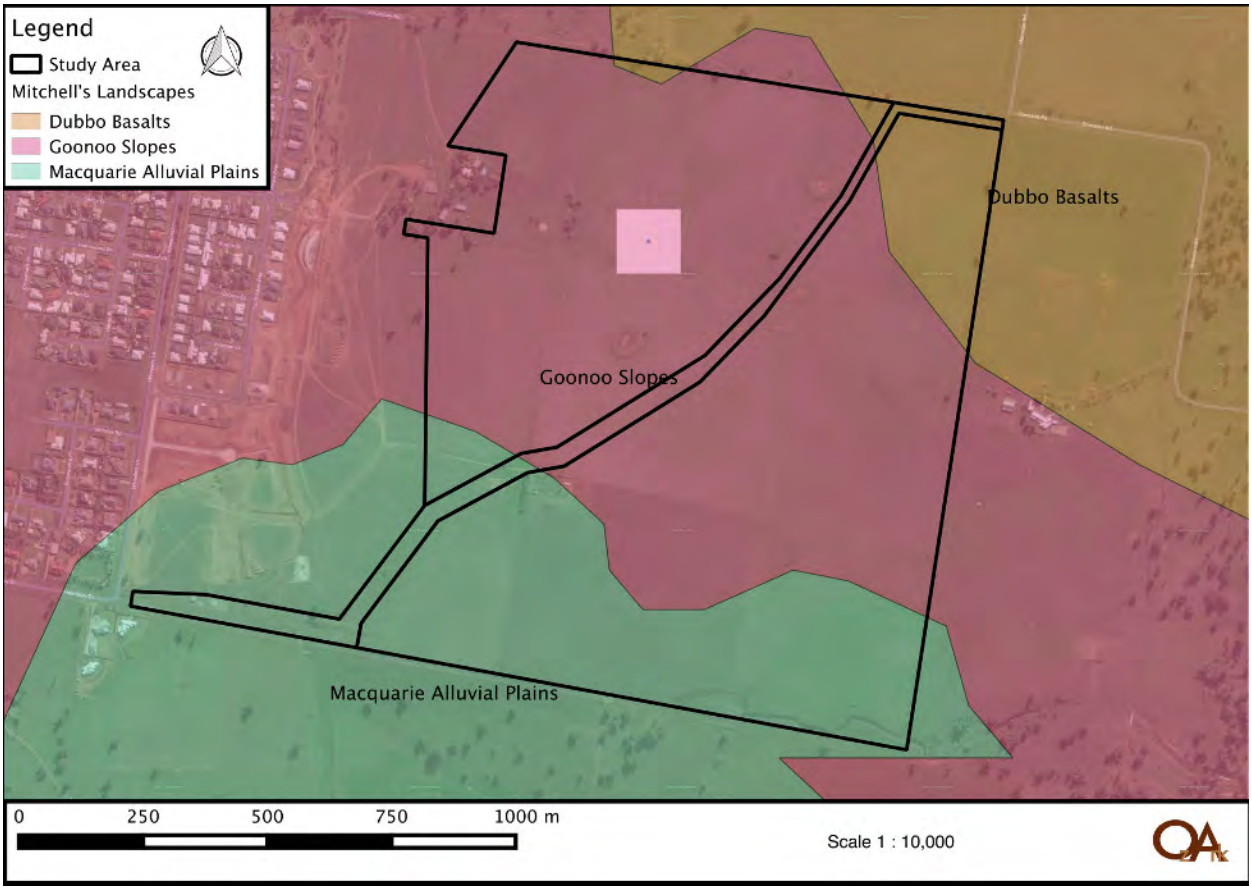
3.1 TOPOGRAPHY

Low hills with long slopes characterise the locality. The Study Area is located on the undulating plain above the Macquarie River floodplain at approximately 280m Australian Height Datum (AHD) in the north to 270m AHD in the south of the property. The Study Area comprises mostly elevated floodplain terraces, with some low to mid slopes and terraces (average slope < 20°) of adjacent low volcanic and sandstone hills, and some upper slopes and ridge lines of adjacent hills with slopes between zero and 45° (Kelton 1995:2).

3.2 GEOLOGY AND SOILS

Mitchell's landscapes classification suggests the Study Area falls predominantly within the Goonoo Slopes (**Figure 3.1)** characterised by: extensive undulating to stepped low hills with long slopes on sub-horizontal Triassic/Jurassic quartz sandstone, conglomerates, siltstone, shale and some coal; and stony yellow earths with sandstone outcrop on ridgelines to yellow harsh texture-contrast soils in shallow valleys (Mitchell 2002). The northern tip of the Study Area is within Dubbo Basalts, and the southern portion falls within the Macquarie Alluvial Plains. Volcanic rock outcrops dominated by basalts of various textures occur in the northeastern corner of the study area.

Figure 3.1: Michell's landscapes classification of the Study Area



3.3 HYDROLOGY

The Study Area is located within the Talbragar Valley sub region of the Central West Catchment Management Area (CMA) situated within the larger Brigalow Belt South Bioregion (BBSB) (Thackway and Cresswell 1995). Eulomogo creek intercepts the south-eastern portion of the Study Area. Two small dams exist on the northern portion of the Study Area. All surface water drains south into adjoining disturbed agricultural land, then into the Macquarie River approximately 1.2 kilometres to the south.

3.4 VEGETATION

Grey Box (*Eucalytpus microcarpa*), Yellow Box (*E. melliodora*) and Rough-barked Apple (*Angophora floribunda*) occur on valley floors, while River Red Gum (*E. camaldulensis*) lines the Macquarie River and River Oak (*Casuarina cunninghamiana*) the tributaries. Fuzzy Box (*E. conica*) is also known to occur along foot slopes and alluvial areas near the Macquarie River. Riverine woodland vegetation has been dramatically altered since European settlement, and few isolated native trees remain in the Study Area.

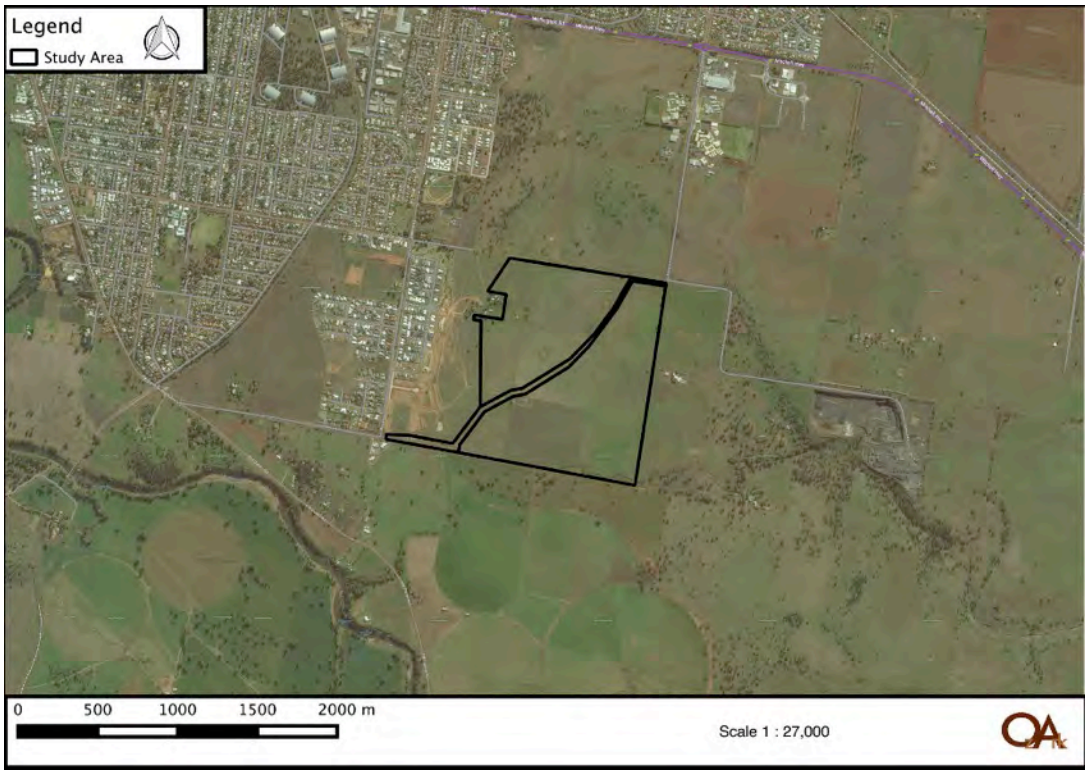
3.5 CLIMATE

Based on the Köppen classification, the climate consists of a sub-humid climate with mostly hot summers and no dry season. The Study Area is located within the elevated eastern bioregion boundary area with a more temperate climate consisting of warm, rather than hot, summers. Mean annual temperatures are lower in this area than in the flatter country to the north and west. The Study Area has an average rainfall of 583.9 millimetres, which occurs throughout the year. The average maximum temperature is 33°C and the average minimum temperature 17.9°C (BOM 2015). Temperatures are considered to have been relatively stable over the past 10,000 years.

3.6 LAND–USE HISTORY AND EXISTING LEVELS OF DISTURBANCE

The Study Area is located on a disturbed relatively flat foot slope. After European occupation it was cleared and grazed, and after WW2 likely ploughed regularly in seasonally favourable conditions. Council has constructed drainage channels within the property. Apart from isolated trees, there are no relatively undisturbed vegetated areas in the Study Area. The majority of land incorporated within the Study Area and locality is subject to continued or historical agricultural practices, infrastructure provision and low density rural housing, and as such exhibits a wide range of land-use associated disturbance levels. Satellite imagery of the Subject Site (**Figure 3.2)** appears to demonstrate moderate levels of broad scale disturbance associated with agricultural land clearance for grazing and cropping. Further afield, large tracts of remnant vegetation and conservation networks occur.

Figure 3.2: Aerial view of Study Area.



3.7 CONCLUSION

The current Study Area includes landforms that would have provided Aboriginal people with access to resources and views over resource areas. The Eulomogo Creek waterway would have supported a wide range of plants and animals used by Aboriginal people, as would the floodplain of the Macquarie River immediately south. The elevated hills overlooking these areas, especially facing to the south and west, would have offered well-drained vantage points for Aboriginal occupation. Land use history has certainly impacted archaeological deposits over the Study Area, with prior ploughing activities, clearing and erosion causing the most damage. Clearing will have removed trees that may have held Aboriginal scars, while ploughing and erosion will have impacted occupation sites.

4 ABORIGINAL ARCHAEOLOGICAL BACKGROUND

4.1 ETHNO-HISTORIC SOURCES OF REGIONAL ABORIGINAL CULTURE

According to Tindale's (1974) map of tribal boundaries the Dubbo area falls within the northern limits of Wiradjuri country, as defined by the limits of the Wiradjuri 'tribal'/language group. Wiradjuri country is bound by Wongaibon country to the west and Wailwan country to the north. Wailwan country begins at Gilgandra, runs across to Nyngan, up the eastern side of the Bogan River to Brewarrina, across to Walgett and down to Coonabarabran. According to Horton (1994), Wiradjuri country extends somewhat further north and west to encompass Gilgandra, Nyngan and most of the Bogan River. The Wiradjuri are typically described as a large language group or tribal nation extending over a considerable area of New South Wales, comprising numerous sub-groups. Use of the term 'tribe' and the delineation of 'tribal boundaries' on maps is considered problematic, despite the fact that distinctive ethno-linguistic groups are known to exist (Bowdler 1983:22). The current report is framed in terms of to two group names used within the Dubbo region: Wiradjuri and Tubba-Gah. The Tubba-Gah comprise a local sub-group, 'clan' or mob within the larger Wirajuri entity that are historically linked to the locality encompassing the Study Area (Kelton 1995:7-8; Koettig 1985:21-22). The territory thought to have been traversed by the Tubba-Gah lies to the east of the Macquarie River, south of the Talbragar River and north of Eulomogo creek.

Little recorded information survives concerning the life of Aboriginal people in the Dubbo area following European settlement (Koettig 1985:19). The most important historical resources are the oral histories passed from parent to child by local Indigenous inhabitants. The current caretakers of this knowledge are involved in a project to record that information. When it becomes available, this resource stands to replace existing documents as the most valuable written resource describing Aboriginal cultural practices at the time of European settlement.

Early accounts of contact between European and Aboriginal people in the Macquarie River area were provided by Oxley (1820) and Sturt (1833) and later by Garnsey (1942) who was born in Dubbo in 1874. Garnsey's interest in Aboriginal cultures led him to record information gleaned from his father and from Aboriginal elders in the Dubbo area. His work remains a useful account of everyday life and religious/ceremonial practices.

According to early accounts, Tubba-Gah territory was rich in animal and plant food resources (Koettig 1985). Garnsey's (1942:6) description of camp life suggests that many activities were performed communally, for the benefit of the mob. Campsites comprised a series of bark or bush shelters arranged in a semi-circle opening to the east, arranged around a central fire, with men occupying shelters to the north, women in the centre, and children to the south. Camps moved frequently over short distances due to alterations in social relations and weather, and in response to hygiene concerns, among other factors. Longer distance movements tended to be

linked to participation in large-scale gatherings (e.g. ceremony or warfare) or alterations in resource availability. Garnsey (1942:16-23) also provides detailed descriptions of ceremonial practices related to alterations in social status and passages from infancy to adulthood. These descriptions of are a composite of various verbal accounts, the accuracy of which is difficult to ascertain. Garnsey (1942:14) suggests that the 'mob' structure began to break down during the 1890s when only older men appeared to retain the tribal markings and knowledge associated with ceremonial practice. Oral histories of traditional custodians are likely to elaborate upon and refute aspects of these early accounts.

4.2 REGIONAL ARCHAEOLOGICAL CONTEXT

Prior to 1985, no systematic archaeological studies had been undertaken in the Dubbo region. During the late nineteenth and early twentieth centuries interested locals and amateurs, including Milne and Gresser, and to a lesser extent Garnsey, recorded a number of sites and collected artefacts, contributing to the body of archaeological data available to researchers today. A number of archaeological studies have since been conducted within the Dubbo region over the last 30 years (Balme 1986; Koettig 1985; OzArk EHM 2006; Pearson 1981; Purcell 2000). These provide baseline data for placing past Aboriginal sites within a regional landscape context.

Pearson (1981) worked primarily in the Upper Macquarie region. The proximity of this area to the current Study Area, and general topographic similarities, render the findings relevant to the Dubbo region. Pearson divided the archaeological sites he recorded into two main categories: occupation sites and non-occupation sites (including grinding grooves, scarred or carved trees, ceremonial and burial sites, etc.). Analysis of site locations produced a site prediction model with occupation occurring in areas with: access to water, good drainage, level ground, adequate fuel and appropriate localised weather patterns for summer or winter occupation. Occupation sites were most frequently found on low ridge tops, creek banks, gently undulating hills and river flats and usually in open woodland vegetation (Pearson 1981:101). The location of non-occupation sites was dependent upon a variety of factors relating to site function. For instance, grinding grooves were found where appropriate sandstone outcropping occurred, as close to occupation sites as possible. The location of scarred trees displayed no obvious patterning, other than proximity to watercourses where camps were more frequently located. Pearson suggested that these patterns would differ on the drier plains to the west – towards Dubbo and beyond – where dependence upon larger, more permanent water supplies was greater.

Koettig (1985:81-82) examined evidence of Aboriginal occupation within five kilometers of Dubbo's city limits. She concluded that sites existed throughout all landscape units surveyed; artifact scatters, scarred trees and grinding grooves were the most frequently occurring site types; and that site location and size were determined by various environmental and social

factors. Of the environmental factors, proximity to water, geological formation and availability of food resources were most important. As such, her site prediction model suggested that: all site types would occur along watercourses; stone arrangements would occur most frequently on knolls or prominent landscape features; larger campsites would occur most frequent along permanent watercourses, near springs or wetlands, and small campsites could be found anywhere; scarred trees could occur anywhere, but particularly in remnant native woodland; campsites would become smaller and more sporadic near the headwaters of creeks; grinding grooves would occur where appropriate sandstone existed; quarries would occur wherever there were suitable stone sources; and shell middens would occur only along the Macquarie River.

The North-Central Rivers study undertaken by Balme (1986) examined site location in terms of preservation. Balme (1986:182) found that, other than historic impacts, site distributions were most affected by geomorphic processes affecting site preservation and leading to site exposure. In addition, there was little scope for the assessment of site chronologies as so few datable contexts had been located. Balme also concluded that sites recorded on the Aboriginal Heritage Information Management System (AHIMS) register from ethnographic accounts were unlikely to be relocated. In an assessment of the Pilliga and Goonoo State Forests, Purcell (2000) recorded 47 and 106 Aboriginal sites respectively. Purcell (2000:31) found that sites were more frequently located within alluvium landforms, demonstrating that 91.5% of sites were recorded within 200-300 meters of water.

OzArk EHM (2006) assessed Indigenous heritage resources within the Dubbo Local Government Area (LGA) to assist Dubbo City Council with planning. This study aimed to: consolidate previous surveys and assessments of Indigenous heritage; set a baseline for further study; and survey areas zoned for future expansion. Approximately 1,120 hectares of land was surveyed including two areas located within 3km west of the Study Area. During the survey, 26 new Aboriginal sites were recorded, and 8 of 12 previously recorded sites were relocated. Proportions of newly located sites by type were similar to those found in previous studies. Fewer scarred trees were found than expected, likely due to intensive agricultural practices and associated tree clearance around Dubbo city compared to the broader Dubbo LGA. No new grinding groove sites were found, which was probable given this site type comprised only 3.61% of previously located sites within the Dubbo LGA. Scarred tree distribution adhered to the predictive model, exclusively following waterways and fence-lines, although this probably reflected land clearing practices more than Indigenous site patterning. Isolated finds and open sites followed a similar pattern, largely limited to watercourse edges and elevated terraces within 500 meters of the Macquarie River and other permanent to semi-permanent waterways. No real pattern emerged in terms of site size or quality, perhaps because surface manifestations do not adequately reflect site size or complexity. Subsequently, OzArk EHM

(2014) undertook an archaeological assessment of Lot 710 DP 1041906 comprising approximately 15 ha, located 500m west of the present Study Area. One new open site comprising two silcrete artefacts and associated potential archaeological deposit was recorded approximately 300m from the Macquarie River.

4.3 LOCAL ARCHAEOLOGICAL CONTEXT

4.3.1 Desktop Database Searches Conducted

A desktop search was conducted on the following databases to identify any potential previously-recorded heritage within the Study Area. The results of this search are summarised here in **Table 4-1** and presented in detail in **Appendix 1**.

Table 4-1: Desktop-Database Search Results.

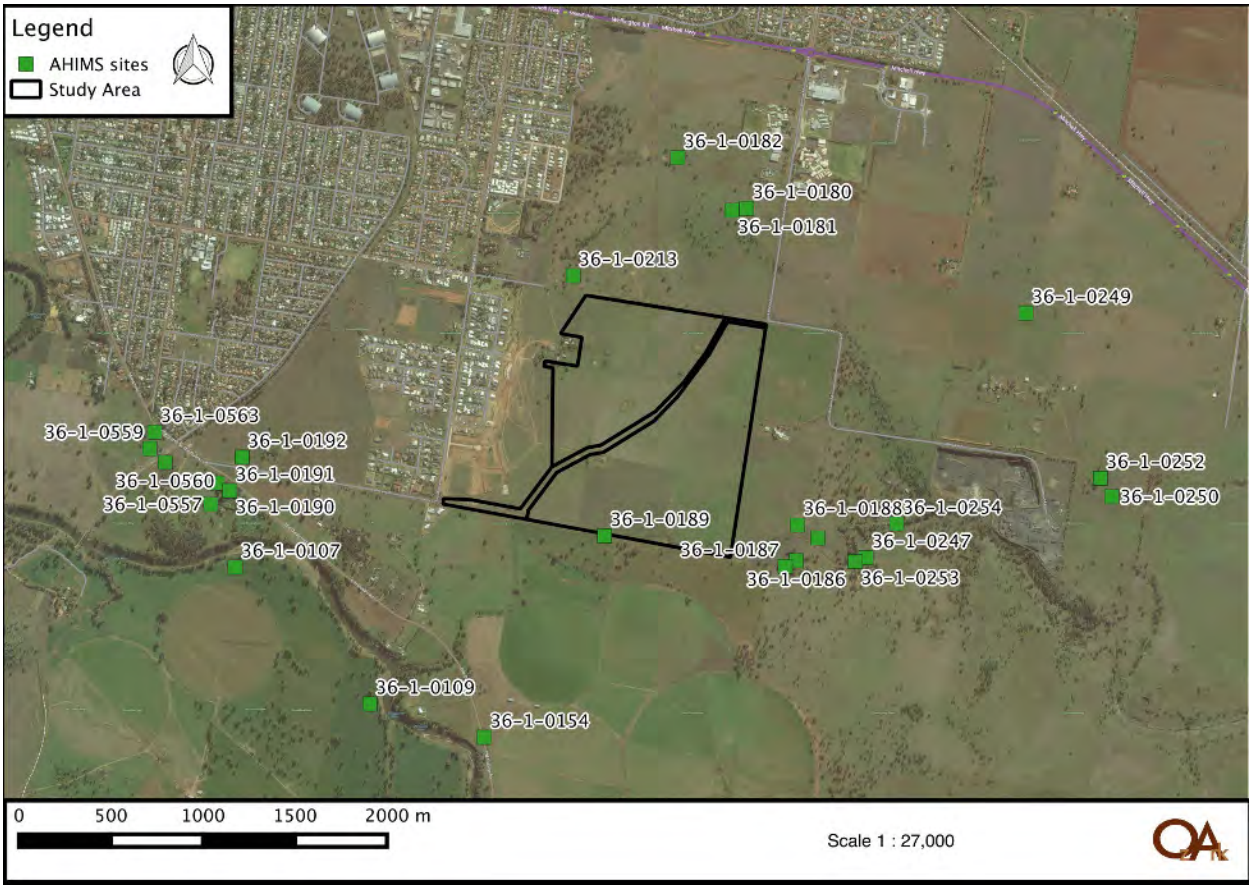
Name of Database Searched	Date of Search	Type of Search	Comment
Australian Heritage Database	28.04.15	Dubbo LGA	No places listed within Study Area
NSW Heritage Office State Heritage Register and State Heritage Inventory	28.04.15	Dubbo LGA	No places listed within Study Area
National Native Title Claims Search	28.04.15	NSW	No Native Title Claims cover the Study Area.
Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS);	15.04.15	10 x 10 km centred on the Study Area	26 sites within the search area. 1 site within the Study Area.
Dubbo Local Environment Plan of 2011	28.04.15	Schedule 5	No places listed within Study Area.
S170 RMS Heritage and Conservation Register	28.04.15	Western Region	No places listed within Study Area.

A search of the OEH administered AHIMS database returned 26 records for Aboriginal heritage sites within the designated search area – see **Table 4-2** and **Figure 4.1**. One site K-OS-4 (#36-1-0189) was within the Study Area.

Table 4-2: AHIMS Site Types and Frequencies.

Site Type	Number	% Frequency
Open camp site	12	46
Scarred tree	10	38
Axe grinding groove	2	8
Isolated find	2	8
Total	**26**	**100**

Figure 4.1: Location of AHIMS sites within the search area



4.4 PREDICTIVE MODEL FOR SITE LOCATION

Across Australia, numerous archaeological studies in widely varying environmental zones and contexts have demonstrated a high correlation between the permanence of a water source and the permanence and/or complexity of Aboriginal occupation. Site location is also affected by the availability of and/or accessibility to a range of other natural resources including: plant and animal foods; stone and ochre resources and rock shelters; as well as by their general proximity to other sites/places of cultural/mythological significance. Consequently sites tend to be found along permanent and ephemeral water sources, along access or trade routes or in areas that have good flora/fauna resources and appropriate shelter.

In formulating a predictive model for Aboriginal archaeological site location within any landscape it is also necessary to consider post-depositional influences on Aboriginal material culture. In all but the best preservation conditions very little of the organic material culture remains of ancestral Aboriginal communities survives to the present. Generally it is the more durable materials such as stone artefacts, stone hearths, shell, and some bones that remain preserved in the current landscape. Even these however may not be found in their original depositional context since these may be subject to either (a) the effects of wind and water erosion/transport - both over short and long time scales or (b) the historical impacts associated with the introduction of European farming practices including: grazing and cropping; land

degradation associated with exotic pests such as goats and rabbits and the installation of farm related infrastructure including water-storage, utilities, roads, fences, stockyards and residential quarters. Scarred trees may survive for up to several hundred years but rarely beyond.

The proximity of the current Study Area to major resource areas – Eulomogo Creek and the Macquarie River – makes it favourable in terms of access to food and water. The landforms that comprise much of the Study Area are elevated and relatively flat in places, offering excellent vantage to the east and south as well as providing well-drained potential camping locations. Considering these factors, and the previously recorded Aboriginal site, the likelihood of encountering evidence of Aboriginal occupation is considered high. There has, however, been a considerable amount of land use disturbance – clearing, ploughing, infrastructure installation and erosion. Disturbance is predicted to have impacted upon the presence (in the case of scarred trees) or the integrity (in the case of archaeological deposits) of any potentially occurring Aboriginal sites, as was recorded by Kelton in 1995. As such, the most likely site types to be encountered in the Study Area are predicted to be:

- *Open camp sites:* may be located on elevated ground, however, due to the high level of disturbance within the Study Area this site type, if present, has a high likelihood of being disturbed and/or of low integrity;
- *Isolated finds:* may occur anywhere, especially in disturbed locations;
- *Scarred Trees:* have a lower likelihood of occurring due to high levels of land clearance, although some individual mature trees may be present, and may bear scars;
- *Axe grinding grooves:* have a low likelihood of occurring given the rarity of this site type, and requirements for suitable sandstone outcropping near to occupation sites; and
- *Ceremonial sites:* do not necessarily follow landform predictability; overall a rare site type with a low likelihood of being present and remaining extant.

5 APPLICATION OF THE DUE DILIGENCE CODE OF PRACTICE

5.1 INTRODUCTION

In late 2010, changes were made to the National Parks and Wildlife Act 1974 (NPW Act 1974) via the Omnibus Bill. As of October 2010, the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010b) was instituted to assist developers to exercise the appropriate level of caution when carrying out activities that could cause harm to Aboriginal heritage.

5.2 DEFENCES UNDER THE NPW REGULATIONS 2009

The first step before application of the Due Diligence process itself is to determine whether the proposed activity is a "low impact activity" for which there is a defence in the NPW regulations 2009. The exemptions are listed in Section 7.5 of the Regulations (DECCW 2010b:6). The activities of MAAS Group Properties do not fall into any of these exemption categories. Therefore the Due Diligence process must be applied. Relevant to this process is the assessed levels of previous land-use disturbance. The regulations (DECCW 2010b:18) define disturbed land as follows:

> *Land is disturbed if it has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable.*
>
> *Examples include ploughing, construction of rural infrastructure (such as dams and fences), construction of roads, trails and tracks (including fire trails and tracks and walking tracks), clearing vegetation, construction of buildings and the erection of other structures, construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure) and construction of earthworks.*

5.3 APPLICATION OF THE DUE DILIGENCE CODE OF PRACTICE TO THE PROPOSED DEVELOPMENT

To follow the generic Due Diligence process, a series of steps in a question answer flowchart format (DECCW 2010b:10) are applied to the project impacts and Study Area and the responses documented. The following paragraphs address this due diligence for the proposed subdivision of Lot 399 DP 1199356 and Lot 503 DP 1152321 Boundary Road, Dubbo NSW.

Step 1: Will the activity disturb the ground surface or any culturally modified trees?

Yes the activity will disturb the ground. Go to Step 2.

Step 2: Are there any:

a) Relevant confirmed site records or other associated landscape feature information on AHIMS? and/or

b) Any other sources of information of which a person is already aware? and/or

c) Landscape features that are likely to indicate presence of Aboriginal objects?

a) Yes (see **Appendix 1**).

b) No. Aboriginal community consultation is not a formal requirement of the Due Diligence process (DECCW 2010b:3). The Proponent may wish to consider undertaking consultation to assist in informing decision-making.

c) Landscape features noted here include (DECCW 2010b:12):

- within 200 metres of waters, or
- located within a sand dune system, or
- located on a ridge top, ridge line or headland, or
- located within 200 metres below or above a cliff face, or
- within 20 metres of or in a cave, rock shelter, or a cave mouth

and is on land that is not disturbed land (see **Section 5.2**) then you must go to Step 3.

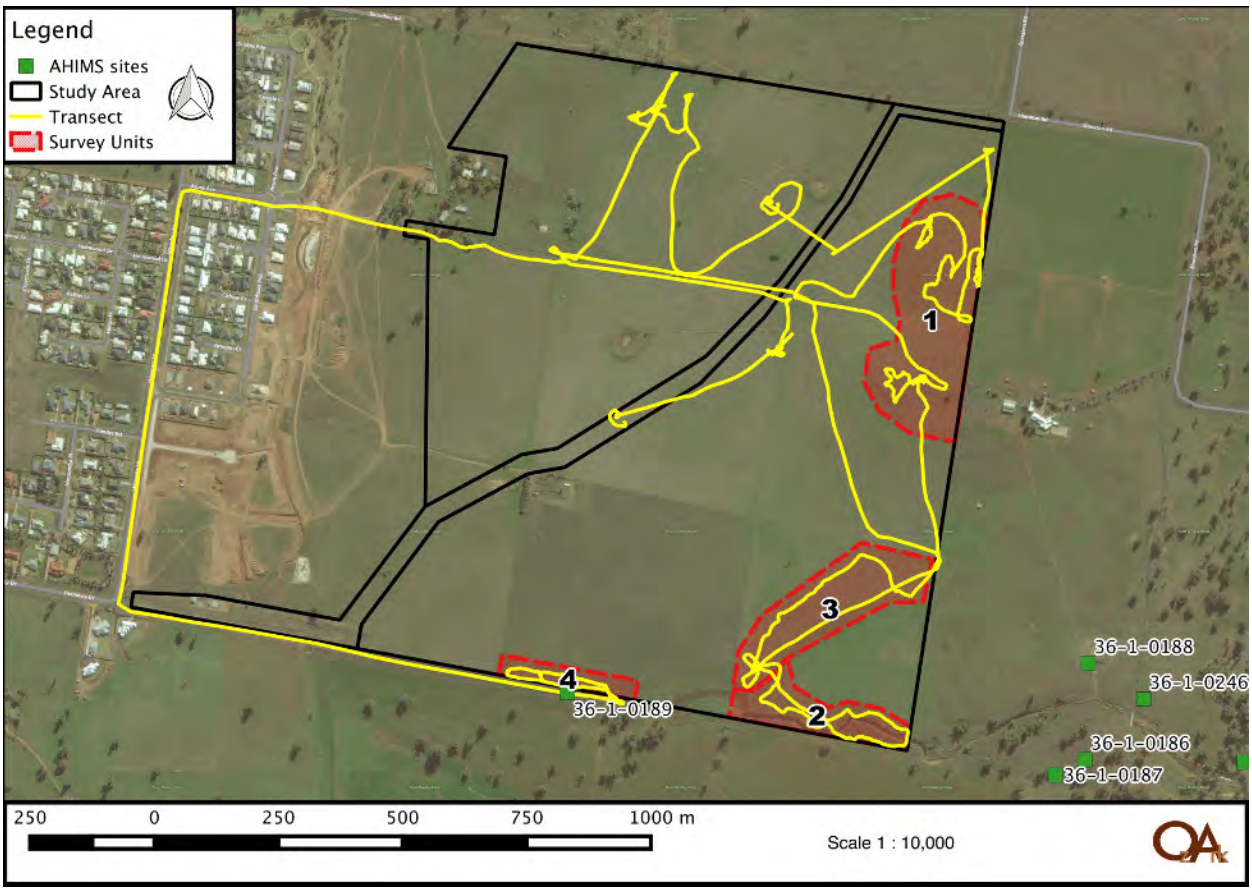
Parts of the Study Area overlap with relevant landscape features. The Proponent elected to apply the precautionary principle and proceed to visual inspection of the Project Site in order to ground-truth the findings of the above desktop level assessment.

6 RESULTS OF ABORIGINAL ARCHAEOLOGICAL ASSESSMENT

6.1 SAMPLING STRATEGY AND FIELD METHODS

Standard archaeological field survey and recording methods were employed in this study (see Burke and Smith 2004) to ground-truth existing levels of disturbance and to relocate previously recorded site K-OS-4 (#36-1-0189). A combination of vehicle and pedestrian survey were utilised (see **Figure 6.1**). Sections of the Study Area with landforms possessing archaeological potential were inspected on foot. These landscape features included: the tops of low hills or ridges (survey unit 1); a waterway i.e. Eulomogo Creek (survey unit 2); and an elevated crest adjacent to the waterway (survey unit 3). Sections of the Study Area that did not contain relevant landscape features were assessed on vehicle and intermittently on foot as a precautionary measure. In most instances, the vehicle travelled very slowly along the Study Area with frequent stops made to inspect on foot. Areas of low archaeological potential were sample surveyed, but all sections of the Study Area remained within visual range. A handheld differential GPS was utilised to relocate site K-OS-4 (#36-1-0189) as per location coordinates recorded on AHIMS and by Kelton (1995) – i.e. survey unit 4.

Figure 6.1: Vehicular and pedestrian survey transects of the Study Area and associated survey units



6.2 PROJECT CONSTRAINTS

There were no significant constraints in completing the assessment.

6.3 RESULTS

6.3.1 Effective Survey Coverage

Two of the key factors influencing the effectiveness of archaeological survey are ground surface visibility (GSV) and exposure. These factors are quantified in order to ensure that the survey data provides adequate evidence for the evaluation of the archaeological materials across the landscape. For the purposes of the current assessment, these terms are used in accordance with the definitions provided in the *Code of Practice* (DECCW 2010a). GSV is defined as:

> *… the amount of bare ground (or visibility) on the exposures which might reveal artefacts or other archaeological materials. It is important to note that visibility, on its own, is not a reliable indicator of the detectability of buried archaeological material. Things like vegetation, plant or leaf litter, loose sand, stone ground or introduced materials will affect the visibility. Put another way, visibility refers to 'what conceals'* (DECCW 2010a:39).

Exposure is defined as:

> *… different to visibility because it estimates the area with a likelihood of revealing buried artefacts or deposits rather than just being an observation of the amount of bare ground. It is the percentage of land for which erosion and exposure was sufficient to reveal archaeological evidence on the surface of the ground. Put another way, exposure refers to 'what reveals'* (DECCW 2010a:37).

GSV and exposure across the Study Area ranged from none in areas of extensive grass cover to poor within areas of exposure. Visibility and exposure ranged from <5 to 15 per cent (see **Table 6-1**). Refer to **Plates 1** to **9** for photographs of the Study Area and associated survey units.

Table 6-1: Survey Coverage Data.

Survey Unit	Landform	Survey Unit Area (sq m)	Visibility %	Exposure %	Effective Coverage Area (sq m) (= Survey Unit Area x Visibility % x Exposure %)	Effective Coverage % (= Effective Coverage Area / Survey Unit Area x 100)	Number of sites
1	Hilltop / ridge top	50,000	15	<5	225	0.45	0
2	Waterway	23,000	10	<5	69	0.3	0
3	Elevated crest adjacent to waterway	30,000	15	<5	135	0.45	0
4	Gentle slope	14,500	1	<5	4.35	0.03	0

6.3.2 Aboriginal Sites Recorded

No new Aboriginal sites were recorded during this heritage assessment.

6.3.3 Aboriginal Sites Re-located

Kelton (1995:40-42) recorded site K-OS-4 (#36-1-0189) comprising a 12,000m^2 open artefact scatter of between 50-100 stone artefacts, situated along the southern boundary of the Study Area – see Section 1.4 and **Figure 1.4**. Pedestrian transects were conducted in the area and constituted survey unit 4 – see Section 6.1 and **Figure 6.1**. Very low GSV and exposure existed throughout survey unit 4 due to extensive grass cover (see **Table 6-1** and **Plates 8** and **9**). As a result, site K-OS-4 was unable to be relocated during this heritage assessment.

6.4 DISCUSSION

The predictive model (see Section 4.4) suggested that the location of, and landforms within, the Study Area were favourable to Aboriginal occupation. All landforms possessing archaeological potential were inspected on foot throughout the Study Area and all areas of exposure encountered were checked for archaeological material. Despite this, no new Aboriginal sites were recorded. GSV was variable across the Study Area, but generally much higher in survey units 1-3 than in survey unit 4 (see **Table 6-1** and **Plates 1** to **7**). As such, the most likely explanation for the lack of discernable archaeological material in the remainder of the Study Area (i.e. other than survey unit 4) is the high degree of land-use disturbance linked to decades of vegetation clearance, ploughing, infrastructure installation and erosion. For instance, the absence of scarred trees is certainly due to the lack of endemic trees of sufficient age for Aboriginal cultural scarring throughout the Study Area due to land clearance.

6.5 ASSESSMENT OF SIGNIFICANCE

6.5.1 Introduction

The appropriate management of cultural heritage items is usually determined on the basis of their assessed significance as well as the likely impacts of any proposed developments. Scientific, cultural and public significance are identified as baseline elements of significance assessment, and it is through the combination of these elements that the overall cultural heritage values of a site, place or area are resolved.

Social or Cultural Value

This area of assessment concerns the importance of a site or features to the relevant cultural group: in this case the Aboriginal community. Aspects of social value include assessment of sites, items, and landscapes that are traditionally significant or that have contemporary importance to the Aboriginal community. This importance involves both traditional links with specific areas, as well as an overall concern by Aboriginal people for their sites generally and the continued protection of these. This type of value may not be in accord with interpretations made by the archaeologist: a site may have low archaeological value but high social value, or vice versa.

Archaeological/Scientific Value

Assessing a site in this context involves placing it into a broader regional framework, as well as assessing the site's individual merits in view of current archaeological discourse. This type of value relates to the ability of a site to answer current research questions and is also based on a site's condition (integrity), content and representativeness.

The overriding aim of cultural heritage management is to preserve a representative sample of the archaeological resource. This will ensure that future research within the discipline can be based on a valid sample of the past. Establishing whether or not a site can contribute to current research also involves defining 'research potential' and 'representativeness'. Questions regularly asked when determining significance are: can this site contribute information that no other site can? Is this site representative of other sites in the region?

Aesthetic Value

This refers to the sensory, scenic, architectural and creative aspects of the place. It is often closely linked with the social values. It may consider form, scale, colour, texture and material of the fabric or landscape, and the smell and sounds associated with the place and its use (Australia ICOMOS 2013).

Historic Value

Historic value refers to the associations of a place with a historically important person, event, phase or activity in an Aboriginal community. Historic places do not always have physical evidence of their historical importance (such as structures, planted vegetation or landscape modifications). They may have 'shared' historic values with other (non-Aboriginal) communities.

Places of post-contact Aboriginal history have generally been poorly recognised in investigations of Aboriginal heritage. Consequently the Aboriginal involvement and contribution to important regional historical themes is often missing from accepted historical narratives. This means it is often necessary to collect oral histories along with archival or documentary research to gain a sufficient understanding of historic values.

6.5.2 Assessed Significance of the Recorded Sites

Social or Cultural Value

All Aboriginal sites hold significance to the local Aboriginal community in the Dubbo region, providing tangible links to the occupation of the land by their ancestors. Site K-OS-4 (#36-1-0189) was previously assessed as holding **moderate to low social or cultural value** in consultation with Aboriginal community representatives (Kelton 1995:42). As no Aboriginal community representatives were present during the current field inspection, no information was documented regarding the Aboriginal social or cultural value of the Study Area.

Archaeological/Scientific Value

Site K-OS-4 (#36-1-0189) was previously assessed as holding **low archaeological value** due to poor levels of representativeness and high levels of past disturbance yielding low site integrity (Kelton 1995:41-42). This assessment is unlikely to have been altered had the site been relocated, although significance is hard to comment on when the site cannot be found.

Aesthetic Value

Site K-OS-4 (#36-1-0189) was not previously assessed for its aesthetic value. The landscape surrounding the site has been highly modified, significantly reducing the area's aesthetic value. As such, the site likely possesses **low aesthetic value**.

Historic Value

Site K-OS-4 (#36-1-0189) was not previously assessed for its historic value. The site can be assessed as holding **low historic value**, with no apparent relationship with known historic Aboriginal sites.

The results of the significance assessment are summarised in **Table 6-2**.

Table 6-2: Significance Assessment.

Site Name	Social or Cultural Value	Archaeological / Scientific Value	Aesthetic Value	Historic Value
K-OS-4	Moderate to Low	Low	Low	Low

6.6 LIKELY IMPACTS TO ABORIGINAL HERITAGE FROM THE PROPOSAL

The final design of the proposed works has not been finalised prior to the conclusion of this report. Impacts to the Study Area will be assessed as causing total destruction to the environment within the Study Area. Under this scenario, K-OS-4 will be directly impacted and will experience total harm and total loss of value (see **Table 6-3**).

Table 6-3: Impact Assessment.

Site Name	Type of Harm (Direct/Indirect / None)	Degree of Harm (Total/Partial / None)	Consequence of Harm (Total/Partial/No Loss of Value)
K-OS-4	Direct	Total	Total

7 MANAGEMENT AND MITIGATION: ABORIGINAL HERITAGE

7.1 GENERAL PRINCIPLES FOR THE MANAGEMENT OF ABORIGINAL SITES

Appropriate management of cultural heritage items is primarily determined on the basis of their assessed significance as well as the likely impacts of the proposed development. **Section 6.5.2** and **Section 6.6** describe, respectively, the significance / potential of the recorded sites and the likely impacts of the development. The following management options are general principles, in terms of best practice and desired outcomes, rather than mitigation measures against individual site disturbance.

- Avoid impact by altering the development proposal or in this case by avoiding impact to a recorded Aboriginal site. If this can be done, then a suitable curtilage around the site must be provided to ensure its protection both during the short-term construction phase of development and in the long-term use of the area. If plans are altered, care must be taken to ensure that impacts do not occur to areas not previously assessed.

- If impact is unavoidable then approval to disturb sites must be sought from OEH and will depend on many factors including the site's assessed significance. Aboriginal community consultation will also need to occur following the OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs). If granted, the local Aboriginal communities may wish to collect or relocate any evidence of past Aboriginal occupation (Aboriginal object), whether temporarily or permanently, if necessary. The fate of all artefacts remains within the statutory control of the OEH. A care and control permit may be issued to local Aboriginal groups or, with Aboriginal community consent, to other parties, for educational or display purposes.

7.2 MANAGEMENT AND MITIGATION OF RECORDED ABORIGINAL SITES

Under the current development proposal, site K-OS-4 will undergo total harm and total loss of value. It is recommended that the Proponent seek to avoid impact to any Aboriginal sites. As such, and following Kelton (1995:50), the current assessment recommends avoidance of K-OS-4 with suitable curtilage (e.g. a 15m buffer clearly demarcated) to avoid inadvertent impacts during the completion of any works within the vicinity of the site. Long-term management of the site should entail its protection and preservation.

Should impacts be deemed unavoidable, the area encompassing the location of the site should be cleared of vegetation to allow for better ground surface visibility, and a targeted pedestrian survey performed by someone with expertise in locating and identifying Aboriginal objects. Aboriginal community consultation and field participation is recommended during the attempted relocation.

If K-OS-4 is relocated, an AHIP must be sought from the OEH. Archaeological recommendations for an AHIP application would be that K-OS-4 is subject to a salvage program involving the collection of surface artefacts. No program of sub-surface salvage by excavation is recommended as the site has been assessed as having low potential for associated sub-surface deposits. Artefacts may be moved to a place of safekeeping agreed upon by Aboriginal stakeholders, or should it be elected that the artefacts be reburied on site in an area not to be impacted, the coordinates of the re-located artefacts should be recorded on an Aboriginal Site Impact Recording Form (ASIRF) with AHIMS.

Beyond the management of site K-OS-4 discussed above, there are no further constraints to the proposed works on the grounds of Aboriginal cultural heritage. Should objects of suspected Aboriginal origin be uncovered during the construction phase of proposed works, the Unanticipated Finds Protocol set out in **Appendix 2** should be followed.

8 RECOMMENDATIONS

8.1 ABORIGINAL HERITAGE

Under Section 91 of the NPW Act (as amended in 1974) it is mandatory that all Aboriginal sites recorded under any auspices be registered with OEH AHIMS. As a professional in the field of cultural heritage management it is the responsibility of OzArk to ensure this process is undertaken. To this end it is noted that **no Aboriginal sites** were recorded during the assessment.

The following recommendations are made with regard to:

- Legal requirements under the terms of the NPW Act (as amended in 1974) whereby it is illegal to damage, deface or destroy an Aboriginal place or object without the prior written consent of OEH;
- The findings of the current investigations undertaken within the Study Area; and
- The interests of the Aboriginal community.

Recommendations concerning the Study Area are as follows:

1. No further archaeological investigation is warranted at site K-OS-4;
2. Avoid impacts to site K-OS-4 and provide a clearly demarcated 15m buffer around the site boundaries identified in **Figure 1.4** (relative to coordinates GDA94 Zone 55 653903, 6427014) to avoid inadvertent impacts during the completion of any works;
3. Long-term management of site K-OS-4 should entail its protection and preservation;
4. Should impacts to K-OS-4 be unavoidable, the area encompassing the location of the site should be cleared of vegetation to allow for better ground surface visibility followed by a pedestrian survey performed by someone with expertise in locating and identifying Aboriginal objects;
5. It is recommended that Aboriginal community consultation and fieldwork participation occur during the attempted relocation of K-OS-4;
6. If K-OS-4 is relocated, an Aboriginal Heritage Impact Permit (AHIP) must be sought from the OEH and Aboriginal community consultation must be undertaken. Archaeological recommendations for the AHIP application would be:
    a. Under supervision of an archaeologist or trained cultural heritage monitors from the Aboriginal community, site K-OS-4 should be salvaged through surface collection of artefacts;
    b. No program of sub-surface salvage is recommended for K-OS-4 as OzArk have assessed the site as possessing low potential for associated potential archaeological deposits;

7. Upon completion of salvage works, artefacts may be moved to a place of safekeeping agreed upon by Aboriginal stakeholders, or should it be elected that the artefacts be reburied on site in an area not to be impacted, or subsequent to the completion of proposed works, the coordinates of the re-located artefacts should be recorded on AHIMS;
8. All land-disturbing activities must be confined to within the assessed Study Area.
9. Work crews involved in the initial and all subsequent ground breaking construction should be made aware of the legislative protection requirements for all Aboriginal sites and objects.
10. In the unlikely event that objects are encountered that are suspected to be of Aboriginal origin (including skeletal material), the Unanticipated Finds Protocol (**Appendix 2**) should be followed.

REFERENCES

Australia ICOMOS
2013 The Burra Charter: The Australia Icomos Charter for Places of Cultural Significance, 2013. In *Australia ICOMOS: International Council on Monuments and Sites* [electronic document]. Available from: http://australia.icomos.org/publications/charters/ [accessed 28th April 2015].

Balme, J.
1986 *North Central Rivers Archaeological Project*. Report to: National Parks and Wildlife Service, NSW.

BOM
2015 Bureau of Meteorology [website]. Available from: http://www.bom.gov.au/ [accessed 29th April 2015].

Bowdler, S.
1983 *Aboriginal Sites on the Crown Timber Lands of NSW*. Report to: Forestry Commission of NSW.

Burke, Heather and Claire Smith
2004 *The Archaeologist's Field Handbook*. Sydney: Allen & Unwin.

DECCW
2010a *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Sydney: Department of Environment, Climate Change and Water.

2010b *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. Sydney: Department of Environment, Climate Change and Water.

Garnsey, E.J.
1942 *A Treatise on the Aborigines of Dubbo and District: Their Camp-Life, Habits and Customs*. Dubbo: Dubbo Museum and Historical Society.

Horton, David (ed.)
1994 *The Encyclopaedia of Aboriginal Australia*. Canberra: Aboriginal Studies Press.

Kelton, Jim
1995 *An Archaeological Survey for the Proposed Keswick Housing Subdivision, Dubbo, NSW* Cowra: Central West Archaeological Services.

Koettig, M.
1985 *Assessment of Aboriginal Sites in the Dubbo City Area*. Report to: Dubbo City Council.

Mitchell, Peter
2002 *Descriptions for NSW (Mitchell) Landscapes, Version 2*. Department of Environment & Climate Change. Available from: http://www.environment.nsw.gov.au/resources/conservation/landscapesdescriptions.pdf.

Oxley, J.
1820 *Journals of Two Expeditions into the Interior of New South Wales: Undertaken by Order of the British Government in the Years 1817-1818*. London: Murray.

OzArk EHM
2006 *Aboriginal Heritage Study: Dubbo Local Government Area*. Report to: Dubbo City Council.

2014 *Aboriginal Archaeological Assessment: Lot 710 Dp 1041906 Hennessy Drive Subdivision, Dubbo NSW*. Report to: Geolyse Pty Ltd.

Pearson, M.
1981 *Seen through Different Eyes: Changing Land Use and Settlement Patterns in the Upper Macquarie River Region of NSW from Prehistoric Times to 1860*. [PhD thesis] Submitted to the Department of Prehistory and Anthropology, The Australian National University.

Purcell, P.
2000 *DECCW Aboriginal Cultural Heritage Assessment, Brigalow Belt South, Stage 1*. Report to: Resource and Conservation Assessment Council.

Sturt, Charles
1833 *Two Expeditions into the Interior of Southern Australia*. London: Smith, Elder and Co.

Thackway, R. and D. Cresswell (eds.)
1995 *An Interim Biogeographic Regionalisation for Australia: A Framework for Setting Priorities in the National Reserves System Cooperative Program*. Canberra: Australian Nature Conservation Agency.

Tindale, Norman B.
1974 *Aboriginal Tribes of Australia: Their Terrain, Environmental Controls, Distribution, Limits, and Proper Names*. Berkeley: University of California Press.

PLATES

Figure 8.1: Map showing the locations of photographs taken within the Study Area

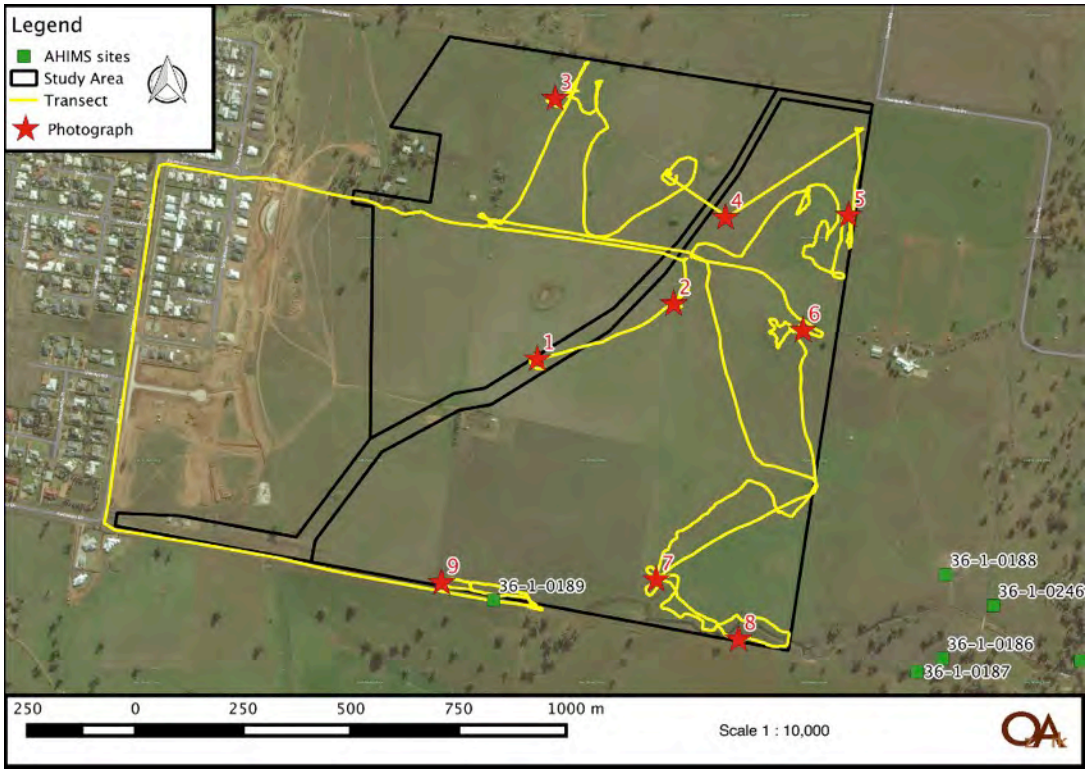


Plate 1: ***Photograph from location 1 (see* Figure 8.1*) – area of low archaeological potential inspected during vehicle transect.***

Plate 2: ***Photograph from location 2 (see* Figure 8.1*) – area of low archaeological potential inspected during vehicle transect.***

Plate 3: ***Photograph from location 3 (see* Figure 8.1*) – area of low archaeological potential inspected during vehicle transect.***

Plate 4: ***Photograph from location 4 (see*** **Figure 8.1*) – view to the southeast toward survey unit 1, hilltop / ridge top.***

Plate 5: ***Photograph from location 5 (see*** **Figure 8.1*) – survey unit 1, hilltop / ridge top.***

Plate 6: ***Photograph from location 6 (see* Figure 8.1*) – survey unit 1, hilltop / ridge top, view to the southwest toward the Macquarie River.***

Plate 7: ***Photograph from location 7 (see* Figure 8.1*) – survey unit 3, elevated crest adjacent to Eulomogo Creek waterway.***

Plate 8: ***Photograph from location 8 (see*** **Figure 8.1*) – survey unit 2, Eulomogo Creek waterway***

Plate 9: ***Photograph location 9 (see*** **Figure 8.1*) – survey unit 4, gentle slope encompassing site K-OS-4***

APPENDIX 1: AHIMS DESKTOP DATABASE SEARCH

SEARCH RESULTS

Office of Environment & Heritage
NSW GOVERNMENT

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : no. 1183 Boundary Rd
Client Service ID : 169248

OzArk Environmental and Heritage Management

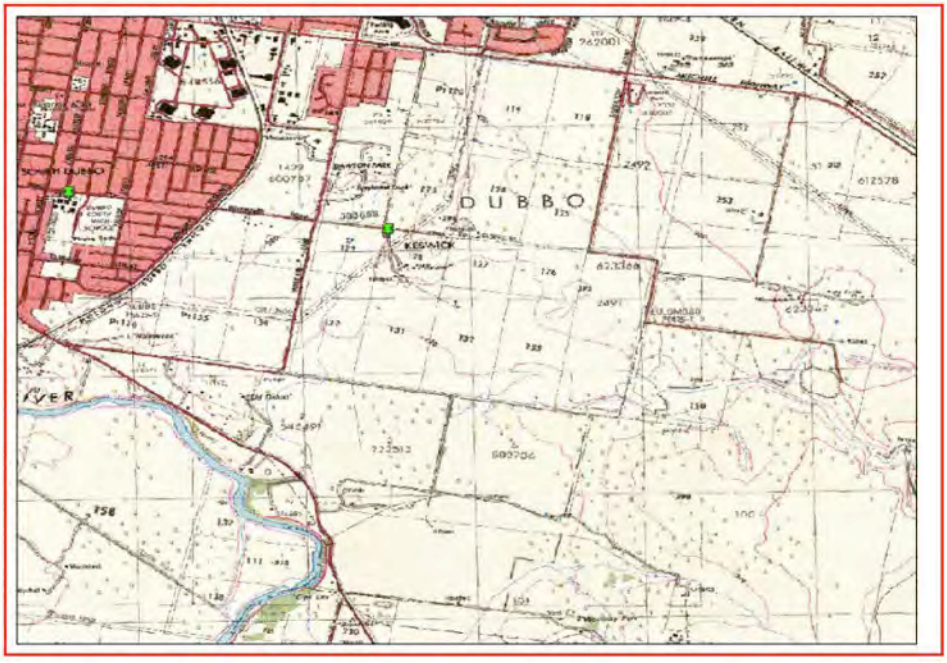
Date: 15 April 2015

PO Box 2069
Dubbo New South Wales 2830
Attention: Chris Lovell
Email: chris@ozarkehm.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 55, Eastings : 651637 - 656502, Northings : 6426050 - 6429038 with a Buffer of 200 meters, conducted by Chris Lovell on 15 April 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

26	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

AHIMS SITE CARDS

[✓] New recording [ ] Additional Info

National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444

Standard Site Recording Form Revised 5/88

NPWS Code [ ]

1:250,000 map sheet: _____

HEAD OFFICE USE ONLY:

NPWS Site no: _____

AMG Grid reference (Full reference - please include leading digits): 250K 653790 mE 25K | 250K 6426830 mN 25K 5/6

Site types:

Accessioned by: _____ Date: _____

Data entered by: _____ Date: _____

Scale of map used for grid reference (Please use largest scale available): [✓] 25K/50K (preferred) [ ] 100K [ ] 250K

1:25K, 50K, 100K map name: EULOMOGO 8633-3-N

Owner/Manager:

Address:

Site name: K-OS-4 Locality/property name: "Hillview" South Dubbo

NPWS District: Coonabarabran Region: Western

Reason for investigation: Arch. Survey.

Portion no: 132

Parish: DUBBO

Photos taken? Yes

How many attached? 1

How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along cliff. Draw diagram on separate sheet.): Site located on cultivated paddock adjacent to the eastern extension of Wheelers Lane.

Other sites in locality? Yes

Are sites in NPWS Register? Yes

Site Types include: Open Campsite, Scarred Trees

Have artefacts been removed from site? No

By whom? When? Deposited where?

Important to local Aborigines? Yes

Give contact(s) name(s) + address(es): Central Region ALC - Dubbo.

Contacted for this recording? Yes

Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report): Archaeological Survey for the Proposed Keswick Sub Division, Dubbo. NPWS Report Catalogue #

Checklist: surface visibility, damage/disturbance/ threat to site

Condition of site: Heavily disturbed

Recommendations for management & protection (attach separate sheet if necessary): As Per Report

Site recorded by: JIM KELTON Date: 17/7/1995

Address/institution: 92 DARLING ST COWRA

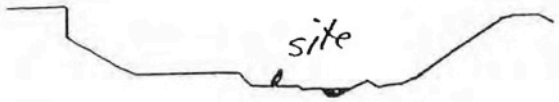
ITE POSITION & ENVIRONMENT

OFFICE USE ONLY: NPWS site no:

Land form a. beach / hill slope / ridge top, etc: Floodplain Flat b. site aspect: 360° c. slope: Nil

mark on diagram provided *or* on your own sketch the position of the site:

e. Describe briefly:



Local rock type: Sandstone g. Land use/effect: Grazing / Crop Cultivation

Distance from drinking water: 100 m Source: Eulomogo Creek

Resource Zone associated with site (estuarine, riverine, forest etc): Open Woodland / Riverine

Vegetation: Euc - dry sclerophyll

Edible plants noted: —

Faunal resources (include shellfish): —

Oth exploitable resources (river pebbles, ochre, etc): —

le a:
Open campsite

DESCRIPTION OF SITE & CONTENTS.
Note state of preservation of site & contents. Do NOT dig, disturb, damage site or contents.

As Per Attached Sheets

HECKLIST TO HELP:
ngth, width, depth, eight of site, shelter, eposit, structure, lement eg. tree scar, rooves in rock.

EPOSIT: colour, xture, estimated epth, stratigraphy, ontents-shell, bone, tone, charcoal, density distribution of these, tone types, artefact ypes.

RT: area of surface ecorated, motifs, olou tst, dry igmen technique of ngra no. of gures, sizes, atination.

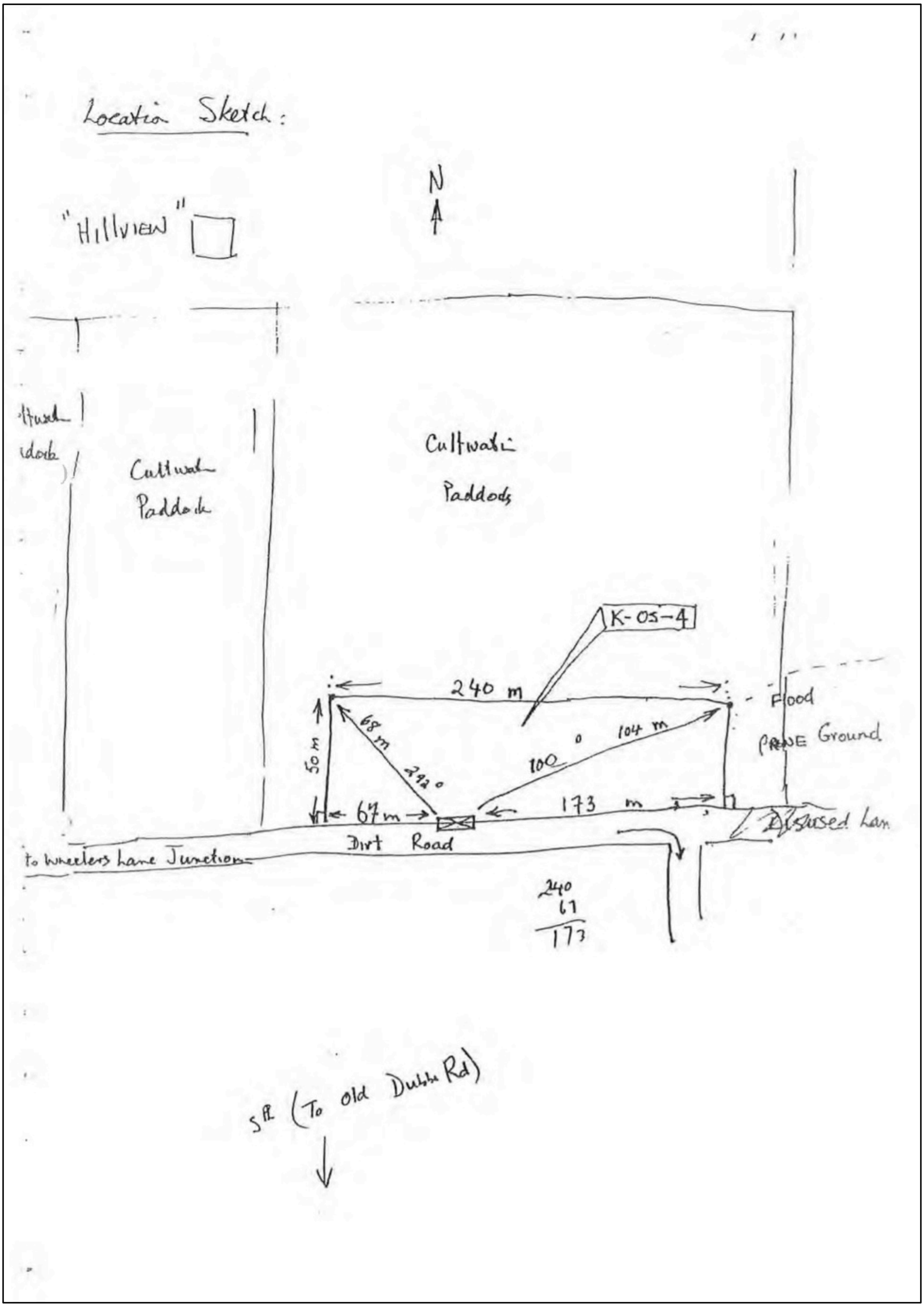
URIALS: number & ondition of bone, osition, age, sex, ssociated artefacts.

REES: number, alive, ead, likely age, scar hape, position, size, atterns, axe marks, egrowth.

UARRIES rock type, ebris, recognisable rtefacts, percentage uarried.

THER SITES EG tructures (fish traps, stone arrangements, ora rings, mummias), ythological sites, rock holes, engraved groove hannels, contact sites (missions massacres cemeteries) as appropriate

Attach sketches etc. eg. plan & section of shelter, show relation between site contents, indicate north, show scale.
Attach annotated photos (stereo where useful) showing scale, particularly for art sites.


Location Sketch:
N
"Hillview"
Cultivation Paddock
Cultivation Paddock
K-05-4
240 m
50 m
68 m
100
104 m
67 m
173 m
Flood PRONE Ground
Disused Lane
Dirt Road
to Wheelers Lane Junction
240
67
173

K-OS-4

GR. 653794
6426834

Open Artefact Scatter Site

Site Name / No: K-OS-4 Date: 18/7/95
Grid Ref.

1. Landform Unit: Elevated flood Plain
(hill slope, ridge top, floodplain etc)

2. Nature of deposit: Sandy
(sandy, gravely, clay etc)

3. Erosion - On Site: Sheet Rilling Gully
Nil

- Environment: @ Cleared – open woodland

4 Site Exposure / Extent: 240 x 50 m. Area 12,000 m²
(artefacts visible)

4. Surface Visibility (est.): <5% 5-10% (20-50%) 50-70% 75-100%
approx 40%

5. Present Landuse: Grazing / Cultivation

6. Type of Archaeological Material Present: Stone Material Pebbles, Cores, Flakes, Axe, Hammer Stones

7. Artefacts in situ ? Probably ~~Yes~~ No because of cultivation
(erosion occurring etc)

8. Artefact Density: 2 Artefact /m² Max.

9. Total Number of artefacts:
Estimated Number of artefacts: (50-100) 100-200 <500 >500

10. Raw Material %s: Quartzite 80% Quartz 15%.
Basalt 5%

11. Site complex characteristics:
(associated hearths, knapping floors, ST's etc)

6426834

Site Name / No: K-OS-A Date: 18/7/95

Artefact	Dimensions (cm) L	W	T	Material	Colour	Cortex (%)	Comments
Hammerstone/ Pick.	135	65	34	Quartzite	Light Brown	99% water-worn	Abrasion at pointed end. Reliable. (River)
Hammerstone	175	55	35	Quartzite	Brown	99% water worn	Abrasion at opposite ends + one flat surface
Hammerstone/ Pick.	126	74	48	Chert	Grey/brown	80% water-worn	Abrasion one end. Opposite end broken 2 Neg flake scars on opposite end.
Axe blank/ trimmed/ Knapped	104	72	35	Basalt	Grey/black	nil	bifacial knapped.
Flaked P.	55	41	14	Quartzite	Red	30% water-worn	1 neg flake scar.
Flake	68	60	16	Chert	Grey/green	20% (water worn)	1 neg flake scar platform bulb.
Flaked P.	48	40	18	Q/zite	Grey/Brown	nil 5% (water-worn)	1 neg flake scar.

Site Details

* Site occurs on cultivated/grazed land.
* ~~Is~~ Visible on surface, low ~~density~~ artefact density but probably more at sub surface level. $<1/m^2$ on surface
* Site Significance: – Scientifically low due to high level of disturbance
  – Educati – low due to scarcity of surface material
  – Aboriginal – will recommend low.
* Visibility – ~~is~~ 50% average
  – bette on cleared ground

Significance

* Site Heavily disturbed by grazing/cultivation

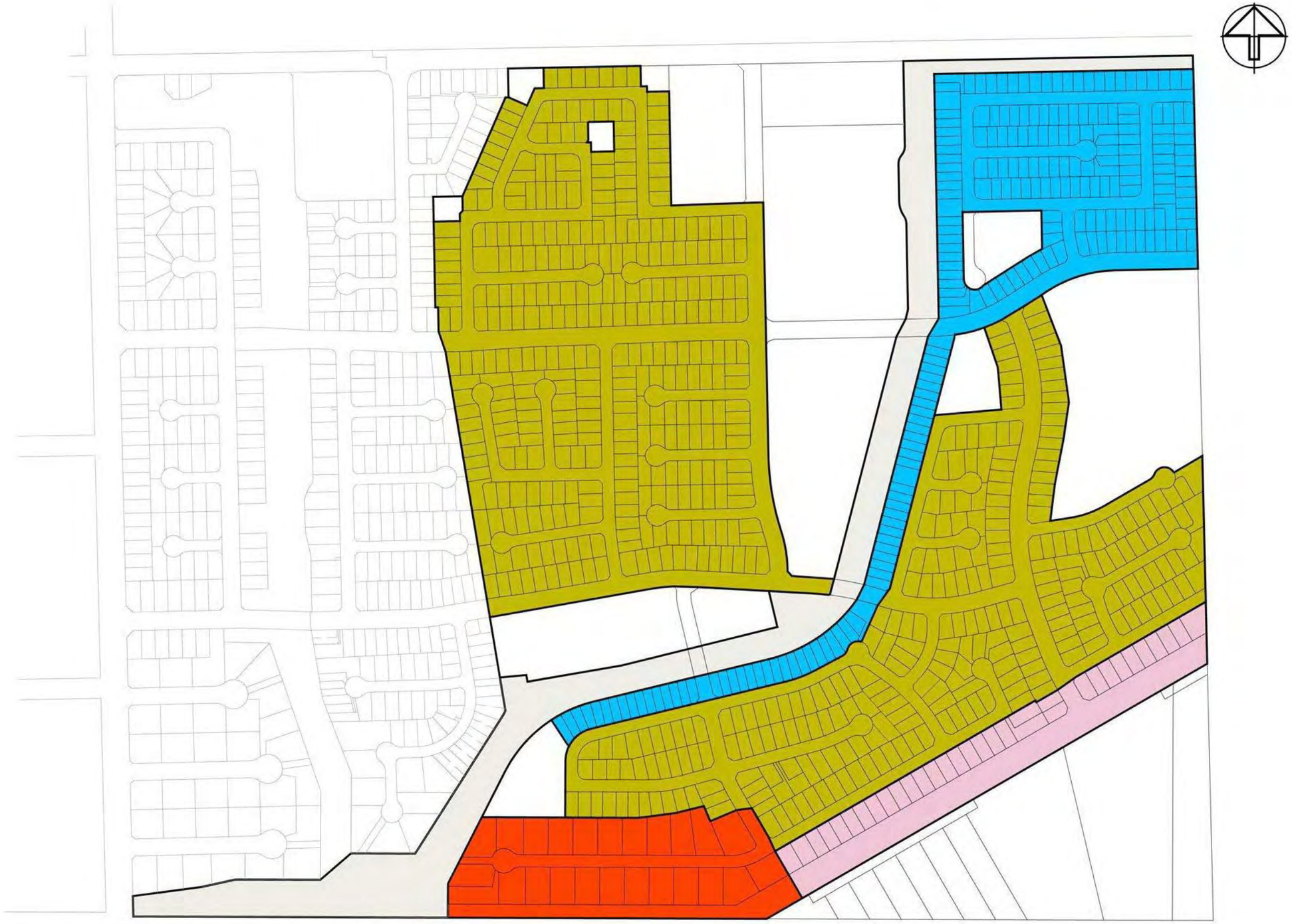
APPENDIX 2: UNANTICIPATED FINDS PROTOCOL

An Aboriginal artefact is anything which is the result of past Aboriginal activity. This includes stone (artefacts, rock engravings etc.), plant (culturally scarred trees) and animal (if showing signs of modification; i.e. smoothing, use). Human bone (skeletal) remains may also be uncovered while onsite.

Cultural heritage significance is assessed by the Aboriginal community and is typically based on traditional and contemporary lore, spiritual values, and oral history, and may also take into account scientific and educational value.

Protocol to be followed in the event that previously unrecorded or unanticipated Aboriginal object(s) are encountered:

1. All ground surface disturbance in the area of the finds should cease immediately the finds are uncovered.
    a) The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be halted; and
    b) The site supervisor will be informed of the find(s).
2. If there is substantial doubt regarding an Aboriginal origin for the finds, then gain a qualified opinion from an archaeologist as soon as possible. This can circumvent proceeding further along the protocol for items which turn out not to be archaeological. If a quick opinion cannot be gained, or the identification is positive, then proceed to the next step.
3. Immediately notify the following authorities or personnel of the discovery:
    a) OEH; and
    b) Relevant Aboriginal Community Representatives.
4. Facilitate, in co-operation with the appropriate authorities and relevant Aboriginal community representatives:
    a) The recording and assessment of the finds;
    b) Fulfilling any legal constraints arising from the find(s). This will include complying with OEH directions; and
    c) The development and conduct of appropriate management strategies. Strategies will depend on consultation with stakeholders and the assessment of the significance of the find(s).
5. Where the find(s) are determined to be Aboriginal Objects, any re-commencement of construction related ground surface disturbance may only resume in the area of the find(s) following compliance with any consequential legal requirements and gaining written approval from OEH (as required).



NOTES:

1. INFORMATION SHOWN IS FOR DEVELOPMENT APPLICATION PURPOSES ONLY
2. AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY

SCALE 1:3000(A1)
0 20 40 80 120 160 200
0 20 40 80 120 160 200
SCALE 1:6000(A3)

GEOLYSE
DUBBO
dubbo@geolyse.com
www.geolyse.com
1st FLOOR
62 WINGEWARRA STREET
P.O. BOX 1842
DUBBO, NSW 2830
Ph. (02) 6884 1525
Fax. (02) 6884 1470

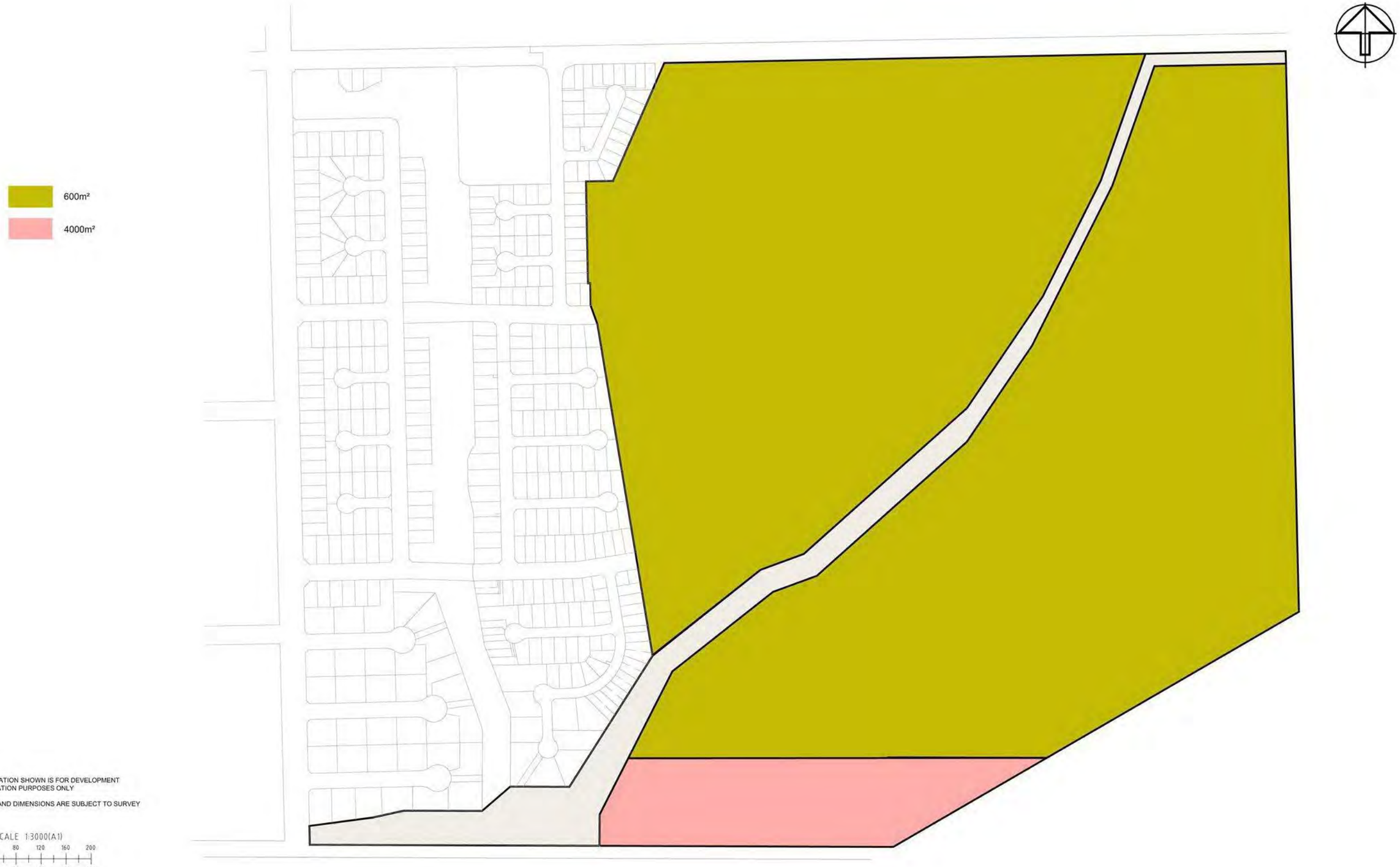
No	DATE	DRAFTING CHECK	APPROVED BY	DETAILS
A	27/07/16	JE	MT	ISSUED TO CLIENT
B	15/08/16	JE	MT	LOT LAYOUT AMENDED

PROJECT
SOUTHLAKES ESTATE
(HILLVIEW)
FILE REFERENCE: 114135_19B_TP04.dwg

APPROVAL AUTHORITY
WESTERN PLAINS
REGIONAL COUNCIL

CLIENT
MAAS GROUP
PROPERTIES No.2
PTY LTD

DRAWING
PROPOSED LOT SIZE MAP
PROJECT NUMBER: 114135
DRAWING NUMBER: 19B_TP04
REV: B
SOURCE: INTERNAL



NOTES:

1. INFORMATION SHOWN IS FOR DEVELOPMENT APPLICATION PURPOSES ONLY
2. AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY

SCALE 1:3000(A1)

0 20 40 80 120 160 200

0 20 40 80 120 160 200

SCALE 1:6000(A3)

GEOLYSE
DUBBO
dubbo@geolyse.com
www.geolyse.com
1st FLOOR
62 WINGEWARRA STREET
P.O. BOX 1842
DUBBO, NSW 2830
Ph. (02) 6884 1525
Fax. (02) 6884 1470

No	DATE	DRAFTING CHECK	APPROVED BY	DETAILS
A	27/07/16	JE	MT	ISSUED TO CLIENT
B	15/08/16	JE	MT	LOT LAYOUT AMENDED

PROJECT
SOUTHLAKES ESTATE
(HILLVIEW)
FILE REFERENCE: 114135_19B_TP03.dwg

APPROVAL AUTHORITY
WESTERN PLAINS
REGIONAL COUNCIL

CLIENT
MAAS GROUP
PROPERTIES No.2
PTY LTD

DRAWING
EXISTING LOT SIZE MAP

PROJECT NUMBER: 114135 | DRAWING NUMBER: 19B_TP03 | REV: B

SOURCE: INTERNAL

DENOTES B1 - NEIGHBOURHOOD CENTRE

DENOTES R1 - GENERAL RESIDENTIAL LAND ZONE

DENOTES R2 - LOW DENSITY RESIDENTIAL LAND ZONE

DENOTES RE1 - PUBLIC RECREATION

NOTES:

1. INFORMATION SHOWN IS FOR DEVELOPMENT APPLICATION PURPOSES ONLY
2. AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY

SCALE 1:3000(A1)

0 20 40 80 120 160 200

0 20 40 80 120 160 200

SCALE 1:6000(A3)

GEOLYSE

DUBBO

dubbo@geolyse.com
www.geolyse.com

1st FLOOR
62 WINGEWARRA STREET
P.O. BOX 1842
DUBBO, NSW 2830
Ph. (02) 6884 1525
Fax. (02) 6884 1470

No	DATE	DRAFTING CHECK	APPROVED BY	DETAILS
A	27/07/16	JE	MT	ISSUED TO CLIENT
B	15/08/16	JE	MT	LOT LAYOUT AMENDED

PROJECT

SOUTHLAKES ESTATE
(HILLVIEW)

FILE REFERENCE: 114135_19B_TP02.dwg

APPROVAL AUTHORITY

WESTERN PLAINS
REGIONAL COUNCIL

CLIENT

MAAS GROUP
PROPERTIES No.2
PTY LTD

DRAWING

PROPOSED ZONING PLAN

PROJECT NUMBER: 114135 | DRAWING NUMBER: 19B_TP02 | REV: B

SOURCE: INTERNAL

PLANNING PROPOSAL

PROPOSED REZONING OF R2 LAND AND AMENDMENTS TO THE MINIMUM LOT SIZE WITHIN THE SOUTH EAST URBAN RELEASE AREA

MAAS GROUP PROPERTIES

OCTOBER 2016

TABLE OF CONTENTS

DRAWINGS

APPENDIX A
EXAMPLE CONCEPT DESIGNS
Collated by Maas Group Properties

APPENDIX B
ECONOMIC IMPACT ASSESSMENT
Prepared by MacroPlanDimasi
October 2015

APPENDIX C
SERVICING STRATEGY &
TRAFFIC STUDY
All prepared by Geolyse Pty Ltd
August & September 2016

APPENDIX D
GROUNDWATER AND SALINITY STUDY
Prepared by Envirowest Consulting Pty Ltd
September 2016

APPENDIX E
ECOLOGICAL ASSESSMENT
Prepared by Ozark Environmental & Heritage Management Pty Ltd
May 2015

APPENDIX F
CONTAMINATION INVESTIGATION STUDY
Prepared by Envirowest Consulting Pty Ltd
September 2016

APPENDIX G
ABORIGINAL ARCHAEOLOGICAL ASSESSMENT
Prepared by Ozark Environmental & Heritage Management Pty Ltd
June 2015

Executive Summary

The intention of the Planning Proposal (PP) is to create a planning regime that supports development of the land in a generally consistent manner to that of the existing Southlake's Estate. The PP would provide greater flexibility and choice in residential land and housing product and the provision of a public recreation area within and adjacent to a realigned drainage corridor and the provision of a new neighbourhood centre within the south east urban release area of Dubbo from that currently available under the homogenous residential zoning regime of the *Dubbo Local Environmental Plan 2011 (LEP)*.

The proposed rezoning and subsequent changes to the minimum allotment size of the LEP would facilitate a Master Planned Neighbourhood that would provide;

- Greater flexibility and choice in residential land and housing product within the south east urban release area and the greater residential market of Dubbo. In particular, increasing the medium density and housing choice options in proximity to proposed local collector roads, recreation areas and commercial zones;
- An additional neighbourhood business centre supporting additional local business opportunities in convenient locations for the future residents of the south east of Dubbo; and
- Public recreation areas within and adjacent to the realigned drainage corridor providing opportunities for passive and active recreation for residents of the south east of Dubbo through the landscaped corridor that incorporates cycle ways, footpaths, decorative lakes and parklands.

It is anticipated that primarily the PP would facilitate;

- A combination of single and two storey low density development with some higher building heights achieved upon larger medium density development;
- A neighbourhood business centre of a similar building height to that of surrounding development adjoining and with direct pedestrian and road links to public recreation land and the local road network;
- A retail GFA greater than 1,000m^2 providing the consent authority has considered the economic impact of proposed retail development is satisfied that the development will not have an impact on the commercial hierarchy of Dubbo;
- A retail centre which permits the provision of a gym or like use as defined under the DLEP as recreation facility (indoor);
- Varied infrastructure designed to provide stormwater management integrated into the design of proposed landscaped recreation areas; and
- Recreation and suitable landscaped areas to enhance the amenity of the local area.

This PP affects the *Land Zoning Map – Sheet LZN_008B* and the *Minimum Lot Size Map – Sheet LSZ_008B* of the *Dubbo Local Environmental Plan 2011* (DLEP). In particular, the PP affects three (3) separate land holdings (Lot 503 DP 1152321, Lot 12 DP 1207280 & Lot 399 DP 1199356) within the South East of Dubbo bounded by Boundary Road to the north, Henessy Road to the south Sheraton Road to the east and the existing Southlakes Estate to the west.

This PP seeks to rezone:

- part of the existing R2 – Low Density Residential land to R1 - General Residential land;
- part of the existing R2 – Low Density Residential land to B1 - Neighbourhood Centre;
- part of the existing R2 – Low Density Residential land to RE1 – Public Recreation by the realignment of the existing drainage corridor land (Lot 503 DP 1152321);

The PP seeks to amend the minimum lot sizes for the land affected by the amended rezoning, as follows:

- The southern portion of R2 zoned land to comprise a minimum lot size range of 600m^2 to 4000m^2;

- R1, RE1 & B1 zoned land comprise no minimum lot size;

The R1 and B1 land have been chosen to facilitate higher density residential land options and commercial use land options adjacent to or within close proximity to public recreation land, walkways, and drainage reserves. It is envisioned that the PP would assist in providing a more flexible development suite and potential subdivision layout for each future site within the indicative lot layout of the PP than that currently achievable under the homogenous R2 zoned land.

Due to the minor nature of the proposal, approval of the planning amendments is sought from the Director-General of the Department of Planning as part of the Gateway Determination.

Details of the proposal's compliance with all applicable strategic, regional, and local planning instruments, state environmental planning policies, and ministerial directions are contained in the body of this report.

This PP has been prepared in accordance with the NSW Department of Planning's (DoP) advisory documents *'A Guide to Preparing Local Environmental Plans'* and '*A Guide to Preparing Planning Proposals'.*

Background

1.1 INTRODUCTION

Maas Group Properties have prepared this PP to support a proposed amendment to the *Dubbo Local Environmental Plan 2011*. This PP affects the *Land Zoning Map – Sheet LZN_008B* and the *Minimum Lot Size Map – Sheet LSZ_008B* of the *Dubbo Local Environmental Plan 2011* (DLEP). In particular, the PP affects three (3) separate land holdings (Lot 503 DP 1152321, Lot 12 DP 1207280 & Lot 399 DP 1199356) within the South East of Dubbo bounded by Boundary Road to the north, Henessy Road to the south Sheraton Road to the east and the existing Southlakes Estate to the west.

This land is nearing readiness for development as the existing residential estate of Southlakes progress east towards the property boundary.

The proposed rezoning and subsequent changes to the minimum allotment size of the LEP would facilitate a Master Planned Neighbourhood that would provide;

- Greater flexibility and choice in residential land and housing product within the south east urban release area and the greater residential market of Dubbo. In particular, increasing the medium density and housing choice options in proximity to proposed local collector roads, recreation areas and commercial zones;
- An additional neighbourhood business centre supporting additional local business opportunities in convenient locations for the future residents of the south east of Dubbo; and
- Public recreation areas within and adjacent to the realigned drainage corridor providing opportunities for passive and active recreation for residents of the south east of Dubbo through the landscaped corridor that incorporates cycle ways, footpaths, decorative lakes and parklands.

It is anticipated that primarily the PP would facilitate;

- A combination of single and two storey low density development with some higher building heights achieved upon larger medium density development;
- A neighbourhood business centre of a similar building height to that of surrounding development adjoining and with direct pedestrian and road links to public recreation land and the local road network;
- A retail GFA greater than 1,000m^2 providing the consent authority has considered the economic impact of proposed retail development is satisfied that the development will not have an impact on the commercial hierarchy of Dubbo;
- A retail centre which permits the provision of a gym or like use as defined under the DLEP as recreation facility (indoor);
- Varied infrastructure designed to provide stormwater management integrated into the design of proposed landscaped recreation areas;
- Recreation and suitable landscaped areas to enhance the amenity of the local area.

This PP affects the *Land Zoning Map – Sheet LZN_008B* and the *Minimum Lot Size Map – Sheet LSZ_008B* of the *Dubbo Local Environmental Plan 2011* (LEP).

The proposal is considered to be of a minor nature and in this respect approval is sought from the Director-General of the Department of Planning as part of the Gateway Determination.

Details of the proposal's compliance with relevant strategic, regional, and local planning instruments, state environmental planning policies, and ministerial directions are contained in the following sections.

1.2 SCOPE OF REPORT

This PP has been prepared in accordance with the NSW Department of Planning's advisory documents *'A Guide to Preparing Local Environmental Plans'* and *'A Guide to Preparing Planning Proposals'*. The latter document requires the PP to be provided in four (4) parts, those being;

- *Part 1* – A statement of the objectives or intended outcomes of the proposed LEP;
- *Part 2* – An explanation of the provisions that are to be included in the proposed LEP;
- *Part 3* – The justification for those objectives, outcomes, and provisions and the process for their implementation;
- *Part 4* – Mapping; and
- *Part 5* – Details of the community consultation that is to be undertaken on the Planning Proposal.

It is noted that Part 4 would be confirmed following a Gateway Determination of this Planning Proposal by the NSW Department of Planning and Environment.

1.3 STRUCTURE

This PP is provided in the following structure;

- **Section 2** provides an overview of the subject site; the development intent; and development constraints;
- **Section 3** provides a statement of the objective and explanation of provisions of the PP;
- **Section 4** provides justification regarding the need for the PP; outlines its relationship to strategic planning strategies; and overviews the environmental, economic, and social impacts of the proposal;
- **Section 5** provides the proposed mapping amendments relating to the Planning Proposal area; and
- **Section 6** details how community consultation is to be undertaken with respect to the PP.

Overview

2.1 THE SUBJECT SITE

2.1.1 SITE DESCRIPTION AND LOCATION

This Planning Proposal (PP) affects a portion of land known identified as Lot 399 DP 1199356, Lot 12 DP 1207280 & Lot 503 DP 1152321 within the South East Urban Release Area of Dubbo bounded by the future extension of Boundary Road to the north, Henessy Road and its future extension to the south and the eastern extent of the Southlakes Estate to the west and Sheraton Road to the east.

This land is nearing readiness for development as the existing residential estate development of Southlakes progress east towards the property. This land is located within the visible transition and eastern edge of Dubbo's South Eastern Urban Development Precinct, being the Sheraton Road and Hennessy Road corridors.

Plate 1 provides an aerial view of the land relative to the city of Dubbo and surrounding development which is the subject of this PP.

Plate 1: Aerial view of the subject land, Dubbo City and surrounding development (source: www.maps.sixnsw.gov.au)

2.2 DEVELOPMENT INTENT

The intention of the Planning Proposal (PP) is to provide;

- Greater flexibility and choice in residential land and housing product within the south east urban release area and the greater residential market of Dubbo. In particular, increasing the medium density and housing choice options in proximity to proposed local collector roads, recreation areas and commercial zones;

- A neighbourhood business centre to compliment the south east urban release area with retail services and providing additional local business opportunities; and

- Public recreation areas within and adjacent to the realigned drainage corridor providing opportunities for passive and active recreation for residents of the south east of Dubbo through the landscaped corridor that incorporates cycle ways, footpaths, decorative lakes and parklands

It is anticipated that primarily the PP would facilitate;

- A combination of single and two storey low density development with some higher building heights achieved upon larger medium density development;
- A neighbourhood commercial centre complimenting the surrounding urban release area and its development adjoining and with direct pedestrian and vehicle links to public recreation land and the local road network;
- A retail GFA greater than 1,000m^2 providing the consent authority has considered the economic impact of proposed retail development is satisfied that the development will not have an impact on the commercial hierarchy of Dubbo;
- A retail centre which permits the provision of a gym or like use as defined under the DLEP as recreation facility (indoor);
- Varied infrastructure integrated with the future road and landscaped recreation areas;
- Landscaped recreation spine through the estate that enhances the amenity and connectivity of the estate, its residents and all the various uses within.

2.2.1 EXISTING ZONE REGIME AND PERMISSIBILITY

The existing Land Zoning Map – Sheet LZN_008B describes a land zoning regime for the site of R2 – Low Density Residential with RE1 – Public Recreation Area for Lot 503 being the existing land used to convey overland stormwater through the site.

The current R2 zoning application across the south east precinct results in a large expanse of land area with a predominantly homogenous residential development potential and without a broad choice of building types supported by a future neighbourhood centre.

The nearest local 'business' centres are approximately 2km to the north and west from the sites north western corner (via either Boundary Road and Wheelers Lane) with other business zoned land located along the Mitchell Highway (Cobra Street) to the east and west.

The B1 Local Centre Zone land use table is a closed table and does not permit the use of land zoned B1 for use as a 'recreation facility (indoor). A DLEP B1 land use table extract is provided below:

Zone B1 Neighbourhood Centre

1 Objectives of zone

- To provide a range of small-scale retail, business and community uses that serve the needs of people who live or work in the surrounding neighbourhood.

- To ensure the growth of each neighbourhood centre is consistent with the commercial hierarchy of the City of Dubbo.

2 Permitted without consent

Environmental protection works; Home-based child care; Roads

3 Permitted with consent

Amusement centres; Boarding houses; Business premises; Car parks; Child care centres; Commercial premises; Community facilities; Educational establishments; Entertainment facilities; Environmental facilities; Function centres; Health consulting rooms; Home businesses; Home industries; Home occupations; Information and education facilities; Medical centres;

Neighbourhood shops; Passenger transport facilities; Places of public worship; Respite day care centres; Shop top housing; Signage; Tourist and visitor accommodation; Veterinary hospitals; Waste or resource transfer stations; Water reticulation systems

4 Prohibited

Advertising structures; Bed and breakfast accommodation; Bulky goods premises; Cellar door premises; Farm stay accommodation; Garden centres; Hardware and building supplies; Kiosks; Landscaping material supplies; Markets; Office premises; Plant nurseries; Pubs; Restricted premises; Roadside stalls; Rural supplies; Timber yards; Vehicle sales or hire premises; ***Any other development not specified in item 2 or 3***

Plate 2 below details the current land zoning regime within the South East Precinct.

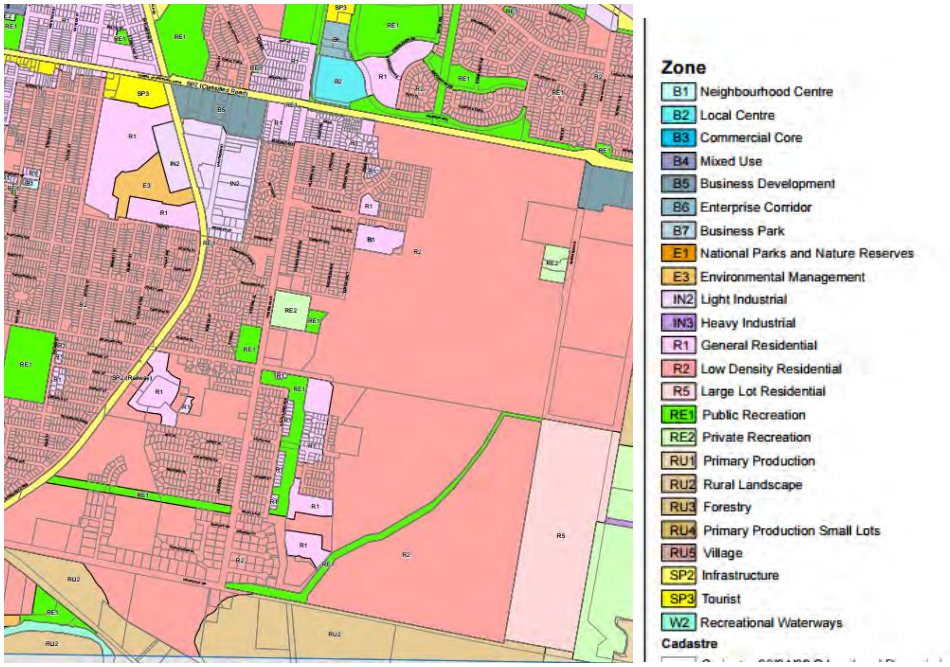


Plate 2: DLEP 2011 Zoning Map LZN_008B extract (Source: www.legislation.nsw.gov.au)

Additional local provisions also apply to the shops in Zone B1 Neighbourhood Centre as prescribed by Clause 7.12 of DLEP the objective of this clause is to maintain the commercial hierarchy of Dubbo by encouraging retail development of an appropriate scale within neighbourhood centres. Subclause (2) does not allow Council to grant development consent to retail development that will exceed a GFA of 1,000m^2. Clause 7.12 extract of the DLEP is provided below:

7.12 Shops in Zone B1 Neighbourhood Centre

(1) The objective of this clause is to maintain the commercial hierarchy of Dubbo by encouraging retail development of an appropriate scale within neighbourhood centres.

(2) Despite any other provision of this Plan, the consent authority must not grant development consent to development for retail premises on land within Zone B1 Neighbourhood Centre if the gross floor area of the development will exceed 1,000 square metres.

(3) Before granting consent to development for the purpose of shops having a gross floor area of 500 square metres or greater, in either one separate tenancy or any number of tenancies, the consent authority must consider the economic impact of the proposed development and be satisfied that the proposed development will not have an adverse impact on the commercial hierarchy of Dubbo.

2.2.2 EXISTING MINIMUM LOT SIZE RESTRICTIONS

Upon viewing the LEP Minimum Lot Size Map – Sheet LSZ_008B the predominant minimum lot size for the majority of R2 zoned land upon the site is 600m^2 with a minimum lot size of 4000m^2 for land adjoining Henessy Road.

Southlakes Estate

The existing residential land within the developed Southlakes Estate is comprised of:

- R1 zoned Land adjoining the stormwater 'lakes' system with no minimum lot size;
- R1 zoned land adjoining the stormwater 'lakes' system with a minimum lot size of 300m^2;
- R2 zoned land adjoining the creek lake system and also generally comprising the majority of the sites land mass with a minimum lot size of 600m^2;
- R2 zoned land in the southern portion of the site north of Hennesy Road with a minimum lot size of 2000m^2

Business and Recreation Land

No minimum lot size is applicable for business zoned land or public recreation land consistent with the general provisions of the LEP as detailed upon the current LEP minimum lot size map shown in Plate 3 below.

The current minimum lot size application across the south east precinct results in a large expanse of land area with a predominantly homogenous residential development potential in the form of standard low density residential subdivision.

Plate 3 below details the current minimum subdivision allotment size regime permissible under the LEP within the South East Precinct. The site is outlined in red.

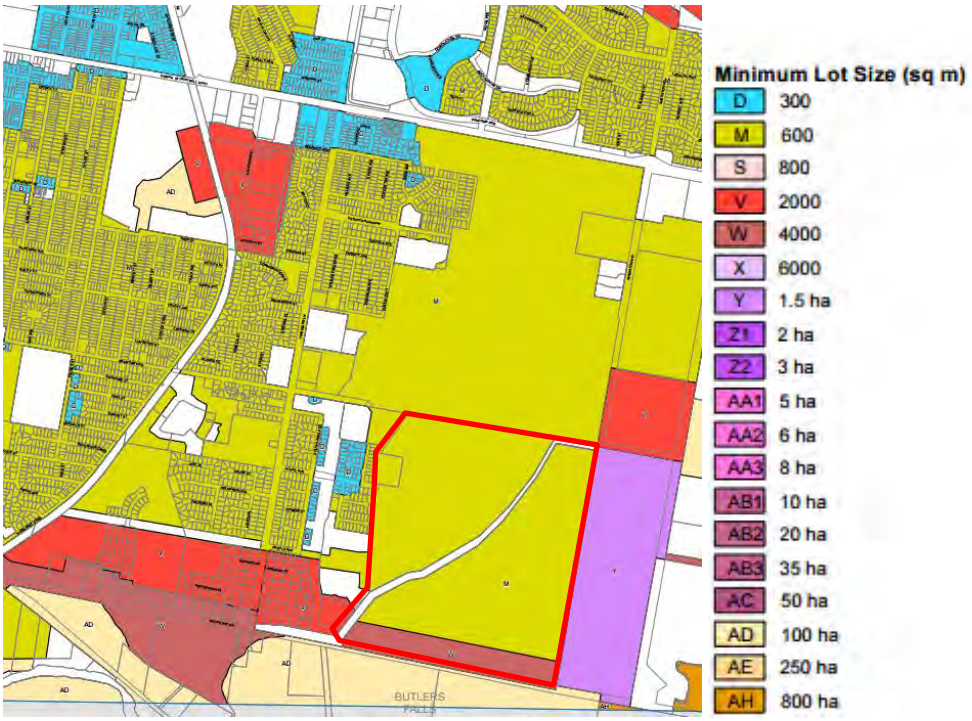


Plate 3: DLEP 2011 Minimum Lot Size Map LSZ_008B extract (Source: www.legislation.nsw.gov.au)

2.2.3 PROPOSED ZONE REGIME

The intention of the rezoning is to provide;

- A combination of single and two storey low density development with some higher building heights achieved upon larger medium density development;
- A neighbourhood commercial centre complimenting the surrounding urban release area and its development adjoining and with direct pedestrian and vehicle links to public recreation land and the local road network;
- A retail GFA greater than 1,000m^2 providing the consent authority has considered the economic impact of proposed retail development is satisfied that the development will not have an impact on the commercial hierarchy of Dubbo;
- A retail centre which permits the provision of a gym or like use as defined under the DLEP as recreation facility (indoor);
- Varied infrastructure integrated with the future road and landscaped recreation areas;
- Landscaped recreation spine through the estate that enhances the amenity and connectivity of the estate, its residents and all the various uses within.

Plate 4 below shows the proposed zoning amendments within the South East Precinct.

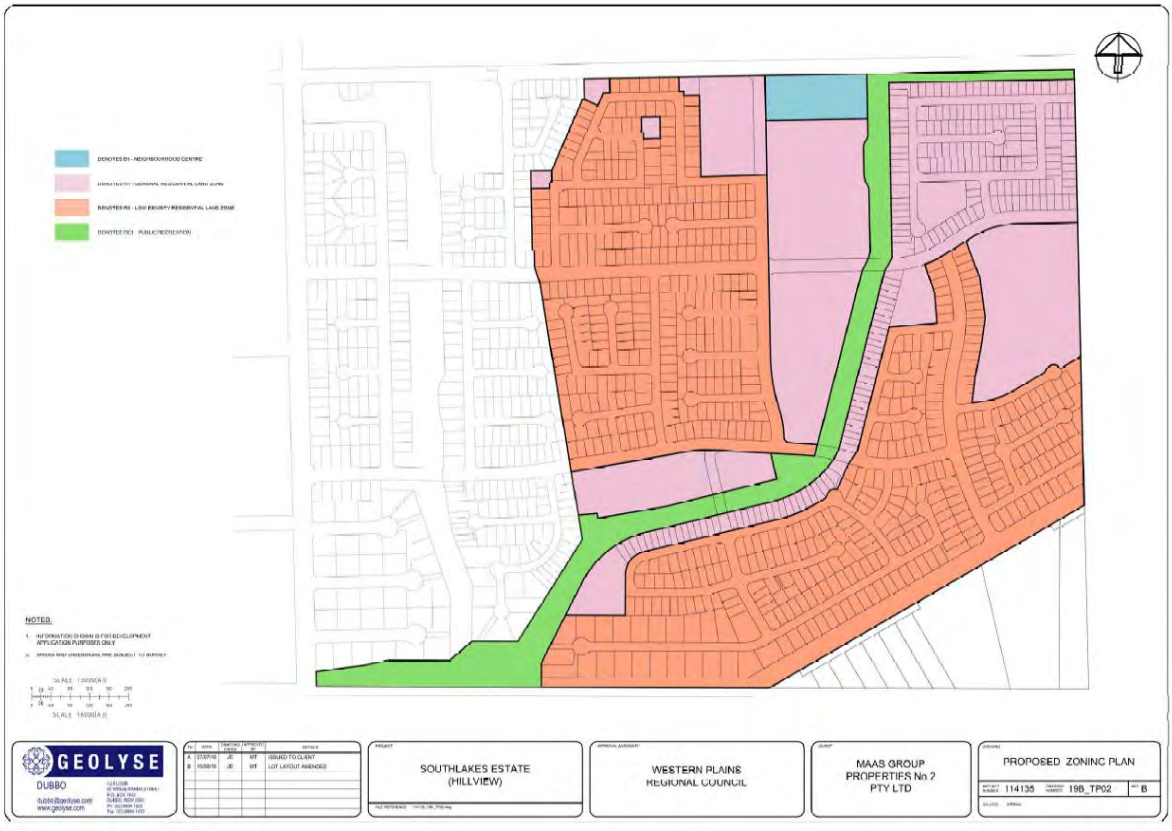


Plate 4: Proposed zoning plan extract (Geolyse Pty Ltd 114135_19B_TP02)

The proposed zoning regime has been developed to;

- Provide a for a variety of housing types and densities;
- Provide higher density residential living adjacent to or within close proximity to neighbourhood shops, public recreation land, cycle ways, walkways, and drainage reserves;
- Provide low density housing within a landscaped setting on the fringe of the Dubbo urban area;

- Provide a range of small-scale retail, business and community uses that serve the needs of people who live or work within the immediate surrounding neighbourhood whilst ensuring the economic viability of the Dubbo CBD and surrounding business zones
- Provide land for infrastructure and related uses;
- Provide land to be used for public open space and recreational purposes; and
- Enhance existing drainage infrastructure land and its surrounding natural environment for recreational use.

2.2.4 PROPOSED MINIMUM LOTS SIZE REQUIREMENTS

In accordance with the Land Zoning Map LZN_008B and Lot Size Map LSZ_008B of the *Dubbo Local Environmental Plan 2011* (LEP), the identified R1 – General Residential land is accompanied by no minimum lot size and a minimum lot size of 450m^2 and the majority of the identified R2 – Low Density Residential land is accompanied by a minimum lot size of 600m^2 with the remaining R2 land having a minimum lot size of 800m^2 and 2000m^2. No minimum lot size applies to RE1 or B1 zoned land of the LEP generally consistent with that immediately to the west.

The proposed B1 zone is approximately 19,500m^2 in area with approximate dimensions of 209.5m (Boundary Road frontage) and 93m (drainage reserve frontage).

Plate 5 below shows the proposed minimum lot size amendments within the South East Precinct.

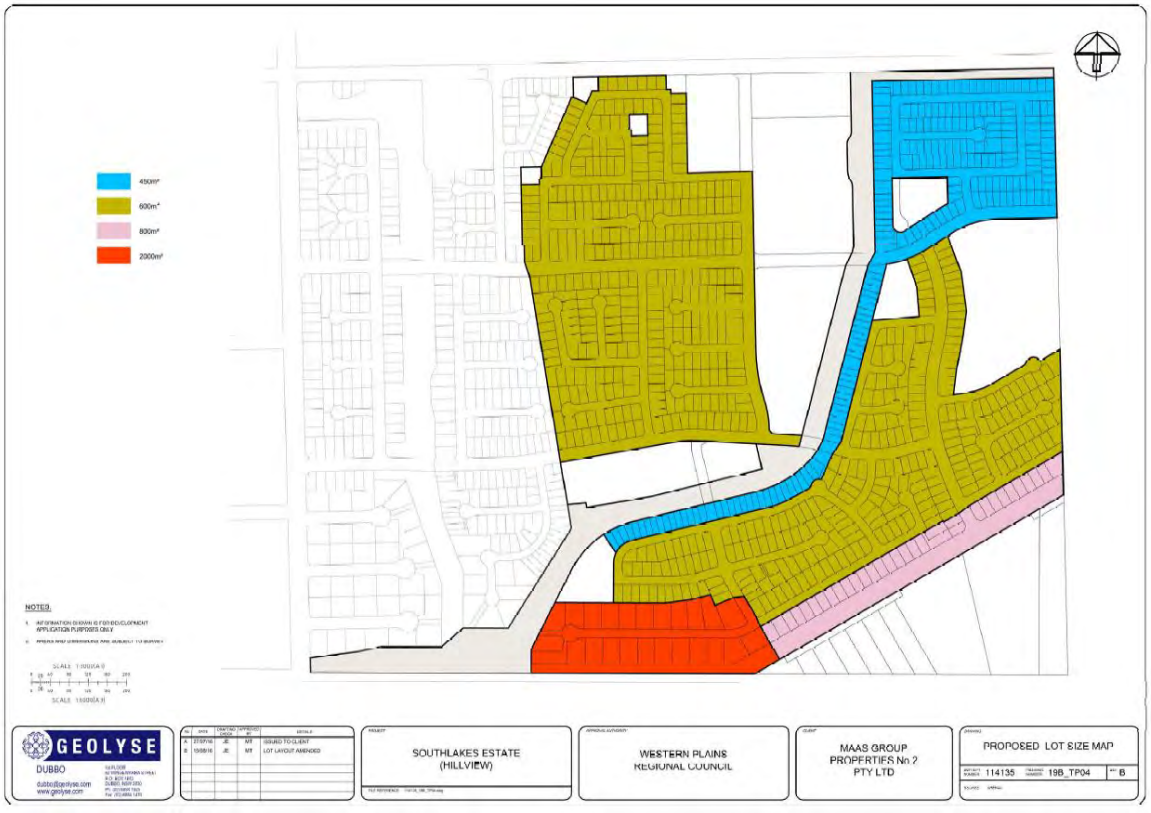


Plate 5: **Proposed lot size plan extract (Geolyse Pty Ltd 114135_19B_TP04)**

As stated above, the intention of the amendment to the minimum allotment size for residential zoned land is to provide greater flexibility and choice in residential land and housing product within the south east land release areas and the greater residential market of Dubbo.

As the future development of these sites would facilitate the establishment of different types of residential development and lots beyond that currently achievable under the LEP land zoning and lot size provisions.

No minimum lot size is provided for B1 and RE1 zoned land consistent with current minimum lot size requirements under the *Dubbo Local Environmental Plan 2011.*

In this regard an amendment to the abovementioned Land Zoning and Lot Size provisions of the LEP would be required in order for the future development of these sites to be permissible and compliant.

2.2.5 ANTICIPATED DEVELOPMENT TYPOLOGIES

It is anticipated that primarily the PP would facilitate a combination of single and two storey development with the majority of development being single storey in height.

The following types of housing to be provided within the R1 zoned land would be:

1. Traditional medium density (multi dwelling housing) development generally in the form of attached 2 bedroom single storey dwellings approximately 4 to 6 dwellings long.

2. Small lot housing (attached and semi-detached dwellings), generally where divided by through roads and drainage corridors and in the form of attached and detached dwellings with minimal private curtilage upon local through roads.

3. Integrated house and land development (Multi dwelling housing, attached dwellings, semi-detached dwellings, and dwellings) with private roads, open space and community facilities.

It is anticipated that the R1 zoned areas would be developed with a mix of all forms of housing ranging from the traditional medium density housing to integrated house and land development.

It is envisaged that the R2 zoned areas would be developed with a mix of traditional house and land development with larger lot living located along the southern fringe.

It is anticipated that the B1 zoned land would be developed with a local neighbourhood business centre that provides a range of supporting retail uses centred around a supermarket with associated parking, loading and unloading, and landscaped areas.

It is envisaged that the RE1 zoned land would be landscaped with a range of vegetation and developed with decorative lakes children's playground and footpaths to provide active and passive recreation areas for residents.

Examples of concept development designs have been compiled to give Council an understanding of the general form and style of development anticipated for the proposed zones are provided at **Appendix A**.

2.2.6 PROPOSED DEVELOPMENT OBJECTIVES

The development of the land is to be developed generally in accordance with the following objectives

- Provide for a neighbourhood centre, attached dwellings and multi dwelling housing in areas of increased amenity including land adjoining or opposite:
    - Neighbourhood centre shops;
    - Parks and open space; and
    - Drainage land corridor.
- Provide opportunities for community open space integrated into the subdivision design.
- Provide opportunities for an increased range of smaller residential lot sizes and varied housing product to the community whilst not preventing the development of detached, single storey dwellings and provide options to make these housing options easier to deliver.
- Provision of local roads including loop roads and laneways for traffic circulation through these areas.

It is noted that future development would be required to be designed in accordance with the objectives of the Dubbo Local Environmental Plan 2011 and Dubbo Development Control Plan 2013, in particular

the development controls for privacy, noise, streetscape amenity and parking provision would be maintained.

In addition to the above objectives it is anticipated that each land use zone would be developed with consideration to the following general objectives:

R1 zoned land

- Provide housing with access to the landscaped 'lakes' corridor which facilitates an active recreation link between the residential zoned land and the neighbourhood centre;
- Provide both local loop roads and lane ways through the larger land areas to create an efficient subdivision layout with effective vehicle and pedestrian circulation;
- Provide varied lot sizes and housing product opportunities integrated with community facilities and open space areas upon larger land areas;
- Provide varied medium density housing options upon smaller land areas including those adjoining and adjacent to opens space and commercial areas;

The market is considered able to provide sufficient varied housing product that is attractive, modern, of good design, employs standard sustainable design provision and is suitably landscaped to ensure an attractive and well-designed development without detriment to future resident's amenity.

It is noted this development is currently being developed within existing R1 zoned land within Southlakes.

R2 zoned land:

- Provide housing with access to the landscaped 'lakes' corridor which facilitates an active recreation link between the residential zoned land and the neighbourhood centre;
- Provide local roads with a mix of traditional grid and some cu-de-sac formation through the majority of the land area to create an efficient subdivision layout with effective vehicle and pedestrian circulation and a range of streetscape typologies;
- Provide varied lot sizes and housing product opportunities with the allotments generally increasing in size as they progress from north to south of the site.

The market is considered to continue to provide attractive, modern, of good design, low density housing products that are suitably landscaped which when the land is full developed would provide for an attractive and well-designed estate.

It is noted this development is currently being developed within existing R2 zoned land within Southlakes.

B1 zoned land:

- Provide a neighbourhood commercial centre with a range of uses to service the daily needs of residents of area;
- Provide a neighbourhood centre with direct access to the adjoining 'lakes' corridor which provides an effective pedestrian link between the neighbourhood centre and the residential zoned land;
- Provide a neighbourhood centre separated from adjoining residential use areas through adjoining roads and landscaped corridor;
- Provide a neighbourhood centre which maintains the commercial hierarchy of Dubbo by providing retail development of an appropriate scale;
- Provide a neighbourhood centre of between 5,000m^2 and 6000m^2 which accommodates a supermarket of at least 3500m^2 and ancillary supporting retail outlets including a gym;
- Provide a neighbourhood centre with direct access to Boundary Road to confirm its identity as the local neighbourhood centre for the urban release area.

The market is considered to provide attractive, modern, good design, commercial development appropriate to surrounding residential and landscaped recreation areas as demonstrated within supporting Economic Impact Assessment prepared by MacroPlan Dimasi dated October 2015 at Appendix B.

It should be noted that the MacroPlan Dimasi assessment includes the recent closure of the full size IGA supermarket within Orana Mall. This amendment within the Dubbo market place adds to the undersupply of supermarket floor space by approximately 3000m^2 (being the floor space of the Super IGA Store previously accounted for in Councils economic impact assessments) resulting in additional capacity within the economy for the provision of an additional supermarket.

RE1 zoned land:

- Provide a landscaped drainage corridor with decorative shallow lakes system through the landscape;
- Provide passive and active recreation areas for use by residents of the area in the form of a children's playground, cycleways, footpaths and bridges meandering through and over a central drainage corridor;
- Provide a landscaped corridor that facilitates additional pedestrian and cycle permeability through the area to adjoining major public transport corridors of Boundary Road, Henessy Road, Wheelers Lane, Sheraton Road including the future freight way;
- Provide a connection through the residential estate to the local neighbourhood centre and adjoining residential estates.

The industry is considered duly able to provide good infrastructure and landscaped areas that would achieve the above objectives as generally designed and detailed within the servicing strategy provided at Appendix C.

2.2.7 SERVICES

A servicing strategy has been prepared and includes the provision of future local roads, water, sewer, stormwater mains infrastructure to support the future development consistent with the required service providers design requirements and similar to that of surrounding arrangements of the urban release area.

In general, telecommunications, roads, power and water service mains are being constructed/extended from the existing mains located to the west within Boundary Road, Wheelers Lane, Argyle Avenue, Azure Avenue and Henessy Road with sewer and stormwater being extended and augmented from their respective downstream mains and would be generally located within the proposed drainage corridor.

The land is to be serviced by all available reticulated utilities, including power, telephone, gas, water and sewerage as are available in the greater locality. Necessary provision and upgrading where required to facilitate the development is acknowledged and generally detailed within the servicing strategy provided at Appendix C. All services would conform to the requirements of the relevant service authority.

2.2.8 TRAFFIC & TRANSPORT CONSIDERATION

R1 and R2 zoned land:

The supporting Traffic Study prepared by Geolyse dated August 2016 and provided at Appendix C calculates the predicted traffic generation rates for the estate once developed in accordance with that indicated upon the masterplan plans numbered 114135_19B_TP02 & TP04.

Once fully constructed the proposed residential estate will be provided with east/west and north/south local collector/spine roads that link to the surrounding local collector roads of Boundary Road, Hennessy Drive and Wheelers Lane

The study identifies additional vehicle trips are not considered to have an adverse impact upon traffic congestion within the surrounding road network and generally result in service levels of A and B for the roads of Boundary Road, Wheelers Lane and their respective intersections as modelled using SIDRA.

It is considered that the surrounding and future road network is of sufficient capacity to cater for the future increase in vehicle trips once developed.

B1 zoned land:

The Neighbourhood Centres would comprise a super market and supporting small retail shops as being like uses that would generate similar trip rates.

The supporting traffic study identifies that the proposed site would be of sufficient area for the provision of onsite parking, loading and unloading and circulation areas.

Once fully constructed the proposed site would provide sufficient area for onsite parking and vehicle circulation that connects to the adjoining road network.

The increase in additional vehicle trips are not considered to have an adverse impact upon traffic congestion within the surrounding road network as they would be designed and constructed to support the additional vehicle trips generated from such development. It is considered that the future surrounding road network is of sufficient capacity to cater for the increase in vehicle trips once developed.

2.3 ENVIRONMENTAL CONSIDERATION

2.3.1 TOPOGRAPHY AND SOILS

The subject site has a gradual slope from north east to south west generally following the existing drainage route through the site. The landform contains trees scattered across the site however is predominantly cleared and maintained for agricultural grazing. Some stormwater drainage has been constructed and runoff is directed into the existing drainage corridor network being an informal open grass overland flow path / channel which ultimately discharges to the designed and partially built southern drainage channel of Southlakes Estate.

The land subject of this PP, is located within the Talbragar Valley Subregion of the Brigalow Belt South Bioregion. Within this subregion Morgan and Terrey (1992) describe the soil environment as;

"Thin stony loams and texture contrast soils over most of the landscape with deeper sands and brown earths on valley floors".

This soil type is consistent with being able to sustain urban development such as residential development subject to design improvements to ensure soil salinity and erosion impact are minimised as detailed below.

2.3.2 SALINITY AND GROUNDWATER

The proposal would have the potential to increase the density of development across the subject sites of varying degree depending upon the proposed zone. The land is mapped by the DLEP 2012 Natural Resource Biodiversity Map Groundwater Vulnerability Map – Sheet CL_008 as being of 'Moderately High Vulnerability'. The development intention for these sites being for a majority of residential with supporting neighbourhood centre development and road and stormwater management infrastructure. The resultant development would manage stormwater collection and disposal in a controlled fashion reducing the threat to the contamination of groundwater or exacerbation of soil salinity.

A *Groundwater and Salinity Study* by Envirowest Consulting has been prepared for the future residential layout of the site and is provided at Appendix D. The objective of this report was to provide detailed information including mitigating options (if required) in relation to dryland and urban salinity processes and groundwater. The report assesses the existing salinity conditions of the soil and groundwater and determine the impact of the development on groundwater.

Generally, the report concludes that the development is suitable for the site and intended development to the area and is of a scale and location in the landscape that is not considered to be high risk and measures are recommended to ensure intended development mitigates any adverse impacts.

2.3.3 FLORA AND FAUNA

As described within the supporting *Ecological Assessment* prepared by Ozark Pty Ltd and provided at Appendix E the site is completely cleared, ploughed and disturbed with few isolated trees.

No known threatened species or ecological communities have been identified as being currently present on these sites. The study identified that the that the vegetation noted upon the site is likely to have been derived from one of the three EECs listed under the TSC Act. In accordance with the TSC Act the 'precautionary principle' has been adopted and an Assessment of Significance has been completed for each to characterise the potential impacts.

Assessments of significance are included within the supporting ecological assessment and having given consideration to the ecology within the subject site, the report concludes the Proposal is:

- Unlikely to significantly affect any of the listed threatened species, fauna populations or communities.
- Unlikely to augment or significantly contribute to any of the National or State listed Key Threatening Processes, if the appropriate safeguards regarding the control of potential vertebrate pests are effectively applied.
- Unlikely to significantly affect any RAMSAR wetland or CAMBA, ROKAMBA or JAMBA listed species;
- Unlikely to significantly affect local hydrology.
- Consistent with ESD principles with regard to fauna, would not adversely affect the local biodiversity and no issue of intergenerational or value added matters are relevant in this instance.

The report concluded that the proposed activity should not be considered to constitute a significant impact and, as such, no Species Impact Statement (SIS) is warranted. No Koala Habitat Management Plan pursuant to SEPP 44 should be required.

2.3.4 BUSHFIRE

Reference is made to Dubbo City Council's Bushfire Prone Land Map which indicates the level of fire risk for properties. In accordance with this Map, the subject land is not identified as being located on bush fire prone land.

2.3.5 FLOODING

The proposed rezoned land is not identified as being within a flood planning area as identified by the *Dubbo Local Environmental Plan 2011.* In this regard the proposed rezoning and the lands future development would not be affected by potential flooding nor result in adverse impact upon the immediate locality.

2.3.6 CONTAMINATION

The soils contained in the area of land proposed for rezoning under this Planning Proposal are of similar quality to that present within the bounds of the adjoining Southlakes Estate. Each of these site have previously been assessed and considered as suitable for residential use and development by past planning rezoning and current development applications across their land.

Notwithstanding, a *Contamination Investigation Study* was conducted by Envirowest Consulting Pty Ltd for the land to ensure the land is suitable for its intended use. The contamination investigation was prepared in accordance with the Contaminated Land Management Guidelines referenced by *State Environmental Planning Policy No. 55 - Remediation of Land*. The final conclusion of the Contamination Investigation Report is as follows:

- The site has a land-use history of grazing;

- There is no evidence of orchards, mines, sheep dips, mixing sheds or contaminating industrial activities on the site;
- The contamination status of the site was assessed from a soil sampling and laboratory analysis program. The soil sampling program did not detect elevated levels of the analysed metals, OCP or TRH. The levels of all substances evaluated were below the EPA investigation threshold for residential and recreational land-use with access to soil. In conclusion no contamination was found;
- Several stockpiles were located across the site. The stockpiles consisted of soil and timber and trace general refuse. No asbestos was identified in the stockpiles on site. The stockpiles are an amenity hazard.

The subject site is therefore suitable for the future residential and recreational activities land uses.

2.4 SOCIAL AND CULTURAL CONSIDERATION

2.4.1 ABORIGINAL ARCHAEOLOGY

An *Archaeological Survey* was conducted by Mr Jim Kelton in August 1995 covering all of the Southlakes Estate, as well as the majority of the land adjacent to Southlakes Estate / Keswick on the Park Estate.

The *Archaeological Survey* was conducted on behalf of Dubbo City Council, in order to assess the potential impacts of the proposed residential developments of the area on local Aboriginal Cultural Heritage, within the terms of the New South Wales *National Parks and Wildlife Act 1974* and the *Environmental Planning and Assessment Act 1979*.

Keltons survey identified the presence of one (1) site located adjacent to the southern boundary of the site which is identified and recorded upon the AHIMS database.

Notwithstanding the above survey Ozark Environmental Management and Heritage conducted an *Aboriginal Archaeological Assessment* of the land to determine the presence and potential impact of the proposal upon aboriginal heritage significance of the area. The assessment is provided at Appendix G.

The survey identified that the land is not likely to contain additional items and that the significance of the existing item is considered 'low'. In this respect and having regard to the indicative lot layout and likely servicing strategy the existing item is likely to require removal through the issue of an AHIP.

It should be noted that if, during the further development of the site, any artefact, potential site or objects of Aboriginal Cultural Heritage Significance are uncovered, works will cease immediately pending referral for an investigation by the NSW National Parks and Wildlife Service in accordance with *the National Parks and Wildlife Act 1974*.

2.4.2 EUROPEAN HERITAGE

The land immediately to the south contains a locally listed heritage item identified by the DLEP as a 'Old Dubbo Homestead'. As the item is segregated by an existing road corridor, future freight way and the Eulomogo Creek it is anticipated that the proposed rezoning and amendments to the minimum allotment size would not adversely impact upon the item and that any future development of this land would not require consideration of the Heritage Item.

The remaining sites do not contain any locally listed heritage items as identified by the DLEP. In this regard the proposed rezoning is not considered to adversely affect the heritage significance of the locality.

Intent and Provisions

3.1 OBJECTIVE

The intention of the Planning Proposal (PP) is to create a planning regime that supports development of the land in a generally consistent manner to that of the existing Southlake's Estate. The PP would provide greater flexibility and choice in residential land and housing product and the provision of a public recreation area within and adjacent to a realigned drainage corridor and the provision of a new neighbourhood centre within the south east urban release area of Dubbo from that currently available under the homogenous residential zoning regime of the Dubbo Local Environmental Plan 2011 (LEP).

3.2 EXPLANATION OF PROVISIONS

This PP affects *Land Zoning Map – Sheet LZN_008B* and *Minimum Lot Size Map – Sheet LSZ_008B* of the DLEP.

This PP seeks to rezone a part of the existing R2 – Low Density Residential land within the South East Precinct of Dubbo as shown upon supporting plans **114135_19B_TP02 & TP04 prepared by Geolyse Pty Ltd** in particular rezone;

The proposed rezoning and subsequent changes to the minimum allotment size of the LEP would facilitate a Master Planned Neighbourhood that would provide;

- Greater flexibility and choice in residential land and housing product within the south east urban release area and the greater residential market of Dubbo. In particular, increasing the medium density and housing choice options in proximity to proposed local collector roads, recreation areas and commercial zones;
- An additional neighbourhood business centre supporting additional local business opportunities in convenient locations for the future residents of the south east of Dubbo; and
- Public recreation areas within and adjacent to the realigned drainage corridor providing opportunities for passive and active recreation for residents of the south east of Dubbo through the landscaped corridor that incorporates cycle ways, footpaths, decorative lakes and parklands.

It is anticipated that primarily the PP would facilitate;

- A combination of single and two storey low density development with some higher building heights achieved upon larger medium density development;
- A neighbourhood business centre of a similar building height to that of surrounding development adjoining and with direct pedestrian and road links to public recreation land and the local road network;
- A retail GFA greater than 1,000m^2 providing the consent authority has considered the economic impact of proposed retail development is satisfied that the development will not have an impact on the commercial hierarchy of Dubbo;
- A retail centre which permits the provision of a gym or like use as defined under the DLEP as recreation facility (indoor);
- Varied infrastructure designed to provide stormwater management integrated into the design of proposed landscaped recreation areas;
- Recreation and suitable landscaped areas to enhance the amenity of the local area.

The R1 and B1 land have been chosen to create higher density residential and commercial use land adjacent to or within close proximity to public recreation land, children's playground, walkways and cycleways in an effort to facilitate a flexible subdivision layout for each site than that currently achievable under the homogenous zoning and minimum allotment regime of the LEP.

Justification

The overarching principles that guide the preparation of PP's are:

- The level of justification should be proportionate to the impact the PP would have;
- It is not necessary to address a question if it is not considered relevant to the PP; and
- The level of justification should be sufficient to allow a Gateway determination to be made with confidence that the LEP can be finalised within the timeframe proposed.

The following justification addresses each relevant question applicable to the PP to ensure confidence can be given to the Gateway determination.

4.1 NEED FOR THE PLANNING PROPOSAL

4.1.1 RESULT OF ANY STRATEGIC STUDY OR REPORT

The PP is not a result of a strategic study or report but rather the current demand of housing choice and residential land product and the need to provide additional local recreation and a local neighbourhood centre within South East Dubbo.

Current land release areas of Dubbo are heavily focused upon delivering the standard R2 – Low Density land and house package yet limited focus exists on delivering medium density options or larger land size.

The existing land supply within the varied zoning regime of the current Southlakes Estate is likely to be exhausted and developed with varied housing product in the near future.

The proposed rezoning seeks to provide a regime for how the land would be developed in the future to create a master planned neighbourhood with a neighbourhood centre and passive and active landscape recreation areas which also serve a dual function of drainage.

Having regard to these current market forces and the reality of housing choice and residential land product within Dubbo it is considered that there is sufficient demand upon the housing market to warrant the expansion of the existing R1 – General Housing zone and continue to vary minimum lot size requirements of both the R1 and R2 zone of the LEP to assist the facilitation of housing choice and varied residential land product centred around a neighbourhood shopping centre within the South East of Dubbo.

The proposed zoning and minimum allotment regime is selected having regard to the lands proximity to public recreation areas, drainage reserve, cycleway and walkways and their proximity to supporting road and infrastructure networks including public transport services. The allotment plan is also focused toward the proposed neighbourhood centre and with regard to the required infrastructure that would support the increased density and commercial development options.

4.1.2 BEST MEANS OF ACHIEVING THE OBJECTIVES OR INTENDED OUTCOMES, OR IS THERE A BETTER WAY

The desired range of housing choice and the provision of neighbourhood commercial development is not comprehensively permissible within the R2 zone and is further limited by the minimum lot size restriction in accordance with the provisions of the DLEP 2011.

The submission of a PP to amend the existing zoning and lot size requirements represents the best method of achieving the desired outcome.

4.2 RELATIONSHIP TO STRATEGIC PLANNING FRAMEWORK

4.2.1 CONSISTENT WITH THE OBJECTIVES AND ACTIONS OF THE APPLICABLE REGIONAL OR SUB-REGIONAL STRATEGY

There are no overriding Regional or Sub-regional strategies that directly relate to the South East Urban Release Area and its future development within the Dubbo Regional LGA or Central West Region.

4.2.2 CONSISTENT WITH COUNCIL'S LOCAL STRATEGY OR OTHER LOCAL STRATEGIC PLAN

South-East Dubbo Residential Urban Release Area Stage 1 Structure Plan

As detailed within the Structure Plan this is the first component of a staged process that aims to ensure residential development opportunities continue to be delivered in Dubbo and in particular the South-East Residential Urban Release Area.

The role of the Plan is to set the overall direction for development in the South-East Residential Urban Release Area, inform land use decisions in the LEP and allow the developers of the Southlakes Estate to pursue a partial development of the Estate having regard to overall infrastructure and servicing constraints.

The objectives of the plan are to

- Identify the opportunities and constraints of the land and the anticipated needs of the community;
- Broadly indicate the likely future development potential of the study area;
- Enable the characteristics of the study area to determine the most appropriate location and form for development;
- Provide a broad context of the consideration, by Council, of individual rezoning submissions within the study area; and
- Establish a vision and set of development objectives which future development proposals will be required to meet;

The Plan provides forty (40) 'Strategic Residential Growth Principles' which have been considered during the preparation of this PP. The principles and a comment having regard to the PP is provided within the following table:

Strategic Residential Growth Principles	Comment
1. *Higher density residential development is encouraged at key locations in the Estate that ensure residents will have a high level of access to public transport, facilities, services and amenity;*	The intent of the allotment regime is to have higher densities located in close proximity to the Neighbourhood Centre and local collector roads of the estate.
2. Seniors housing is encouraged to be provided in locations and formats that provide for integration with residential neighbourhoods, areas of public open space and neighbourhood centre development;	The master plan details some larger parcels in close proximity to the neighbourhood centre and lake system would be suitable for this type of development
3. *Dual occupancy development is encouraged and promoted on land with an area greater than 900m^2 and a frontage of greater than 17m*	Noted.

4. *Dual occupancy development is specifically suited and encouraged as an efficient and effective urban design outcome for corner lots which allows each unit to have a separate frontage and address to a different street;*	Noted.
5. *Small format and small lot housing in the R1 general Residential zone should be provided with a zero lot line on one side boundary to encourage design quality and protect the amenity of residents;*	Noted.
6. *Council will prepare a Residential Design Guide for the use of the Dubbo Development Industry that will encourage site-responsive design and variety of housing offer;*	Noted.
7. *Where applicable and practicable, the provision of shop top housing is encouraged as a mechanism to further activate residential and commercial lands and add further variability in development types;*	The master plan details some larger parcels in close proximity to the neighbourhood centre and lake system would be suitable for this type of development
8. *Small format and integrated housing is encouraged where it can adequately mix with residential neighbourhoods and actively encourage social inclusion*	Noted.
9. *Any future amendment to the Dubbo local environmental plan 2011 to introduce a commercial zoning to facilitate a neighbourhood centre be required to include a maximum floor space limitation to limit the size and configuration of any commercial development to a neighbourhood scale*	The master plans Neighbourhood Centre would be developed and designed to service the needs and add to the amenity of the residents of the Southlakes whilst operating as a viable retail facility without detriment to the CBD of Dubbo and Orana Mall.
10. *Any Planning Proposal to introduce a commercial zone to allow for neighbourhood centre development will be required to provide an economic impact assessment which provides an assessment of such a proposal on the Dubbo Central District, the Orana Mall Market Place and other neighbourhood centres*	An economic impact assessment has been undertaken and is provided at Appendix B.
11. *A variety of access provisions are to be provided to the neighbourhood centre development including facilities for walking, cycling onsite public transport provision and suitable parking for private cars*	A variety of access provisions are provided to neighbourhood centre as it would be connected via walkway/cycleway through the lake system. Sufficient area would be provided on site for parking of vehicles and public transport services.
12. *Any neighbourhood centre development will be of a local scale which will not impact the residential amenity of development.*	Noted, preliminary concept facades are provided at Appendix A.
13. *Residential subdivision establishes a clear urban structure and hierarchy that promotes the creation of*	The master plans layout provides various links to the lakes system reserve through the estate which is

active neighbourhoods and encourages alternative forms of transport;	provided with footpaths and cycleways. The road system would be serviced with footpaths and cycleways along local collector roads linking all use areas within the estate.
14. *The natural attributes of the land should be used and reinforced in subdivision design through the placement of visible key landmark features such as parks and other focal points;*	Noted.
15. *The natural topography of the land shall be used in the design of residential subdivision. The natural site topography is an important design feature to add variation and interest to residential neighbourhoods.*	Noted.
16. *Residential subdivision shall optimise outlook and proximity to public community facilities*	Noted.
17. *Residential allotments shall be provided with a range of lot frontages which actively promotes streetscape variance and allow variation in the size and style of residential housing.*	The master plan has been designed to incorporate a range of lot frontages to assist the promotion of varied streetscapes
18. *Any residential subdivision should comply with the minimum internal connectivity index score of 1.3*	The master plan achieves a connectivity index of 1.18.
19. *Residential development shall not be provided backing onto areas of open space and should be separated by a road or other key access point unless the development provides a suitable level of access to open space areas in accordance with the requirements of Western Plains Regional Council, has open and transparent fencing and promotes living areas fronting open space.*	The master plan details allotments backing onto open space areas of which these lots would be provided within open and transparent fencing and promotes living areas overlooking the public open space.
20. *Any embellishment of current or future lands for the purposes of public open space over and above the requirements of the Dubbo Section 94 Contributions Plan – Open Space and Recreation Facilities shall be at the cost of the developer.*	Noted.
21. *Any developer undertaking embellishment in accordance with Strategic Growth principle 20 shall be required to enter into an appropriate agreement/s with Council in respect of long term maintenance.*	Noted.
22. *Public access and movement shall be maintained across and throughout areas of public open space.*	The master plan includes a footpath and cycleway plan through the public open space.
23. *In any situation where an allotment may have one of its boundaries to public open space, any fencing of this boundary shall be of an open and transparent nature.*	Fencing adjoining the public open space area would be of an open and transparent nature.
24. *The pedestrian and cycleway shall maintain legibility and ease of access to promote safe walking and cycling*	Noted.

25. *Not existent*	Noted.
26. *New growth areas have a variety of destinations within walking or cycling distance and the density of residential development supports the provision of required infrastructure.*	The masterplan provides a connection to all use areas within the estate.
27. *A movement network is created of streets with bicycle lanes that allows the safe interaction and movement for all road users.*	The master plan includes a bicycle network through the estate integrated with the road design.
28. *Major public transport access is provided throughout the land including connections to the Dubbo Central Business District;*	The master plan details suitable connections both existing and new via local collector roads throughout the estate and ultimately to the Dubbo CBD.
29. *A hierarchy of interconnected streets is established that gives safe, convenient and clear access points within and beyond individual subdivisions in the subject area;*	The master plan and supporting traffic study provides a safe and convenient street layout through the site and to adjoining land.
30. *The design of access and movement systems in the area ensures environmental impacts associated with groundwater and salinity are avoided or minimised;*	Noted.
31. *The access and movement system shall ensure the design of future subdivisions provides for energy efficient lot layouts and building orientation.*	The master plan provides a lot layout that has regard to topographical features and their influence upon required supporting infrastructure whilst also trying to achieve an energy efficient lot layout.
32. *Dubbo is maintained as a 10-minute city.*	The traffic study identifies service levels of key intersections to be of levels A and B demonstrating the efficiency of the surrounding road network.
33. *Based on the information included in Figure 20, the balance of the Hillview land (Southlakes Estate) shall only be developed to the location as shown in Figure 20. Land situated in the Stage 2 Structure plan area will require the preparation of an Infrastructure and Servicing Strategy for the overall land area.*	The proposed master plan excludes Stage 2 land.
34. *The Infrastructure and Servicing Strategy referred to in Principle 33 above shall be prepared by the owners of the subject lands.*	This is provided at Appendix C.
35. *The Cardno Keswick Drainage Review, August 2010 (Report No. W4823-1) is the adopted strategy for the provision of stormwater infrastructure to service the subject lands. Any developer seeking a variance to the regime included in the Strategy shall be required to prepare an independent stormwater drainage strategy that can detail how the projected stormwater volumes*	Stormwater management is provided within the Appendix C.

can be managed on the subject lands and through to receiving waters. Council is under no specific requirement to approve any alternative stormwater drainage strategy.	
36. *Any future site specific Development Control plan for the Southlakes lands shall be required to include a detailed section providing overall infrastructure principles and information explaining how residential development is proposed to be serviced in accordance with Councils adopted policies, plans and practices.*	Noted. The provisions of the existing Dubbo DCP would be transposed for future development.
37. *Land degradation and clearing is minimised and natural assets are maintained or enhanced.*	Noted.
38. *Development meets the 'improve or maintain test' by avoiding impacts to areas of high conservation value and providing offsets for unavoidable impacts.*	The site does not comprise areas of high ecological conservation value refer to Appendix F.
39. *Any future development application for subdivision across the subject site will provide a detailed and comprehensive Salinity Study and Salinity and Groundwater Management Plan.*	Already, assessed and provided at Appendix D.
40. *The Fuzzy Box Woodland Endangered Ecological Community contained in Keswick shall be protected from development and enhanced with further plantings and an appropriate management and maintenance regime.*	The site is not located within 'Keswick' and does not comprise areas of high ecological conservation value refer to Appendix F.

Having regard to the above consideration of the Structure Plans Strategic Residential Growth Principles the master plan and supporting reports are considered to be consistent with the Structure Plan.

Dubbo City Urban Development Strategy - Residential Areas Development Strategy 1996-2015

The purpose of the Dubbo City Residential Areas Development Strategy 1996-2015 (Strategy) is *"to provide a spatial, servicing and development control framework that will assure the timely provision of residential development opportunities which fit the needs of Dubbo and the region it services"*. The Strategy was designed to protect land for future residential development and to facilitate the servicing, staging, and release of this land.

The Strategy divides the Dubbo LGA into thirteen (13) separate precincts including seven urban precincts. The subject site falls within the 'South East Precinct'. The Strategy sets a goal to *'Identify and protect the established residential neighbourhoods and ensure a sufficient supply of suitable land to meet the future residential development needs of the city.'* The strategy also recognises this precinct as being very significant to Dubbo due to the precinct being the last extensive area for prospective residential development east of the Macquarie River.

The proposed rezoning would be consistent with the strategy for the following reasons:

- An amended R1 and R2 zone and minimum lot size distribution would facilitate the timely provision of residential development that fits the current needs of Dubbo and the region it services;
- The intent of the PP is to meet the residential housing choice needs of Dubbo;
- The intent of the PP is to ensure a neighbourhood centre and community would be established;
- Development of this allotment would continue to complete the eastward phase of suburban development of Dubbo as the market changes and progresses;
- The sites are located within the visible transition/eastern edge of urban development, being the Sheraton Road and Hennessy Road corridors;

- The future construction and the resultant development would have due consideration to the local environmental constraints;
- It is anticipated that the PP would ensure the Dubbo Construction & Development Industry and the Dubbo Real Estate Industry would be provided with a secure and diverse residential and additional commercial land supply that is anticipated to last beyond 5 years;

Dubbo City Planning & Transportation Strategy 2036

The Dubbo City Planning and Transportation Strategy 2036 has been designed to provide guidance regarding the construction of roads and pedestrian pathways in Dubbo City. The 'Context' of the Plan states that the Strategy is to be considered in future strategic land use planning decisions.

The 'Context' also states that the Strategy does not represent the adopted Strategic Land Use Policy for the City and its future growth. In this regard, and due to the fact that the land is located within an expanding part of the residential area of Dubbo, the PP is considered to be generally accommodated within the scheduling, expectations and recommendations of this strategy. Detailed considerations of the PP against the recommendations of the strategy is not considered warranted.

It should be noted that the strategy makes the following statements to which the PP is considered to remain consistent:

"Residential Development in Dubbo is planned in three sectors, the South East Sector, the North West Sector and the South West Sector.

The Density of existing residential areas is approximately 7.8 dwellings per hectare; this is a gross figure including roads, schools and local community facilities including open space.

Should development continue at this density, the three sectors could accommodate 10,500 dwellings, sufficient until about 2050.

The scheduling for the three sectors if described in Table 2.1 and the location is described in Figure 5.1. …"

4.2.3 CONSISTENT WITH APPLICABLE STATE ENVIRONMENTAL PLANNING POLICIES

Orana Regional Environmental Plan No. 1 – Siding Spring Observatory

The only regional/sub-regional strategy relating to the Dubbo Local Government Area is the *Orana Regional Environmental Plan No.1 – Siding Spring Observatory*. As the Siding Spring Observatory is located more than 100 kilometres away in Coonabarabran, the future proposed development of the site is not considered to be of a scale that would have the potential to cause an adverse effect upon the operations of the Observatory.

State Environmental Planning Policy No. 21 – Caravan Parks

The change in zoning would enable 'manufactured home estate' development as caravan parks are a permitted use within the R1 land use table subject to development consent being granted. If the land were to be developed in this manner such development would be required to ensure it achieves the relevant provisions of this plan. The PP does not include provisions that contradict or hinder the application of this policy. It is not the development intention of these sites to the developed as a caravan park.

State Environmental Planning Policy No. 36 – Manufactured Home Estates

The change in zoning would enable 'manufactured home estate' development as caravan parks are a permitted use within the R1 land use table subject to development consent being granted. If the land were to be developed in this manner such development would be required to ensure it achieves the relevant provisions of this plan. The PP does not include provisions that contradict or hinder the application of this policy.

State Environmental Planning Policy No. 44 – Koala Habitat Protection

An Ecological Assessment provided at Appendix E has been prepared which assesses the impact of the proposal upon ecological communities and or their habitats.

The report concluded that the proposed activity should not be considered to constitute a significant impact and, as such, no Species Impact Statement (SIS) is warranted and no Koala Habitat Management Plan pursuant to SEPP 44 should be required. In this respect the suitability of this site for residential and commercial purposes is considered suitable.

State Environmental Planning Policy No. 55 – Remediation of Land

Clause 6 of the *State Environmental Planning Policy No. 55 – Remediation of Land* requires the issue of contamination and remediation to be considered in zoning or rezoning proposals. A contamination investigation has been prepared for the subject land which found the land to be suitable for its intended development. In this respect the suitability of this site for residential and commercial purposes is considered suitable.

State Environmental Planning Policy No. 64 – Advertising and Signage

The change in zoning would enable limited business uses subject to development consent form Council. If signage were to form part of a future development application the provisions of *State Environmental Planning Policy No. 64 – Advertising and Signage* would apply and the development would need to ensure the relevant provisions of the policy are achieved. The PP does not include provisions that contradict or hinder the application of this policy.

State Environmental Planning Policy No 65 – Design Quality of Residential Flat Development

The change in zoning would enable 'Residential Flat Buildings' and 'Shop Top Housing' development of the land subject to development consent being granted. If the land were to be developed in this manner such development would need to ensure it achieves the relevant provisions of this plan. The PP does not include provisions that contradict or hinder the application of this policy.

State Environmental Planning Policy (Affordable Rental Housing) 2009

The provisions of *State Environmental Planning Policy (Affordable Rental Housing) 2009* would continue to apply to the land with future development under this plan being subject to development consent being granted. If the land were to be developed in this manner such development would need to ensure it achieves the relevant provisions of this plan. The PP does not include provisions that contradict or hinder the application of this policy.

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

The provisions of *State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004* would continue to apply to residential affected development in accordance with the provisions of this policy. The PP does not include provisions that contradict or hinder the application of this policy.

State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004

The provisions of *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004* would continue to apply to the land with future development under this plan being subject to development consent being granted. If the land were to be developed in this manner such development would need to ensure it achieves the relevant provisions of this plan. The PP does not include provisions that contradict or hinder the application of this policy.

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

The provisions of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* would continue to apply to the land generally consistent with that achievable under the current land zoning. The PP does not include provisions that contradict or hinder the application of this policy.

State Environmental Planning Policy (Infrastructure) 2007

The provisions of *State Environmental Planning Policy (Infrastructure) 2007* would continue to apply consistent with that achievable under the current zoning. The PP does not include provisions that contradict or hinder the application of this policy.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The site is not located within any identified resource areas, potential resource areas or transitional areas. There are no known existing mines, petroleum production operations or extractive industries are in the area of the PP or within its vicinity. Given existing development on the site and within the immediate locality the PP would be of minor significance and would not further restrict development potential or create land use conflict beyond existing arrangements.

4.2.4 CONSISTENT WITH APPLICABLE S117 (2) MINISTERIAL DIRECTIONS – 3.1 RESIDENTIAL ZONES

The Minister for Planning and Infrastructure, under Section 117(2) of the EP&A Act 1979 issues directions that local Councils must follow when preparing PP's for new Local Environmental Plans. The directions cover the following broad categories:

1. Employment and Resources
2. Environment and Heritage
3. Housing, Infrastructure and Urban Development
4. Hazard and Risk
5. Regional Planning
6. Local Plan Making

The following section provides an assessment of the PP against the relevant Section 117 directions. Note this section provides the objectives of the relevant direction, a full copy of the directions can be viewed at:

http://www.planning.nsw.gov.au/planningsystem/local.asp.

The following discussion demonstrates the PP's consistency with the relevant Section 117 directions.

Direction 1.1 – Business and Industrial Zones

Ministerial Direction 1.1 – Business and Industrial Zones is applicable as the PP would rezone land for local employment opportunities. The objectives of this direction are to encourage employment growth in suitable locations, protect employment land in business and industrial zones and support the viability of identified strategic centres.

The PP is supported by an economic impact assessment prepared by MacroPlan Dimasi provided at Appendix B and demonstrates that the proposed commercial area would encourage employment growth, not result in adverse impact upon the commercial viability of the Dubbo CBD and Orana Mall and protect existing employment lands of Dubbo.

Direction 1.3 – Mining, Petroleum Production and Extractive Industries

Ministerial Direction 1.3 – Mining, Petroleum Production and Extractive Industries is not applicable as the PP affected land does not prohibit the mining of coal or other minerals, production of petroleum, or winning or obtaining of extractive materials or restricting the potential development of such by permitting a land use that is likely to be incompatible with such development.

It is noted that the sites are currently zoned for residential use and are provided with a buffer of existing residentially zoned land.

Direction 2.1 – Environment Protection Zones

Ministerial Direction 2.1 – Environment Protection Zones does apply to the PP as The Keswick on the Park Estate is mapped by the DLEP 2012 Natural Resource Biodiversity Map NRB_008 as being of 'high' biodiversity significance. The area is known to contain an Endangered Ecological Community (EEC). The site is currently vacant of any vegetation and is currently being constructed for low density residential dwellings. The PP is not considered to adversely affect the EEC.

Direction 2.3 – Heritage Conservation

Ministerial Direction 2.3 – Heritage Conservation is applicable as the PP affected land includes items, areas, objects and places of environmental heritage significance and indigenous heritage significance.

The PP is considered consistent with the objectives of this direction as the existing identified heritage items and the relevant development considerations of the DLEP would remain unaffected by the PP. all future development would require due consideration in accordance with these provisions.

Direction 3.1 – Residential Zones

Ministerial Direction 3.1 – Residential Zones is applicable as the PP proposes to redistribute the residential zones across the site.

The PP is considered consistent with the objectives of this direction as the redistributed rezoning and amended minimum lot sizes;

- Would encourage a variety and choice of housing types to provide for the existing and future housing needs of Dubbo;
- Would make more efficient use of existing and future infrastructure and services of Dubbo;
- Would reduce the consumption of land for housing and associated urban development on the fringe of Dubbo; and
- It is anticipated that future development would be of 'good design' having regard to current modern housing and infrastructure development and construction requirements.

As stated above the PP is located in an area that contains adequate access to services such as sewerage, and water as well as public transport facilities. The future development of the site would make efficient use of these existing services and would reduce the need for additional development to take place upon the urban fringe of Dubbo.

Direction 3.3 – Home Occupations

Ministerial Direction 3.3 – Home Occupations is applicable as the proposed R1 General Residential zone permits dwelling houses. The objective of this direction is to encourage the carrying out of low-impact small business in dwelling houses The PP maintains existing provisions that enable 'home occupations' to be carried out without the need of development consent.

Direction 3.4 – Integrating Land Use and Public Transport

Ministerial Direction 3.4 – Integrating Land Use and Public Transport is applicable as the PP would rezone land for urban residential purposes.

In accordance with the following, the rezoning of the subject site for urban residential purposes must be consistent with the aims and objectives of the following documents.

"A planning proposal must locate zones for urban purposes and include provisions that give effect to and are consistent with the aims, objectives and principles of:

(a) Improving Transport Choice – Guidelines for planning and development (DUAP 2001), and

(b) The Right Place for Business and Services – Planning Policy (DUAP 2001)".

With reference to the abovementioned documents, future occupants of each estate would have access to existing and planned public transport nodes which would traverse these sites and South East Dubbo.

The provision of dwelling house developments in a location serviced by public transport is imperative as future residents would use such services as one of their main means of transportation around Dubbo.

The development of these sites as opposed to other sites in the LGA would negate the need for new transport routes such as new bus routes and road facilities on the urban fringe.

Direction 4.3 – Flood Prone Land

Ministerial Direction 4.3 – Flood Prone Land is not applicable as the PP affected land as detailed upon plans prepared by Geolyse Pty ltd numbered 114135_19B_TP02 and TP04 is not identified as flood prone land by the LEP.

Direction 6.1 – Approval and Referral Requirements

Ministerial Direction 6.1 – Approval and Referral Requirements applies to all Planning Proposals forwarded for Gateway Determination by a local authority.

The proposed rezoning does not include provisions that would trigger a need for concurrence, consultation, or referral to the State Government.

Direction 6.2 – Reserving Land for Public Purposes

Ministerial Direction 6.2 – Reserving Land for Public Purposes applies as this PP would realign and rezone land for public recreation purposes. The objectives of this direction are simply to facilitate the provision of public services and facilities by reserving land for public purposes and to facilitate the removal of reservations of land for public purposes where the land is no longer required for acquisition.

The PP would result in additional land being provided to the public for recreation purposes as a result of the realigned dual public use stormwater channel design accommodating stormwater from the site and upstream catchments (and incorporating suitable freeboard to residential land) and the recreation needs i.e. cycleways, playground and landscaped areas for use by the general public

Direction 6.3 – Site Specific Provisions

Ministerial Direction 6.3 – Site Specific Provisions applies to all Planning Proposals forwarded for Gateway Determination by a local authority.

The PP does not propose to create any site specific development standards in addition to those currently within the principal environmental planning instrument other than to also provide a minimum allotment size of 600m^2 consistent with surrounding R2 zoned land and no minimum allotment size for R1 zoned land, that is consistent with other R1 zoned land within Dubbo.

4.3 ENVIRONMENTAL, SOCIAL AND ECONOMIC IMPACTS

4.3.1 IS THERE ANY LIKELIHOOD THAT CRITICAL HABITAT OR THREATENED SPECIES, POPULATIONS OR ECOLOGICAL COMMUNITIES, OR THEIR HABITATS, WILL BE ADVERSELY AFFECTED AS A RESULT OF THE PROPOSAL?

The land is mapped by the DLEP 2012 Natural Resource Biodiversity Map Groundwater Vulnerability Map – Sheet CL_008 as being of 'Moderately High Vulnerability'. The development intention for this land is for residential development with supporting neighbourhood centre development and road and stormwater management infrastructure. The resultant development would manage stormwater

collection and disposal in a controlled and engineered fashion in accordance with relevant experts' advice and recommendations reducing the threat to groundwater.

An Ecological Assessment provided at Appendix E has been prepared which assesses the impact of the proposal upon ecological communities and or their habitats.

No known threatened species or ecological communities have been identified as being currently present on these sites. The study identified that the that the vegetation noted upon the site is likely to have been derived from one of the three EECs listed under the TSC Act. In accordance with the TSC Act the 'precautionary principle' has been adopted and an Assessment of Significance has been completed for each to characterise the potential impacts.

Assessments of significance are included within the supporting ecological assessment and having given consideration to the ecology within the subject site, the report concludes the Proposal is:

- Unlikely to significantly affect any of the listed threatened species, fauna populations or communities.
- Unlikely to augment or significantly contribute to any of the National or State listed Key Threatening Processes, if the appropriate safeguards regarding the control of potential vertebrate pests are effectively applied.
- Unlikely to significantly affect any RAMSAR wetland or CAMBA, ROKAMBA or JAMBA listed species;
- Unlikely to significantly affect local hydrology.
- Consistent with ESD principles with regard to fauna, would not adversely affect the local biodiversity and no issue of intergenerational or value added matters are relevant in this instance.

The report concluded that the proposed activity should not be considered to constitute a significant impact and, as such, no Species Impact Statement (SIS) is warranted. No Koala Habitat Management Plan pursuant to SEPP 44 should be required.

The PP does not affect the existing DLEP 2012 'Additional Local Provisions' for consideration of Natural Resource – biodiversity and Groundwater vulnerability.

4.3.2 ARE THERE ANY OTHER LIKELY ENVIRONMENTAL EFFECTS AS A RESULT OF THE PLANNING PROPOSAL AND HOW ARE THEY PROPOSED TO BE MANAGED?

The parcels of land proposed for rezoning largely consist of vacant grassland of no particular environmental value. No known threatened species or ecological communities are present on each site.

The PP does not propose to amend the flood prone land of the Eulomogo Creek in the south east extent of the site and does not proposed to impact by way of earthworks or road corridors within 80m of the existing creek line.

Any future development of these areas would require due consideration of relevant environmental impacts be undertaken during a development application if Council required assurance whether the land is suitable for the proposed use.

4.3.3 HAS THE PLANNING PROPOSAL ADEQUATELY ADDRESSED ANY SOCIAL AND ECONOMIC EFFECTS?

Due to the site's location within a residential area, the land has adequate access to public transport and due to its location to the Dubbo CBD and the Orana Mall, it is anticipated that a future property owners would be within a reasonable vicinity of any required medical, educational, and retail services and

facilities along with all transport means, including trains, coaches and planes to neighbouring towns and cities.

Additionally, with the inclusion of the proposed Neighbourhood Centre zone it is anticipated that future residents would be within a reasonable distance of future permissible medical and retail services and facilities should they occupy this site once developed.

The PP is supported by an economic impact assessment prepared by MacroPlan Dimasi provided at Appendix B and demonstrates that the proposed commercial area would encourage employment growth, not result in adverse impact upon the commercial viability of the Dubbo CBD and Orana Mall and protect existing employment lands of Dubbo.

4.4 STATE AND COMMONWEALTH INTERESTS

4.4.1 ADEQUATE PUBLIC INFRASTRUCTURE FOR PROPOSAL?

Adequate public infrastructure would be available to all future allotments. The lots would have the capacity to be serviced by sewer, water, and stormwater infrastructure and would each be connected to electricity and telecommunications infrastructure from the surrounding existing service mains designed and installed to service the development of these estates.

As detailed above the land would enjoy reasonable access to public transport and are within close proximity of any required medical, educational, and retail services and facilities and all transport means, including trains, coaches and planes to neighbouring towns and cities.

4.4.2 VIEWS OF STATE/COMMONWEALTH PUBLIC AUTHORITIES CONSULTED IN ACCORDANCE WITH THE GATEWAY DETERMINATION?

The views of state and commonwealth public authorities would be ascertained during the formal course of this PP in accordance with the comments contained in the future Gateway Determination.

Required Instrument Amendments

5.1 AMENDED MAPPING REQUIRED

The following DLEP maps would be amended as part of the PP;

- Land Zoning Map LZN_008B of the DLEP 2011 with regard to the new R1 – General Residential and B1 Neighbourhood Centre zoned land and the amended R2 – Low Density Residential and amended RE1 – Public Recreation a zoned land as shown upon supporting plan **114135_19B_TP02 prepared by Geolyse Pty Ltd**; and
- Lot Size Map LSZ_008B of the DLEP 2011 with regard to the new R1 General Residential and B1 Neighbourhood Centre zoned land and the amended R2 – Low Density Residential zoned land. In particular the amended minimum lot sizes would be as show upon supporting plan **114150_19B_TP04 prepared by Geolyse Pty Ltd.**

The following clauses and schedules of the DLEP would be amended as part of the PP;

- Part 7 Additional Local Provisions clause 7.12 Shops in Zone B1 Neighbourhood Centre by amending subclause (2) to allow Council to grant consent to retail development that would exceed 1,000 square meters where such development maintains the objective of Clause 7.12 being to maintain the commercial hierarchy of Dubbo by encouraging retail development of an appropriate scale within neighbourhood centres. Suggested amended wording is provided as follows:

(2) Development for the purposes of retail premises on land within Zone B1 Neighbourhood Centre that exceeds 1,000 square meters of Gross Floor Area may be carried out but only with development consent.

- Schedule 1 Additional Permitted Uses. In particular the inclusion of an additional use within the proposed B1 zone located upon Boundary Road bounded by Sheraton Road to the east and Wheelers Lane to the west being development for the purposes of recreation facility (indoor);

Community Consultation

6.1 TYPE OF COMMUNITY CONSULTATION REQUIRED

Section 5.5.2 of 'A Guide to Preparing Local Environmental Plans' identifies two different exhibition periods for community consultation;

- Low Impact Proposals – 14 days; and
- All other Planning Proposals (including any proposal to reclassify land) – 28 days.

The Guide describes Low Impact Proposals as having the following attributes;

- *A 'low' impact planning proposal is a planning proposal that, in the opinion of the person making the gateway determination, is;*
    - o *Consistent with the pattern of surrounding land use zones and/or land uses;*

The proposed amendments to the zoning and minimum lot sizes of these site generally accords with Council's local strategies and policies as detailed above and would be consistent with other R1, R2, B1 and RE1 zoned land within the Dubbo.

- o *Consistent with the strategic planning framework;*

Responses have been provided within section 4.2 of this report detailing the proposal's compliance with relevant local, regional and state planning strategies, policies, and ministerial directions.

- o *Presents no issues with regard to infrastructure servicing;*

The future residential development of these sites would have access to sewer, water, and stormwater services, and would be connected with electricity and telecommunications facilities.

- o *Not a principle LEP; and*

Not relevant.

- o *Does not reclassify public land.*

The PP does not seek to reclassify existing public land.

In accordance with the responses to the above 'Low Impact Proposals' guide, the PP is considered to be of low impact as it does not seek to reclassify land and is considered consistent with the Southlakes Structure Plan, the objectives of the LEP and the EP & A Act. Respectfully, it is therefore requested that a community consultation period of 14 days be applied to the exhibition of this PP.

Reference s

Morgan and Terrey. 1992, Nature Conservation in Western New South Wales. National Park Association, Sydney.

NSW Department of Planning (DoP). 2009a, A Guide to Preparing Local Environmental Plans, DoP, Sydney.

NSW Department of Planning (DoP). 2009a, A Guide to Preparing Planning Proposals, DoP, Sydney.

Section 117 Directions Issued by the Minister for Planning dated 1 July 2009 updated 14 April 2016

Drawings

Appendix A

EXAMPLE CONCEPT DESIGNS

Shallow lake with adjoining public reserve area.

Landscaped gardens and reserve furniture within reserve area.

Landscaped lake system with meandering footpaths and cycleway

Detached Dwellings backing onto the lake system

Potential Dual Occupancy Development

Master Planned community with local through roads / access ways