

EVC 53: Swamp Scrub - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

40 % cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 55: Plains Grassy Woodland

Description:

An open, eucalypt woodland to 15 m tall occurring on a number of geologies and soil types. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	80 cm	10 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus tereticornis</i> ssp. <i>mediana</i>	Gippsland Red-gum
	<i>Eucalyptus camaldulensis</i>	River Red-gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	1	5%	T
Medium Shrub	2	10%	MS
Small Shrub	1	1%	SS
Prostrate Shrub	1	1%	PS
Large Herb	1	5%	LH
Medium Herb	10	20%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	1	10%	LNG
Medium to Small Tufted Graminoid	9	35%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Allocasuarina littoralis</i>	Black Sheoak
T	<i>Acacia measmii</i>	Black Wattle
T	<i>Acacia melanoxylon</i>	Blackwood
MS	<i>Kunzea ericoides</i>	Burgan
SS	<i>Pimelea humilis</i>	Common Rice-flower
PS	<i>Bosiella prostrata</i>	Creeping Bossiella
MH	<i>Hypericum gramineum</i>	Small St John's Wort
MH	<i>Oxalis perennans</i>	Grassland Wood-sorrel
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Poranthera microphylla</i>	Small Poranthera
LTG	<i>Austrostipa rudis</i>	Veined Spear-grass
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Carex breviculmis</i>	Common Grass-sedge
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Schoenus apogon</i>	Common Bog-sedge
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass

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EVC 55: Plains Grassy Woodland - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

10 % cover

Logs:

10 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low
MH	<i>Centaurea erythraea</i>	Common Centaury	high	low
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MNG	<i>Romulea rosea</i>	Onion Grass	high	low
MNG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MNG	<i>Briza minor</i>	Lesser Quaking-grass	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 56: Floodplain Riparian Woodland

Description:

An open eucalypt woodland to 20 m tall over a medium to tall shrub layer with a ground layer consisting of amphibious and aquatic herbs and sedges. Occurs along the banks and floodplains of the larger meandering rivers and major creeks, often in conjunction with one or more floodplain wetland communities. Elevation and rainfall are relatively low and soils are fertile alluviums subject to periodic flooding and inundation.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	80 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus camaldulensis</i>	River Red-gum
	<i>Eucalyptus tereticornis</i> ssp. <i>mediana</i>	Gippsland Red Gum
	<i>Eucalyptus ovata</i>	Swamp Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree	1	5%	T
Understorey Tree or Large Shrub	2	10%	MS
Medium Shrub	1	15%	LH
Large Herb	1	10%	MH
Medium Herb	5	10%	SH
Small or Prostrate Herb	2	5%	LHG
Large Tufted Graminoid	2	10%	LNG
Large Non-tufted Graminoid	1	10%	MTG
Medium to Small Tufted Graminoid	5	10%	MNG
Medium to Tiny Non-tufted Graminoid	2	10%	SC
Scrambler or Climber	2	5%	BL
Bryophytes/Lichens	na	10%	

LF Code

Species typical of at least part of EVC range

Common Name

T	<i>Acacia implexa</i>	Lightwood
T	<i>Acacia melanoxylon</i>	Blackwood
MS	<i>Ozothamnus ferrugineus</i>	Tree Everlasting
MS	<i>Bursaria spinosa</i> ssp. <i>spinosa</i>	Sweet Bursaria
MS	<i>Hymenanthera dentata</i> s.l.	Tree Violet
LH	<i>Urtica incisa</i>	Scrub Nettle
LH	<i>Persicaria subsessilis</i>	Hairy Knotweed
LH	<i>Senecio quadridentatus</i>	Cottony Fireweed
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
MH	<i>Hydrocotyle hirta</i>	Hairy Pennywort
MH	<i>Stellaria pungens</i>	Prickly Starwort
MH	<i>Veronica plebeia</i>	Trailing Speedwell
SH	<i>Oxalis corniculata</i> s.l.	Yellow Wood-sorrel
SH	<i>Dichondra repens</i>	Kidney-weed
LHG	<i>Carex appressa</i>	Tall Sedge
LHG	<i>Poa labillardierei</i>	Common Tussock-grass
LNG	<i>Phragmites australis</i>	Common Reed
MTG	<i>Juncus amabilis</i>	Hollow Rush
MTG	<i>Cyperus</i> spp.	Flat-sedge
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Eleocharis acuta</i>	Common Spike-sedge
SC	<i>Calystegia sepium</i>	Large Bindweed

EVC 56: Floodplain Riparian Woodland - Gippsland Plain bioregion

Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:

40 % cover

Logs:

30 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	<i>Crataegus monogyna</i>	Hawthorn	high	high
T	<i>Fraxinus</i> spp.	Ash	high	high
MS	<i>Solanum pseudocapsicum</i>	Madeira Winter-cherry	high	low
MS	<i>Prunus cerasifera</i>	Cherry Plum	high	high
MS	<i>Rubus fruticosus</i> spp. agg.	Blackberry	high	high
LH	<i>Rumex conglomeratus</i>	Clustered Dock	high	low
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Rumex crispus</i>	Curled Dock	high	low
LH	<i>Rorippa palustris</i>	Marsh Yellow-cress	high	high
LH	<i>Helminthotheca echinoides</i>	Ox-tongue	high	low
LH	<i>Verbena bonariensis</i> s.l.	Purple-top Verbena	high	high
LH	<i>Aster subulatus</i>	Aster-weed	high	low
MH	<i>Ranunculus repens</i>	Creeping Buttercup	high	high
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
MH	<i>Taraxacum officinale</i> spp. agg.	Garden Dandelion	high	low
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low
SH	<i>Trifolium repens</i> var. <i>repens</i>	White Clover	high	low
SH	<i>Modiola caroliniana</i>	Red-flower Mallow	high	low
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Bromus catharticus</i>	Prairie Grass	high	low
MTG	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	high	high
MTG	<i>Cyperus eragrostis</i>	Drain Flat-sedge	high	high
MTG	<i>Paspalum dilatatum</i>	Paspalum	high	high
MTG	<i>Lolium perenne</i>	Perennial Rye-grass	high	low
MTG	<i>Agrostis capillaris</i> s.l.	Brown-top Bent	high	high
MNG	<i>Paspalum distichum</i>	Water Couch	high	high
SC	<i>Galium aparine</i>	Cleavers	high	low
SC	<i>Tradescantia fluminensis</i>	Wandering Jew	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 59: Riparian Thicket

Description:

Dense thickets of Woolly Tea-tree *Leptospermum lanigerum* and/or Scented Paperbark *Melaleuca squarrosa* to 6 m tall with occasional emergent eucalypts that occur on broad beds of small streams or on regular flooded terraces of large streams and rivers. Ground layer is dominated by a number of ferns, tree-ferns and sedges.

Canopy Cover:

%cover	Character Species	Common Name
50%	<i>Leptospermum lanigerum</i>	Woolly Tea-tree
	<i>Melaleuca squarrosa</i>	Scented Paperbark

Understorey:

Life form	#Spp	%Cover	LF code
Medium Shrub	8	30%	MS
Small Shrub	3	5%	SS
Prostrate Shrub	1	1%	PS
Large Herb	2	5%	LH
Medium Herb	5	10%	MH
Small or Prostrate Herb	1	5%	SH
Large Tufted Grassoid	1	10%	LTG
Large Non-tufted Grassoid	2	5%	LNG
Medium to Small Tufted Grassoid	2	5%	MTG
Medium to Tiny Non-tufted Grassoid	3	15%	MNG
Ground Fern	3	10%	GF
Tree Fern	1	5%	TRF
Scrambler or Climber	2	5%	SC
Bryophytes/Lichens	na	20%	BL

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Eperis impressa</i>	Common Heath
MS	<i>Cassinia aculeata</i>	Common Cassinia
MS	<i>Ozothamnus rosmarinifolius</i>	Rosemary Everlasting
MS	<i>Kunzea ericoides</i>	Burgan
SS	<i>Dampiera stricta</i>	Blue Dampiera
SS	<i>Amperea xiphioides</i> var. <i>xiphioides</i>	Broom Spurge
SS	<i>Acacia brownii</i>	Heath Wattle
PS	<i>Acrotriche prostrata</i>	Trailing Ground-berry
LH	<i>Senecio minimus</i>	Shrubby Fireweed
LH	<i>Epilobium pallidiflorum</i>	Showy Willow-herb
MH	<i>Viola hederacea</i> sensu Willis (1972)	Ivy-leaf Violet
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
LTG	<i>Cyperus lucidus</i>	Leafy Flat-sedge
LTG	<i>Carex appressa</i>	Tall Sedge
LNG	<i>Tetrarrhena juncea</i>	Forest Wire-grass
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Lepidosperma filiforme</i>	Common Rapier-sedge
MNG	<i>Poa tenax</i>	Slender Tussock-grass
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Baumea tetragona</i>	Square Twig-sedge
GF	<i>Gleichenia dicarpa</i>	Pouched Coral-fern
GF	<i>Pteridium esculentum</i>	Austral Bracken
GF	<i>Blechnum minus</i>	Soft Water-fern
TRF	<i>Cyathea australis</i>	Rough Tree-fern
SC	<i>Billardiera scandens</i>	Common Apple-berry

EVC 59: Riparian Thicket - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

40 % cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	<i>Salix cinerea</i>	Grey Sallow	high	high
T	<i>Pinus radiata</i>	Radiata Pine	high	high
MS	<i>Prunus cerasifera</i>	Cherry Plum	high	high
MS	<i>Cotoneaster pannosus</i>	Velvet Cotoneaster	high	high
MS	<i>Erica lusitanica</i>	Spanish Heath	high	high
SS	<i>Rubus</i> sp. aff. <i>armeniacus</i>	Blackberry	high	high
LH	<i>Solanum nigrum</i> sensu Willis (1972)	Black Nightshade	high	low
MH	<i>Lotus suaveolens</i>	Hairy Bird's-foot Trefoil	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Prunella vulgaris</i>	Self-heal	high	low
SH	<i>Callitriche stagnalis</i>	Common Starwort	high	low
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 61: Box Ironbark Forest

Description:

Occurs on gently undulating rises, low hills and peneplains on infertile, often stony soils derived from a range of geologies. The open overstorey to 20 m tall consists of a variety of eucalypts, often including one of the Ironbark species. The mid storey often forms a dense to open small tree or shrub layer over an open ground layer ranging from a sparse to well-developed suite of herbs and grasses.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Eucalyptus polyanthemos</i>	Red Box
	<i>Eucalyptus macrorhyncha</i>	Red Stringybark
	<i>Eucalyptus globoidea</i>	White Stringybark
	<i>Eucalyptus tricarpa</i>	Red Ironbark

Understorey:

Life form	#Spp	%cover	EF code
Immature Canopy Tree	1	5%	TT
Medium Shrub	4	20%	SS
Small Shrub	3	10%	SS
Prostrate Shrub	2	1%	PS
Large Herb	2	5%	LH
Medium Herb	10	15%	MH
Small or Prostrate Herb	2	1%	SH
Large Tufted Graminoid	1	1%	LTG
Medium to Small Tufted Graminoid	5	10%	MTG
Ground Fern	1	1%	GF
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	20%	S/C
Total understorey projective foliage cover		80%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Acacia pycnantha</i>	Golden Wattle
MS	<i>Acacia genistifolia</i>	Spreading Wattle
MS	<i>Pultanea gurnii</i>	Golden Bush-pea
MS	<i>Kunzea ericoides</i>	Burgan
SS	<i>Dillwynia phylloides</i>	Small-leaf Parrot-pea
SS	<i>Leucopogon virgatus</i>	Common Beard-heath
SS	<i>Dillwynia cinerascens</i> s.l.	Grey Parrot-pea
PS	<i>Acrotriche serrulata</i>	Honey-pots
LH	<i>Senecio tenuiflorus</i>	Slender Fireweed
LH	<i>Wahlenbergia stricta</i>	Tall Bluebell
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Glossodia major</i>	Wax-lip Orchid
MH	<i>Drosera peltata</i> ssp. <i>auriculata</i>	Tall Sundew
MH	<i>Poranthera microphylla</i>	Small Poranthera
SH	<i>Opercularia varia</i>	Variable Stinkweed
SH	<i>Hydrocotyle laevis</i>	Stinking Pennywort
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Joycea pallida</i>	Silvertop Wallaby-grass
MTG	<i>Lomandra filiformis</i> ssp. <i>filiformis</i>	Wattle Mat-rush
MTG	<i>Lomandra nana</i>	Dwarf Mat-rush
MTG	<i>Dianella revoluta</i> s.l.	Black-anther Flax-lily
SC	<i>Thysanotus patersonii</i>	Twining Fringe-lily

EVC 61: Box Ironbark Forest – Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 68: Creekline Grassy Woodland

Description:

Eucalypt-dominated woodland to 15 m tall with occasional scattered shrub layer over a mostly grassy/sedgy to herbaceous ground-layer. Occurs on low-gradient ephemeral to intermittent drainage lines, typically on fertile colluvial/alluvial soils, on a wide range of suitably fertile geological substrates. These minor drainage lines can include a range of graminoid and herbaceous species tolerant of waterlogged soils, and are presumed to have sometimes resembled a linear wetland or system of interconnected small ponds.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	80 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
15%	<i>Eucalyptus camaldulensis</i>	River Red Gum
	<i>Eucalyptus ovata</i>	Swamp Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	2	10%	T
Medium Shrub	2	5%	MS
Small Shrub	2	1%	SS
Large Herb	2	5%	LH
Medium Herb	8	15%	MH
Small or Prostrate Herb	1	1%	SH
Large Tufted Graminoid	3	15%	LTG
Medium to Small Tufted Graminoid	12	20%	MTG
Medium to Tiny Non-tufted Graminoid	3	15%	MNG
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia meunsii</i>	Black Wattle
MS	<i>Ozothamnus ferrugineus</i>	Tree Everlasting
MS	<i>Acacia pycnantha</i>	Golden Wattle
SS	<i>Pimelea humilis</i>	Common Rice-flower
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Acaena echinata</i>	Sheep's Burr
SH	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
LTG	<i>Carex appressa</i>	Tall Sedge
LTG	<i>Poa labillardierei</i>	Common Tussock-grass
MTG	<i>Elymus scaber</i> var. <i>scaber</i>	Common Wheat-grass
MTG	<i>Lachnagrostis filiformis</i>	Common Blown-grass
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass

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EVC 68: Creekline Grassy Woodland - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

40% cover

Logs:

20m/0.1 ha

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	low
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	low	low
MH	<i>Anagallis arvensis</i>	Pimpernel	low	low
LTG	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	low	high
MNG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MNG	<i>Romulea rosea</i>	Onion Grass	high	low
MNG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MNG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MNG	<i>Aira elegantissima</i>	Delicate Hair-grass	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 82: Riverine Escarpment Scrub

Description:

Shrubland to 10 m tall with occasional emergent eucalypts. Occurs on shallow colluvial soils along rocky cliffs and slopes associated with rivers and creeks and may extend onto alluvial terraces. Characterised by a dense medium to tall shrub layer over a ground layer which can range from low to high diversity and consist of a variety of graminoids, grasses and herbs. Ferns can often be a major component of the ground stratum.

Canopy Cover:

%cover	Character Species	Common Name
25%	<i>Acacia dealbata</i>	Silver Wattle
	<i>Pomaderris aspera</i>	Hazel Pomaderris

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Medium Shrub	10	20%	MS
Large Herb	4	5%	LH
Medium Herb	13	20%	MH
Small or Prostrate Herb	6	10%	SH
Large Tufted Graminoid	2	5%	LTG
Medium to Small Tufted Graminoid	6	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Ground Fern	7	20%	GF
Scrambler or Climber	4	5%	SC
Bryophytes/Lichens	na	10%	BL

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EVC 82: Riverine Escarpment Scrub - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Olearia lirata</i>	Snowy Daisy-bush
MS	<i>Coprosma quadrifida</i>	Prickly Currant-bush
MS	<i>Pimelea axiflora</i>	Bootlace Bush
MS	<i>Prostanthera lasianthos</i>	Victorian Christmas-bush
SS	<i>Hibbertia obtusifolia</i>	Grey Guinea-flower
PS	<i>Acrotriche serrulata</i>	Honey-pots
LH	<i>Ajuga australis</i>	Austral Bugle
LH	<i>Xerochrysum bracteatum</i>	Golden Everlasting
LH	<i>Senecio tenuiflorus</i>	Slender Fireweed
MH	<i>Euchiton collinus s.l.</i>	Clustered/Creeping Cudweed
MH	<i>Veronica calycina</i>	Hairy Speedwell
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
MH	<i>Hypericum gramineum</i>	Small St John's Wort
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Oxalis exilis</i>	Shady Wood-sorrel
SH	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
SH	<i>Desmodium gunnii</i>	Southern Tick-trefoil
LTG	<i>Carex appressa</i>	Tall Sedge
LTG	<i>Austrostipa rudis ssp. nervosa</i>	Veined Spear-grass
LTG	<i>Lomandra longifolia ssp. exilis</i>	Cluster-headed Mat-rush
LNG	<i>Tetrarrhena juncea</i>	Forest Wire-grass
MTG	<i>Dianella tasmanica</i>	Tasman Flax-lily
MTG	<i>Carex breviculmis</i>	Common Grass-sedge
MTG	<i>Isolepis inundata</i>	Swamp Club-sedge
MTG	<i>Schoenus maschalinus</i>	Leafy Bog-sedge
MNG	<i>Microlaena stipoides var. stipoides</i>	Weeping Grass
MNG	<i>Echinopogon ovatus</i>	Common Hedgehog-grass
MNG	<i>Poa tenera</i>	Slender Tussock-grass
GF	<i>Pteridium esculentum</i>	Austral Bracken
GF	<i>Adiantum aethiopicum</i>	Common Maidenhair
GF	<i>Polystichum proliferum</i>	Mother Shield-fern
GF	<i>Pellaea falcata s.l.</i>	Sickle Fern
TRF	<i>Dicksonia antarctica</i>	Soft Tree-fern
TRF	<i>Cyathea australis</i>	Rough Tree-fern
SC	<i>Clematis glycinoides var. glycinoides</i>	Forest Clematis

Recruitment:

Continuous

Organic Litter:

40 % cover

Logs:

5 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Rubus polyanthemus</i>	Blackberry	high	high
MS	<i>Rubus fruticosus spp. agg.</i>	Blackberry	high	high
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Centaurea erythraea</i>	Common Centaury	high	low
MH	<i>Prunella vulgaris</i>	Self-heal	high	low
MH	<i>Gamochaeta purpurea s.l.</i>	Purple Cudweed	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 83: Swampy Riparian Woodland

Description:

Woodland to 15 m tall generally occupying low energy streams of the foothills and plains. The lower strata are variously locally dominated by a range of large and medium shrub species on the stream levees in combination with large tussock grasses and sedges in the ground layer.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus ovata</i>	Swamp Gum
	<i>Eucalyptus radiata</i> s.l.	Narrow-leaf Peppermint

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	4	30%	T
Medium Shrub	5	20%	MS
Small Shrub	1	1%	SS
Prostrate Shrub	1	1%	PS
Large Herb	3	5%	LH
Medium Herb	7	10%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	3	15%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	5	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Ground Fern	2	10%	GF
Scrambler or Climber	2	5%	SC
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia melanoxylon</i>	Blackwood
T	<i>Melaleuca ericifolia</i>	Swamp Paperbark
T	<i>Leptospermum lanigerum</i>	Woolly Tea-tree
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Coprosma quadrifida</i>	Prickly Currant-bush
MS	<i>Bursaria spinosa</i>	Sweet Bursaria
LH	<i>Senecio minimus</i>	Shrubby Fireweed
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
MH	<i>Hydrocotyle hirta</i>	Hairy Pennywort
SH	<i>Dichondra repens</i>	Kidney-weed
LTG	<i>Carex appressa</i>	Tall Sedge
LTG	<i>Cyperus lucidus</i>	Leafy Flat-sedge
LTG	<i>Lepidosperma elatius</i>	Tall Sword-sedge
LTG	<i>Juncus procerus</i>	Tall Rush
LNG	<i>Phragmites australis</i>	Common Reed
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
GF	<i>Pteridium esculentum</i>	Austral Bracken

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EVC 83: Swampy Riparian Woodland - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Prunella vulgaris</i>	Self-heal	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 125: Plains Grassy Wetland

Description:

This EVC is usually treeless, but in some instances can include sparse River Red Gum *Eucalyptus camaldulensis* or Swamp Gum *Eucalyptus ovata*. A sparse shrub component may also be present. The characteristic ground cover is dominated by grasses and small sedges and herbs. The vegetation is typically species-rich on the outer verges but is usually species-poor in the wetter central areas.

Life forms:

Life form	#Spp	%Cover	LF code
Large Herb	3	10%	LH
Medium Herb	10	20%	MH
Small or Prostrate Herb	2	10%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	2	10%	LNG
Medium to Small Tufted Graminoid	10	20%	MTG
Medium to Tiny Non-tufted Graminoid	4	10%	MNG
Bryophytes/Lichens	na	10%	BL
Total understorey projective foliage cover		95%	

LF Code	Species typical of at least part of EVC range	Common Name
LH	v <i>Craspedia paludicola</i>	Swamp Billy-buttons
LH	<i>Villarsia reniformis</i>	Running Marsh-flower
MH	<i>Myriophyllum crispatum</i>	Upright Water-milfoil
MH	<i>Lythrum hyssopifolia</i>	Small Loosestrife
MH	<i>Centella cordifolia</i>	Centella
SH	<i>Neopaxia australasica</i>	White Purslane
SH	<i>Myriophyllum integrifolium</i>	Tiny Water-milfoil
LTG	<i>Amphibromus nervosus</i>	Common Swamp Wallaby-grass
LNG	<i>Baumea arthropophylla</i>	Fine Twig-sedge
MTG	<i>Schoenus tesquorum</i>	Soft Bog-sedge
MTG	<i>Triglochin alcockiae</i>	Southern Water-ribbons
MTG	<i>Notodanthonia semiannularis</i>	Wetland Wallaby-grass
MTG	<i>Austrodanthonia duttoniana</i>	Brown-back Wallaby-grass
MNG	<i>Eleocharis acuta</i>	Common Spike-sedge
MNG	<i>Hemarthria uncinata</i> var. <i>uncinata</i>	Mat Grass
MNG	k <i>Eleocharis macbarronii</i>	Grey Spike-sedge
MNG	<i>Triglochin striatum</i>	Streaked Arrowgrass

Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:

10% cover

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EVC 125: Plains Grassy Wetland - Gippsland Plain bioregion

Logs:

5 m/0.1 ha.(where trees are overhanging the wetland)

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Rumex conglomeratus</i>	Clustered Dock	high	high
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
MH	<i>Lotus corniculatus</i>	Bird's-foot Trefoil	high	high
MH	<i>Mentha pulegium</i>	Pennyroyal	high	high
MH	<i>Centaureum erythraea</i>	Common Centaury	high	low
MH	<i>Plantago coronopus</i>	Buck's-horn Plantain	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Anagallis arvensis</i>	Pimpernel	high	low
SH	<i>Trifolium repens</i> var. <i>repens</i>	White Clover	high	high
LTG	<i>Watsonia meriana</i> var. <i>bulbillifera</i>	Bulbil Watsonia	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Paspalum dilatatum</i>	Paspalum	high	high
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MTG	<i>Gladiolus undulatus</i>	Wild Gladiolus	high	low
MTG	<i>Juncus articulatus</i>	Jointed Rush	high	high
MTG	<i>Lolium perenne</i>	Perennial Rye-grass	high	high
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MTG	<i>Agrostis capillaris</i> s.l.	Brown-top Bent	high	high
MNG	<i>Paspalum distichum</i>	Water Couch	high	high
TTG	<i>Cyperus tenellus</i>	Tiny Flat-sedge	high	low
SNG	<i>Sisyrinchium iridifolium</i>	Blue Pigroot	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 127: Valley Heathy Forest

Description:

A low, open forest to 15 m tall with a sedgy/grassy understorey with a component of small ericoid shrubs and grass-trees. Soil and moisture factors are critical in delimiting the vegetation.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Eucalyptus melliodora</i>	Yellow Box
	<i>Eucalyptus goniacalyx</i> s.l.	Bundy
	<i>Eucalyptus cephalocarpa</i> s.l.	Silverleaf Stringybark
	<i>Eucalyptus obliqua</i>	Messmate Stringybark

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	2	10%	T
Medium Shrub	7	15%	MS
Small Shrub	5	5%	SS
Prostrate Shrub	2	1%	PS
Medium Herb	6	10%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	2	20%	LNG
Medium to Small Tufted Graminoid	7	15%	MTG
Medium to Tiny Non-tufted Graminoid	1	1%	MNG
Ground Fern	1	1%	GF
Scrambler or Climber	3	5%	SC
Bryophytes/Lichens	na	10%	BL

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EVC 127: Valley Heathy Forest - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Exocarpos cupressiformis</i>	Cherry Ballart
MS	<i>Epacris impressa</i>	Common Heath
MS	<i>Cassinia aculeata</i>	Common Cassinia
MS	<i>Daviesia leptophylla</i>	Narrow-leaf Bitter-pea
MS	<i>Cassinia arcuata</i>	Drooping Cassinia
SS	<i>Platylobium obtusangulum</i>	Common Flat-pea
SS	<i>Dillwynia cinerascens</i> s.l.	Grey Parrot-pea
SS	<i>Hovea heterophylla</i>	Common Hovea
SS	<i>Pimelea humilis</i>	Common Rice-flower
PS	<i>Acrotriche serrulata</i>	Honey-pots
PS	<i>Bossiaea prostrata</i>	Creeping Bossiaea
MH	<i>Leptorhynchus tenuifolius</i>	Wiry Buttons
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Helichrysum scorpioides</i>	Button Everlasting
SH	<i>Opercularia varia</i>	Variable Stinkweed
SH	<i>Drosera whittakeri</i> ssp. <i>aberrans</i>	Scented Sundew
SH	<i>Oxalis corniculata</i> s.l.	Yellow Wood-sorrel
LTG	<i>Xanthorrhoea minor</i> ssp. <i>lutea</i>	Small Grass-tree
LTG	<i>Deyeuxia quadriseta</i>	Reed Bent-grass
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Joycea pallida</i>	Silvertop Wallaby-grass
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Poa morrisii</i>	Soft Tussock-grass
MTG	<i>Dianella revoluta</i> s.l.	Black-anther Flax-lily
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
GF	<i>Lindsaea linearis</i>	Screw Fern
SC	<i>Billardiera scandens</i>	Common Apple-berry
SC	<i>Hardenbergia violacea</i>	Purple Coral-pea

Recruitment:

Episodic/Fire. Desirable period between disturbances is 30 years.

Organic Litter:

40 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	<i>Pinus radiata</i>	Radiata Pine	high	high
MS	<i>Rubus fruticosus</i> spp. agg.	Blackberry	high	high
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 128: Grassy Forest

Description:

Low growing forest to 20 m tall with an understorey of small and medium shrubs and a rich diversity of herbs. Large shrubs and understorey trees may also be conspicuous. Often grows in areas transitional between drier box stringybark forests and taller, herb-rich forests typical of more favourable environments.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus goniacalyx</i> s.l.	Bundy
	<i>Eucalyptus radiata</i> s.l.	Narrow-leaf Peppermint

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	2	10%	T
Medium Shrub	4	10%	MS
Small Shrub	2	1%	SS
Prostrate Shrub	2	5%	PS
Large Herb	1	1%	LH
Medium Herb	5	10%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	1	1%	LNG
Medium to Small Tufted Graminoid	3	45%	MTG
Ground Fern	1	1%	GF
Scrambler or Climber	3	5%	SC
Bryophytes/Lichens	na	10%	BL

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EVC 128: Grassy Forest - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia melanoxylon</i>	Blackwood
MS	<i>Bursaria spinosa</i> ssp. <i>spinosa</i>	Sweet Bursaria
MS	<i>Cassinia aculeata</i>	Common Cassinia
MS	<i>Acacia stricta</i>	Hop Wattle
SS	<i>Pimelea humilis</i>	Common Rice-flower
SS	<i>Hovea heterophylla</i>	Common Hovea
PS	<i>Bossiaea prostrata</i>	Creeping Bossiaea
PS	<i>Platylobium formosum</i>	Handsome Flat-pea
PS	<i>Acrotriche prostrata</i>	Trailing Ground-berry
MH	<i>Hypericum gramineum</i>	Small St John's Wort
MH	<i>Acaena agnipila</i>	Hairy Sheep's Burr
MH	<i>Ranunculus lappaceus</i>	Australian Buttercup
SH	<i>Oxalis corniculata</i> s.l.	Yellow Wood-sorrel
SH	<i>Opercularia varia</i>	Variable Stinkweed
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Goodenia lanata</i>	Trailing Goodenia
LNG	<i>Tetrarrhena juncea</i>	Forest Wire-grass
MTG	<i>Joycea pallida</i>	Silvertop Wallaby-grass
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Poa morrisii</i>	Soft Tussock-grass
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
GF	<i>Adiantum aethiopicum</i>	Common Maidenhair
SC	<i>Glycine clandestina</i>	Twining Glycine
SC	<i>Comesperma volubile</i>	Love Creeper

Recruitment:

Continuous

Organic Litter:

40 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Rubus fruticosus</i> spp. <i>agg.</i>	Blackberry	high	high
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 132_61: LaTrobe Valley Plains Grassland

Description:

Treeless vegetation dominated by largely grass and herb life forms. Shrubs and trees may be also occasionally present.

Life Forms:

Life form	#Spp	%Cover	LF code
Small Shrub	1	1%	SS
Large Herb	2	5%	LH
Medium Herb	12	30%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	1	1%	LTG
Medium to Small Tufted Graminoid	10	40%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Bryophytes/Lichens	na	10%	BL
Total understorey projective foliage cover		95%	

LF Code	Species typical of at least part of EVC range	Common Name
LH	<i>Calcecephalus citreus</i>	Lemon Beauty-heads
MH	<i>Eryngium ovatum</i>	Blue Devil
MH	<i>Acaena echinata</i>	Sheep's Burr
MH	<i>Drosera peltata</i> ssp. <i>peltata</i>	Pale Sundew
MH	<i>Leptorhynchus squamatus</i>	Scaly Buttons
SH	<i>Solenogyne dominii</i>	Smooth Solenogyne
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Schoenus apogon</i>	Common Bog-sedge
MTG	<i>Austrodanthonia setacea</i>	Bristly Wallaby-grass
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
SC	<i>Convolvulus erubescens</i> spp. agg.	Pink Bindweed

Recruitment:

Episodic/Fire or Grazing. Desirable period between disturbances is 5 years.

Organic Litter:

10 % cover

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EVC 132_61: LaTrobe Valley Plains Grassland - Gippsland Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
SS	<i>Galenia pubescens</i> var. <i>pubescens</i>	Galenia	high	high
LH	<i>Rumex conglomeratus</i>	Clustered Dock	high	low
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Senecio jacobaea</i>	Ragwort	high	high
LH	<i>Rapistrum rugosum</i>	Giant Mustard	high	high
LH	<i>Lepidium africanum</i>	Common Peppergrass	high	low
LH	<i>Urtica dioica</i>	Giant Nettle	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
MH	<i>Plantago coronopus</i>	Buck's-horn Plantain	high	low
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low
MH	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	high	low
SH	<i>Trifolium repens</i> var. <i>repens</i>	White Clover	high	low
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Paspalum dilatatum</i>	Paspalum	high	high
MTG	<i>Sporobolus africanus</i>	Rat-tail Grass	high	high
MTG	<i>Bromus catharticus</i>	Prairie Grass	high	low
MTG	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	Soft Brome	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Agrostis capillaris</i> s.l.	Brown-top Bent	high	high
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Lolium rigidum</i>	Wimmera Rye-grass	high	low
MTG	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	high	high
MTG	<i>Ehrharta longiflora</i>	Annual Veldt-grass	high	low
MNG	<i>Dactylis glomerata</i>	Cocksfoot	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 132_62: South Gippsland Plains Grassland

Description:

Treeless or with occasional scattered trees above a largely grassy understorey on grey silty-loamy soils, often seasonally water-logged. Shrubs may be also occasionally present.

Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	5	5%	LH
Medium Herb	12	5%	MH
Small or Prostrate Herb	6	5%	SH
Large Tufted Graminoid	3	10%	LTG
Medium to Small Tufted Graminoid	5	50%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Bryophytes/Lichens	na	10%	BL
Total understorey projective foliage cover		95%	

LF Code	Species typical of at least part of EVC range	Common Name
LH	<i>Tricoryne elatior</i>	Yellow Rush-lily
LH	<i>Leptorhynchos tenuifolius</i>	Wiry Buttons
LH	<i>Calceophalus lacteus</i>	Milky Beauty-heads
LH	<i>Haloragis heterophylla</i>	Varied Raspwort
MH	<i>Oxalis exilis</i>	Shady Wood-sorrel
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
SH	<i>Dichondra repens</i>	Kidney-weed
LTG	<i>Poa labillardierei</i>	Common Tussock-grass
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Lachnagrostis filiformis</i>	Common Blown-Grass
MTG	<i>Schoenus apogon</i>	Common Bog-sedge
MTG	<i>Austrodanthonia laevis</i>	Smooth Wallaby-grass
MNG	<i>Hemarthria uncinata</i> var. <i>uncinata</i>	Mat Grass
MNG	<i>Distichlis distichophylla</i>	Australian Salt-grass
SC	<i>Clematis microphylla</i>	Small-leaved Clematis

Recruitment:

Episodic/Fire or Grazing.

Organic Litter:

10 % cover

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EVC 132_62: *South Gippsland* Plains Grassland - Gippsland Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
SS	<i>Galenia pubescens</i> var. <i>pubescens</i>	Galenia	high	high
LH	<i>Rumex conglomeratus</i>	Clustered Dock	high	low
LH	<i>Plantago lanceolata</i>	Ribwort	high	high
LH	<i>Senecio jacobaea</i>	Ragwort	high	high
LH	<i>Lepidium africanum</i>	Common Peppergrass	high	low
LH	<i>Urtica dioica</i>	Giant Nettle	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	low
LH	<i>Centaurea tenuiflorum</i>	Slender Centaury	high	low
MH	<i>Plantago coronopus</i>	Buck's-horn Plantain	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	high	low
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	high
SH	<i>Trifolium repens</i> var. <i>repens</i>	White Clover	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MTG	<i>Paspalum dilatatum</i>	Paspalum	high	high
MTG	<i>Sporobolus africanus</i>	Rat-tail Grass	high	high
MTG	<i>Bromus catharticus</i>	Prairie Grass	high	low
MTG	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	Soft Brome	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Agrostis capillaris</i> s.l.	Brown-top Bent	high	high
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Lolium rigidum</i>	Wimmera Rye-grass	high	low
MTG	<i>Lolium perenne</i>	Perennial Rye-grass	high	low
MTG	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	high	high
MTG	<i>Ehrharta longiflora</i>	Annual Veldt-grass	high	low
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	high
MNG	<i>Dactylis glomerata</i>	Cocksfoot	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 133: Limestone Pomaderris Shrubland

Description:

Open woodland to 10 m tall or shrubland with scattered emergent eucalypts to 5 m tall occurring on steep, north facing aspects associated with limestone cliffs with an understorey dominated by medium shrubs. It is found at altitudes of 750 m above sea level and receives a moderate rainfall of approximately over 700 mm per annum.

* woodland only components (ignore when assessing shrubland areas and standardise final score as appropriate)

Large trees*:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	60 cm	10 / ha

Tree Canopy Cover*:

%cover	Character Species	Common Name
10%	<i>Eucalyptus viminalis</i>	Manna Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree*		5%	IT
Understorey Tree or Large Shrub*	2	10%	T
Medium Shrub	9	45%	MS
Small Shrub	2	1%	SS
Large Herb	5	5%	LH
Medium Herb	10	15%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	2	1%	LTG
Medium to Small Tufted Graminoid	7	30%	MTG
Scrambler or Climber	3	1%	SC
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	10%	S/C

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EVC 133: Limestone Pomaderris Shrubland - Gippsland Plain bioregion

LF Code		Species typical of at least part of EVC range	Common Name
T	V v	<i>Acacia caeruleascens</i>	Limestone Blue Wattle
MS	K v	<i>Ozothamnus adnatus</i>	Winged Everlasting
MS		<i>Bursaria spinosa</i> ssp. <i>lasiophylla</i>	Hairy Bursaria
MS	R r	<i>Pomaderris oraria</i> ssp. <i>calicicola</i>	Limestone Pomaderris
MS	R r	<i>Pomaderris oraria</i>	Bassian Pomaderris
SS	r	<i>Pimelea flava</i> ssp. <i>dichotoma</i>	Diosma Rice-flower
SS		<i>Pimelea glauca</i>	Smooth Rice-flower
PS		<i>Astroloma humifusum</i>	Cranberry Heath
LH		<i>Wahlenbergia gracilis</i> s.l.	Sprawling Bluebell
LH		<i>Senecio quadridentatus</i>	Cotton Fireweed
LH	r	<i>Arthropodium</i> sp. 1 (robust glaucous)	Tall Vanilla-lily
MH		<i>Oxalis perennans</i>	Grassland Wood-sorrel
MH		<i>Daucus glochidiatus</i>	Australian Carrot
MH		<i>Galium migrans</i>	Wandering Bedstraw
SH		<i>Dichondra repens</i>	Kidney-weed
SH		<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
SH		<i>Cymbonotus preissianus</i>	Austral Bear's-ear
LTG		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LTG		<i>Austrostipa nodosa</i>	Knotty Spear-grass
LTG		<i>Austrostipa blackii</i>	Crested Spear-grass
MTG		<i>Themeda triandra</i>	Kangaroo Grass
MTG		<i>Carex breviculmis</i>	Common Grass-sedge
MTG		<i>Dianella revoluta</i> s.l.	Black-anther Flax-lily
MTG		<i>Poa labillardierei</i>	Common Tussock-grass
GF		<i>Pleurosorus rutifolius</i> s.l.	Blanket Fern
SC	k	<i>Clematis microphylla</i> var. <i>leptophylla</i>	Skeleton Vine
SC		<i>Clematis microphylla</i>	Small-leaved Clematis
SC		<i>Convolvulus erubescens</i> spp. agg.	Pink Bindweed

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs⁺:

5 m/0.1 ha.

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Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Rosa rubiginosa</i>	Sweet Briar	low	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	low
LH	<i>Centaureum tenuiflorum</i>	Slender Centaury	high	low
MH	<i>Centaureum erythraea</i>	Common Centaury	high	low
MH	<i>Anagallis arvensis</i>	Pimpernel	high	low
MH	<i>Taraxacum officinale</i> spp. agg.	Garden Dandelion	high	low
MH	<i>Galium murale</i>	Small Goosegrass	high	low
MH	<i>Cardamine hirsuta</i> s.l.	Common Bitter-cress	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Petrorhagia velutina</i>	Velvety Pink	high	low
MH	<i>Veronica persica</i>	Persian Speedwell	high	low
MH	<i>Stellaria media</i>	Chickweed	high	low
MTG	<i>Catapodium rigidum</i>	Fern Grass	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 134: Sand Forest

Description:

Eucalypt forest to 20 m tall occurring on deep, low fertility sand deposits subject to high fire frequency. The understorey is visually dominated by Austral Bracken and the overall diversity is low.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Eucalyptus globoides</i>	White Stringybark
	<i>Eucalyptus consideriana</i>	Yertchuk
	<i>Eucalyptus obliqua</i>	Messmate Stringybark

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	1	5%	T
Medium Shrub	3	5%	MS
Small Shrub	1	5%	SS
Prostrate Shrub	2	5%	PS
Medium Herb	2	5%	MH
Large Tufted Graminoid	1	1%	LTG
Medium to Small Tufted Graminoid	7	15%	MTG
Medium to Tiny Non-tufted Graminoid	2	1%	MNG
Ground Fern	1	50%	GF
Bryophytes/Lichens	na	10 %	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia mearnsii</i>	Black Wattle
T	<i>Banksia serrata</i>	Saw Banksia
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Brachyloma daphnoides</i>	Daphne Heath
MS	<i>Acacia paradoxa</i>	Hedge Wattle
SS	<i>Astroloma conostephioides</i>	Flame Heath
PS	<i>Bossiaea prostrata</i>	Creeping Bossiaea
PS	<i>Astroloma humifusum</i>	Cranberry Heath
MH	<i>Goodenia geniculata</i>	Bent Goodenia
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
LTG	<i>Xanthorrhoea australis</i>	Austral Grass-tree
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Austrodanthonia geniculata</i>	Knead Wallaby-grass
MTG	<i>Lomandra nana</i>	Dwarf Mat-rush
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
GF	<i>Pteridium esculentum</i>	Austral Bracken

Recruitment:

Continuous

Organic Litter:

40 % cover

Logs:

15m/0.1 ha

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EVC 134: Sand Forest - Gippsland Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Hypochoeris glabra</i>	Smooth Cat's-ear	high	low
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MNG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MNG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MNG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MNG	<i>Aira elegantissima</i>	Delicate Hair-grass	high	low
MNG	<i>Holcus setosus</i>	Annual Fog	high	low
MNG	<i>Aira praecox</i>	Early Hair-grass	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 135: Gallery Rainforest

Description:

Closed forest to 20 m tall occurring along the fringes of substantial streams that periodically flood. The understorey comprises of a number of willow shrubs that can withstand flooding while mature woody vines are generally absent.

Large trees:

Species	DBH(cm)	#/ha
Various spp.	70 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
50%	<i>Tristanopsis laurina</i>	Kanooka
	<i>Acacia melanoxylon</i>	Blackwood

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	4	20%	T
Medium Shrub	12	30%	MS
Small Shrub	2	5%	SS
Prostrate Shrub	1	1%	PS
Large Herb	1	1%	LH
Medium Herb	6	10%	MH
Small or Prostrate Herb	2	1%	SH
Large Tufted Graminoid	4	15%	LTG
Large Non-tufted Graminoid	1	1%	LNG
Medium to Small Tufted Graminoid	4	5%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Ground Fern	6	20%	GF
Tree Fern	1	1%	TRF
Epiphyte	2	5%	EP
Scrambler or Climber	8	10%	SC
Bryophytes/Lichens	na	20%	BL

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EVC 135: Gallery Rainforest - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Elaeocarpus reticulatus</i>	Blue Oliveberry
T	<i>Rapanea howittiana</i>	Mutton-wood
MS	<i>Notelaea venosa</i>	Large Mock-olive
MS	<i>Coprosma quadrifida</i>	Prickly Currant-bush
MS	<i>Lomatia myricoides</i>	River Lomatia
MS	<i>Leucopogon lanceolatus</i> var. <i>lanceolatus</i>	Lance Beard-heath
PS	<i>Platylobium formosum</i>	Handsome Flat-pea
MH	<i>Viola hederacea</i> sensu Willis (1972)	Ivy-leaf Violet
MH	<i>Geranium potentilloides</i>	Cinquefoil Cranesbill
MH	<i>Gratiola peruviana</i>	Austral Brooklime
MH	<i>Opercularia aspera</i>	Coarse Stinkweed
SH	<i>Dichondra repens</i>	Kidney-weed
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LTG	<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge
LTG	<i>Gahnia clarkei</i>	Tall Saw-sedge
LNG	<i>Tetrarrhena juncea</i>	Forest Wire-grass
MTG	<i>Dianella tasmanica</i>	Tasman Flax-lily
MTG	<i>Dianella caerulea</i> var. <i>caerulea</i>	Paroo Lily
MTG	<i>Isolepis inundata</i>	Swamp Club-sedge
MTG	<i>Poa sieberiana</i>	Grey Tussock-grass
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Oplismenus hirtellus</i>	Australian Basket-grass
GF	<i>Blechnum nudum</i>	Fishbone Water-fern
GF	<i>Adiantum aethiopicum</i>	Common Maidenhair
GF	<i>Calochlaena dubia</i>	Common Ground-fern
GF	<i>Blechnum cartilagineum</i>	Gristle Fern
TRF	<i>Cyathea australis</i>	Rough Tree-fern
EP	<i>Hymenophyllum cupressiforme</i>	Common Filmy Fern
SC	<i>Eustrephus latifolius</i>	Wombat Berry
SC	<i>Smilax australis</i>	Austral Sarsaparilla
SC	<i>Tylophora barbata</i>	Bearded Tylophora
SC	<i>Clematis aristata</i>	Mountain Clematis

Recruitment:

Continuous

Organic Litter:

40 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Conyza</i> spp.	Fleabane	high	low
MH	<i>Prunella vulgaris</i>	Self-heal	high	low
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 136: Sedge Wetland

Description:

Occupies seasonal wetlands and consists of generally treeless vegetation dominated by sedges. May contain a fringe of shrubs and isolated shrubs may also be present throughout. Usually of low diversity in central areas, but richer on verges and in some more ephemeral forms of the EVC. Frequently on soils of high organic content, in depressions within sandy terrain.

Life form:

Life form	#Spp	%Cover	LF code
Medium Shrub	1	5%	MS
Large Herb	1	5%	LH
Medium Herb	4	10%	MH
Large Tufted Graminoid	1	15%	LTG
Large Non-tufted Graminoid	2	30%	LNG
Medium to Small Tufted Graminoid	1	1%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Bryophytes/Lichens	na	10%	BL
Total understorey projective foliage cover		85%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Allocasuarina misera/paradoxa</i>	Slender/Green Sheoak
LH	<i>Vittarsia reniformis</i>	Running Marsh-flower
MH	<i>Utricularia australis</i>	Yellow Bladderwort
MH	<i>Goodenia humilis</i>	Swamp Goodenia
MH	<i>Centella cordifolia</i>	Centella
LTG	<i>Baumea articulata</i>	Jointed Twig-sedge
LNG	<i>Lepidosperma longitudinale</i>	Pithy Sword-sedge
LNG	<i>Baumea rubiginosa s.l.</i>	Soft Twig-rush
MTG	<i>Lepidosperma concavum</i>	Sandhill Sword-sedge
MNG	<i>Lepydia muelleri</i>	Common Scale-rush
MNG	<i>Isoplepis fluitans</i>	Floating Club-sedge

Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:

10 % cover

Weediness:

There are no consistent weeds in this EVC.

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EVC 136: Sedge Wetland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 140: Mangrove Shrubland

Description:

Shrubland to 2m tall. Confined to protected low energy coastal environments where there is sufficient shelter from strong wave action and currents to allow the accumulation of fine sediments, generally on mud flats within the tidal zone.

Life Forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	1	40%	MS
Medium to Tiny Non-tufted Graminoid	1	5%	MNG
Total understorey projective foliage cover		25%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Avicennia marina ssp. australasica</i>	White Mangrove
MNG	<i>Zostera muelleri</i>	Dwarf Grass-wrack

Recruitment:

Continuous

Weediness:

There are no consistent weeds in this EVC.

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EVC 140: Mangrove Shrubland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 141: Sandy Flood Scrub

Description:

Structurally dominated by medium to large shrubs to 8 m tall with occasional eucalypt emergents. The understorey may contain a range of shrubs, grasses/sedges and herbs/ferns depending on location and period of inundation. Occupies alluvial terraces with coarse to fine sandy soils of permanent streams and rivers.

Canopy Cover:

%cover	Character Species	Common Name
40%	<i>Leptospermum continentale</i>	Prickly Tea-tree
	<i>Kunzea ericoides</i>	Burgan
	<i>Pomaderris aspera</i>	Hazel Pomaderris
	<i>Acacia mearnsii</i>	Black Wattle

Understorey:

Life form	#Spp	%Cover	LF code
Medium Shrub	3	15%	MS
Small Shrub	1	1%	SS
Medium Herb	2	5%	MH
Small or Prostrate Herb	1	1%	SH
Large Tufted Graminoid	3	15%	LTG
Large Non-tufted Graminoid	1	10%	LNG
Medium to Small Tufted Graminoid	1	1%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Ground Fern	1	5%	GF
Bryophytes/Lichens	na	20%	BL
Total understorey projective foliage cover		75%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Monotoca scoparia</i>	Prickly Broom-heath
MS	<i>Banksia marginata</i>	Silver Banksia
MS	<i>Callistemon citrinus</i>	Crimson Bottlebrush
SS	<i>Hibbertia fasciculata</i> var. <i>prostrata</i>	Bundled Guinea-flower
MH	<i>Phyllanthus hirtellus</i>	Thyme Spurge
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LTG	<i>Poa labillardierei</i>	Common Tussock-grass
LTG	<i>Carex appressa</i>	Tall Sedge
LNG	<i>Lepidosperma longitundale</i>	Pithy Sword-sedge
MNG	<i>Caustis flexuosa</i>	Curly Wig
MNG	<i>Microsena stipoides</i> var. <i>stipoides</i>	Weeping Grass
TTG	<i>Centrolepis strigosa</i> ssp. <i>strigosa</i>	Hairy Centrolepis
GF	<i>Pteridium esculentum</i>	Austral Bracken
GF	<i>Adiantum aethiopicum</i>	Common Maidenhair

Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:

10 % cover

Logs:

5 m/0.1 ha. (note: large log class does not apply)

Weediness:

There are no consistent weeds in this EVC.

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EVC 141: Sandy Flood Scrub - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 151: Plains Grassy Forest

Description:

Open forest to 20 m tall often above a heathy shrub layer and a diverse grassy, sedge and herbaceous ground layer. Occurs on lowland plains and old river terraces made up of gravelly sandy clays.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Eucalyptus muelleriana</i>	Yellow Stringybark
	<i>Eucalyptus bridgesiana</i> s.l.	But But
	<i>Eucalyptus polyanthemus</i>	Red Box
	<i>Eucalyptus macrorhyncha</i>	Red Stringybark

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	3	15%	T
Medium Shrub	6	20%	MS
Small Shrub	3	5%	SS
Prostrate Shrub	2	5%	PS
Large Herb	3	5%	LH
Medium Herb	6	10%	MH
Small or Prostrate Herb	2	5%	SH
Large Tufted Graminoid	2	10%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	4	15%	MTG
Medium to Tiny Non-tufted Graminoid	2	1%	MNG
Ground Fern	2	10%	GF
Bryophytes/Lichens	na	10%	BL

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EVC 151: Plains Grassy Forest - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Allocasuarina littoralis</i>	Black Sheoak
T	<i>Acacia mearnsii</i>	Black Wattle
T	<i>Acacia implexa</i>	Lightwood
T	<i>Exocarpos cupressiformis</i>	Cherry Ballart
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Banksia marginata</i>	Silver Banksia
MS	<i>Kunzea ericoides</i>	Burgan
MS	<i>Melaleuca parvistaminea</i>	Rough-barked Honey-myrtle
SS	<i>Pimelea humilis</i>	Common Rice-flower
SS	<i>Hibbertia riparia</i>	Erect Guinea-flower
SS	<i>Platyllobium obtusangulum</i>	Common Flat-pea
SS	<i>Phyllanthus hirtellus</i>	Thyme Spurge
PS	<i>Acrotriche serrulata</i>	Honey-pots
PS	<i>Bossiaea prostrata</i>	Creeping Bossiaea
PS	<i>Astroloma humifusum</i>	Cranberry Heath
LH	<i>Tricoryne elatior</i>	Yellow Rush-lily
LH	<i>Wahlenbergia gracilis s.l.</i>	Sprawling Bluebell
MH	<i>Poranthera microphylla</i>	Small Poranthera
MH	<i>Hypericum gramineum</i>	Small St John's Wort
MH	<i>Hydrocotyle hirta</i>	Hairy Pennywort
MH	<i>Gonocarpus tetragynus</i>	Common Raspswort
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Oxalis corniculata s.l.</i>	Yellow Wood-sorrel
SH	<i>Opercularia varia</i>	Variable Stinkweed
LTG	<i>Xanthorrhoea minor ssp. lutea</i>	Small Grass-tree
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Poa australis spp. agg.</i>	Tussock Grass
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Lepidosperma laterale</i>	Variable Sword-sedge
MNG	<i>Microlaena stipoides var. stipoides</i>	Weeping Grass
MNG	<i>Entolasia marginata</i>	Bordered Panic
GF	<i>Pteridium esculentum</i>	Austral Bracken

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Centaurium tenuiflorum</i>	Slender Centaury	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Centaurium erythraea</i>	Common Centaury	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 155: Bird Colony Succulent Herbland

Description:

Closed herbland formed on nutrient-enriched sandy substrates associated with shearwater and penguin breeding colonies. A species-poor EVC dominated by species able to cope with both the nutrient enrichment and the severe disturbance caused by the large numbers of burrowing birds.

Life Forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	1	10%	MS
Large Herb	2	5%	LH
Medium Herb	5	10%	MH
Small or Prostrate Herb	1	10%	SH
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	3	30%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Scrambler or Climber	1	5%	SC
Total understorey projective foliage cover		75%	

LF Code	Character Species	Common Name
MS	<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Seaberry Saltbush
MH	<i>Plantago varia</i>	Variable Plantain
MH	<i>Asperula conferta</i>	Common Woodruff
MTG	<i>Poa poliformis</i>	Coast Tussock-grass
SC	<i>Tetragonia implexicoma</i>	Bower Spinach
SC	<i>Clematis microphylla</i>	Small-leaved Clematis

Recruitment:

Continuous.

Organic Litter:

NA

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Lycium ferocissimum</i>	African Box-thorn	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Senecio elegans</i>	Purple Groundsel	high	high
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low
MH	<i>Cakile maritima</i> ssp. <i>maritima</i>	Sea Rocket	high	low
LNG	<i>Ammophila arenaria</i>	Marram Grass	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Ehrharta longiflora</i>	Annual Veldt-grass	high	low
MTG	<i>Bromus diandrus</i>	Great Brome	high	low
MTG	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	high	high
MNG	<i>Lagurus ovatus</i>	Hare's-tail Grass	high	low
MNG	<i>Vulpia fasciculata</i>	Dune Fescue	high	low

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EVC 155: Bird Colony Succulent Herbland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 160: Coastal Dune Scrub

Description:

Closed scrub to 5 m tall with occasional emergents occurring on secondary dunes along ocean and bay beaches and lake shores. Occupies siliceous and calcareous sands that are subject to high levels of saltspray and continuous disturbance from onshore winds.

Life forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	6	50%	MS
Large Herb	1	1%	LH
Medium Herb	3	10%	MH
Small or Prostrate Herb	1	1%	SH
Large Tufted Graminoid	2	5%	LTG
Medium to Small Tufted Graminoid	6	15%	MTG
Medium to Tiny Non-tufted Graminoid	1	1%	MNG
Scrambler or Climber	3	5%	SC
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Acacia longifolia</i> s.l.	Coast Wattle
MS	<i>Leptospermum laevigatum</i>	Coast Tea-tree
MS	<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Seaberry Saltbush
MS	<i>Leucopogon parviflorus</i>	Coast Beard-heath
SH	<i>Carpobrotus rossii</i>	Karkalla
LTG	<i>Austrostipa mollis</i>	Supple Spear-grass
LTG	<i>Austrostipa flavescens</i>	Coast Spear-grass
MTG	<i>Austrodanthonia geniculata</i>	Kneed Wallaby-grass
MTG	<i>Lepidosperma concavum</i>	Sandhill Sword-sedge
SC	<i>Tetragonia implexicoma</i>	Bower Spinach

Recruitment:

Episodic/Fire. Desirable period between disturbances is 30 years.

Organic Litter:

40 % cover

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EVC 160: Coastal Dune Scrub - Gippsland Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Chrysanthemoides monilifera</i>	Boneseed	high	high
MS	<i>Coprosma repens</i>	Mirror Bush	low	high
MS	<i>Lycium ferocissimum</i>	African Box-thorn	low	high
MS	<i>Cotoneaster pannosus</i>	Velvet Cotoneaster	low	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
MH	<i>Salpichroa origanifolia</i>	Pampas Lily-of-the-Valley	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	high
MH	<i>Hypochoeris glabra</i>	Smooth Cat's-ear	high	low
SH	<i>Medicago polymorpha</i>	Burr Medic	high	low
SH	<i>Crassula multicava</i> ssp. <i>multicava</i>	Shade Crassula	high	low
SH	<i>Carpobrotus edulis</i>	Hottentot Fig	high	high
LNG	<i>Pennisetum clandestinum</i>	Kikuyu	high	high
MTG	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	high	high
MTG	<i>Ehrharta longiflora</i>	Annual Veldt-grass	high	low
MTG	<i>Bromus diandrus</i>	Great Brome	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Sporobolus africanus</i>	Rat-tail Grass	high	high
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Hainardia cylindrica</i>	Common Barb-grass	high	low
MTG	<i>Bromus catharticus</i>	Prairie Grass	high	low
MNG	<i>Lagurus ovatus</i>	Hare's-tail Grass	high	low
MNG	<i>Aira caryophyllea</i>	Silvery Hair-grass	high	low
SC	<i>Tradescantia fluminensis</i>	Wandering Jew	high	high
SC	<i>Delairea odorata</i>	Cape Ivy	high	high
SC	<i>Asparagus asparagoides</i>	Bridal Creeper	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 161: Coastal Headland Scrub

Description:

Scrub or low shrubland to 2 m tall on steep, rocky coastal headlands often associated with cliffs exposed to the stresses of extreme salt-laden winds and salt spray from the south west. Occurs on shallow sands along rocky sections of the coast.

Life forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	7	50%	MS
Small Shrub	2	5%	SS
Large Herb	2	1%	LH
Medium Herb	4	5%	MH
Small or Prostrate Herb	2	5%	SH
Large Tufted Graminoid	1	1%	LTG
Medium to Small Tufted Graminoid	4	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Scrambler or Climber	2	5%	SC
Bryophytes/Lichens	na	10%	BL
Total understorey projective foliage cover		70%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Leptospermum laevigatum</i>	Coast Tea-tree
MS	<i>Acacia longifolia</i> ssp. <i>sophorae</i>	Coast Wattle
MS	<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Seaberry Saltbush
MS	<i>Leucopogon parviflorus</i>	Coast Beard-heath
SS	<i>Leucophyta brownii</i>	Cushion Bush
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Rounded Noon-flower
MTG	<i>Dianella brevicaulis</i>	Small-flower Flax-lily
MTG	<i>Lachnagrostis billardierei</i> s.l.	Coast Blown-grass
MTG	<i>Poa poliformis</i>	Coast Tussock-grass
MTG	<i>Austrodanthonia caespitosa</i>	Common Wallaby-grass
MNG	<i>Ficinia nodosa</i>	Knobby Club-sedge
SC	<i>Clematis microphylla</i>	Small-leaved Clematis
SC	<i>Tetragonia implexicoma</i>	Bower Spinach

Recruitment:

Continuous

Organic Litter:

40 % cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Chrysanthemoides monilifera</i>	Boneseed	high	high
MS	<i>Polygala myrtifolia</i> var. <i>myrtifolia</i>	Myrtle-leaf Milkwort	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MTG	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	high	high

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EVC 161: Coastal Headland Scrub - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 163: Coastal Tussock Grassland

Description:

A tussock grassland that may contain emergent shrubs. Occurs on exposed coastal cliffs and bluffs. Soils are saline and the strong salt-laden winds preclude tree growth.

Life Forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	3	20%	MS
Small Shrub	1	5%	SS
Prostrate Shrub	1	1%	PS
Large Herb	2	5%	LH
Medium Herb	5	10%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	3	10%	LTG
Medium to Small Tufted Graminoid	4	25%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	10%	S/C

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Leucopogon parviflorus</i>	Coast Beard-heath
MS	<i>Correa alba</i>	White Correa
MH	<i>Viola hederacea sensu Willis (1972)</i>	Ivy-leaf Violet
MH	<i>Samolus repens</i>	Creeping Brookweed
MH	<i>Asperula conferta</i>	Common Woodruff
MH	<i>Daucus glochidiatus</i>	Austral Carrot
SH	<i>Selliera radicans</i>	Shiny Swamp-mat
LTG	<i>Gahnia trifida</i>	Coast Saw-sedge
LTG	<i>Austrostipa stipoides</i>	Prickly Spear-grass
LTG	<i>Dichelachne crinita</i>	Long-hair Plume-grass
MTG	<i>Poa poliformis</i>	Coast Tussock-grass
MTG	<i>Schoenus apogon</i>	Common Bog-sedge
MTG	<i>Dianella revoluta s.l.</i>	Black-anther Flax-lily
MTG	<i>Lepidosperma gladiatum</i>	Coast Sword-sedge
MNG	<i>Baumea juncea</i>	Bare Twig-sedge

Recruitment:

Continuous

Organic Litter:

20 % cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low
MH	<i>Anagallis arvensis</i>	Pimpernel	high	low
MH	<i>Plantago coronopus</i>	Buck's-horn Plantain	high	low
MH	<i>Leontodon taraxacoides ssp. taraxacoides</i>	Hairy Hawkbit	high	low

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EVC 163: Coastal Tussock Grassland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 164: Creekline Herb-rich Woodland

Description:

Woodland or open forest to 15 m tall occurring on creek terraces and along shallow drainage lines with ephemeral flows. Soils are mostly alluvial deposits of seasonally wet sands and silts. Characterised by a sparse shrub layer above a grassy/sedgy understorey, often rich in herbs within the inter-tussock spaces.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	10 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus viminalis</i>	Manna Gum
	<i>Eucalyptus ovata</i>	Swamp Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	2	10%	T
Medium Shrub	5	15%	MS
Large Herb	2	1%	LH
Medium Herb	5	5%	MH
Small or Prostrate Herb	1	1%	SH
Large Tufted Graminoid	3	15%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	2	5%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Ground Fern	2	20%	GF
Bryophytes/Lichens	na	20%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia melanoxylon</i>	Blackwood
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Ozothamnus ferrugineus</i>	Tree Everlasting
MS	<i>Cassinia aculeata</i>	Common Cassinia
LH	<i>Senecio minimus</i>	Shrubby Fireweed
LH	<i>Senecio linearifolius</i>	Fireweed Groundsel
MH	<i>Lobelia anceps</i>	Angled Lobelia
MH	<i>Senecio sp. aff. tenuiflorus</i>	Beaked Fireweed
SH	<i>Oxalis exilis</i>	Shady Wood-sorrel
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LTG	<i>Lepidosperma laterale</i> var. <i>majus</i>	Variable Sword-sedge
LTG	<i>Poa labillardierei</i>	Common Tussock-grass
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Poa clevelandii</i>	Noah's Ark
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Poa tenera</i>	Slender Tussock-grass
MNG	<i>Imperata cylindrica</i>	Blady Grass
GF	<i>Pteridium esculentum</i>	Austral Bracken
GF	<i>Adiantum aethiopicum</i>	Common Maidenhair
SC	<i>Glycine clandestina</i>	Twining Glycine

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

10 m/0.1 ha.

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EVC 164: Creekline Herb-rich Woodland - Gippsland Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Chrysanthemoides monilifera</i>	Boneseed	high	high
MS	<i>Rubus sp. aff. armeniacus</i>	Blackberry	high	high
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Crepis capillaris</i>	Smooth Hawksbeard	high	low
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Oxalis pes-caprae</i>	Soursob	high	high
MH	<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed	high	low
MH	<i>Trifolium dubium</i>	Suckling Clover	high	low
MH	<i>Centaureum erythraea</i>	Common Centaury	high	low
SH	<i>Trifolium repens var. repens</i>	White Clover	high	low
LTG	<i>Watsonia meriana var. bulbifera</i>	Bulbil Watsonia	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Gladiolus undulatus</i>	Wild Gladiolus	high	low
MTG	<i>Agrostis capillaris s.l.</i>	Brown-top Bent	high	high
MTG	<i>Poa annua</i>	Annual Meadow-grass	high	low
MTG	<i>Paspalum dilatatum</i>	Paspalum	high	high
MTG	<i>Ehrharta longiflora</i>	Annual Veldt-grass	high	low
MTG	<i>Ehrharta erecta var. erecta</i>	Panic Veldt-grass	high	high
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MNG	<i>Dactylis glomerata</i>	Cocksfoot	high	high
MNG	<i>Aira caryophylla</i>	Silvery Hair-grass	high	low
SC	<i>Vicia sativa</i>	Common Vetch	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 169: Dry Valley Forest

Description:

Open eucalypt forest to 20 m tall occurring along minor gullies, ephemeral streams and river flats. The understorey consists of a range of shrubs and herbs.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Eucalyptus globoides</i>	White Stringybark
	<i>Eucalyptus muelleriana</i>	Yellow Stringybark
	<i>Eucalyptus polyanthemus</i>	Red Box
	<i>Eucalyptus macrorhyncha</i>	Red Stringybark
	<i>Eucalyptus radiata</i>	Narrow-leaf Peppermint
	<i>Eucalyptus bridgesiana</i>	But But

Understorey:

Life form	# Spp	%cover	LF code
Immature Canopy Tree	1	5%	IT
Understorey Tree or Large Shrub	1	10%	TS
Medium Shrub	4	30%	MS
Medium Herb	9	20%	MH
Small or Prostrate Herb	4	10%	SH
Large Tufted Graminoid	1	5%	LGT
Medium to Small Tufted Graminoid	1	5%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Ground Fern	3	10%	GF
Scrambler or Climber	3	5%	SC
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia mearnsii</i>	Black Wattle
T	<i>Exocarpos cupressiformis</i>	Cherry Ballart
T	<i>Pomaderris aspera</i>	Hazel Pomaderris
MS	<i>Kunzea ericoides</i>	Burgan
MS	<i>Cassinia longifolia</i>	Shiny Cassinia
MS	<i>Hymenanthera dentata</i>	Tree Violet
MS	<i>Coprosma quadrifida</i>	Prickly Currant-bush
SS	<i>Rubus parvifolius</i>	Small-leaf Bramble
MH	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
MH	<i>Viola hederacea</i>	Ivy-leaf Violet
MH	<i>Veronica plebeia</i>	Trailing Speedwell
SH	<i>Opercularia hispida</i>	Hairy Stinkweed
SH	<i>Oxalis corniculata</i> s.l.	Yellow Wood-sorrel
SH	<i>Dichondra repens</i>	Kidney-weed
MTG	<i>Lepidosperma laterale</i>	Variable Sword-sedge
MNG	<i>Microsena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Luzula campestris</i> spp. agg.	Field Woodrush
GF	<i>Pteridium esculentum</i>	Austral Bracken
GF	<i>Adiantum aethiopicum</i>	Common Maidenhair
GF	<i>Asplenium flabellifolium</i>	Necklace Fern
SC	<i>Clematis aristata</i>	Mountain Clematis

EVC 169: Dry Valley Forest - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

40 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
MH	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Polycarpon tetraphyllum</i>	Four-leaved Allseed	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 175: Grassy Woodland

Description:

A variable open eucalypt woodland to 15 m tall or occasionally Sheoak woodland to 10 m tall over a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha
<i>Allocasuarina</i> spp.	40 cm	

Tree Canopy Cover:

%cover	Character Species	Common Name
15%	<i>Eucalyptus radiata</i> s.l.	Narrow-leaf Peppermint
	<i>Allocasuarina verticillata</i>	Drooping Sheoak

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	2	10%	T
Medium Shrub	6	15%	MS
Small Shrub	2	5%	SS
Prostrate Shrub	2	1%	PS
Large Herb	2	5%	LH
Medium Herb	8	10%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	2	10%	LTG
Large Non-tufted Graminoid	1	10%	LNG
Medium to Small Tufted Graminoid	6	20%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Ground Fern	1	5%	GF
Scrambler or Climber	2	5%	SC
Bryophytes/Lichens	na	10%	BL

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EVC 175: Grassy Woodland - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia mearnsii</i>	Black Wattle
T	<i>Allocasuarina littoralis</i>	Black Sheoak
T	<i>Exocarpos cupressiformis</i>	Cherry Ballart
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Epacris impressa</i>	Common Heath
MS	<i>Cassinia aculeata</i>	Common Cassinia
MS	<i>Acacia paradoxa</i>	Hedge Wattle
SS	<i>Pimelea humilis</i>	Common Rice-flower
SS	<i>Hibbertia riparia</i>	Erect Guinea-flower
PS	<i>Bossiaea prostrata</i>	Creeping Bossiaea
PS	<i>Astroloma humifusum</i>	Cranberry Heath
PS	<i>Acrotriche serrulata</i>	Honey-pots
LH	<i>Pterostylis longifolia</i> s.l.	Tall Greenhood
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Drosera peltata</i> ssp. <i>auriculata</i>	Tall Sundew
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Opercularia varia</i>	Variable Stinkweed
SH	<i>Drosera whittakeri</i> ssp. <i>aberrans</i>	Scented Sundew
LTG	<i>Deyeuxia quadriseta</i>	Reed Bent-grass
LTG	<i>Xanthorrhoea minor</i> ssp. <i>lutea</i>	Small Grass-tree
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Poa sieberiana</i>	Grey Tussock-grass
MTG	<i>Lepidosperma laterale</i>	Variable Sword-sedge
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
GF	<i>Pteridium esculentum</i>	Austral Bracken
SC	<i>Comesperma volubile</i>	Love Creeper
SC	<i>Billardiera scandens</i>	Common Apple-berry

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

15 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	<i>Pinus radiata</i>	Radiata Pine	high	high
T	<i>Pittosporum undulatum</i>	Sweet Pittosporum	high	high
MS	<i>Chrysanthemoides monilifera</i>	Boneseed	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 191: Riparian Scrub

Description:

A dense shrubland to 6 m tall with occasional eucalypt emergents growing on waterlogged substrates often with a peaty surface horizon. Emergent eucalypts may be occasionally present. The understorey is often species-poor and consists typically of sedges tolerant of seasonal waterlogging. Occurs along creeks and minor stream tributaries of the lowland plains.

Canopy Cover:

%cover	Character Species	Common Name
60%	<i>Melaleuca squarrosa</i>	Scented Paperbark
	<i>Leptospermum continentale</i>	Prickly Tea-tree

Understorey:

Life form	#Spp	%Cover	LF code
Medium Shrub	3	10%	MS
Small Shrub	1	1%	SS
Medium Herb	1	1%	MH
Small or Prostrate Herb	1	1%	SH
Large Tufted Graminoid	1	10%	LTC
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	1	1%	MTG
Medium to Tiny Non-tufted Graminoid	3	15%	MNG
Ground Fern	1	5%	GF
Scrambler or Climber	2	15%	SC
Bryophytes/Lichens	na	20%	BL
Total understorey projective foliage cover		80%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Coprosma quadrifida</i>	Prickly Currant-bush
MS	<i>Ozothamnus ferrugineus</i>	Tree Everlasting
MS	<i>Acacia verticillata</i>	Prickly Moses
MS	<i>Ozothamnus rosmarinifolius</i>	Rosemary Everlasting
SS	<i>Amperea xiphoclada</i> var. <i>xiphoclada</i>	Broom Spurge
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Selaginella uliginosa</i>	Swamp Selaginella
LTC	<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge
LNG	<i>Lepidosperma longitundale</i>	Pithy Sword-sedge
MNG	<i>Baumea tetragona</i>	Square Twig-rush
MNG	<i>Schoenus brevifolius</i>	Zig-zag Bog-sedge
MNG	<i>Empodisma minus</i>	Spreading Rope-rush
GF	<i>Pteridium esculentum</i>	Austral Bracken
SC	<i>Gleichenia microphylla</i>	Scrambling Coral-fern
SC	<i>Billardiera scandens</i>	Common Apple-berry
SC	<i>Cassytha glabella</i>	Slender Dodder-laurel

Recruitment:

Continuous

Organic Litter:

40 % cover

Weediness:

There are no consistent weeds in this EVC.

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EVC 191: Riparian Scrub - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 309: Calcareous Swale Grassland

Description:

A low coastal grassland that develops on the swales of calcareous sand dunes of Quaternary origin. The only known location of this grassland, at Wilsons Promontory, was disturbed in the past and is now invaded by Coast Tea-tree, Silky Guinea-flower and Drooping Sheoak.

Lifeforms:

Life form	#Spp	%Cover	LF code
Medium Shrub	3	30%	MS
Small Shrub	1	1%	SS
Prostrate Shrub	1	1%	PS
Large Herb	1	1%	LH
Medium Herb	2	5%	MH
Small or Prostrate Herb	2	5%	SH
Large Tufted Graminoid	2	5%	LTG
Medium to Small Tufted Graminoid	4	10%	MTG
Medium to Tiny Non-tufted Graminoid	1	20%	MNG
Scrambler or Climber	2	5%	SC
Bryophytes/Lichens	na	20%	BL

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Leptospermum laevigatum</i>	Coast Tea-tree
MS	<i>Leucopogon parviflorus</i>	Coast Beard-heath
MS	<i>Bursaria spinosa</i> ssp. <i>spinosa</i>	Sweet Bursaria
MS	<i>Allocasuarina verticillata</i>	Drooping Sheoak
SS	<i>Hibbertia sericea</i> s.l.	Silky Guinea-flower
PS	<i>Acrotriche prostrata</i>	Trailing Ground-berry
LH	<i>Senecio pinnatifolius</i>	Variable Groundsel
MH	<i>Lagenophora stipitata</i>	Common Bottle-daisy
MH	<i>Geranium potentilloides</i>	Cinquefoil Cranesbill
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Oxalis exilis</i>	Shady Wood-sorrel
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LTG	<i>Austrostipa flavescens</i>	Coast Spear-grass
MTG	<i>Dianella revoluta</i> s.l.	Black-anther Flax-lily
MTG	<i>Carex breviculmis</i>	Common Grass-sedge
MTG	<i>Austrodanthonia setacea</i>	Bristly Wallaby-grass
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Dichelachne cinnata</i>	Long-hair Plume-grass
MNG	<i>Ficinia nodosa</i>	Knobby Club-sedge
MNG	<i>Baumea juncea</i>	Bare Twig-sedge
SC	<i>Clematis microphylla</i>	Small-leaved Clematis
SC	<i>Cornosperma volubile</i>	Love Creeper

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EVC 309: Calcareous Swale Grassland - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

10%

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Centaurium erythraea</i>	Common Centaury	high	high
MH	<i>Anagallis arvensis</i>	Pimpernel	high	high
MH	<i>Arenaria serpyllifolia</i> ssp. <i>serpyllifolia</i>	Thyme-leaved Sandwort	high	low
MTG	<i>Catapodium rigidum</i>	Fern Grass	high	low
MNG	<i>Aira caryophylla</i>	Silvery Hair-grass	high	high
Und	<i>Hypochoeris</i> spp.	Cat's Ear	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 311: Berm Grassy Shrubland

Description:

Low shrubland to 1.5 m tall occurring in sheltered coastal areas where sand deposits have formed as a result of low energy wave action. Contains a number of halophytic species over a ground layer of grasses and herbs.

Life Forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	2	20%	MS
Small Shrub	2	5%	SS
Large Herb	2	5%	LH
Medium Herb	2	10%	MH
Small Herb	2	5%	SH
Large Tufted Graminoid	1	1%	LTG
Medium to Small Tufted Graminoid	2	25%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Total understorey projective foliage cover		70%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Atriplex cinerea</i>	Coast Saltbush
MS	<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Seaberry Saltbush
SS	<i>Frankonia pauciflora</i> var. <i>gunnii</i>	Southern Sea-heath
LH	<i>Senecio pinnatifolius</i>	Variable Groundsel
LH	<i>Senecio glomeratus</i>	Annual Fireweed
MH	<i>Sarcocornia quinqueflora</i> ssp. <i>quinqueflora</i>	Beaded Glasswort
MH	<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed
MH	<i>Actites megalocarpa</i>	Coast Sow-thistle
SH	<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Rounded Noon-flower
SH	<i>Dichondra repens</i>	Kidneyweed
LTG	<i>Dichelachne crinita</i>	Long-hair Plume Grass
MTG	<i>Poa poliformis</i>	Coast Tussock-grass
MTG	<i>Austrofestuca littoralis</i>	Coast Fescue
MNG	<i>Distichlis distichophylla</i>	Australian Salt-grass
MNG	<i>Ficinia nodosa</i>	Knobby Club-sedge

Recruitment:

Continuous

Organic Litter:

10% Cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Chrysanthemoides monilifera</i> ssp. <i>monilifera</i>	Boneseed	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Coryza albidia</i>	Tall Fleabane	high	low
MH	<i>Polycarpon tetraphyllum</i>	Four-leaved Allseed	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Anagallis arvensis</i>	Pimpernel	high	low
MNG	<i>Vulpia myuros</i>	Rat's-tail Fescue	high	low
MNG	<i>Lagurus ovatus</i>	Hare's-tail Grass	high	low

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EVC 311: Berm Grassy Shrubland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 316: Shrubby Damp Forest

Description:

Grows in gullies and on protected slopes on relatively skeletal but fertile sedimentary soils. Occurs at elevations of around 500 m above sea level and receives a low to moderate annual rainfall of approximately 750 mm. The overstorey includes a variety of Eucalypt species to 30 m tall. Silver Wattle is a common understorey tree. The dense mid stratum is comprised of medium to large shrubs characteristic of both drier and damper environments. The ground layer has a sparse cover of grasses and herbs, and commonly includes Austral Bracken.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	90 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
40%	<i>Eucalyptus obliqua</i>	Messmate Stringybark

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	4	20%	T
Medium Shrub	8	20%	MS
Small Shrub	2	10%	SS
Prostrate Shrub	1	1%	PS
Large Herb	4	5%	LH
Medium Herb	8	15%	MH
Small or Prostrate Herb	2	5%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	1	1%	LNG
Medium to Small Tufted Graminoid	3	10%	MTG
Medium to Tiny Non-tufted Graminoid	1	5%	MNG
Ground Fern	2	15%	GF
Tree Fern	1	1%	TRF
Scrambler or Climber	2	5%	SC
Bryophytes/Lichens	na	20%	BL

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EVC 316: Shrubby Damp Forest - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Pomaderris aspera</i>	Hazel Pomaderris
T	<i>Acacia dealbata</i>	Silver Wattle
T	<i>Exocarpos cupressiformis</i>	Cherry Ballart
MS	<i>Cassinia longifolia</i>	Shiny Cassinia
MS	<i>Pimelea axiflora</i>	Bootlace Bush
MS	<i>Coprosma quadrifida</i>	Prickly Currant-bush
MS	<i>Olearia lirata</i>	Snowy Daisy-bush
SS	<i>Olearia megalophylla</i>	Large-leaf Daisy-bush
LH	<i>Senecio linearifolius</i>	Fireweed Groundsel
MH	<i>Viola hederacea</i> sensu Willis (1972)	Ivy-leaf Violet
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Lagenophora stipitata</i>	Common Bottle-daisy
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LTG	<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge
MTG	<i>Dianella tasmanica</i>	Tasman Flax-lily
MTG	<i>Poa australis</i> spp. agg.	Tussock Grass
MTG	<i>Dianella revoluta</i> s.l.	Black-anther Flax-lily
MTG	<i>Austrodanthonia pilosa</i>	Velvet Wallaby-grass
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
GF	<i>Pteridium esculentum</i>	Austral Bracken
GF	<i>Polystichum proliferum</i>	Mother Shield-fern
GF	<i>Blechnum wattsi</i>	Hard Water-fern
SC	<i>Clematis aristata</i>	Mountain Clematis

Recruitment:

Continuous

Organic Litter:

50 % cover

Logs:

30 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 641: Riparian Woodland

Description:

Occurs beside permanent streams, typically on narrow alluvial deposits. Woodland to 20 m tall generally dominated by *Eucalyptus camaldulensis* over a tussock grass-dominated understorey. Tall shrubs may be present and amphibious herbs may occur in occasional ponds and beside creeks. While flooding may be common, sites are rarely inundated for lengthy periods.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	80 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus camaldulensis</i>	River Red-gum
	<i>Eucalyptus viminalis</i> ssp. <i>viminalis</i>	Manna Gum
	<i>Eucalyptus tereticornis</i>	Gippsland Red Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree	6	5%	IT
Understorey Tree or Large Shrub	1	10%	MS
Medium Shrub	4	10%	MS
Small Shrub	4	5%	SS
Large Herb	4	15%	LH
Medium Herb	5	10%	MH
Small or Prostrate Herb	1	5%	SH
Large Tufted Graminoid	3	15%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	4	20%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Scrambler or Climber	1	5%	SC
Bryophytes/Lichens	na	10%	BL

LF Code

Species typical of at least part of EVC range

Common Name

T	<i>Acacia meurnsii</i>	Black Wattle
T	<i>Metaleuca ericifolia</i>	Swamp Paperbark
MS	<i>Bursaria spinosa</i> ssp. <i>spinosa</i>	Sweet Bursaria
MS	<i>Hymenanthera dentata</i>	Tree Violet
MS	<i>Callistemon sieberi</i>	River Bottlebrush
MS	<i>Gynatrix pulchella</i>	Hemp Bush
SS	<i>Rubus parvifolius</i>	Small-leaf Bramble
LH	<i>Wahlenbergia gracilis</i> s.s.	Sprawling Bluebell
LH	<i>Senecio minimus</i>	Shrubby Groundsel
LH	<i>Myriophyllum crispatum</i>	Upright Water-milfoil
MH	<i>Rumex brownii</i>	Slender Dock
MH	<i>Oxalis perennans</i>	Grassland Wood-sorrel
MH	<i>Mentha australis</i>	River Mint
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
SH	<i>Dichondra repens</i>	Kidneyweed
LTG	<i>Poa labillardierei</i>	Common Tussock-grass
LTG	<i>Carex appressa</i>	Tall Sedge
LNG	<i>Phragmites australis</i>	Common Reed
MTG	<i>Lachnagrostis filiformis</i> var. <i>filiformis</i>	Common Blown-grass
MTG	<i>Triglochin procerum</i> s.l.	Water-ribbons
MNG	<i>Eleocharis acuta</i>	Common Spike-sedge
SC	<i>Calystegia sepium</i>	Large Bindweed

EVC 641: Riparian Woodland - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

30% cover

Logs:

20m / 0.1 ha

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Rosa rubiginosa</i>	Sweet Briar	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Helminthotheca echinoides</i>	Ox-tongue	high	low
LH	<i>Rumex crispus</i>	Curled Dock	high	low
LH	<i>Aster subulatus</i>	Aster-weed	high	low
LH	<i>Rorippa palustris</i>	Marsh Yellow-cress	high	high
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
LTG	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	Soft Brome	high	low
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MNG	<i>Paspalum distichum</i>	Water Couch	high	high
SC	<i>Galium aparine</i>	Cleavers	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 651: Plains Swampy Woodland

Description:

Eucalypt woodland to 15 m tall with ground layer dominated by tussock grasses, sedges and herbs. Shrubs are often scattered throughout. Occurs on poorly drained, seasonally waterlogged heavy soils.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	80 cm	10 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
10%	<i>Eucalyptus ovata</i>	Swamp Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	1	5%	T
Medium Shrub	3	15%	MS
Large Herb	3	5%	LH
Medium Herb	8	20%	MH
Small or Prostrate Herb	4	5%	SH
Large Tufted Graminoid	3	30%	LTG
Large Non-tufted Graminoid	1	1%	LNG
Medium to Small Tufted Graminoid	7	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Bryophytes/Lichens	na	20%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia melanoxylon</i>	Blackwood
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Ozothamnus ferrugineus</i>	Tree Everlasting
MS	<i>Allocasuarina paludosa</i>	Scrub Sheoak
LH	<i>Senecio tenuiflorus</i>	Slender Fireweed
LH	<i>Villarsia reniformis</i>	Running Marsh-flower
MH	<i>Asperula conferta</i>	Common Woodruff
MH	<i>Centella cordifolia</i>	Centella
MH	<i>Lobelia anceps</i>	Angled Lobelia
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
SH	<i>Eryngium vesiculosum</i>	Prickfoot
SH	<i>Oxalis exilis</i>	Shady Wood-sorrel
SH	<i>Hypericum japonicum</i>	Matted St John's Wort
LTG	<i>Gahnia trifida</i>	Coast Saw-sedge
LTG	<i>Carex appressa</i>	Tall Sedge
LTG	<i>Poa labillardierei</i> var. <i>labillardierei</i>	Common Tussock-grass
MTG	<i>Poa clevelandii</i>	Noah's Ark
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MNG	<i>Poa tenera</i>	Slender Tussock-grass
MNG	<i>Homarthra uncinata</i> var. <i>uncinata</i>	Mat Grass

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EVC 651: Plains Swampy Woodland - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

10 % cover

Logs:

10 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Sonchus asper</i> s.l.	Rough Sow-thistle	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
MH	<i>Trifolium dubium</i>	Suckling Clover	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Prunella vulgaris</i>	Self-heal	high	low
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
LTG	<i>Festuca arundinacea</i>	Tall Fescue	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MNG	<i>Holcus setosus</i>	Annual Fog	high	low
MNG	<i>Juncus capitatus</i>	Capitate Rush	high	low
TTG	<i>Cyperus tenellus</i>	Tiny Flat-sedge	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 653: Aquatic Herbland

Description:

Herbland of permanent to semi-permanent wetlands, dominated by sedges (especially on shallower verges) and/or aquatic herbs. Occurs on fertile paludal soils, typically heavy clays beneath organic accumulations.

Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	2	10%	LH
Medium Herb	3	20%	MH
Small or Prostrate Herb	3	15%	SH
Large Non-tufted Graminoid	2	20%	LNG
Medium to Small Tufted Graminoid	2	10%	MTG
Medium to Tiny Non-tufted Graminoid	1	5%	MNG
Total understorey projective foliage cover		80%	

LF Code	Species typical of at least part of EVC range	Common Name
LH	<i>Persicaria decipiens</i>	Slender Knotweed
MH	<i>Myriophyllum verrucosum</i>	Red Water-milfoil
MH	<i>Potamogeton pectinatus</i>	Fennel Pondweed
SH	<i>Lemna disperma</i>	Common Duckweed
SH	<i>Azolla filiculoides</i>	Pacific Azolla
SH	<i>Mimulus repens</i>	Creeping Monkey-flower
SH	<i>Wolffia australiana</i>	Tiny Duckweed
LNG	<i>Typha orientalis</i>	Broad-leaf Cumbungi
LNG	<i>Phragmites australis</i>	Common Reed
MTG	<i>Triglochin procerum</i> s.l.	Water Ribbons
MNG	<i>Bolboschoenus caldwellii</i>	Salt Club-sedge

Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:

10% Cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Aster subulatus</i>	Aster-weed	high	low
MH	<i>Cotula coronopifolia</i>	Water Buttons	high	high

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EVC 653: Aquatic Herbland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 656: Brackish Wetland

Description:

Sedgeland or herbland, occasionally grassland, dominated by salt-tolerant species, but samphires, if present usually with low cover. Typically occurs on heavy, at least seasonally shallowly inundated to waterlogged soils, on a range of geologies. Common in estuaries, along the shorelines of saline/brackish lakes and along poorly defined drainage lines near the coast.

Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	1	5%	LH
Medium Herb	4	20%	MH
Small or Prostrate Herb	2	5%	SH
Large Tufted Graminoid	1	15%	LTG
Large Non-tufted Graminoid	1	10%	LNG
Medium to Small Tufted Graminoid	2	5%	MTG
Medium to Tiny Non-tufted Graminoid	3	15%	MNG
Scrambler or Climber	1	5%	SC
Total understorey projective foliage cover		80%	

LF Code	Species typical of at least part of EVC range	Common Name
LH	<i>Epilobium biltardierianum</i>	Variable Willow-herb
MH	<i>Myriophyllum verrucosum</i>	Red Water-milfoil
MH	<i>Myriophyllum muelleri</i>	Hooded Water-milfoil
MH	<i>Lilaeopsis polyantha</i>	Australian Lilaeopsis
MH	<i>Samolus repens</i>	Creeping Brookweed
SH	<i>Mimulus repens</i>	Creeping Monkey-flower
SH	<i>Selliera radicans</i>	Shiny Swamp-mat
LTG	<i>Juncus kraussii</i> ssp. <i>australiensis</i>	Sea Rush
LNG	<i>Phragmites australis</i>	Common Reed
MTG	<i>Triglochin procerum</i> s.l.	Water Ribbons
MTG	<i>Poa poliformis</i>	Coast Tussock-grass
MNG	<i>Bolboschoenus caldwellii</i>	Salt Club-sedge
MNG	<i>Ruppia polycarpa</i>	Many-fruit Tassel
MNG	<i>Ruppia megacarpa</i>	Large-fruit Tassel
MNG	<i>Triglochin striatum</i>	Streaked Arrowgrass
SC	<i>Calystegia sepium</i>	Large Bindweed

Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:

10% cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Cicendia filiformis</i>	Slender Cicendia	high	low
MH	<i>Anagallis arvensis</i>	Pimpernel	high	low
SH	<i>Anagallis minima</i>	Chaffweed	high	low
MTG	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	Soft Brome	high	low
MTG	<i>Polypogon maritimus</i> var. <i>subspatheus</i>	Coast Beard-grass	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MNG	<i>Aira cupaniana</i>	Quicksilver Grass	high	low
TTG	<i>Cyperus tenuis</i>	Tiny Flat-sedge	high	low

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EVC 656: Brackish Wetland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 674: Sandy Stream Woodland

Description:

Reed, sedge or shrub-dominated woodland to 15 m tall with a large range of amphibious herbs. Occupies the beds of seasonal creeks where large amounts of coarse sand have been deposited by past flows, often resulting in a distinctive 'U' shape to the drainage line. Sites periodically inundated through the wetter months and soils moist throughout the year. Restricted to moderately high rainfall areas (>600 mm) where coarse parent material available upstream.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	80 cm	10 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
10%	<i>Eucalyptus ovata</i>	Swamp Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	2	15%	T
Medium Shrub	1	10%	MS
Medium Herb	1	10%	MH
Small or Prostrate Herb	1	10%	SH
Large Tufted Graminoid	2	10%	LTG
Large Non-tufted Graminoid	2	20%	LNG
Medium to Small Tufted Graminoid	10	30%	MTG
Medium to Tiny Non-tufted Graminoid	3	5%	MNG
Tree Fern	1	1%	TF
Ground Fern	2	5%	GF
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia melanoxylon</i>	Blackwood
T	<i>Acacia dealbata</i>	Silver Wattle
MS	<i>Prostanthera lasiantha</i>	Victorian Christmas-bush
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Melaleuca squarrosa</i>	Scented Paperbark
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
SS	<i>Rubus parvifolius</i>	Small-leaf Bramble
LH	<i>Persicaria decipiens</i>	Slender Knobweed
MH	<i>Oxalis perennans</i>	Grassland Wood-sorrel
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
SH	<i>Lobelia pratioides</i>	Poison Lobelia
SH	<i>Crassula helmsii</i>	Swamp Crassula
LTG	<i>Poa labillardierei</i>	Common Tussock-grass
LTG	<i>Juncus procerus</i>	Tall Rush
LTG	<i>Carex appressa</i>	Tall Sedge
LTG	<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge
LNG	<i>Phragmites australis</i>	Common Reed
LNG	<i>Typha domingensis</i>	Cumbungi
MTG	<i>Poa tenera</i>	Slender Tussock-grass
MTG	<i>Austrodanthonia caespitosa</i>	Common Wallaby-grass
MTG	<i>Juncus pauciflorus</i>	Loose-flower Rush
MTG	<i>Juncus caespiticus</i>	Grassy Rush
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Eleocharis acuta</i>	Common Spike-sedge
MNG	<i>Ficinia nodosa</i>	Knobby Club-sedge
TF	<i>Dicksonia antarctica</i>	Soft Tree-fern
GF	<i>Blechnum nudum</i>	Fishbone Water-fern
GF	<i>Hypolepis</i> spp.	Ground Fern

EVC 674: Sandy Stream Woodland – Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

40 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	<i>Salix fragilis</i>	Crack Willow	high	high
MS	<i>Lycium ferocissimum</i>	African Box-thorn	low	high
MS	<i>Genista monspessulana</i>	Montpellier Broom	high	high
MS	<i>Rosa fruticosus</i> spp. agg	Blackberry	high	high
MS	<i>Rubus</i> sp. aff. <i>armeniacus</i>	Blackberry	high	high
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Verbena bonariensis</i> s.l.	Purple-top Verbena	high	high
LH	<i>Rumex crispus</i>	Curled Dock	high	high
LH	<i>Rumex conglomeratus</i>	Clustered Dock	high	high
LH	<i>Conium maculatum</i>	Hemlock	high	high
LH	<i>Helminthotheca echinoides</i>	Ox-tongue	high	low
LH	<i>Aster subulatus</i>	Aster-weed	high	low
LH	<i>Sonchus asper</i> s.l.	Rough Sow-thistle	high	low
LH	<i>Solanum nigrum</i> sensu Willis (1972)	Black Nightshade	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Foeniculum vulgare</i>	Fennel	high	high
SH	<i>Modiola caroliniana</i>	Red-flower Mallow	high	low
LTG	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	high	high
LTG	<i>Piptatherum millicium</i>	Rice Millet	high	high
MTG	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	high	high
MTG	<i>Paspalum dilatatum</i>	Paspalum	high	high
MTG	<i>Bromus catharticus</i>	Prairie Grass	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Bromus diandrus</i>	Great Brome	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MTG	<i>Agrostis capillaris</i> s.l.	Brown-top Bent	high	high
MNG	<i>Dactylis glomerata</i>	Cocksfoot	high	high
MNG	<i>Paspalum distichum</i>	Water Couch	high	high
SC	<i>Tradescantia fluminensis</i>	Wandering Jew	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 707: Sedgy Swamp Woodland

Description:

Eucalypt woodland to 15 m tall with sedgy ground layer and a range of herbs tolerant of seasonal waterlogging. Occurs on poorly drained, seasonally wet flats on sandy soils over heavier subsoils.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	80 cm	10 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
10%	<i>Eucalyptus ovata</i>	Swamp Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Medium Shrub	2	5%	MS
Large Herb	3	5%	LH
Medium Herb	6	10%	MH
Small or Prostrate Herb	5	5%	SH
Large Tufted Graminoid	1	10%	LTG
Medium to Small Tufted Graminoid	4	5%	MTG
Large Non-tufted Graminoid	2	40%	LNG
Medium to Tiny Non-tufted Graminoid	2	1%	MNG
Bryophytes/Lichens	na	5%	BL

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
LH	<i>Villarsia reniformis</i>	Running Marsh-flower
LH	<i>Epilobium billardierianum</i>	Variable Willow-herb
MH	<i>Centella cordifolia</i>	Centella
MH	<i>Goodenia humilis</i>	Swamp Goodenia
MH	<i>Gratiola pubescens</i>	Glandular Brooklime
MTG	<i>Triglochin procerum</i> s.l.	Water Ribbons
LNG	<i>Lepidosperma longitundale</i>	Pithy Sword-sedge
LNG	<i>Baumea rubiginosa</i> s.l.	Soft Twig-rush

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

10 m/0.1 ha.

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EVC 651: Sedgy Swamp Woodland - Gippsland Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Sonchus asper</i> s.l.	Rough Sow-thistle	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
MH	<i>Trifolium dubium</i>	Suckling Clover	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Prunella vulgaris</i>	Self-heal	high	low
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
LTG	<i>Festuca arundinacea</i>	Tall Fescue	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MNG	<i>Holcus setosus</i>	Annual Fog	high	low
MNG	<i>Juncus capitatus</i>	Capitate Rush	high	low
TTG	<i>Cyperus tenellus</i>	Tiny Flat-sedge	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 710: Damp Heathland

Description:

Developed on sites of intermittent waterlogging, typically wet in winter and dry in summer, with low nutrient availability. Closed tall heathland, or scrub if long unburnt. There is a dense ground layer of rushes and sedges, and sometimes emergent eucalypts.

Understorey:

Life form	#Spp	%Cover	LF code
Medium Shrub	5	50%	MS
Small Shrub	5	10%	SS
Prostrate Shrub	1	1%	PS
Medium Herb	4	10%	MH
Small or Prostrate Herb	3	10%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	1	1%	LNG
Medium to Small Tufted Graminoid	4	5%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Scrambler or Climber	3	5%	SC
Bryophytes/Lichens	na	20%	BL

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Allocasuarina paludosa</i>	Scrub Sheoak
MS	<i>Banksia marginata</i>	Silver Banksia
SS	<i>Hibbertia sericea</i> s.l.	Silky Guinea-flower
SS	<i>Platylobium obtusangulum</i>	Common Flat-pea
SS	<i>Pimelea humilis</i>	Common Rice-flower
SS	<i>Dillwynia glaberrima</i>	Smooth Parrot-pea
PS	<i>Acrotriche serrulata</i>	Honey-pots
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Selaginella uliginosa</i>	Swamp Selaginella
MH	<i>Viola hederacea</i> sensu Willis (1972)	Ivy-leaf Violet
LTG	<i>Deyeuxia quadrifida</i>	Reed Bent-grass
LTG	<i>Xanthorrhoea minor</i> ssp. <i>lutea</i>	Small Grass-tree
LNG	<i>Lepidosperma longitundale</i>	Pithy Sword-sedge
MTG	<i>Patersonia fragilis</i>	Short Purple-flag
MTG	<i>Lepidosperma concavum</i>	Sandhill Sword-sedge
MTG	<i>Burchardia umbellata</i>	Milkmaids
MNG	<i>Hypolaena fastigiata</i>	Tassel Rope-rush
MNG	<i>Baumea juncea</i>	Bare Twig-sedge
SC	<i>Cassytha pubescens</i> s.s.	Downy Dodder-laurel
SC	<i>Cassytha glabella</i>	Slender Dodder-laurel
SC	<i>Billardiera scandens</i>	Common Apple-berry

Recruitment:

Episodic/Fire. Desirable period between disturbances is 30 years.

Organic Litter:

20% cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low

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EVC 710: Damp Heathland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 793: Damp Heathy Woodland

Description:

Woodland to 10 m tall with tall dense heathy understorey which becomes tall scrub if long unburnt in high rainfall areas. The ground layer consists of grasses, herbs, small shrubs and tough-leaved monocots. Developed on sandy soils of moderate to low fertility, typically wet in winter due to impeding layer in soil and dry in summer.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	60 cm	10 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
15%	<i>Eucalyptus cephalocarpa</i> s.l.	Mealy Stringybark
	<i>Eucalyptus radiata</i> s.l.	Narrow-leaf Peppermint
	<i>Eucalyptus ovata</i>	Swamp Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Medium Shrub	5	30%	MS
Small Shrub	4	5%	SS
Prostrate Shrub	2	1%	PS
Medium Herb	3	5%	MH
Small or Prostrate Herb	3	20%	SH
Large Tufted Graminoid	2	5%	LTG
Medium to Small Tufted Graminoid	3	10%	MTG
Medium to Tiny Non-tufted Graminoid	1	5%	MNG
Ground Fern	1	5%	GF
Bryophytes/Lichens	na	20%	BL
Soil Crust	na	10%	S/C

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Epacris impressa</i>	Common Heath
MS	<i>Banksia marginata</i>	Silver Banksia
MS	<i>Kunzea ericoides</i>	Burgan
SS	<i>Hibbertia riparia</i>	Erect Guinea-flower
SS	<i>Hovea heterophylla</i>	Common Hovea
PS	<i>Acrotriche serrulata</i>	Honey-pots
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
SH	<i>Drosera whittakeri</i> ssp. <i>aberrans</i>	Scented Sundew
LTG	<i>Xanthorrhoea minor</i> ssp. <i>lutea</i>	Small Grass-tree
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Lepidosperma filiforme</i>	Common Rapier-sedge
GF	<i>Pteridium esculentum</i>	Austral Bracken
SC	<i>Cassytha glabella</i>	Slender Dodder-laurel

Recruitment:

Episodic/Fire. Desirable period between disturbances is 30 years.

Organic Litter:

20 % cover

Logs:

10 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low

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EVC 793: Damp Heathy Woodland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 821: Tall Marsh

Description:

Occurs on Quaternary sedimentary geology of mainly estuarine sands, soils are peaty, silty clays, and average annual rainfall is approximately 600 mm. It requires shallow water (to 1 m deep) and low current-scour, and can only tolerate very low levels of salinity. Closed to open grassland/sedgeland to 2-3 m tall, dominated by Common Reed and Cumbungi. Small aquatic and semi-aquatic species occur amongst the reeds.

Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	3	10%	LH
Medium Herb	2	5%	MH
Small or Prostrate Herb	6	10%	SH
Large Tufted Graminoid	1	5%	LTG
Large Non-tufted Graminoid	2	40%	LNG
Medium to Tiny Non-tufted Graminoid	1	1%	MNG
Total understorey projective foliage cover		70%	

LF Code	Species typical of at least part of EVC range	Common Name
LH	<i>Myriophyllum verrucosum</i>	Red Water-milfoil
LH	<i>Myriophyllum salsugineum</i>	Lake Water-milfoil
LH	<i>Villarsia reniformis</i>	Running Marsh-flower
MH	<i>Rumex bidens</i>	Mud Dock
MH	<i>Lilaeopsis polyantha</i>	Australian Lilaeopsis
MH	<i>Lepilaena bilocularis</i>	Small-fruit Water-mat
SH	<i>Lemna disperma</i>	Common Duckweed
SH	<i>Azolla filiculoides</i>	Pacific Azolla
SH	<i>Wolffia australiana</i>	Tiny Duckweed
SH	<i>Mimulus repens</i>	Creeping Monkey-flower
LTG	<i>Triglochin procerum</i> s.l.	Water Ribbons
LTG	<i>Juncus ingens</i>	Giant Rush
LNG	<i>Schoenoplectus tabernaemontani</i>	River Club-sedge
LNG	<i>Phragmites australis</i>	Common Reed
LNG	<i>Typha domingensis</i>	Cumbungi
LNG	<i>Typha orientalis</i>	Broad-leaf Cumbungi
MNG	<i>Lepilaena cylindrocarpa</i>	Long-fruit Water-mat
MNG	<i>Eleocharis acuta</i>	Common Spike-sedge

Recruitment:

Episodic/Flood: desirable period of disturbance is every five years

Organic Litter:

10% cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Cotula coronopifolia</i>	Water Buttons	high	high
MNG	<i>Paspalum distichum</i>	Water Couch	high	high

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EVC 821: Tall Marsh - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 858: Coastal Alkaline Scrub (syn. Calcarenite Dune Woodland)

Description:

Near-coastal, deep calcareous (alkaline) and largely stable sand dunes and swales commonly dominated by Moonah *Melaleuca lanceolata* ssp. *lanceolata*. It occurs at low elevations of 20-60 m above sea level, average annual rainfall is approximately 550-950 mm, and it occurs on a variety of geologies and soil types. Low woodland or tall shrubland to 8 m tall, typically with a medium shrub layer, small shrub layer and sedges, grasses and herbs in the ground layer.

Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i>	Moonah
	<i>Allocasuarina verticillata</i>	Drooping Sheoak
	<i>Leptospermum laevigatum</i>	Coast Tea-tree
	<i>Bursaria spinosa</i> ssp. <i>macrophylla</i>	Sweet Bursaria

Life forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	4	30%	MS
Small Shrub	2	5%	SS
Large Herb	1	1%	LH
Medium Herb	5	10%	MH
Small or Prostrate Herb	2	5%	SH
Large Tufted Graminoid	1	5%	LTG
Medium to Small Tufted Graminoid	4	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Scrambler or Climber	2	1%	SC
Bryophytes/Lichens	na	20%	BL
Total understorey projective foliage cover		80%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Acacia longifolia</i> ssp. <i>sophorae</i>	Coast Wattle
MS	<i>Leucopogon parviflorus</i>	Coast Beard-heath
MS	<i>Acacia retinodes</i> var. <i>uncifolia</i>	Coast Wattle
MS	<i>Pomaderris paniculosa</i>	Coast Pomaderris
SS	<i>Hibbertia sericea</i> s.l.	Silky Guinea-flower
SS	<i>Pimelea serpyllifolia</i> ssp. <i>serpyllifolia</i>	Thyme-leaf Rice-flower
MH	<i>Lagenophora stipitata</i>	Common Bottle-daisy
MH	<i>Geranium potentilloides</i>	Cinquefoil Cranesbill
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Oxalis exilis</i>	Shady Wood-sorrel
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
MTG	<i>Dianella revoluta</i> s.l.	Black-anther Flax-lily
MTG	<i>Carex breviculmis</i>	Common Grass-sedge
MTG	<i>Lachnagrostis billardierei</i> s.l.	Coast Blown-grass
MTG	<i>Austrodanthonia setacea</i>	Bristly Wallaby-grass
MNG	<i>Ficinia nodosa</i>	Knobby Club-sedge
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
SC	<i>Clematis microphylla</i>	Small-leaved Clematis
SC	<i>Comesperma volubile</i>	Love Creeper

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EVC 858: Coastal Alkaline Scrub (syn. Calcarenite Dune Woodland) - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

40 % cover

Logs:

5 m/0.1 ha. (note: large log class does not apply)

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Centaurium erythraea</i>	Common Centaury	high	low
MH	<i>Anagallis arvensis</i>	Pimpernel	high	low
MH	<i>Hypochoeris</i> spp.	Cat's Ear	high	low
MTG	<i>Ehrharta erecta</i>	Panic Veldt-grass	high	high
MTG	<i>Catapodium rigidum</i>	Fern Grass	high	low
MNG	<i>Aira caryophyllea</i>	Silvery Hair-grass	high	low
SC	<i>Myrsiphyllum asparagoides</i>	Smilax Asparagus	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 863: Floodplain Reedbed

Description:

A closed to open grassland to 2–3 m tall, dominated by Common Reed. Small aquatic and semi-aquatic species occur amongst the reeds. It occurs on swamps on river plains, especially the lower reaches of the floodplain. Soils are Quaternary stream alluvium with floodplain and low level terrace deposits consisting of silt, clay and peat. Swamp Paperbark frequently fringes the margins of these reed beds.

Life Forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	1	5%	MS
Large Herb	2	10%	LH
Medium Herb	2	5%	MH
Small or Prostrate Herb	2	5%	SH
Medium to Small Tufted Graminoid	1	5%	MTG
Large Non-tufted Graminoid	2	30%	LNG
Scrambler or Climber	1	1%	SC
Total understorey projective foliage cover		60%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Solanum aviculare</i>	Kangaroo Apple
MH	<i>Myriophyllum crispatum</i>	Upright Water-milfoil
LH	<i>Lycopus australis</i>	Australian Gipsywort
LH	<i>Urtica incisa</i>	Scrub Nettle
SH	<i>Mimulus repens</i>	Creeping Monkey-flower
LNG	<i>Phragmites australis</i>	Common Reed
MTG	<i>Triplachin procerum</i> s.l.	Water Ribbons
SC	<i>Calystegia sepium</i>	Large Bindweed

Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:

10% cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Aster subulatus</i>	Aster-weed	high	low
MH	<i>Cotula coronopifolia</i>	Water Buttons	high	high

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EVC 863: Floodplain Reedbed - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 875: Blocked Coastal Stream Swamp

Description:

Margins of coastal streams that are consistently flooded for long periods where the entrances become plugged by sand during low flow periods. The blockage is breached during floods, briefly exposing the wetlands before the mouth silts up and the dammed river overflows, flooding the habitat of this EVC. Soils are peats derived from Quaternary swamp and lagoonal deposits. Elevation is near sea level and average annual rainfall is 900 mm.

Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	3	25%	LH
Medium Herb	1	5%	MH
Small or Prostrate Herb	1	1%	SH
Large Non-tufted Graminoid	1	55%	LNG
Medium to Small Tufted Graminoid	3	5%	MTG
Medium to Tiny Non-tufted Graminoid	1	1%	MNG
Total understorey projective foliage cover		90%	

LF Code	Species typical of at least part of EVC range	Common Name
LH	<i>Euphrasia collina</i>	Purple Eyebright
LH	<i>Typha domingensis</i>	Narrow-leaf Cumbungi
LH	<i>Epilobium billardierianum</i>	Variable Willow-herb
MH	<i>Utricularia dichotoma</i> s.l.	Fairies' Aprons
MH	<i>Drosera binata</i>	Forked Sundew
MH	<i>Cardamine gunnii</i> s.l.	Common Bitter-cress
SH	<i>Hydrocotyle sibthorpioides</i>	Shining Pennywort
LNG	r <i>Cladium procerum</i>	Leafy Twig-sedge
MTG	<i>Lepidosperma filiforme</i>	Common Rapier-sedge
MTG	r <i>Lachnagrostis rudis</i>	Ruddy Blown-grass
MTG	<i>Isolepis platycarpa</i>	Broad-fruit Club-sedge
MTG	<i>Juncus caespitosus</i>	Grassy Rush
MNG	<i>Triglochin striatum</i>	Streaked Arrowgrass
MNG	<i>Schoenus niter</i>	Shiny Bog-sedge
MNG	<i>Baumea juncea</i>	Bare Twig-sedge

Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:

10% cover

Weediness:

There are no consistent weeds in this EVC.

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EVC 875: Blocked Coastal Stream Swamp - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 876: Spray-zone Coastal Shrubland

Description:

A wind-pruned salt-affected open shrubland usually less than 1 m tall (with occasional emergent taller shrubs) that occurs on the most exposed coastal areas subject to salt-spray and run-off at the crest of sea cliffs. This EVC usually occurs in association with taller Coastal Headland Scrub (EVC 161).

Life forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	2	5%	MS
Small Shrub	4	30%	SS
Medium Herb	2	5%	MH
Small or Prostrate Herb	4	5%	SH
Large Tufted Graminoid	2	5%	LTG
Medium to Small Tufted Graminoid	4	10%	MTG
Medium to Tiny Non-tufted Graminoid	1	1%	MNG
Scrambler or Climber	1	5%	SC
Soil Crust	na	10%	S/C
Total understorey projective foliage cover		60%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Olearia axillaris</i>	Coast Daisy-Bush
MS	<i>Alyxia buxifolia</i>	Sea Box
SS	<i>Leucophyta brownii</i>	Cushion Bush
SS	<i>Ozothamnus turbinatus</i>	Coast Everlasting
SS	<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Seaberry Saltbush
SS	<i>Correa alba</i>	White Correa
MH	<i>Sarcocornia quinqueflora</i>	Beaded Glasswort
MH	<i>Samolus repens</i>	Creeping Brookweed
MH	<i>Senecio planatifolius</i>	Toothed Groundsel
MH	<i>Actites megalocarpa</i>	Coast Sow-thistle
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Rounded Noon-flower
SH	<i>Carpobrotus rossii</i>	Karkalla
SH	<i>Calandrinia calypttrata</i>	Pink Purslane
LTG	<i>Austrostipa stipoides</i>	Prickly Spear-grass
LTG	<i>Dicheloschne crinita</i>	Long-hair Plume-grass
MNG	<i>Ficinia nodosa</i>	Knobby Club-sedge
MTG	<i>Lachnagrostis billardierei</i> s.l.	Coast Blown-grass
MTG	<i>Poa poliformis</i>	Coast Tussock-grass
MTG	<i>Lepidosperma gladiatum</i>	Coast Sword-sedge
MTG	<i>Dianella brevicaulis</i>	Small-flower Flax-lily
SC	<i>Tetragonia implexicoma</i>	Bower Spinach

Recruitment:

Continuous

Organic Litter:

10 % cover

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EVC 876: Spray-zone Coastal Shrubland - Gippsland Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LNG	<i>Pennisetum clandestinum</i>	Kikuyu	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Oxalis pes-caprae</i>	Soursob	high	high
MS	<i>Chrysanthemoides monilifera</i>	Boneseed	high	high
MS	<i>Polygala myrtifolia</i> var. <i>myrtifolia</i>	Myrtle-leaf Milkwort	high	high
MS	<i>Coprosma repens</i>	Mirror Bush	high	high
MS	<i>Lycium ferocissimum</i>	African Box-thorn	high	high
MTG	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	high	high
SC	<i>Delairea odorata</i>	Cape Ivy	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 877: Lowland Herb-rich Forest

Description:

Primarily occurs in gullies and along lower slopes close to minor drainage lines. Soils are reasonably fertile colluvial loams. Open eucalypt forest to 20 m tall with a range of medium shrubs conspicuous in the mid-stratum. The ground layer is dominated by a dense cover of grasses and a high diversity of tussock-forming graminoids and herbs.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Eucalyptus cypellocarpa</i>	Mountain Grey-gum
	<i>Eucalyptus globoides</i>	White Stringybark
	<i>Eucalyptus polyanthemus</i>	Red Box

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	3	10%	T
Medium Shrub	4	20%	MS
Small Shrub	1	1%	SS
Prostrate Shrub	1	5%	PS
Large Herb	2	5%	LH
Medium Herb	13	30%	MH
Small or Prostrate Herb	4	5%	SH
Large Non-tufted Graminoid	1	15%	LTG
Medium to Small Tufted Graminoid	5	5%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Bryophytes/Lichens	na	10%	BL

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EVC 877: Lowland Herb-rich Forest - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia mearnsii</i>	Black Wattle
MS	<i>Zieria smithii</i>	Sandfly Zieria
MS	<i>Kunzea ericoides</i>	Burgan
MS	<i>Cassinia longifolia</i>	Shiny Cassinia
MS	<i>Cassinia aculeata</i>	Common Cassinia
MS	<i>Melaleuca parvistaminea</i>	Rough-barked Honey-myrtle
SS	<i>Pimelea humilis</i>	Common Rice-flower
PS	<i>Bossiaea prostrata</i>	Creeping Bossiaea
LH	<i>Stypandra glauca</i>	Nodding Blue-lily
LH	<i>Senecio tenuiflorus</i>	Slender Fireweed
MH	<i>Hypericum gramineum</i>	Small St John's Wort
MH	<i>Lagenophora stipitata</i>	Common Bottle-daisy
MH	<i>Pterostylis concinna</i>	Trim Greenhood
SH	<i>Opercularia varia</i>	Variable Stinkweed
SH	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
SH	<i>Oxalis exilis</i>	Shady Wood-sorrel
SH	<i>Dichondra repens</i>	Kidney-weed
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Luzula meridionalis</i>	Common Woodrush
MTG	<i>Lomandra filiformis</i> ssp. <i>coriacea</i>	Wattle Mat-rush
MTG	<i>Poa sieberiana</i>	Grey Tussock-grass
MTG	<i>Dianella caerulea</i> var. <i>caerulea</i>	Paroo Lily
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Entolasia marginata</i>	Bordered Panic
SC	<i>Comesperma volubile</i>	Love Creeper

Recruitment:

Continuous

Organic Litter:

40 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Rubus fruticosus</i> spp. agg.	Blackberry	high	high
LH	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	high	low
LH	<i>Centaureum tenuiflorum</i>	Slender Centaury	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Prunella vulgaris</i>	Self-heal	high	low
MH	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	high	low
SH	<i>Trifolium repens</i> var. <i>repens</i>	White Clover	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 879: Coastal Dune Grassland

Description:

Consists of grasses and halophytes (succulents) that colonise the foredunes of ocean beaches. Soils are siliceous sands that have a very low humus content.

Life Forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	1	5%	MS
Small Shrub	1	5%	SS
Prostrate Shrub	1	1%	PS
Large Herb	2	5%	LH
Medium Herb	4	5%	MH
Small or Prostrate Herb	3	10%	SH
Medium to Small Tufted Graminoid	3	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	25%	MNG
Scrambler or Climber	1	1%	SC
Total understorey projective foliage cover		60%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Atriplex cinerea</i>	Coast Saltbush
SS	<i>Suaeda australis</i>	Austral Seablite
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
MH	<i>Actites megalocarpa</i>	Dune Thistle
MH	<i>Senecio pinnatifolius</i>	Variable Groundsel
SH	<i>Carpobrotus rossii</i>	Karkalla
SH	<i>Crassula sieberiana</i>	Sieber Crassula
SH	<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Rounded Noon-flower
SH	<i>Apium annuum</i>	Annual Celery
MTG	<i>Dianella brevicaulis</i>	Small-flower Flax-lily
MTG	<i>Carex pumila</i>	Strand Sedge
MNG	<i>Spinifex sericeus</i>	Hairy Spinifex
MNG	<i>Ficinia nodosa</i>	Knobby Club-sedge
SC	<i>Clematis microphylla</i>	Small-leaved Clematis

Recruitment:

Continuous

Organic Litter:

10 % cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
MTG	<i>Thinopyrum junceiforme</i>	Sea Wheat-grass	high	high
LTG	<i>Ammophila arenaria</i>	Marram Grass	high	high

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EVC 879: Coastal Dune Grassland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 895: Escarpment Shrubland

Description:

Occurs on rocky escarpments in steep valleys or gorges, associated with limestone or basalt. Sites have moderate to high fertility, are well-drained but subject to regular summer drought due to shallow soils. Eucalypt woodland to 15 m tall or non-eucalypt shrubland to 8 m tall, sometimes with occasional eucalypts; lichen-covered rock outcrops are common.

* eucalypt woodland only components (ignore when assessing shrubland areas and standardise site condition score as required)

Large trees*:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
15%	<i>Acacia implexa</i>	Lightwood
	<i>Allocasuarina verticillata</i>	Drooping Sheoak
	<i>Acacia meurnsii</i>	Black Wattle
	<i>Bursaria spinosa</i>	Sweet Bursaria
	<i>Eucalyptus radiata</i>	Narrow-leaf Peppermint

Understorey:

Life form	#Sp	%cover	LF code
Immature Canopy Tree	3	5%	IT
Understorey Tree or Large Shrub*	3	10%	T
Medium Shrub	3	10%	MS
Small Shrub	2	5%	SS
Large Herb	3	5%	LH
Medium Herb	4	10%	MH
Small or Prostrate Herb	5	5%	SH
Large Tufted Graminoid	1	5%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	9	25%	MTG
Medium to Tiny Non-tufted Graminoid	3	5%	MNG
Ground Fern	1	5%	GF
Scrambler or Climber	1	5%	SC
Bryophytes/Lichens	na	20%	BL
Soil Crust	na	10%	S/C

LF Code

Species typical of at least part of EVC range

MS	<i>Rhagodia parabolica</i>	Fragrant Saltbush
MS	<i>Hymenanthera dentata</i> s.l.	Tree Violet
SS	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush
LH	<i>Wahlenbergia communis</i> s.l.	Tufted Bluebell
MH	<i>Oxalis perennans</i>	Grassland Wood-sorrel
MH	<i>Maireana enchylaenoides</i>	Wingless Bluebush
MH	<i>Einadia nutans</i> ssp. <i>nutans</i>	Nodding Saltbush
SH	<i>Chamaesyce drummondii</i>	Flat Spurge
SH	<i>Dichondra repens</i>	Kidney-weed
LTG	<i>Austrostipa bigeniculata</i>	Knead Spear-grass
MTG	<i>Austroanthonia racemosa</i> var. <i>racemosa</i>	Striped Wallaby-grass
MTG	<i>Austroanthonia setacea</i>	Bristly Wallaby-grass
MNG	<i>Panicum effusum</i>	Hairy Panic
GF	<i>Chellanthus distans</i>	Bristly Cloak-fern
SC	<i>Clematis microphylla</i>	Small-leaved Clematis
SC	<i>Convolvulus erubescens</i> spp. agg.	Pink Bindweed

EVC 895: Escarpment Shrubland - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

15 m/0.1 ha⁺.

5 m/0.1 ha. (note: large log class does not apply)

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Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	<i>Schinus molle</i>	Pepper Tree	high	high
MS	<i>Lycium ferocissimum</i>	African Box-thorn	high	high
MS	<i>Genista monspessulana</i>	Montpellier Broom	high	high
SS	<i>Marrubium vulgare</i>	Horehound	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Helminthotheca echioides</i>	Ox-tongue	high	low
LH	<i>Lactuca serriola</i>	Prickly Lettuce	high	low
LH	<i>Sisymbrium officinale</i>	Hedge Mustard	high	high
LH	<i>Sonchus asper</i> s.l.	Rough Sow-thistle	high	low
LH	<i>Verbascum thapsus</i> ssp. <i>thapsus</i>	Great Mullein	high	high
LH	<i>Echium plantagineum</i>	Paterson's Curse	high	high
LH	<i>Centaurea tenuiflorum</i>	Slender Centaury	high	low
LH	<i>Foeniculum vulgare</i>	Fennel	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Trifolium arvense</i> var. <i>arvense</i>	Hare's-foot Clover	high	low
MH	<i>Trifolium subterraneum</i>	Subterranean Clover	high	low
MH	<i>Trifolium campestre</i> var. <i>campestre</i>	Hop Clover	high	low
MH	<i>Trifolium angustifolium</i> var. <i>angustifolium</i>	Narrow-leaf Clover	high	low
MH	<i>Lotus suaveolens</i>	Hairy Bird's-foot Trefoil	high	low
MH	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	high	low
SH	<i>Medicago polymorpha</i>	Burr Medic	high	low
SH	<i>Trifolium glomeratum</i>	Cluster Clover	high	low
SH	<i>Modiola caroliniana</i>	Red-flower Mallow	high	low
SH	<i>Aptenia cordifolia</i>	Heart-leaf Ice-plant	high	high
LTG	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
LNG	<i>Avena fatua</i>	Wild Oat	high	low
MTG	<i>Nassella trichotoma</i>	Serrated Tussock	high	high
MTG	<i>Ehrharta longiflora</i>	Annual Veldt-grass	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MTG	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	Soft Brome	high	low
MTG	<i>Sporobolus africanus</i>	Rat-tail Grass	high	high
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Pentstemon airoides</i> ssp. <i>airoides</i>	False Hair-grass	high	low
MTG	<i>Lolium perenne</i>	Perennial Rye-grass	high	low
MTG	<i>Dactylis glomerata</i>	Cocksfoot	high	high
MTG	<i>Vulpia myuros</i>	Rat's-tail Fescue	high	low
MTG	<i>Bromus rubens</i>	Red Brome	high	low
MTG	<i>Avena barbata</i>	Bearded Oat	high	low
MTG	<i>Aira caryophylla</i>	Silvery Hair-grass	high	low
SC	<i>Vicia sativa</i> ssp. <i>sativa</i>	Common Vetch	low	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 902: Gully Woodland

Description:

Woodland or open forest to 20 m tall occurring along moderately steep gullies. Soils are mostly colluvial deposits of sands and silts. Characterised by a medium dense small tree and shrub layer above a grassy/sedgy understorey, often rich in herbs within the inter-tussock spaces.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	10 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus viminalis</i>	Manna Gum
	<i>Eucalyptus ovata</i>	Swamp Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	4	15%	T
Medium Shrub	6	15%	MS
Small Shrub	1	1%	SS
Large Herb	2	1%	LH
Medium Herb	6	10%	MH
Small or Prostrate Herb	2	5%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	8	20%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Ground Fern	3	10%	GF
Scrambler or Climber	4	10%	SC
Bryophytes/Lichens	na	20%	BL

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

10 m/0.1 ha.

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EVC 902: Gully Woodland - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia mearnsii</i>	Black Wattle
T	<i>Acacia melanoxylon</i>	Blackwood
T	<i>Bursaria spinosa</i>	Sweet Bursaria
T	<i>Allocasuarina littoralis</i>	Black Sheoak
MS	<i>Goodenia ovata</i>	Hop Goodenia
MS	<i>Coprosma quadrifida</i>	Prickly Currant-bush
MS	<i>Cassinia aculeata</i>	Dogwood
SS	<i>Rubus parvifolius</i>	Small-leaf Bramble
LH	<i>Senecio glomeratus</i>	Annual Fireweed
LH	<i>Senecio tenuiflorus</i>	Slender Fireweed
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Hypericum gramineum</i>	Small St John's-wort
MH	<i>Viola hederacea</i> sensu Willis (1972)	Ivy-leaf Violet
SH	<i>Dichondra repens</i>	Kidneyweed
SH	<i>Oxalis exilis</i>	Shady Wood-sorrel
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Poa labillardierei</i>	Common Tussock-grass
MTG	<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>	Stippled Wallaby-grass
MTG	<i>Lepidosperma laterale</i> var. <i>laterale</i>	Variable Sword-sedge
MTG	<i>Poa morrisii</i>	Soft Tussock-grass
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Poa tenera</i>	Slender Tussock-grass
GF	<i>Pteridium esculentum</i>	Austral Bracken
GF	<i>Adiantum aethiopicum</i>	Common Maidenhair
GF	<i>Doodia australis</i>	Common Rasp-fern
SC	<i>Clematis aristata</i>	Mountain Clematis
SC	<i>Pandorea pandorana</i>	Wonga Vine
SC	<i>Clematis microphylla</i>	Small-leaf Clematis
SC	<i>Comesperma volubile</i>	Love Creeper
EP	<i>Agrostis capillaris</i>	Creeping Mistletoe

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Chrysanthemoides monilifera</i>	Boneseed	high	high
MS	<i>Rubus fruticosus</i> spp. agg.	Blackberry	high	high
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Oxalis pes-caprae</i>	Sour sob	high	high
MH	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	high	low
MH	<i>Anagallis arvensis</i>	Scarlet Pimpernel	high	low
MH	<i>Centaurea erythraea</i>	Common Centaury	high	low
MH	<i>Oxalis incarnata</i>	Pale Wood-sorrel	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MTG	<i>Ehrharta erecta</i>	Panic Veldt Grass	high	high
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Ehrharta longiflora</i>	Annual Veldt-grass	high	low
MTG	<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	high	high
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MNG	<i>Dactylis glomerata</i>	Cocksfoot	high	high
MNG	<i>Allium triquetrum</i>	Angled Onion	high	high
MNG	<i>Agrostis capillaris</i> s.l.	Brown-top Bent	high	high
SC	<i>Asparagus asparagoides</i>	Bridal Creeper	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 914: Estuarine Flats Grassland

Description:

Closed to open grassland to 1.5 m tall with occasional shrubs occurring on estuarine flats often associated with current or old beach berms or sand sheets that are occasionally inundated by high tides. Occupies areas on marginally higher ground inland from Coastal Saltmarsh.

Life Forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	2	5%	MS
Small Shrub	1	5%	SS
Large Herb	1	1%	LH
Medium Herb	3	15%	MH
Small Herb	4	15%	SH
Large Tufted Graminoid	2	15%	LTG
Medium to Small Tufted Graminoid	2	20%	MTG
Medium to Tiny Non-tufted Graminoid	3	15%	MNG
Total understorey projective foliage cover		85%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Atriplex cinerea</i>	Coast Saltbush
MS	<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Seaberry Saltbush
SS	<i>Frankenia pauciflora</i> var. <i>gunnii</i>	Southern Sea-heath
LH	<i>Senecio pinnatifolius</i>	Variable Groundsel
MH	<i>Sarcocornia quinqueflora</i> ssp. <i>quinqueflora</i>	Beaded Glasswort
MH	<i>Suaeda australis</i>	Austral Seablite
MH	<i>Samolus repens</i>	Creeping Brookweed
SH	<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Rounded Noon-flower
SH	<i>Selliera radicans</i>	Shiny Swamp-mat
SH	<i>Hemichroa pentandra</i>	Trailing Hemichroa
LTG	<i>Austrostipa stipoides</i>	Prickly Spear-grass
LTG	<i>Gahnia filum</i>	Chaffy Saw-sedge
MTG	<i>Poa poliformis</i>	Coast Tussock-grass
MTG	<i>Lachnagrostis billardierei</i> ssp. <i>billardierei</i>	Coast Blown-grass
MNG	<i>Spinifex sericeus</i>	Hairy Spinifex
MNG	<i>Distichlis detichophylla</i>	Australian Salt-grass
MNG	<i>Ficinia nodosa</i>	Knobby Club-sedge

Recruitment:

Continuous

Organic Litter:

10% Cover

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Chrysanthemoides monilifera</i> ssp. <i>monilifera</i>	Boneseed	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Coryza albidia</i>	Tall Fleabane	high	low
MH	<i>Polycarpon tetraphyllum</i>	Four-leaved Allseed	high	low
MH	<i>Hypochaeris radicata</i>	Cat's Ear	high	low
MH	<i>Anagallis arvensis</i>	Pimpernel	high	low
MNG	<i>Vulpia myuros</i>	Rat's-tail Fescue	high	low
MNG	<i>Lagurus ovatus</i>	Hare's-tail Grass	high	low

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EVC 914: Estuarine Flats Grassland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 934: Brackish Grassland

Description:

Grassland or sedgeland occurring on silts in low-lying areas within brackish floodplains. Often occurs in association with Brackish Wetland.

Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	1	1%	LH
Medium Herb	3	5%	MH
Small or Prostrate Herb	5	5%	SH
Large Tufted Graminoid	2	20%	LTG
Medium to Small Tufted Graminoid	4	20%	MTG
Medium to Tiny Non-tufted Graminoid	1	10%	MNG
Bryophytes/Lichens	na	10%	BL
Total understorey projective foliage cover		70%	

LF Code

LH	<i>Senecio glomeratus</i>
MH	<i>Sarcocornia quinqueflora</i>
MH	<i>Samolus repens</i>
MH	<i>Sebaea albidiflora</i>
MH	<i>Calceophalus lacteus</i>
SH	<i>Selliera radicans</i>
SH	<i>Utricularia tenella</i>
LTG	<i>Gahnia filum</i>
LTG	<i>Gahnia trifida</i>
LTG	<i>Poa labillardierei</i>
MTG	<i>Poa poliformis</i>
MTG	<i>Schoenus apogon</i>
MTG	<i>Austrodanthonia geniculata</i>
MNG	<i>Distichlis distichophylla</i>

Species typical of at least part of EVC range

Common Name

Annual Fireweed
Beaded Glasswort
Creeping Brookweed
White Sebaea
Milky Beauty-heads
Shiny Swamp-mat
Pink Bladderwort
Chaffy Saw-sedge
Coast Saw-sedge
Common Tussock-grass
Blue Tussock-grass
Common Bog-sedge
Knead Wallaby-grass
Australian Salt-grass

Recruitment:

Continuous

Organic Litter:

10% cover

Weediness:

There are no consistent weeds in this EVC.

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EVC 934: Brackish Grassland - Gippsland Plain bioregion

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 937: Swampy Woodland

Description:

Open eucalypt woodland to 15 m tall with ground-layer dominated by tussock grasses and/or sedges and often rich in herbs. Occurs on poorly drained, seasonally waterlogged heavy soils, primarily on swamp deposits but extending to suitable substrates within some landscapes of sedimentary origin.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
15%	<i>Eucalyptus ovata</i>	Swamp Gum
	<i>Eucalyptus cephalocarpa</i> s.s.	Mealy Stringybark
	<i>Eucalyptus radiata</i> s.l.	Narrow-leaf Peppermint
	<i>Eucalyptus obliqua</i>	Messmate Stringybark

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	1	5%	T
Medium Shrub	2	20%	MS
Medium Herb	5	10%	MH
Small or Prostrate Herb	3	10%	SH
Large Tufted Graminoid	4	30%	LTG
Large Non-tufted Graminoid	2	10%	LNG
Medium to Small Tufted Graminoid	4	10%	MTG
Bryophytes/Lichens	na	20%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Metaleuca ericifolia</i>	Swamp Paperbark
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
MH	<i>Centella cordifolia</i>	Centella
MH	<i>Gratiola peruviana</i>	Austral Brooklime
SH	<i>Mazus pumilio</i>	Swamp Mazus
LTG	<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge
LTG	<i>Poa labillardierei</i>	Common Tussock-grass
LTG	<i>Carex appressa</i>	Tall Sedge
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
LNG	<i>Phragmites australis</i>	Common Reed
MTG	<i>Schoenus apogon</i>	Common Bog-sedge
MTG	<i>Lepidosperma laterale</i>	Variable Sword-sedge
MNG	<i>Poa tenera</i>	Slender Tussock-grass
MNG	<i>Juncus holoschoenus</i>	Joint-leaf Rush

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

15 m/0.1 ha.

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EVC 937: Swampy Woodland - Gippsland Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Rubus</i> sp. aff. <i>armeniacus</i>	Blackberry	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 938: Shrubby Gully Forest

Description:

An open eucalypt forest to woodland to 20 m tall confined to narrow bands along low gradient gullies on minor streams within foothills. Often associated with granite soils. The understorey is dominated by shrubs, sedges and ferns and lacks the diversity of herbs and grasses associated with drainage lines on more fertile soils.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Eucalyptus radiata</i> s.l.	Narrow-leaf Peppermint
	<i>Eucalyptus ovata</i>	Swamp Gum
	<i>Eucalyptus viminalis</i> ssp. <i>viminalis</i>	Manna Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree	6	5%	IT
Understorey Tree or Large Shrub	5	10%	MS
Medium Shrub	5	20%	MS
Medium Herb	3	10%	SH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	3	15%	LTG
Large Non-tufted Graminoid	2	10%	LNG
Medium to Small Tufted Graminoid	3	10%	MTG
Medium to Tiny Non-tufted Graminoid	1	5%	MNG
Ground Fern	4	20%	GF
Scrambler or Climber	2	1%	SC
Bryophytes/Lichens	na	20%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia melanoxylon</i>	Blackwood
T	<i>Metaleuca squarrosa</i>	Scented Paperbark
T	<i>Metaleuca ericifolia</i>	Swamp Paperbark
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Ozothamnus ferrugineus</i>	Tree Everlasting
MS	<i>Coprosma quadrifida</i>	Prickly Currant-bush
MS	<i>Goodenia ovata</i>	Hop Goodenia
MH	<i>Veronica plebeia</i>	Trailing Speedwell
MH	<i>Viola hederacea</i> sensu Willis (1972)	Ivy-leaf Violet
SH	<i>Oxalis corniculata</i> s.l.	Yellow Wood-sorrel
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Desmodium gunnii</i>	Southern Tick-trefoil
LTG	<i>Carex appressa</i>	Tall Sedge
LTG	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LTG	<i>Poa labillardieri</i>	Common Tussock Grass
LTG	<i>Cyperus lucidus</i>	Leafy Flat-sedge
LNG	<i>Phragmites australis</i>	Common Reed
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Poa morrisii</i>	Soft Tussock-grass
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
GF	<i>Polystichum proliferum</i>	Mother Shield-fern
GF	<i>Calochlaena dubia</i>	Common Ground-fern
SC	<i>Billardiera scandens</i>	Common Apple-berry

EVC 938: Shrubby Gully Forest - Gippsland Plain bioregion

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

15 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Rubus fruticosus</i> spp. agg.	Blackberry	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 953: Estuarine Scrub

Description:

Closed scrub to 6 m tall growing on the edge of estuarine waterbodies such as creeks, rivers and lagoons with intermediate salinity and poor drainage conditions. Dominated by Swamp Paperbark *Melaleuca ericifolia* with a halophytic (succulent) ground layer dominated by graminoids and herbs. Often occurs in close association with Estuarine Wetland.

Canopy Cover:

%cover	Character Species	Common Name
50%	<i>Melaleuca ericifolia</i>	Swamp Paperbark

Understorey:

Life form	#Spp	%Cover	LF code
Medium Shrub	2	10%	MS
Medium Herb	3	20%	MH
Small or Prostrate Herb	2	5%	SH
Medium to Small Tufted Graminoid	2	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	15%	MNG
Total understorey projective foliage cover		60%	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Seaberry Saltbush
MS	<i>Atriplex cinerea</i>	Coast Saltbush
MH	<i>Samolus repens</i>	Creeping Brookweed
MH	<i>Chenopodium glaucum</i>	Glaucous Goosefoot
MH	<i>Sarcocornia quinqueflora</i>	Beaded Glasswort
SH	<i>Selliera radicans</i>	Shiny Swamp-mat
SH	<i>Apium prostratum</i> ssp. <i>prostratum</i>	Sea Celery
MTG	<i>Poa poliformis</i>	Blue Tussock-grass
MTG	<i>Poa labillardierei</i>	Common Tussock-grass
MNG	<i>Ficinia nodosa</i>	Knobby Club-sedge
MNG	<i>Distichlis distichophylla</i>	Australian Salt-grass

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

5 m/0.1 ha. (note: large log class does not apply)

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high

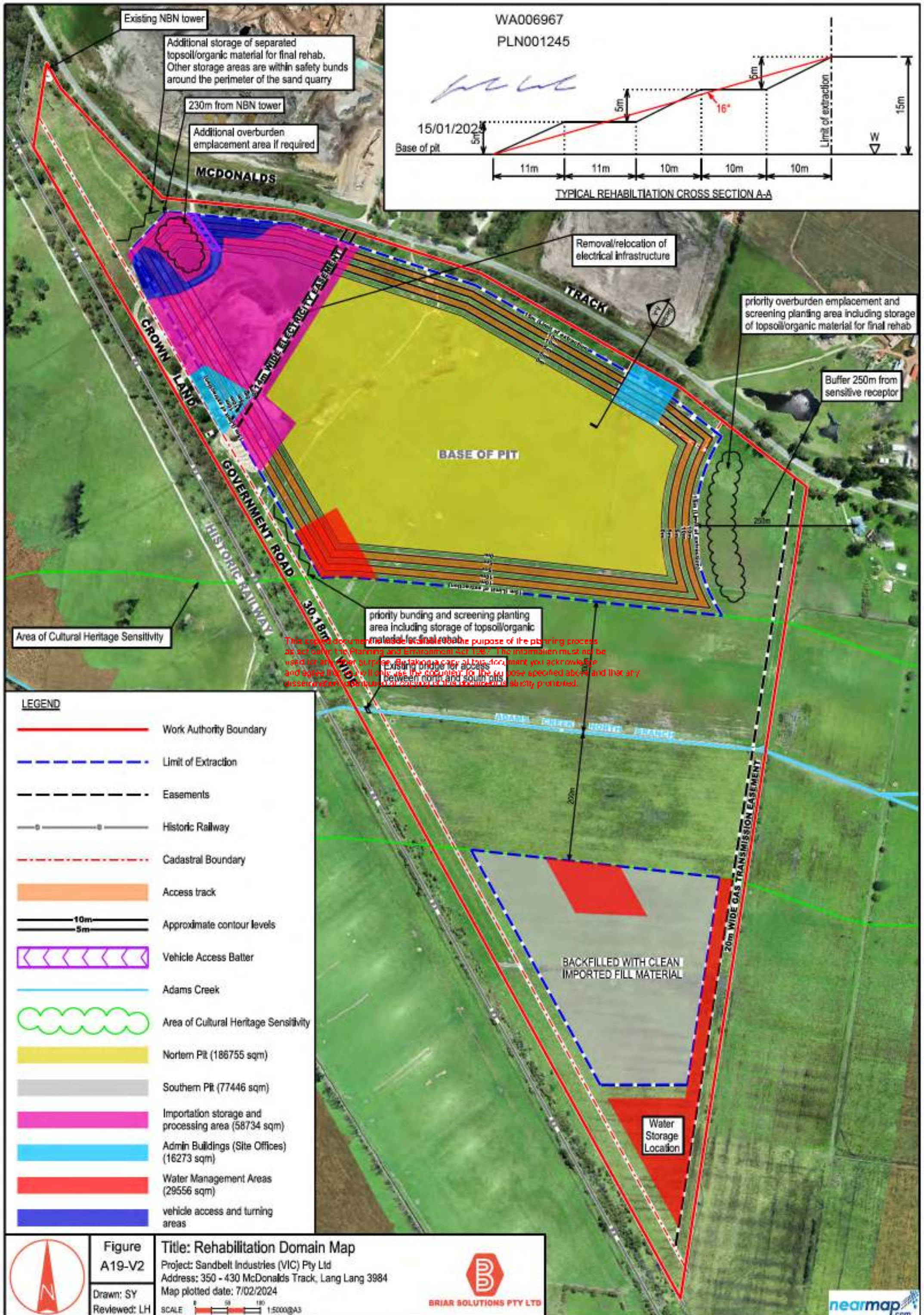
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Attachment B

Plans to be endorsed

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BRIAR SOLUTIONS PTY LTD



Sandbelt Industries – Lang Lang Visual Impact Assessment

McDonalds Track, Lang Lang

July 2025

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Version Control

Rev	Rev Date	Details	Authorised by
A	9 July 2025	Final Issued	LH

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1.0 Introduction

1.1 Background

This visual impact assessment is prepared by Briar Solutions Pty Ltd (Briar) on behalf of Sandbelt Industries (VIC) Pty Ltd (Sandbelt) in support of a planning permit application to expand the existing small quarry site associated with Work Authority 6967.

The report provides a landscape and visual evaluation of the potential visibility of the proposed Sandbelt Sand Quarry. The proposal is subject to a Work Plan Application for Extractive Industry Work Authority No. 6967.

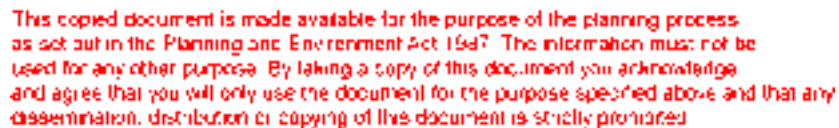
The assessment is based on the following information:

- The quarry development plans as taken from the Work Plan, and represent the nature of the proposed development and rehabilitation.
- Files used for visual modelling visualising the latest version of proposed quarry plans.
- Existing conditions survey plan by vicmap LiDAR survey based on 2018 aerial photography (Greater Melbourne LiDAR project).
- Topographic, cadastral and transport GIS data from State Government sources.

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Figure 1 Location Map



1.2 The site

The site is located at 350-430 McDonalds Track, Lang Lang. The site (or Work Authority Area) is made up of three land parcels as shown in *Figure 2*. These land parcels are:

- Lot 1 PS817451 (0.9984ha),
- Lot 2 PS817451 (79.08ha), and
- Crown Land known as 'Unreserved Crown Land - Unused Road Southwest of Lot 2 PS817451, Parish of Lang Lang' (6.08ha).

The site is located south east of the township of Lang Lang in South Gippsland Victoria. The site is bounded on the north by McDonalds Track and on the south by the disused South Gippsland railway. The site contains a residence and numerous out buildings. It is fenced with post and wire and contains remnants of livestock handling facilities. The site consists primarily of agricultural land and has a history of dairy farming including fodder conservation. Several agricultural drains have been established on the site for the purpose of stock watering. The vegetation quality of the grazed areas of the site is currently low and is dominated by weedy pasture species. The vegetation in the drain has been removed by Melbourne Water as part of their regular cleaning program. There is little if any natural regeneration of overstorey within the grazed areas.

In 2019 the site was acquired and has since been used for importation, blending, and transportation of sand supply materials. In a Section 95D entry report dated 3 May 2022, compliance was observed - Sandbelt Industries (Vic) Pty Ltd were operating in accordance with the s5AA(1) exemption. A Work Authority and accompanying Work Plan have since been lodged with an undergone assessment by ERR.

The site is located on a slight sandy rise, with an elevation of approximately 20m Australian Height Datum (AHD) which gently flattens south away from McDonalds Track and is presently used for sand stockpiling and cattle grazing. The site primarily consists of open paddocks with shelter belts and has likely historically been used for cattle grazing and fodder production. The northern part of the property is currently used by Sandbelt for sand storage, importation and processing (of sand sourced from external sources), whilst the remainder of the site is currently used for cattle grazing (agistment).



Figure 2 Work Authority Map Showing Land Parcels (Existing bridge access between pits)

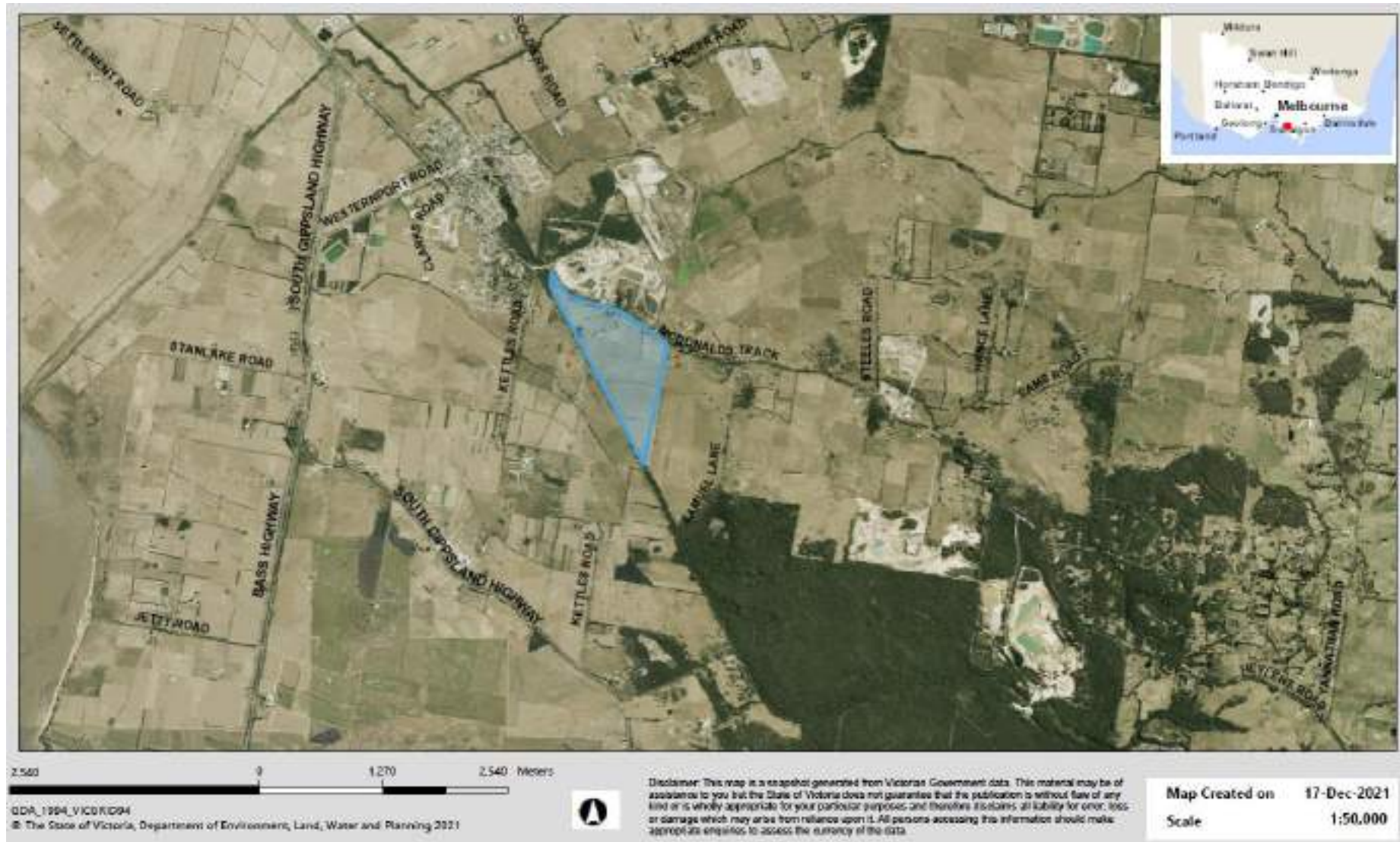


Figure 3 Regional Aerial

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1.3 The Work Authority Proposal

The Work Plan involves the development of quarrying activities on WA 6967 including extraction, screening, blending (with imported materials) and transportation of material offsite. Site activities include quarrying support activities and uses: administration offices, staff/lab facilities, workshop area/storage, water storage and reuse, and ancillary uses for the extractive, blending and processing operation, and operating hours.

Progressive rehabilitation will be undertaken which includes measures to minimise impacts to visual amenity during both progressive rehabilitation, final rehabilitation, and closure. The final land use will be sympathetic to the surrounding landscape. Rehabilitation measures will ensure that the site is left in a safe, stable, non-polluting and in a visually acceptable condition.

1.4 Scope of Assessment

The visual analysis has been undertaken through simulated GIS modelling, to assess visibility of the proposed quarry from the surrounding sensitive receivers. The arterial road, McDonalds Track is heavily vegetated and screened as can be seen from aerial imagery. There is no proposed removal of native vegetation. The modelling is based on a 'line of sight' process from designated viewpoints to the proposed quarry. Images are produced based on data captured by a laser scanner that recorded three-dimensional survey information including vegetation, built form and terrain surface. Data presented enables desktop analysis of existing site features that may filter or screen views towards the project and informs our understanding of potential visual impacts and identification of opportunities to reduce impacts. Site photography was subsequently captured to verify these site characteristics.

1.5 Visual Sensitivity Ratings

Examples of **Higher value** visual receptors would include:

- Scenic lookouts in National or Regional Parks
- High use leisure settings such as trails or park visitor centres
- High use tourism settings such as publicly accessible wineries or function centres
- Major regional roads that carry a higher volume of traffic
- Areas of designated landscape or cultural heritage value, as defined through state or local government policy or planning frameworks. This includes places covered by a Significant Landscape Overlay.
- Town centres and related residential development.

Examples of **Moderate value** visual receptors would include:

- Rural-residential housing
- Lower volume traffic public roads used by non-farming related traffic
- Outdoor sports facilities
- General park environments

Examples of **Lower value** visual receptors would include:

- Farming properties
- Local farm roads
- Industrial and general commercial land uses

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2.0 Context

2.1 Surrounding land use

The proposed quarry site is located at 350-430 McDonalds Track, Lang Lang. The property is bound by McDonalds Track to the north, a gas transmission easement to the east/south east and a disused railway easement and subsequently Duberkes Road to the west/south west. There is an existing quarry development north of McDonalds Track.

The area surrounding the site can be characterised as agricultural farming area on the south west, and immediately east. Extractive operations surround the north of the site, and extend to the far east of the site. A cemetery is also located directly north of the site, on the opposing side of McDonalds Track. The neighbours surrounding the site are rural residential neighbours, the cemetery, and a quarry. **Error! Reference source not found.** provides the regional context of the site noting that the site is within a 6km radius of seven existing sand quarries.

The subject site, and land surrounding the site is zoned Green Wedge Zone (GWZ) under the Cardinia Planning Scheme as shown in *Figure 5*. Further south on McDonalds Track (South of Samuel Lane, Lang Lang), land is zoned Rural Conservation Zone – Schedule 1 (RCZ1).

Land to the north of the site (north of Range Road) and land to the west of the site (west of Kettles Road), is zoned Low Density Residential (LDRZ2) and forms part of Lang Lang Urban Growth Boundary Area. The Township Boundary area is bounded to the north by the Lang Lang River, to the east by Soldiers Road, to the south by Range Road, and to the west by the South Gippsland Highway. The *Lang Lang Township Strategy* applying to this area focuses on prioritising residential and rural residential development, rural industries (horticulture and agriculture), sand extraction activities, open space and recreational pursuits.

The identified sensitive receptors (residential buildings) located nearby the site are shown in *Figure 4*. There are 5 sensitive receptors located within 500m of the site.

There are two existing residential buildings onsite. One currently operates as a site office, the other is owned by Sandbelt, and rented for residential use. There will be no residential use of the property when extraction progresses to 300m of the residence. Instead, the existing building will operate as a site office or be used as staff facilities and will not be recognised as a sensitive receptor.

Table 1 summarises residential sensitive receptors within 500m distance from the proposed quarry, and the distance from the limit of extraction.

Table 1 Sensitive receptor summary

No.	Postal Address	Distance
1	470 Kettles Road, Lang Lang 3984	255m
2	435 McDonalds Track, Lang Lang 3984	162m
3	485 McDonalds Track, Lang Lang 3984	453m
4	460 McDonalds Track, Lang Lang 3984	250m
5	510 McDonalds Track, Lang Lang 3984	580m
8	40 Duberkes Road, Lang Lang 3984	352m

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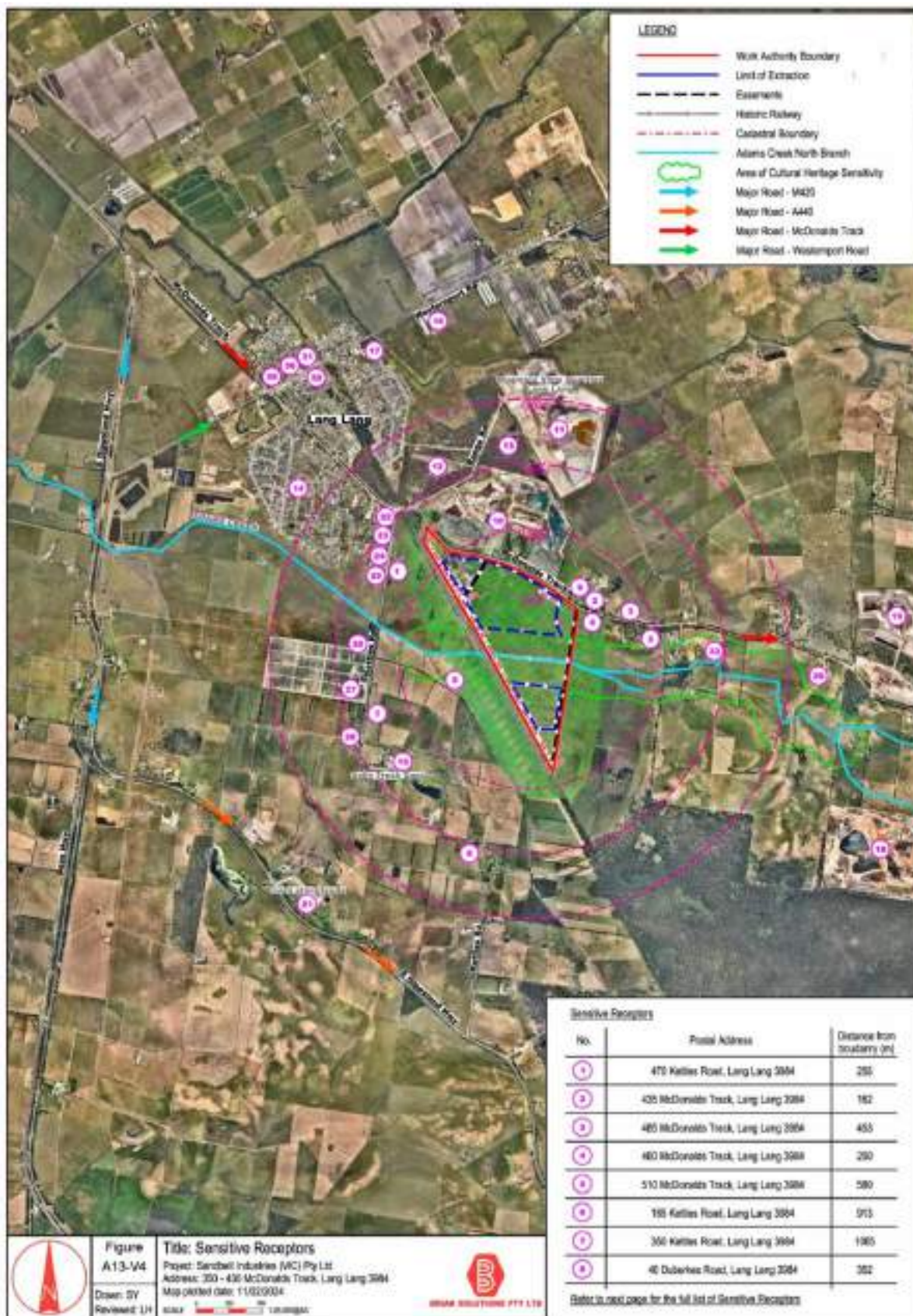


Figure 4 Sensitive Receptors

2.2 Planning controls

Schedule 3 to clause 42.03 of the Significant Landscape Overlay (SLO3)

The Work Authority area is predominantly zoned Green Wedge. There is an inundation overlay (LSIO) over the Work Authority and a Significant Landscape Overlay – Schedule 3 over the entire Work Authority. The planning overlays relevant to the site are shown in *Figure 5*.



Figure 5 Planning Overlays (Source: Cardinia Planning Scheme)

Statement of Nature and Key Elements of Landscape

The Heath Hill landscape extends east from the township of Lang Lang to Nyora in the south and Poowong in the east. The area, which has been recognised by the National Trust, includes landforms which range from alluvial river flats, through sandy heaths to rolling hills which reach elevations of 182 metres. The area is crossed by tributaries of the Lang Lang River which form a catchment area that drains into Western Port. The area contains one of the last extensive heathy woodland remnants in the Western Port region and is a mixture of cleared pasture land which contains clumps of indigenous areas of heath and Messmate forest, particularly along the stream and road lines. Scenic views are available from elevated points with views across the river flats and to Western Port. The environmental characteristics of the landscape are sensitive to any further fragmentation or development.

Landscape character objectives to be achieved

- *To protect and enhance the environmental and landscape values of the Lang Lang/Heath Hill area.*
- *To protect, conserve and improve habitat for flora and fauna which contributes to the significance of the landscape and provides fauna habitat and biolinks.*
- *To ensure that any new buildings and works are located and designed to avoid detrimental effects on the key characteristics of the landscape.*
- *To maintain and protect vegetation as an important element within the landscape.*

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3.0 Visual Analysis

3.1 Methodology

Modelling analysis was undertaken for the site in June 2025 to understand the potential visibility of the quarry to surrounding areas, including locations of potential visual sensitivity.

The visual analysis utilises GIS modelling to assess 'line of sight' visibility of the proposed quarry from the surrounding landscape and sensitive receptors. The modelling is based on topographic data only and does not include vegetation or local structures that are not included within the terrain model. **As such, it represents a 'worst-case scenario' for potential visibility of the proposed quarry that is unlikely to exist under actual day-to-day conditions.**

The analysis provides an objective basis to determine the likely extent of visibility and the location of potential visual receptors associated with the proposed development.

Data specifications

- Aerial imagery sourced from Aerometrex in GDA2020 Zone 55
- LiDAR provided by the client. Capture data 28/11/2017 provided in GDA2020 Zone 55
- Photography provided by Brendan Creaser Photography using a full frame DSLR camera with a 50 mm focal length in portrait orientation. Camera was mounted to a panohead and 360 degree photography was captured in 15 degree increments

Methodology

- 2D quarry plans were provided by the client in GDA2020 Zone 55 and modelled in 3D by Cambium Group (CG)
- Aerometrex aerial imagery was imported to the model along with the LiDAR scan
- The existing surface level was derived from the LiDAR dataset and subtracted from the 3D quarry model
- A 5 m high overburden emplacement was modelled and imported to the master 3D model
- Simulated cameras were located at receivers known as VP1, VP4 and VP8
- The project horizontal field of view from each receiver was calculated and simulated camera bearings were established
- Simulated camera heights were derived from the LiDAR surface model and 1.5 m in height was added to represent receiver viewing height
- Simulated views were rendered to determine preliminary visual impacts
- 24 x single frame panoramic photography was stitched using proprietary software
- 360 degree photography captured from VP4 was imported to the 3D model using LiDAR as a calibration tool
- Quarry strata and overburden rehabilitation materials were applied to the model and simulated sunlight was setup to replicate the time and date of the photography, then rendered
- Final simulated views and photomontage were annotated and submitted with corresponding metadata.

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Sandbelt Industries (VIC) Pty Ltd



Figure 6 View shed of accessed sensitive receivers (pink: represents proposed minimum extraction pit contours)



3.2 Visual Receptor Sensitivity

Visual receptor sensitivity is a measure of the direct or indirect effect/s that development-based changes may have on a view or scenic resource, which could include physical elements, visual character and cultural values.

To determine visual receptor sensitivity, consideration is given to those receptors who have the potential to view the proposed change. For the purposes of the detailed impact assessment, viewer sensitivity is defined as a combination of the following factors:

- Location or land use has a specific interest in or relationship to the visual environment
- There is a strong attachment or functional relationship between the receptor and the place that is subject to change
- The viewer distance and the available angle of view (field of view) is likely to result in a noticeable or dominant visual change
- The surrounding level of use (the number of visual receptors/users).

Table 2 Receptor Sensitivity Classification

Sensitivity Level	Definition
High	<ul style="list-style-type: none">• Designated state level parks and scenic reserves, major recreation trails, formal scenic view locations & lookouts• Highways with higher traffic volumes• Major tourist roads and established scenic routes• Public spaces within town centres• Non-rural residential properties
Moderate	<ul style="list-style-type: none">• Large volume regional link roads• Secondary tourist roads and recreational driving routes• Commercial facilities (ie Wineries) or tourism sites that are based specifically around established scenic values• Major landscape dependant outdoor recreation facilities & settings• Rural residential properties [relevant for this assessment]• Schools and residential care facilities
Low	<ul style="list-style-type: none">• Local rural roads [relevant for this assessment]• Farming properties [relevant for this assessment]• Industrial land uses• Local sports facilities• Forest areas and other relatively inaccessible locations• Forest trails where the focus is mountain biking or other activity-based focus

On-site Verification

The visual modelling process identifies areas that may potentially provide views of the development site. On-site inspection, reference photography and simulated views confirm whether views actually exist, the nature and magnitude of the view and the degree to which visual effects can be mitigated.

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3.3 Visual Modelling from Key Visual Receptor Locations

Figures 7-23 illustrate the likely pattern of viewing based on the visual modelling from three individual visual receptor points. The modelling findings for the proposed quarry configuration (the Proposal) indicate theoretical visibility, without existing vegetation or other site-specific factors.

The impact assessment discussed in Section 4 is based on actual site photography and wireframe modelling which provides a realistic assessment of what will actually be seen from each visual receptor location, and on that basis, provides a more definitive assessment of visual effects associated with the long term future development proposal.

The following visual receptor points represent the most sensitive or most representative potential receptor locations. Modelling toward the proposed quarry location from these locations provides an understanding of the theoretical extent of views. **These results are likely to represent a 'worst case' scenario that does not consider small changes in landform, structures and existing vegetation which can significantly reduce view potential.**

Receptor 1 (R1) – Rural Residential Property off Kettles Road

- The site is 255m from the site
- Modelling indicates that there are no views of the site operations
- Existing vegetation is likely to eliminate views from this viewpoint.

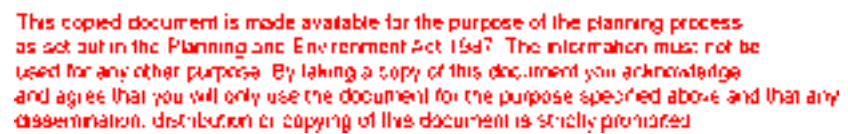
Receptor 4 (R4) – Rural Residential Property off McDonalds Track

- The site is 250m from the proposed quarry
- The eastern boundary of the northern pit of the proposed quarry has the highest potential level of visibility
- Overburden screening is likely to mitigate views from this viewpoint.

Receptor 8 (R8) – Rural Residential Property off Duberkes Road

- The property is approximately 352m from the Site
- Modelling indicates that there are no views of the site operations
- This receptor location has a marginally higher viewing potential than Receptor 1

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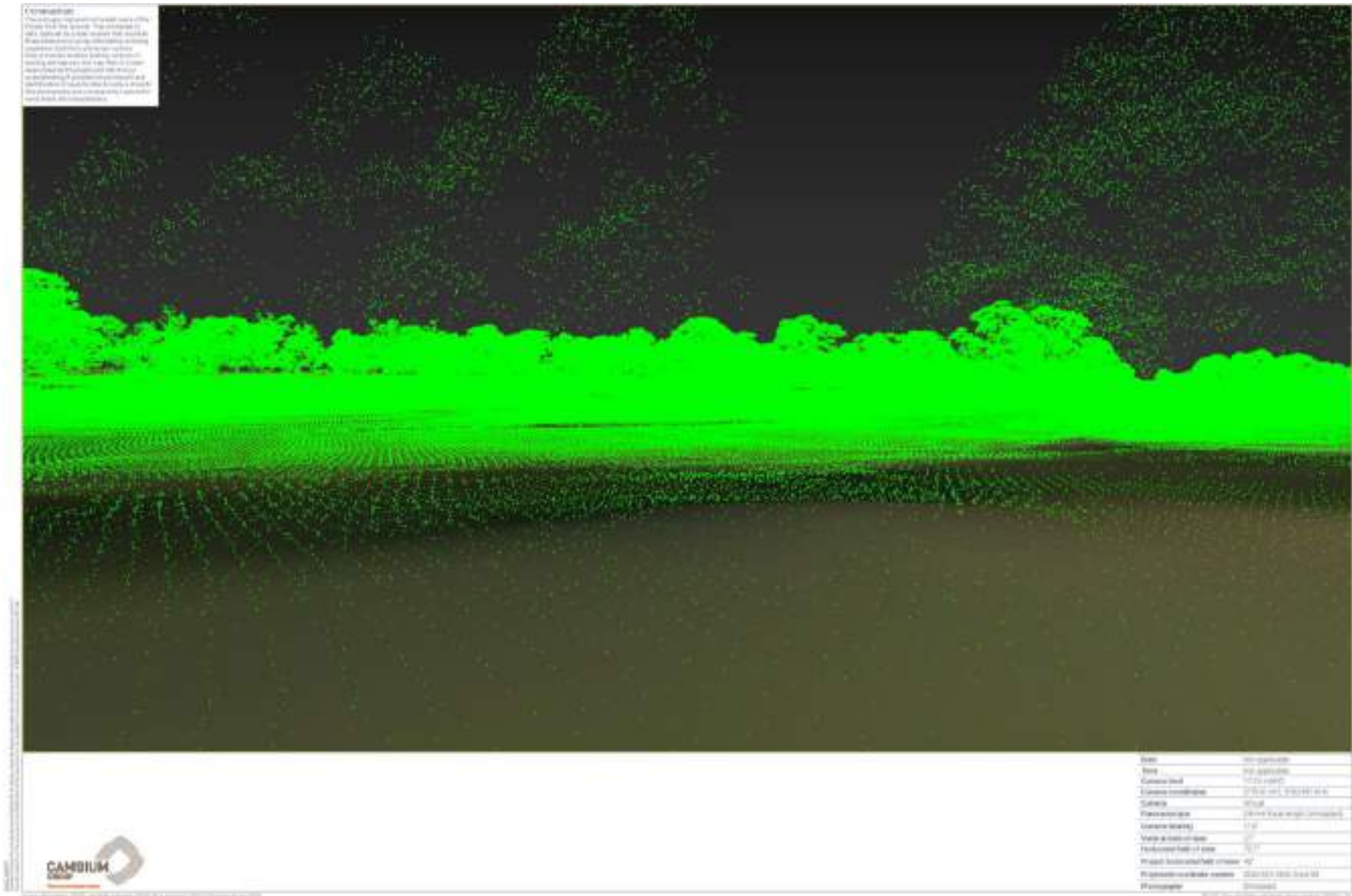


Figure 8 VP1 - Simulated LiDAR view (Project not visible) (24mm focal length)



Figure 9 VP4 - Simulated view (Project not visible) (24mm focal length)

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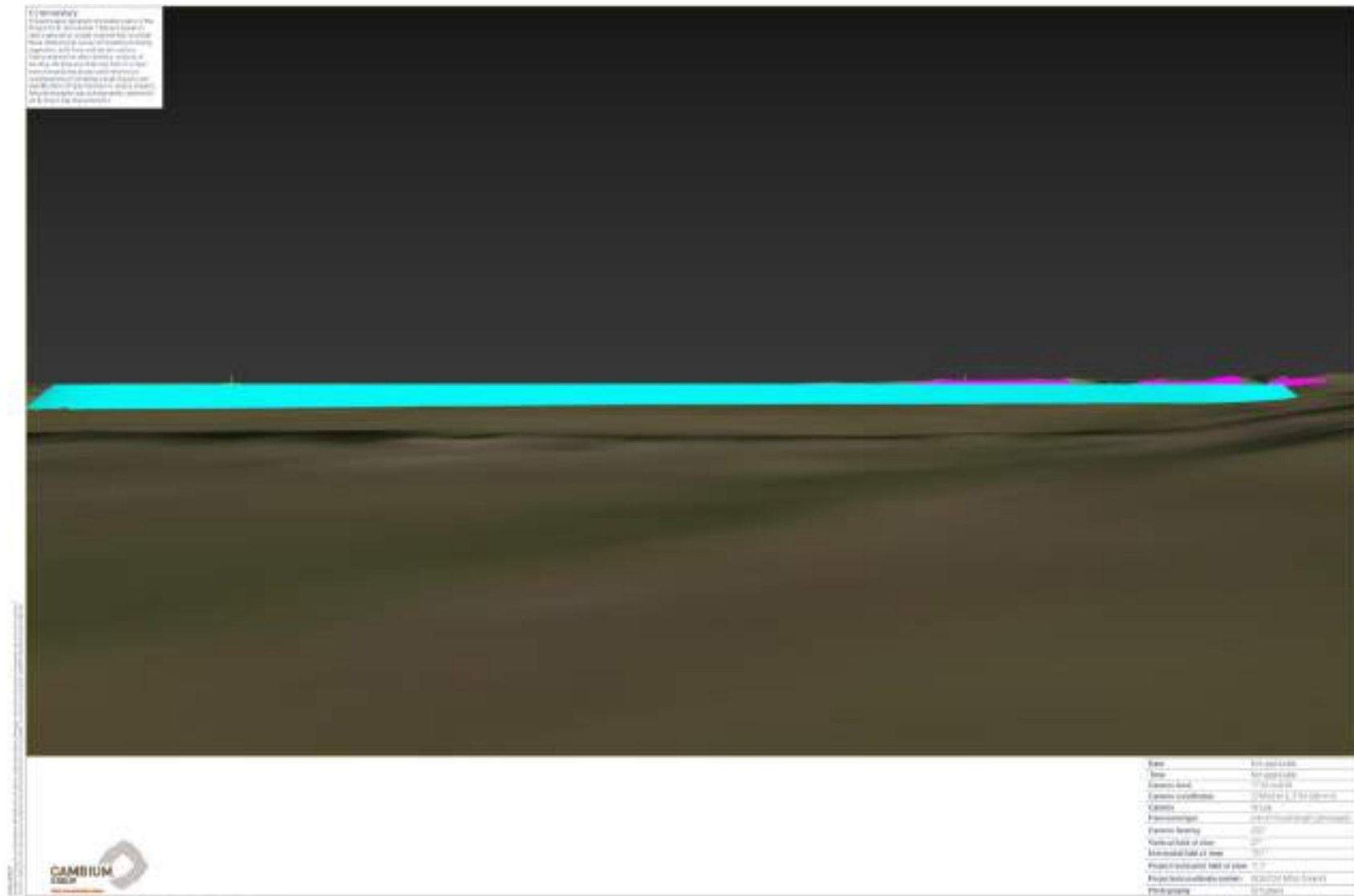


Figure 10 VP4 - Simulated view (Project incl. overburden emplacement) (24mm focal length)

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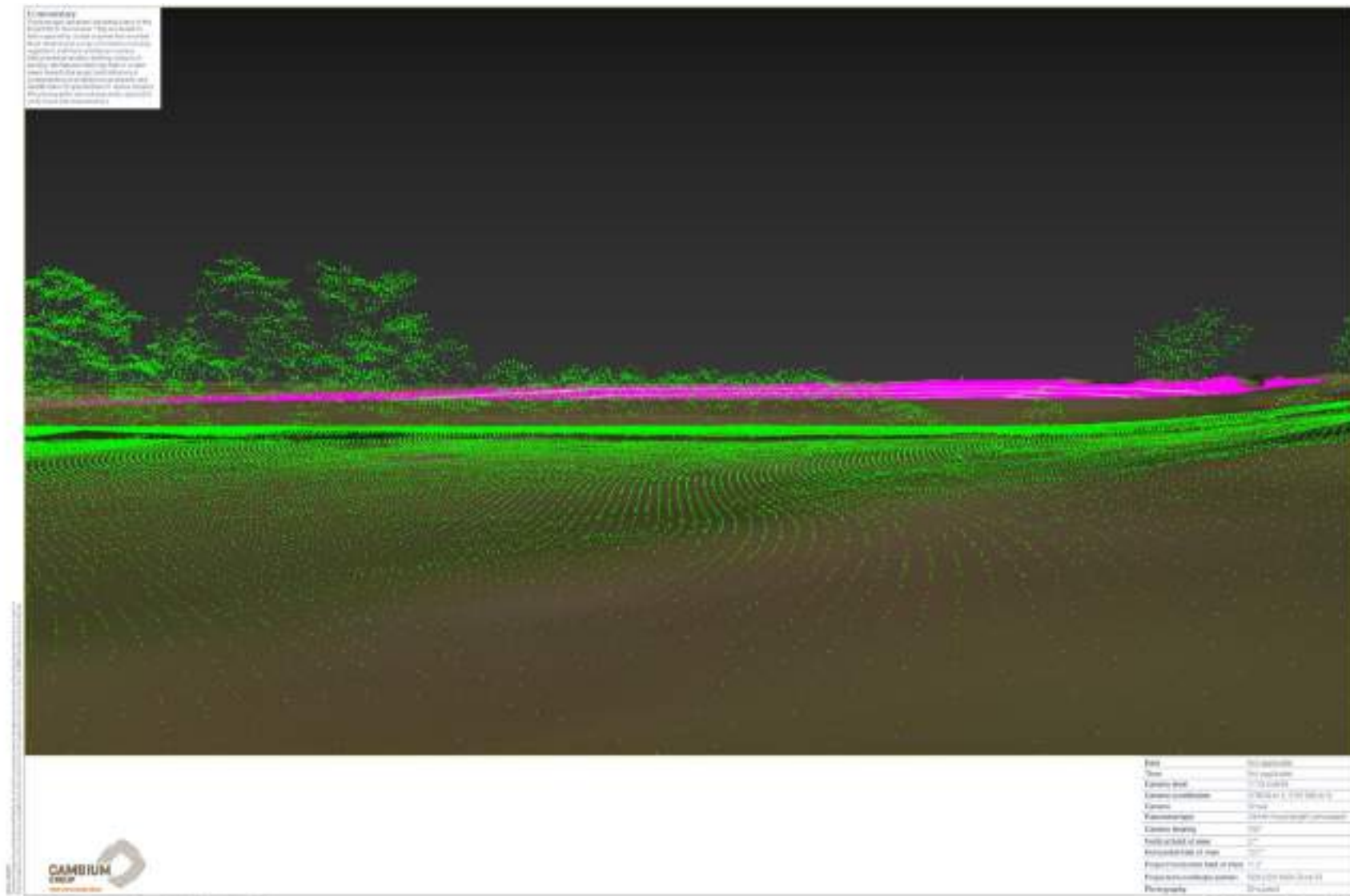


Figure 11 VP4 - Simulated LiDAR view (Project) (24mm focal length)

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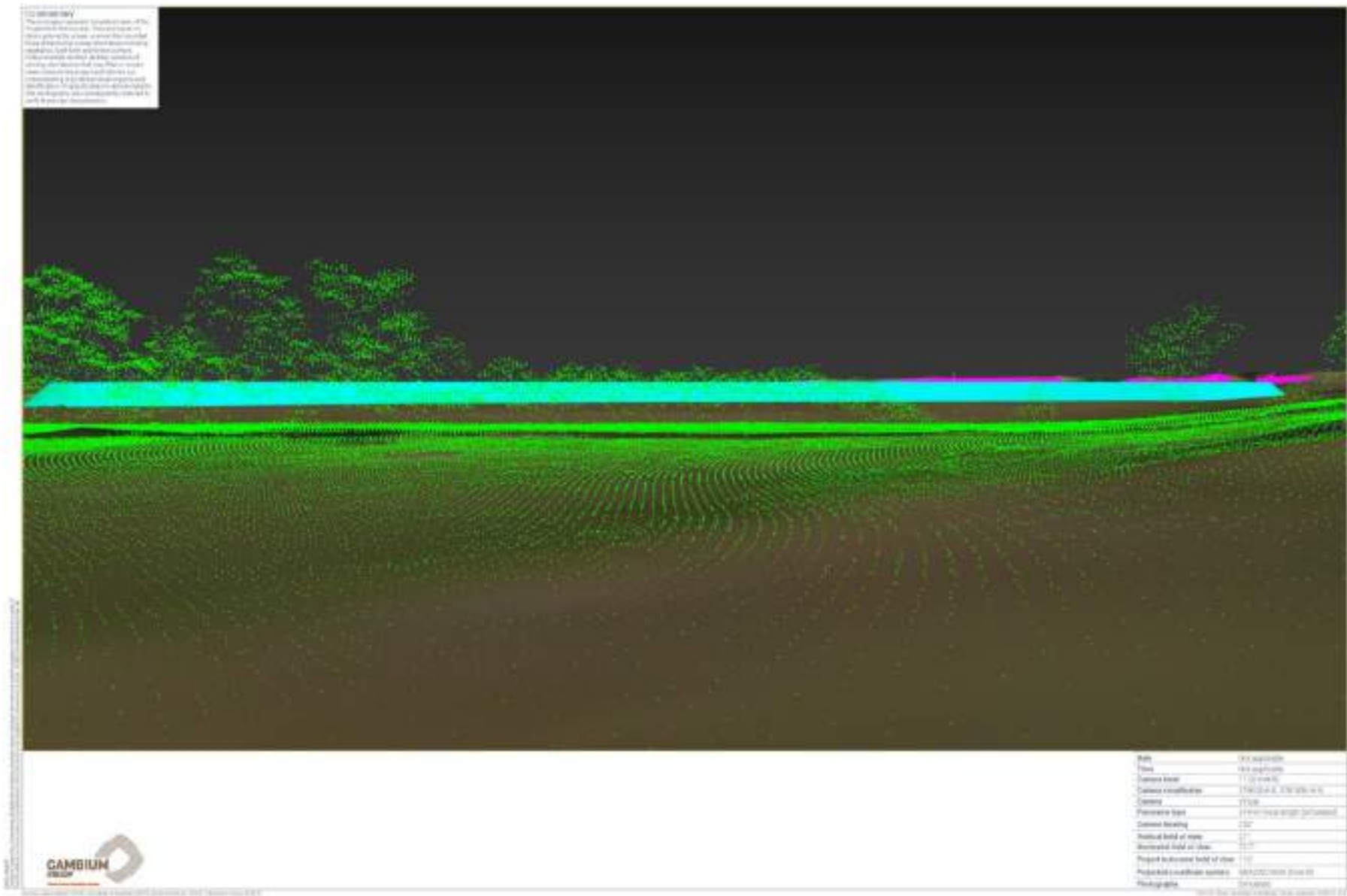


Figure 12 VP4 - Simulated LiDAR view (Project incl. overburden emplacement) (24mm focal length)

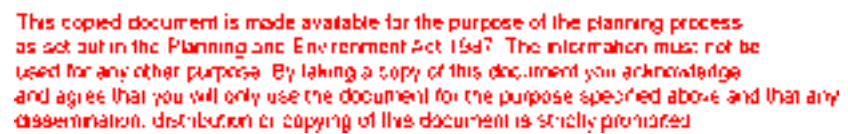


Figure 13 VP4 - Simulated view (Project) (24mm focal length)



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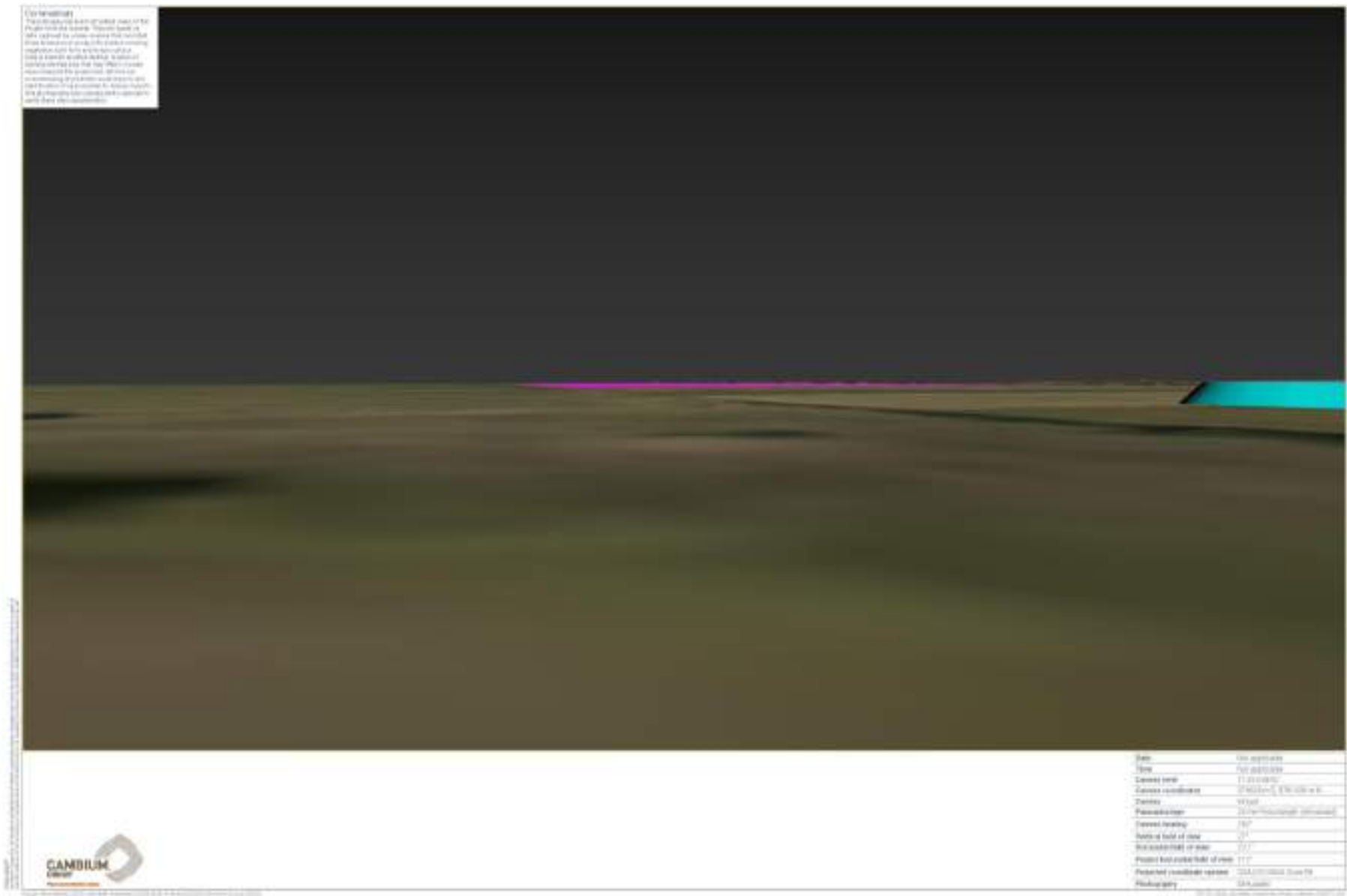
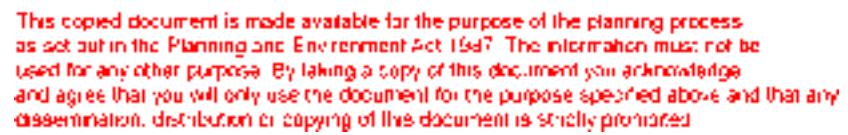
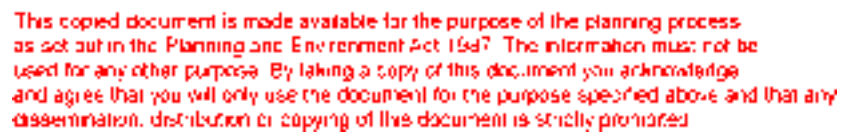


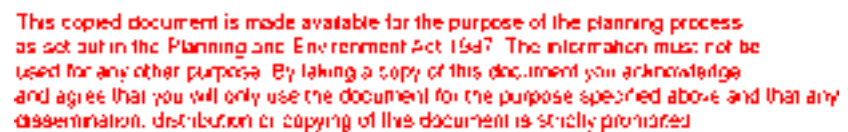
Figure 14 VP4 - Simulated view (Project + overburden emplacement) (24mm focal length)



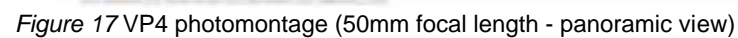
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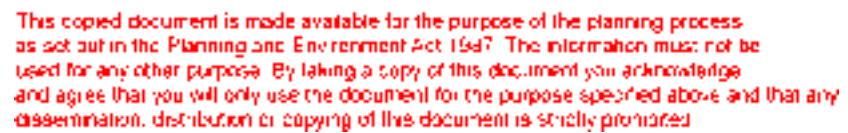


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Figure 18 VP4 photomontage (50mm focal length - single frame)



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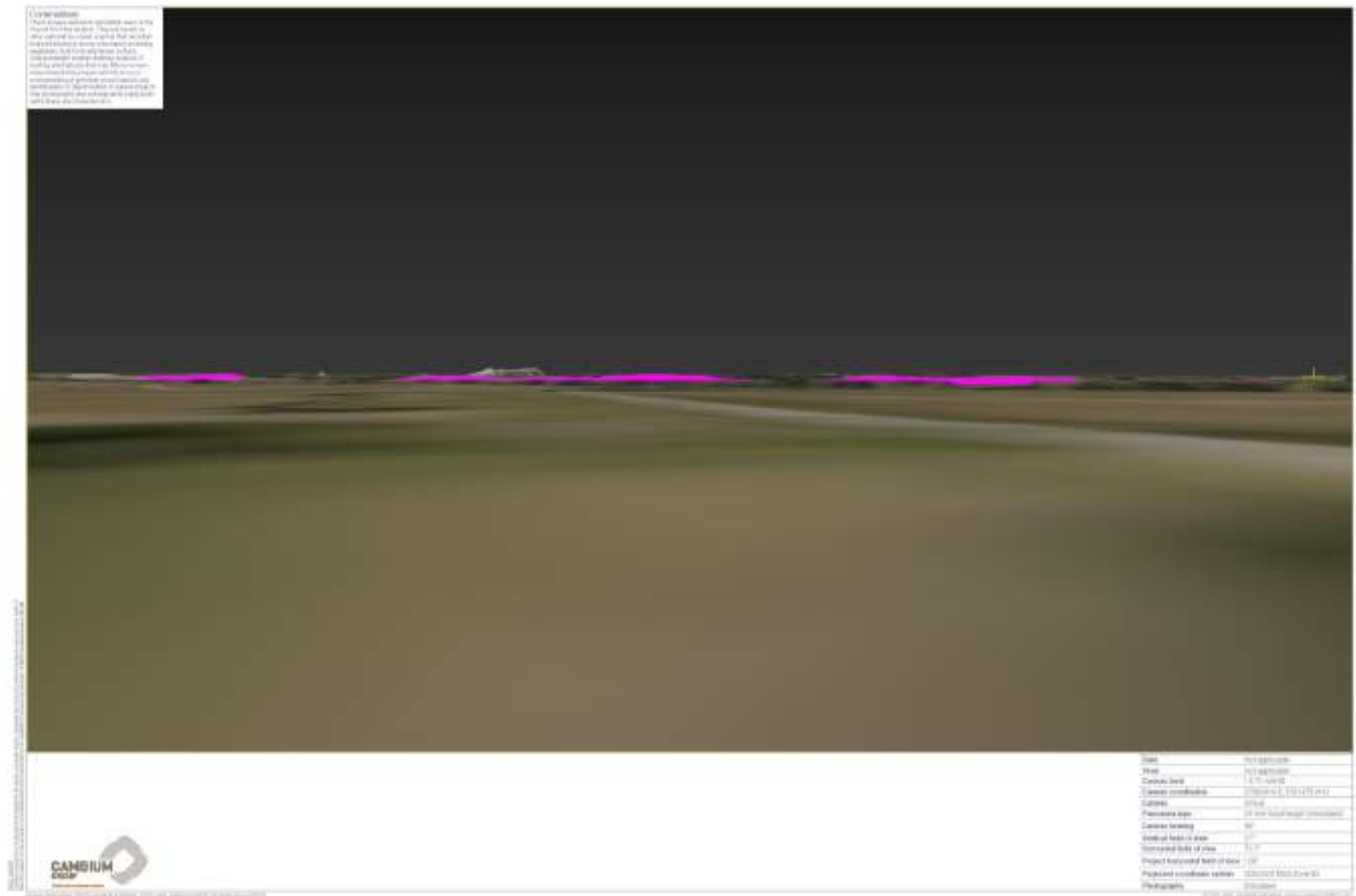
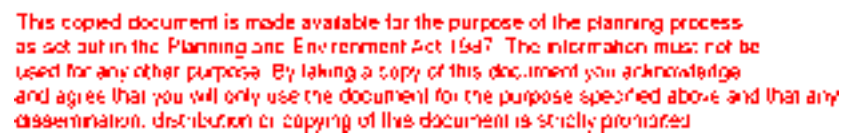


Figure 20 VP8 - Simulated view (Project) (24mm focal length)



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Figure 22 VP8 - Simulated view (Project) (24mm focal length)



4.0 Impact Assessment

The visual impact assessment deals with potential effects on visual resources from changes in the composition and quality of views, people's response to likely changes and the overall effect on visual amenity. This impact assessment has been based on the criteria of the sensitivity of receptors, duration of impacts, nature and magnitude of impacts and the overall significance of impacts.

As a result of the baseline assessment and subsequent modelling, one representative viewpoint within the affected areas was identified for more detailed analysis and visual simulations. The photo simulations are based on surveyed photo locations and standardised photo techniques that describe the actual effect of the Proposal on the subject location.

One surveyed photo simulation undertaken (for R4).

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4.1 Method for visual impact assessment

Impact assessment has been based on the criteria of sensitivity of key visual receptors (viewers), the nature and magnitude of impacts, the likely duration of impacts and the overall significance of impacts. As there is already approved importation and blending operations at the site which forms a baseline, the duration of impacts primarily refers to the cumulative impact of both existing and proposed additional works.

Perception of Change

In determining the magnitude of landscape change, the following factors of landscape character will be considered. These findings, model visual change (in isolation), they are not definitive measures of how people might feel about those changes (likely perceptions of visual impacts or the personal values that may be attached to those changes in the viewed landscape by individuals.) The model focuses on physical features and does not consider elements such as cultural meaning and the manner in which the receptor views the landscape

Table 3 Principles of landscape character assessment

Principles	Definitions
Visibility	The magnitude of visual impact is at least partly determined by the nature of that view and whether it is moving or static.
Method of Perception	These fields of vision indicate a field of view and visual 'recognition' but in isolation, are not meaningful measures of scenic perception. The process of recognising and observing an object or scene (Dynamic Visual Acuity) is complex and involves constant scanning of the seen area, recognition and refocussing within the field of view; a process that is modified (narrowed and simplified) by viewer movement, the speed of movement of the viewer and secondary activities such as driving, but enhanced by colour contrasts, illumination, proximity, size, shape, symbol recognition based on expectation and other factors.
Field of view	Horizontal line of sight: The normal binocular field of vision (horizontal line of sight / width of view) is considered to be 124 degrees. Within the binocular field of vision the viewer has depth perception. Either side of the binocular field is a monocular field of 42 degrees for each eye (peripheral vision) which provides the viewer with awareness of movement speed and locational cues. Within the binocular field is a central foveal field (zone of visual acuity) of 2.5 degrees where viewed objects are sharply fixed and in detailed focus. Vertical line of sight: the normal vertical field of view is considered to be 120 degrees with the limit of colour discrimination at 55 degrees.
Occupied view area	The nature and magnitude of the visual impact is likely to have a proportional relationship to the percentage of the available view taken up by development infrastructure, new activities or landscape interventions. Objects may be visible, but not dominant, particularly when they occur within landscapes that have been modified by human activity and where the context and complexity of the natural landscape has been significantly altered. A spread of built elements or landscape changes across a wide view or several viewable areas is likely to result in a perception of greater overall visual impact than a similar number of built elements within a more confined viewable area. Horizontal field of view: as a general guide only, a visual element of less than 5° of a field of view may be considered insignificant, depending on the nature of background visual contrasts and the movement of the viewer. Vertical field of view: as a general guide only, less than 0.5° of a field of view may be considered insignificant, depending on the nature of background visual contrasts and the movement of the viewer.
Speed of movement	As the speed of movement increases, viewer concentration on a fixed area increases and peripheral vision diminishes, effectively shrinking the visual field. Foreground detail begins to fade.



Principles	Definitions
Relative elevation	Objects viewed against a skyline silhouette or at the edge of a break in slope are likely to have a greater visual impact than objects or changes viewed from a location where features are viewed against a land backdrop. Colour contrasts may modify this outcome.
Size, colour and form	The greater proportion of a view occupied by new features or activities the greater the impact. Contrasting colours and forms increase the relative impact of change.
Illumination	Luminance contrast increases the visual definition of the shape, size and location of objects and potentially changes the context in which objects are re viewed. Lighting colour and movement increase the potential level of contrast.
Activity	Movement of objects, including vehicles and light reflection changing with movement will increase impact.
Complexity	Changes to a visually complex field of view with elements of varying scales and form are likely to result in lower impacts than changes to a relatively uniform field of view.
Context	The extent to which the proposed development is in character with the land use and landscape character of the site will affect the perceived level of impact.
Weather conditions	Overall clarity of the view, the angle of the sun and the degree to which skyline silhouettes are masked by clouds etc will affect visibility.
Change	The degree of change in the view and the process of change will affect the degree of impact on the viewer.
Familiarity	Changes to a familiar visual setting or where the viewer interacts with the setting is likely to have a relatively greater impact on the viewer than changes to a setting that is rarely seen or poorly understood.
Cultural context	Changes to a visual setting with significant cultural value or purpose is likely to have a relatively greater impact on the viewer than what may be considered a 'generic' landscape setting with no specific value.
Individual context	Perception of a visual impact or visual improvement within a landscape is likely to differ between communities, cultural groups and among individuals. Personal context and values strongly influence the manner in which visual effects are valued.
Distance	The greater the viewing distance, the less detail is observable and the more difficult it is to distinguish between the site or object and its background, diminishing the impact. Distance is an important factor in assessing the magnitude of change and overall impacts. Other potential aspects of change include scale, proportion, size, height, massing, colour, texture, finish, permanence.

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Table 4 Nature and magnitude of impacts

Nature of Impact	Magnitude of Impact	Definitions — Visual Impacts on Landscape	Definitions — Visual Impacts on Receptors
Major Adverse	High (6)	<ul style="list-style-type: none"> Total or substantial alteration to key features of the baseline conditions Effects are at considerable variance with the landform, scale and pattern of the landscape and cannot be substantially mitigated. Would cause a high quality or designated landscape to be substantially changed and its quality and values diminished. 	<ul style="list-style-type: none"> Total or substantial alteration to key features of the baseline conditions. The proposal forms a significant and dominant part of a view of high scenic quality. Other scenic elements become subordinate and diminished in value. The valued scenic character of the site is markedly changed. Sensitive visual receptors are adversely affected by the change.
Moderate Adverse	Moderate (5)	<ul style="list-style-type: none"> Would be noticeably out of scale with the landscape and clearly at variance with key landscape attributes identified within the baseline conditions. Will leave an adverse impact on a landscape of recognised quality 	<ul style="list-style-type: none"> The proposal forms a clearly visible and recognisable new element within the overall scene that is readily noticed by the receptor. The scenic character and quality of the site is diminished.
Minor Adverse	Low (4)	<ul style="list-style-type: none"> Will have an apparent but not obvious or dominant effect on an area of recognised landscape character or its key attributes. 	<ul style="list-style-type: none"> The proposal constitutes a discernible but minor component of the wider view. Awareness of the element will have a negative but not a marked effect on overall scenic quality.
Neutral Impact	Negligible (3)	<ul style="list-style-type: none"> Only a very slight change to baseline conditions and maintains existing landscape character and quality. New features complement the scale, landform and pattern of the site landscape and its broader setting 	<ul style="list-style-type: none"> No part of the development proposal or associated activity is visually discernible. The activity or feature is visible but has an insignificant effect on the perceived values or scenic quality of the setting
Minor Beneficial	Negligible (2)	<ul style="list-style-type: none"> Likely to enable the restoration of valued landscape characteristics or features lost or diminished through existing land use activities. Potential to contribute to the development of a new and higher quality landscape character. 	<ul style="list-style-type: none"> The proposal fits comfortably within the existing visual landscape The proposal helps to articulate existing visual character and amenity values Potential for the proposed development to contribute to the development of a new and higher value visual character.
Moderate / Major Beneficial	Negligible (1)	<ul style="list-style-type: none"> Fits comfortably within the existing landscape character and clearly contributes to the development of higher landscape values. Results in a significant improvement to the quality of the landscape through the rehabilitation of damaged areas or the removal of features or activities that have a negative impact on landscape values. Results in a distinctive landscape feature that has the potential to add new values to the landscape without diminishing existing valued landscape characteristics. 	<ul style="list-style-type: none"> Fits comfortably within the existing landscape character and clearly contributes to the development of higher landscape values. Results in a significant improvement to the visual quality of the landscape through the rehabilitation of damaged areas or the removal of features or activities that have a negative impact on scenic values. Results in a distinctive landscape feature that has the potential to add new visual or tourism values to the landscape without diminishing existing valued visual characteristics.

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Impact **duration** is defined as outlined in **Table 5**.

Table 5 Impact duration

Duration	Definitions
Short Term	Project construction and establishment phase (<3 years)
Medium Term	Early project operational phase (3 – 10 years)
Long Term	Within projected operational phase (10 – 25 years)
Permanent	Beyond projected operational phase (25 years +)
Reversible	Physical potential for full rehabilitation to original baseline condition within feasible cost parameters and land use objectives To be specified within the decommissioning management plan
Irreversible	Permanent physical change to the baseline condition Beyond feasible cost parameters and land use objectives Specified for retention in the Decommissioning Management Plan

Impact **significance** is defined as outlined in **Table 6**.

Table 6 Impact significance

Significance	Definitions
Significance Ratings	Reflect an assessment of the importance of the predicted impact and also indicate mitigation priorities.
Impact Significance	Is derived from combining the magnitude of landscape and visual change with sensitivity of the receptor
Significance Values	Are expressed as three levels (represented by shading).
Rating Combinations	A number of 'moderate' rating factors may collectively represent a relatively 'high' degree of change to a receptor (cumulative impact) and therefore mitigation measures may need to be considered for more than 'high significance' rated impacts.
Ratings	Are made against the Baseline Condition.

		Low	Moderate	High
Magnitude of Change	High	Moderate	High	High
	Moderate	Moderate	Moderate	High
	Low	Low	Moderate	Moderate
	Negligible	Low	Low	Low
		Sensitivity (Landscape / Viewers)		

Figure 24 Magnitude and Sensitivity Impact with related significance rating

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4.2 Visual impact assessment

The visual impact assessment is based on a combination of views that represent:

- Areas of likely sensitivity based on the type of visual receptor
- Different types and angles of view

Table 7 Visual impact assessment

Viewpoint	Description of likely impacts	Receptor Sensitivity	Nature of Magnitude of Change	Duration	Significance Rating	Mitigation Measures / Recommendations
Receptor 1 (R1) – Rural Residential Property off Kettles Road	<ul style="list-style-type: none">• The receptor is located approximately 255m north-west of the proposed quarry.• Modelling indicates that there are no views of the existing operation.• The north-east edge of the proposed quarry has the highest potential level of visibility.• Foreground vegetation, shelterbelt plantations and farm developments within the receptor property boundary have the potential to block views and provide a more complex visual field that reduces visual awareness of landscape features at the site.• Existing vegetation is highly likely to eliminate views from this viewpoint. <p>Baseline (existing) condition</p> <ul style="list-style-type: none">• There is no view of existing operations from this location. Operations are screened by existing landform and vegetation.• No operational activity, including processing or truck movements are evident. <p>Proposed future condition</p> <ul style="list-style-type: none">• Modelling indicates that there will be no views of the quarry formation due to foreground landform and vegetation. The project is not visible as per <i>Figure 8</i> of the visual analysis.• There is no change to skyline.	Low / Moderate	Neutral Negligible (3)	Long Term	Low	<ul style="list-style-type: none">• Maintain boundary vegetation



Viewpoint	Description of likely impacts	Receptor Sensitivity	Nature of Magnitude of Change	Duration	Significance Rating	Mitigation Measures / Recommendations
Receptor 4 (R4) – Rural Residential Property off McDonalds Track	<ul style="list-style-type: none">The location is approximately 250m east of the proposed quarry.People viewing the landscape from this location would be the residents of the property.The eastern boundary of the northern pit of the proposed quarry has the highest potential level of visibilityOverburden screening is likely to mitigate views from this viewpoint. <p>Baseline (existing) condition</p> <ul style="list-style-type: none">There is a small view of existing operations on site (sand storage). This appears as a very slight colour contrast (beige) 'layer' within the overall grassy landform that surrounds the site.No operational activity, including processing or truck movements are evident.The visual effects of distance results in minimal colour contrasts and no awareness of movement or on-site activities. <p>Proposed future condition</p> <ul style="list-style-type: none">Modelling indicates that the visible extent of the upper layer of the quarry will extend to the north and slightly to the south.There is no proposed change to skyline.Modelling indicates that overburden bund effectively eliminates views of the proposed quarry pit and any operations from this location. There will be a view of the overburden bund from this location which will be vegetated.Modelling indicates that vegetating the overburden screening bund mitigates the visual impact of overburden. This change will therefore be seen as a small colour contrast in an otherwise vegetated landscape.	Low / Moderate	Low Minor Adverse	Long Term Reversible	Moderate	<ul style="list-style-type: none">Overburden will be used to create screening as a priority to reduce visual impacts on receptors.Overburden will be vegetated with grasses to reduce visual impact of the overburden.Maintaining a vegetated 'skyline' and unchanged skyline landform.



Viewpoint	Description of likely impacts	Receptor Sensitivity	Nature of Magnitude of Change	Duration	Significance Rating	Mitigation Measures / Recommendations
Receptor 8 (R8) – Rural Residential Property off Duberkes Road	<ul style="list-style-type: none"> The location of the property is approximately 352m from the visible edge of the proposed extraction area to the west of the site. Modelling indicates that there are no views of the existing operation This receptor location has a marginally higher viewing potential than Receptor 1. <p>Baseline (existing) condition</p> <ul style="list-style-type: none"> There is no view of existing operations from this location. The existing operation is screened by existing landform and vegetation. <p>Proposed future condition</p> <ul style="list-style-type: none"> There is no view of the proposed operation from this location. The proposed development is screened by existing vegetation. If vegetation was entirely removed then modelling indicates that there would potentially be an isolated view of a small colour contrast on the horizon. The project is not visible as per <i>Figure 21-23</i> of the visual analysis. There is no change to skyline. 	Low / Moderate	Neutral Negligible (3)	Long Term Reversible	Low	<ul style="list-style-type: none"> Vegetation screening on the south-western edges of the proposed northern pit will effectively mitigate or eliminate the visual effect of quarry activity. Planting has occurred recently, and vegetation is growing. Additional planting will occur to replace any vegetation with low survival rates. Retain vegetation along western site boundary.

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The proposed site rehabilitation process is described in the Rehabilitation Plan (Briar, 2025).

The rehabilitation plan is presented in **Figure 25**. As a result of progressive rehabilitation and regrowth of vegetation on worked areas, noticeable changes to the site's landform or vegetation are expected to be minimal to negligible.

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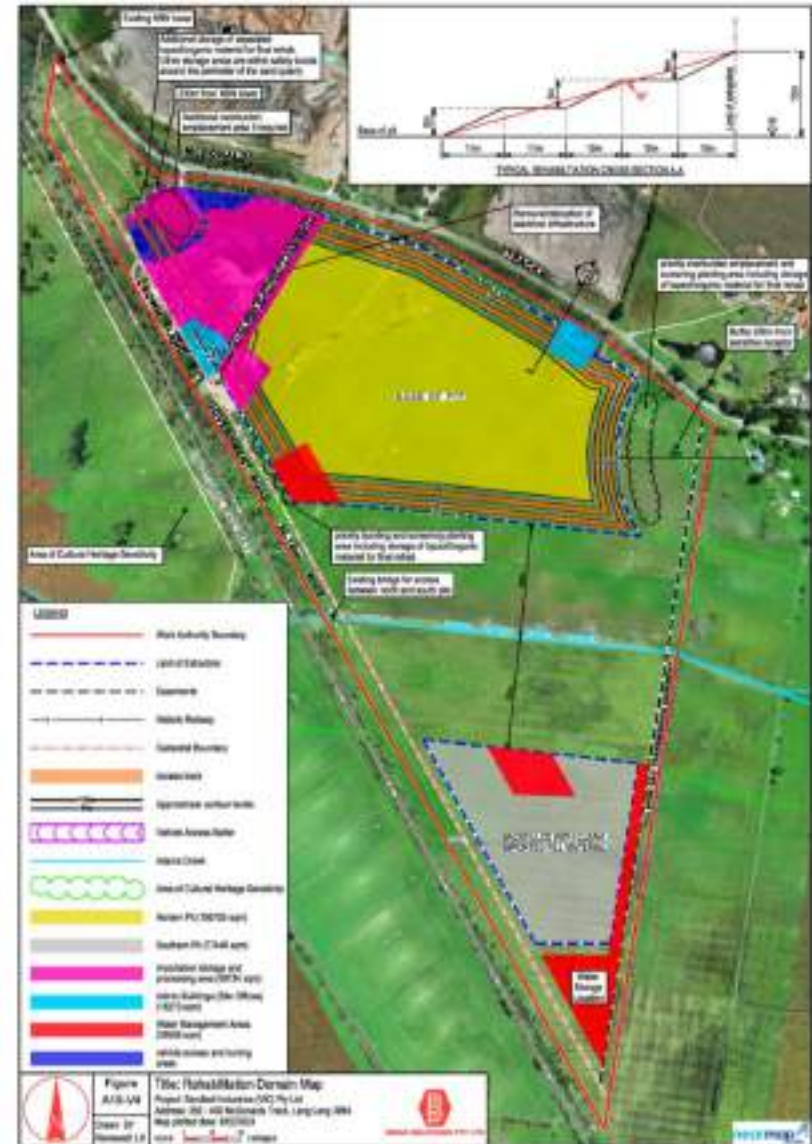


Figure 25 Rehabilitation Domain Map



6.0 Evaluation

6.1 Evaluation

Views of the site from McDonalds Track are currently limited due to distance, landform and existing screening roadside vegetation. However, intermittent glimpses of activity (e.g. vehicles) may be possible from some elevated or open sections of the road, during early works (at surface).

To minimise any potential visual intrusion from McDonalds Track, screening measures are proposed along the site boundary, including targeted planting of native vegetation and maintenance of existing vegetation buffers. These measures will help soften the appearance of operations and assist in integrating the site into the broader rural landscape. Screening will not only reduce potential impacts on visual amenity but will also support positive relationships with nearby residents and road users.

Baseline (existing) conditions

- The subject site comprises existing importation and blending operations.
- The surrounding context includes a range of extractive activities (larger scale than this proposal).
- The existing operations are partly visible from nearby locations (McDonalds Track) to the north, but the seen area is relatively small and only seen as a minor colour change in the landscape. The Lang Lang landform skyline is not affected by operations.
- Other existing landscape features such as industrial uses, power transmission infrastructure and farming development are components of the view and reinforce the perception that this is a working landscape, not an undisturbed natural landscape.
- There are no views of the existing operations from the west or south.
- Existing visual impacts are substantially mitigated by factors including the nature of the view receptor (largely drivers driving at speed), the viewing distance, atmospheric conditions and vegetation at or near the view-point.

- The current operation has a relatively low impact on the landscape character and scenic quality of the setting.

New (future) conditions

- Views from the west (R1 and R8) will continue to be blocked by foreground landforms and vegetation. Any potential visual impacts from the western receptors will likely be fully mitigated in the medium to long term as a result of vegetation growth close to the view points.
- Views from the east (R4) will include a view of vegetated screening (vegetated overburden). The change is considered to provide a 'low / adverse' impact on the view quality, but the significance of the change is considered to be low, as a result of vegetated screening that will substantially mitigate the visual changes resulting from the proposed quarry.
- The landform skyline will not be affected by the proposed quarrying operations.
- Intermittent glimpses of site activity from some elevated or open sections of McDonalds Track, from road users, will be minimised through screening measures along the site boundary, including targeted planting of native vegetation and maintenance of existing vegetation buffers.
- Over the long term, progressive rehabilitation will eliminate the duration of visual changes resulting from the proposed quarry from the three sensitive receptors and from road users of McDonalds Track.

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Significant Landscape Overlay – Objectives

To protect and enhance the environmental and landscape values of the Lang Lang/Heath Hill area.

- The landscape and visual effects resulting from the proposed quarry works will not change the fundamental visual character and scenic quality of the landscape.

To protect, conserve and improve habitat for flora and fauna which contributes to the significance of the landscape and provides fauna habitat and biolinks.

- The vegetation quality of the grazed areas of the site is currently low and is dominated by weedy pasture species. The proposal will have no significant impact on the habitat for flora and fauna or the listed species. Rehabilitation will ensure the site is revegetated with appropriate vegetation with correct EVC plant species (landscape plan to be submitted to Melbourne Water for approval before landscape works commence)

To ensure that any new buildings and works are located and designed to avoid detrimental effects on the key characteristics of the landscape.

- Changes to the views and scenic quality resulting from the works are considered to be Low and not dominant.
- Site rehabilitation is described within the application as approved in principle by ERR, including early rehabilitation of each stage of the pits, including those areas that are visible from receptors 4 and 8.

To maintain and protect vegetation as an important element within the landscape.

- There is no interaction with native vegetation. Rehabilitation works will be consistent with indigenous landscape qualities. Revegetation of the site will only include appropriate vegetation including correct Ecological Vegetation Class(s) (EVC) and plant species being Grassy Woodland, Swampy Riparian Woodland, Swampy Scrubs and Woodland.

To protect and enhance the open character, contrast and scenic quality of the landscape.

- The character, contrast and scenic quality of the landscape are not changed by the proposed works.

Visual amenity impacts - conclusion

- Overall, the LVIA assessment suggests that the effects associated with proposed works are low level and compatible with the nature of the Lang Lang setting and the Significant Landscape Overlay objectives.
- Although the level of impact is considered low, additional mitigation measures are still proposed. These include visual screening of operations, which not only helps reduce any residual visual impacts but also contributes to maintaining positive relationships with surrounding residents and the broader community.

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6.2 Conclusion

- The proposed quarry maintains the existing pattern of viewing and the nature of those views, although the size of operations (being the length of quarry operations) will increase from the eastern sensitive receptor (R4).
- Views from R4 located to the west of the site (the closest viewpoint) will be changed as a result of the quarry proposal, but the change will be small scale and easily mitigated, and entirely screening in the short term through vegetated screening. The change in scenic quality is considered to be minor and reversible in the short term.
- The viewing distances from R1 and R8, located to the east of the site and the nature of the foreground landscapes are major mitigating factors, and on that basis, the change in scenic quality from those receptors is negligible.
- On the basis of the analysis, the proposed change is considered acceptable from a visual impact perspective.
- The proposal is considered to meet the objectives and decision guidelines of the Significant Landscape Overlay.

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Sandbelt Industries – Lang Lang COMMUNITY ENGAGEMENT PLAN

*Mineral Resources (Sustainable Development) Act
1990*

Tenement Number: **WA006967**

Plan No:

Signed:

Delegated:

Date: **15/01/2025**

**WA 6967
PLN-001245**

December 2022



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Version Control and Approval

Version No.	Prepared	Reviewed	Approved	Date	Description	Next Revision
0	[REDACTED] (Officer)	[REDACTED] (Administrative Manager)	[REDACTED] (CEO)	Dec 2022	Initial Plan	~2027

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1. CEO or Company Representative Statement

We are committed to utilising the latest technology to improve site safety and reducing our carbon footprint and through the use of electronic invoicing we have seen a significant reduction in waste use.

We value our relationships with our clients, the local community, residents, Cardinia Council and regulators. Sandbelt Industries is committed to:

- Meeting **environmental, cultural and economic values** of the local area.
- Preserving **local native flora and fauna**, by avoiding habitat wherever possible.
- Complying with all state and commonwealth **environmental and cultural heritage** legislation.
- Adopting the EPA waste hierarchy, **promoting reuse and recycling**.
- Engaging with **local labour, contractors and material providers** where possible.
- Engaging with **local residents, by hosting Community Engagement Meetings** to discuss their concerns to find mutually beneficial solutions and outside of regular meetings, maintain an **open-door policy** with local residents so timely responses can be implemented.
- Maintaining positive **relationships with the local community**, Cardinia Council, Earth Resources Regulation, Environment Protection Authority and the Department of Environment, Land, Water and Planning.
- **Rehabilitating the quarry site** at the end of project in a way that contributes to the local community and environmental values of the area.

We are excited by the opportunity to expand our small-scale quarrying operations. We look forward to meeting community and regulator expectations and playing a positive role in the Lang Lang community.

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2. Introduction

Who are we?

Sandbelt Industries is a **family- owned and family-run company** that commenced as a garden supply business located in Somerville over 30 years ago. Sandbelt Industries (VIC) Pty Ltd has been supplying quality raw materials to the turf, building and construction industries since 1985. Our long-standing establishment, over the years, has developed a passionate work ethic, extensive product knowledge and robust partnership frameworks.

Our Practices

Through our 37 years of service, we have developed quality products and practices that are underpinned by client satisfaction, product adaptability, safety and environmental sustainability.

Operating out of Lang Lang and we seek to support the local community through the operation of our business. Where possible we seek to purchase from and support local vendors, maintaining deep ties with the community.

Sandbelt Industries' Lang Lang has been an importation and blending operation for many years. The current site operates under existing consents to undertake activities of importing material, blending and processing, then transporting material to customers around Victoria. The site produces quality construction materials for the specialty turf, building, construction and landscaping industries. The site primarily produces high quality sand for recreational purposes such as sports playing fields, golf courses, horse arenas and racing tracks.



Figure 1 Sandbelt Industries site operations

3. Site description

The site comprises of three land parcels that are collectively known as 350 McDonalds Track, Lang Lang. The formal parcels of land are described as:

- Lot 1 PS817451,
- Lot 2 PS817451, and
- Crown Land known as 'Unreserved Crown Land - Unused Road Southwest of Lot 2 PS817451, Parish of Lang Lang'.

The work authority incorporates all three land parcels; however the limit of extraction is limited to only Lot 1 and Lot 2 PS817451 as shown on Attachment A.

The surrounding community

The area surrounding the site can be characterised as agricultural farming area on the southwest, and immediately east. Extractive operations surround the north of the site and extend to the far east of the site. A cemetery is also located directly north of the site, on the opposing side of McDonalds Track.

The neighbouring properties surrounding the site are rural residential neighbours, the cemetery and a quarry.

- A Work Authority Map is included in Attachment A.
- A Locality Map is included in Attachment B.
- A Regional Aerial Map is included in Attachment C.
- A Sensitive Receptor Map is included in Attachment D.
- Attachment E shows nearby work authorities held by other extractive industry operators.

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4. Background

The site

Engagement with stakeholder's have primarily been focused on updates and sharing of information at times where there is a change at the site. For example, notification to neighbours as part of a planning permit application process. In recent years consultation has been restricted to letter mail outs due to COVID-19 restrictions and health advice.

Sandbelt Industries purchased the current site in April 2019. Community engagement activities since this time included the following:

Date	Communication type	Description
24 Sept 2019	Site Meeting	Site Meeting with ERR and all other regulators occurred to discuss the proposed extractive operation and impacts/issues that needed to be addressed in a proposed works plan.
Sept 2020	Letters to mapped stakeholders	Introduction letters sent to all neighbouring properties communicating who we are, what we do and an invitation to share any concerns with us.
18 Oct 2021	Emails	Consent from gas authority approving extraction adjacent to gas easement
Jan 2022	Letters and emails	Landowner Consent obtained to include unreserved Crown Land within Work Authority
July 2022	Letters to mapped stakeholders	Letters sent to all neighbouring properties about Work Authority and an invitation for further contact.
Sept 2022	Letters to neighbouring stakeholders	Letters sent to two neighbouring stakeholders asking to meet and discuss future plans for the site – a response timeframe was included to encourage feedback.
19 Oct 2022	In-Person Meeting	<p>Following the Sept 2022 correspondence, a meeting occurred with the two neighbouring stakeholders to discuss Work Authority and approval process, establish clear communication lines, and provide transparency on the plans for the site. Feedback from the neighbour resident included:</p> <p>Queries regarding impacts on groundwater quality which were addressed and reassured i.e. the operation is a dry operation (no dredging which occurs at nearby operations). There was discussion about an approved bore (to be built) at 60m depth which will not impact the shallower aquifer local bores used.</p>

The site is a relatively small operation (~100,000t pa). Stakeholder engagement is expected to increase as activities onsite increase, as described in detail later in this document.

To date, consultation with nearby stakeholders has been difficult due to the COVID pandemic. Sandbelt Industries have made various attempts to proactively reach out to stakeholders and to offer consultation methods in line with the state government health advice.

5. Legislative framework

This community engagement plan has been prepared in order to meet the legislative requirements set out in the *Mineral Resources (Sustainable Development) Act 1990* and associated regulations.

Legislative framework - extractives

Mineral Resources (Sustainable Development) Act 1990

Section 77G(3)(e) – Community Engagement Plan for a new work plan

Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2019

Regulation 12 – for the purposes of regulation 7(e) the specified information is information that –

- a) identifies the community likely to be affected by the quarry operations; and
- b) sets out how the extractive industry authority holder will -
 - (i) identify community attitudes and expectations; and
 - (ii) share information to the community; and
 - (iii) receive feedback from the community; and
 - (iv) analyse community feedback and consider community concerns or expectations; and
- c) register, document and respond to complaints and other communications from members of the community in relation to the quarry operations.

Legislative framework - minerals

Mineral Resources (Sustainable Development) Act 1990

Section 40(3)(d) –Community Engagement Plan for a new work plan

Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2019

Proposed Part 3, Division 6, Regulation 46 Information required in work plans – community consultation

For the purposes of regulation 40(c), the specified information is how the licensee will comply with their duty to consult with the community under section 39A of the Act throughout the period of the licence, in the form of a plan that—

- a) identifies the community likely to be affected by the work under the licence; and
- b) sets out how the licensee will share information with the community; and
- c) sets out how the licensee will receive feedback from the community; and
- d) sets out how the licensee will manage complaints and other communications from members of the community; and
- e) in the case of a work plan for a mining licence that covers an area of more than 5 hectares, sets out how the licensee will—
 - (i) identify community attitudes and expectations;
 - (ii) analyse community feedback, taking into account community concerns or expectations; and
 - (iii) register, document and respond to complaints and other communications from members of the community in relation to the mine operations

Regulation 48(g) the prescribed information required for variation of the workplan, is the proposed changes to the information, if the variation includes or gives rise to any changes relating to community consultation

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6. Aims and Objectives

Aims

The aims of this plan are to:

- Build and maintain stakeholder relationships of mutual respect and trust.
- Maintain a social licence to operate within the community.
- Manage risk proactively.
- Work in partnership with stakeholders.
- Ensure value for money pertaining to social investments.

Objectives

The objectives of this plan are to:

- Manage expectations of the site operations through accurate and timely communication, tailored to the needs of each stakeholder.
- Build stakeholder and community trust through engagement and education.
- Anticipate and manage potential issues to prevent escalation in the public domain.
- Positively position the project and its importance to the region and regional community.
- Select key initiatives that align with the company values and will provide the greatest outcomes with per \$/resource input.

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7. Stakeholder and issues analysis

Table 1 identifies stakeholders, their likely interest or concern in the operations and controls that respond to those concerns/interests. Controls may be adapted to respond to new expectations or attitudes as they arise.

Table 1 Stakeholder issues analysis

Stakeholder	Issues or concerns	Impact Level	Controls
Melbourne Water	Responsible for agricultural drain traversing site (known as Adams Creek North Branch)	Medium	<p>Extraction avoids Melbourne Water Drain.</p> <p>Access provided to Melbourne Water to undertake maintenance of drain.</p> <p>Floodwater catchment systems to ensure the extraction doesn't increase existing surface water flow impacts.</p> <p>Floodwaters kept separate from operational waters and directed to the Melbourne Water Drain.</p>
DEWLP Crown Land	The unreserved Crown Land, and historic railway	Medium	<p>Obtain landowner consent/licence to include areas in Work Authority while progressing purchase of unreserved Crown Land.</p> <p>Undertake activities in accordance with landowner consent/licence.</p>
Utilities (Electrical)	Electrical transmission infrastructure & easement (to relocate)	Medium	Relocation (in due course) of electrical transmission lines in accordance with regulator requirements.
Utilities (NBN & Gas)	Existing infrastructure (to remain)	Medium	Extraction footprint avoids infrastructure.
Immediately adjacent landowners to the west (numbered 1 on the Stakeholder Map)	Noise and dust	Medium	<p>Noise attenuation bunding/planting between processing area and sensitive receptor.</p> <p>Water suppression via sprinklers or water carts.</p> <p>Reduced speed limits.</p>

Immediately adjacent landowners to the east (numbered 2-5 inclusive on the Stakeholder Map)	Noise and dust	Medium	<p>Maintaining 250m bufferzone between extraction and #4 Stakeholder.</p> <p>Noise attenuation bunding/planting between processing area and sensitive receptor.</p> <p>Water suppression via sprinklers or water carts.</p> <p>Reduced speed limits.</p>
Immediately adjacent landowners (agricultural uses)	Agricultural groundwater access (existing bores)	Low	<p>No dewatering activity as part of the quarrying operations.</p> <p>Establishing a groundwater monitoring program once extraction >10m below surface level</p> <p>An approved bore (to be built) at 60m depth which will not impact the shallower aquifer local bores used</p>
Immediately adjacent to the east (numbered 4 & 5 on the Stakeholder Map)	Flooding/surface water flows	Low	<p>Floodwater catchment systems to ensure the extraction doesn't increase existing surface water flow impacts.</p> <p>Floodwaters kept separate from operational waters and directed to the Melbourne Water Drain.</p>
Surrounding land users	Visual impacts	Low	<p>Retention of trees along McDonalds Track for visual screening.</p> <p>Perimeter bunding/planting prioritised to areas to minimise visual (and dust and noise impacts).</p>
Surrounding land users, particularly extractive industry operators	Traffic movement on McDonalds Track	Low	<p>Limiting traffic movements to occur within opening hours.</p> <p>Safe access points from site onto McDonalds Track.</p>
Registered Aboriginal Party - Bunurong Land Council	The Registered Aboriginal Party is the recognised body to speak for cultural heritage of land that has	Low (due to past significant disturbance of land, and construction/m	Maintain records of past significant disturbance.

Aboriginal Corporation	not been significantly disturbed.	aintenance of agricultural drain)	
Council	Road safety (increased traffic resulting from material transporting from site)	Low	Safe access points from site onto McDonalds Track. Additional signage as required.

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8. Communication

Expectation and attitudes

Table 1 analyses stakeholders, their likely issues/concern with the site, and controls to alleviate those concerns. Section 3 of this document describes the surrounding community. The general expectation or attitudes of the surrounding community are:

- Enjoyment of private property.
- Successful businesses (whether agricultural, extractive or other).
- Quality of life is to be maintained.
- Ongoing agricultural water supply from bores (related to offsite dewatering practices by a separate party).

Engagement Activities

Engagement activities are an opportunity to share information and knowledge about the site, and the operations. They also provide an opportunity for community to provide valuable feedback. Some engagement activities lend themselves to fostering feedback better than others. Table 2 below provides a list of engagement tools that will be utilised, and identifies if there is a feedback opportunity using that engagement method.

At the time of drafting this document COVID-19 pandemic is restricting engagement activities. Engagement activities will be undertaken in accordance with public health advice and may be ceased and/or adapted to meet public health requirements.

Table 2 Receiving feedback via engagement activities

Engagement tool/method	Receiving Feedback	Trigger for engagement method to be used
Community Newsletters / Letter box drop	Yes – contact details will be included on each newsletter with an option for community to make contact or provide feedback	Annually while throughput is <100,000 tpa.
		6 monthly while throughput is >100,000 tpa
		If there is a change to operations requiring regulatory amendments.
Community Information Sheets	No	If queries are received about a particular subject matter
Company Website	No	Always
One on one face to face meetings/door knocking (adjoining landowners)	Yes	Annually while throughput is <100,000 tpa.
		6 monthly while throughput is >100,000 tpa & <250,000 tpa
		If there is a change to operations requiring regulatory amendments.

Email notifications	Yes – contact details will be included on each notification with an option for community to make contact or provide feedback	As required (both proactively and reactively)
Phone Calls	Yes	As required (both proactively and reactively)
Open Day/Meet the Team	Yes	Once every 5 years (delayed from 2020 due to COVID)
Sponsorship	No	Considered on a case by case basis. Noting that in recent years Sandbelt Industries has provided sponsorship arrangements to local groups (financial and material/in kind).

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Analysing and responding to feedback

Once feedback has been provided it needs to be analysed to be incorporated into the design, or operations of the site. The site will consider all feedback received and consider if it is possible to adapt operations to respond to the feedback, or whether the feedback might require a different response (e.g. education material). It may not be possible to respond favourably to all feedback and there may be safety or operational constraints which inhibit the ability to favourably respond to feedback. Once the feedback has been analysed, the site will respond to the relevant stakeholders that provided the feedback so they are able to understand how their feedback was considered.

Feedback will be responded to using the following engagement methods:

- Community newsletters or letter drops where there may be changes to the operation as a result of feedback,
- One on one face to face meetings/door knocking where adjoining landowners have provided feedback,
- Email/phone calls where the feedback is in relation to a particular matter than warrants a direct and timely response.

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9. Stakeholder engagement plan

Table 3 provides a stakeholder engagement plan in line with the *International Association for Public Participation* (IAP2) best practice. The Level of Engagement in Table 3 correlates to the IAP2's Public Participation Spectrum included in Figure 2 below.



Figure 2 IAP2's Public Participation Spectrum¹

Table 3 Stakeholder engagement plan

Stakeholder	Issue or concern	Level of engagement (IAP2)	Method of engagement	Timing	Controls to be communicated to impacted stakeholders
Immediately impacted residents	Noise & Dust	Inform	Face to face meeting	As per triggers in Table 2.	Maintaining 250m bufferzone between extraction and #4 Stakeholder.
			Letterbox drop		Noise attenuation bunding/planting between processing area and sensitive receptor.
			Phone Calls & Email	As required	Water suppression via sprinklers or water carts Reduced speed limits.

¹ The *International Association for Public Participation* (IAP2) best practice Public Participation Spectrum https://iap2.org.au/wp-content/uploads/2019/07/IAP2_Quality_Assurance_Standard_2015.pdf

Utilities (NBN & gas)	Existing infrastructure (to remain)	Consult	Phone calls & Email	As required	Extraction footprint avoids infrastructure.
Immediately impacted residents (numbered 4 & 5 on the Stakeholder Map)	Flooding / surface water flows	Inform & Consult	Face to face meeting	As required	Floodwater catchment systems to ensure the extraction doesn't increase existing surface water flow impacts.
			Phone calls & Email	As required	Floodwaters kept separate from operational waters and directed to the Melbourne Water Drain.
Melbourne Water	Responsible for agricultural drain traversing site (known as Adams Creek North Branch)	Consult & Involve	Face to face/site meeting	As required	Extraction avoids Melbourne Water Drain. Access provided to Melbourne Water to undertake maintenance of drain.
			Phone calls/ Email	As required	Floodwater catchment systems to ensure the extraction doesn't increase existing surface water flow impacts. Floodwaters kept separate from operational waters and directed to the Melbourne Water Drain.
DEWLP Crown Land	The unreserved Crown Land, and historic railway	Consult & Involve	Face to face meeting	As required	Obtain landowner consent/licence to include areas in Work Authority while progressing purchase of unreserved Crown Land.
			Phone calls/ Email	As required	Undertake activities in accordance with landowner consent/licence.
Utilities (Electrical)	Electrical transmission infrastructure & easement (to relocate)	Consult & Involve	Face to face meeting	As required	Relocation (in due course) of electrical transmission lines in accordance with regulator requirements.
			Phone calls/ Email	As required	
Immediately adjacent landowners (agricultural uses)	Agricultural groundwater access (existing bores)	Inform	Phone calls/ Email	As required	No dewatering activity as part of the quarrying operations. Establishing a groundwater monitoring program once

			Face to face meeting	As required	extraction >10m below surface level
Surrounding land users	Visual impacts	Inform & Consult	Letterbox drop	As required	Retention of trees along McDonalds Track for visual screening.
			Phone calls/ Email	As required	Perimeter bunding/planting prioritised to areas to minimise visual (and dust and noise impacts).
Surrounding land users, particularly extractive industry operators	Traffic movement on McDonalds Track	Inform	Phone calls/ Email	As required	Limiting traffic movements to occur within opening hours. Safe access points from site onto McDonalds Track.
Registered Aboriginal Party - Bunurong Land Council Aboriginal Corporation	The Registered Aboriginal Party is the recognised body to speak for cultural heritage of land that has not been significantly disturbed.	Inform	Phone calls/ Email	As required	Maintain records of past significant disturbance. Extraction operations exclude areas of cultural sensitivity until sign off from RAP is obtained and a WPV processed.
Council	Road safety (increased traffic resulting from material transporting from site)	Inform & Consult	Face to face/site meeting	As required	Safe access points from site onto McDonalds Track.
			Phone calls/ Email	As required	Additional signage as required.

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10. Complaints management process

Responding to feedback from community is described in Section 8 of this document. From time to time the site may receive a complaint, for example from a nearby neighbour. A complaints management process sets out how the complaint will be handled, investigated, recorded and resolved. It also sets out when communication with the complainant should occur.

Figure 3 shows the complaint management process that the site implements. The process is as follows:

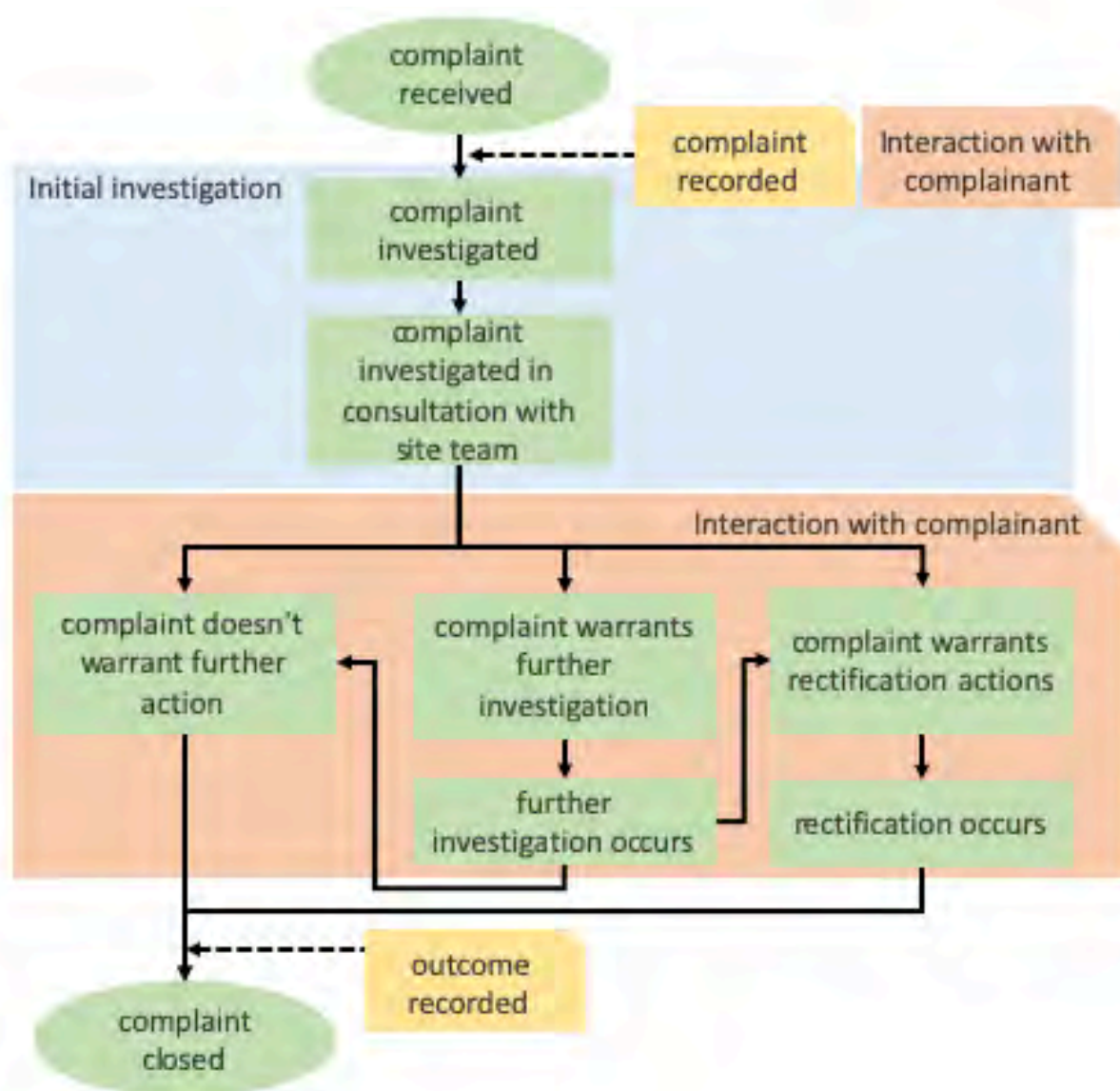
- A complaint may be received via many avenues (e.g. phone call).
- The complaint is recorded using the template in Attachment F, and then investigated.
- The investigation may result in one of three initial outcomes:
 1. The complaint doesn't warrant further action e.g perhaps the complaint is unfounded (related to another land parcel) or broader education might be required. Note in these instances education of information sheets may be produced, but would not result in operational changes.
 2. The complaint warrants further investigation beyond the initial investigation e.g. monitoring data is required.
 3. The complaint warrants rectification actions.
 - Communication with the complainant should occur during this time to keep them updated on the status of their complaint.
- After the initial outcome has been determined it may or may not be appropriate to investigate further or apply rectification actions.
- Once the outcome/result of the complaint is understood, it should be recorded in the template in Attachment F, and the complainant advised of the outcome.

Complaint handling includes the following:

- Complaints are investigation by the Site Manager (or their delegate)
- It is envisaged that the initial investigation would be completed within 2 business days for typical complaints.
- Complaint records (including outcomes) will be kept for a period of 5 years.
- A summary of complaints register will be maintained on site.

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Figure 3 Complaint Management Process



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11. Evaluation

Evaluation of the community engagement activities should occur annually to assess if the activities are meeting the objectives and aims of the plan. Some KPI's or measures of success to consider include:

- Complaint handling timeframes (completed within 2 business days).
- Instances of positive feedback from community/stakeholders.
- Increased stakeholder and community knowledge of the site/operations.
- Number and types of complaints received.
- Positive stakeholder sentiment.
- Focused investment in key areas that aligned with the company's values.

Activities and invitees may need to be altered and updated to ensure the right stakeholders are included in the engagement activities. Minor augmentation to this plan (consistent with the aims and objectives) will not require an update of this community engagement plan. Major changes would likely require an update this community engagement plan.

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12. Contact us

If you would like to make contact, our details are:



CEO: [REDACTED]

Site address: 350 McDonalds Track, Lang Lang 3984

Email: sales@sandbelt.net

Telephone: 03 9787 5115

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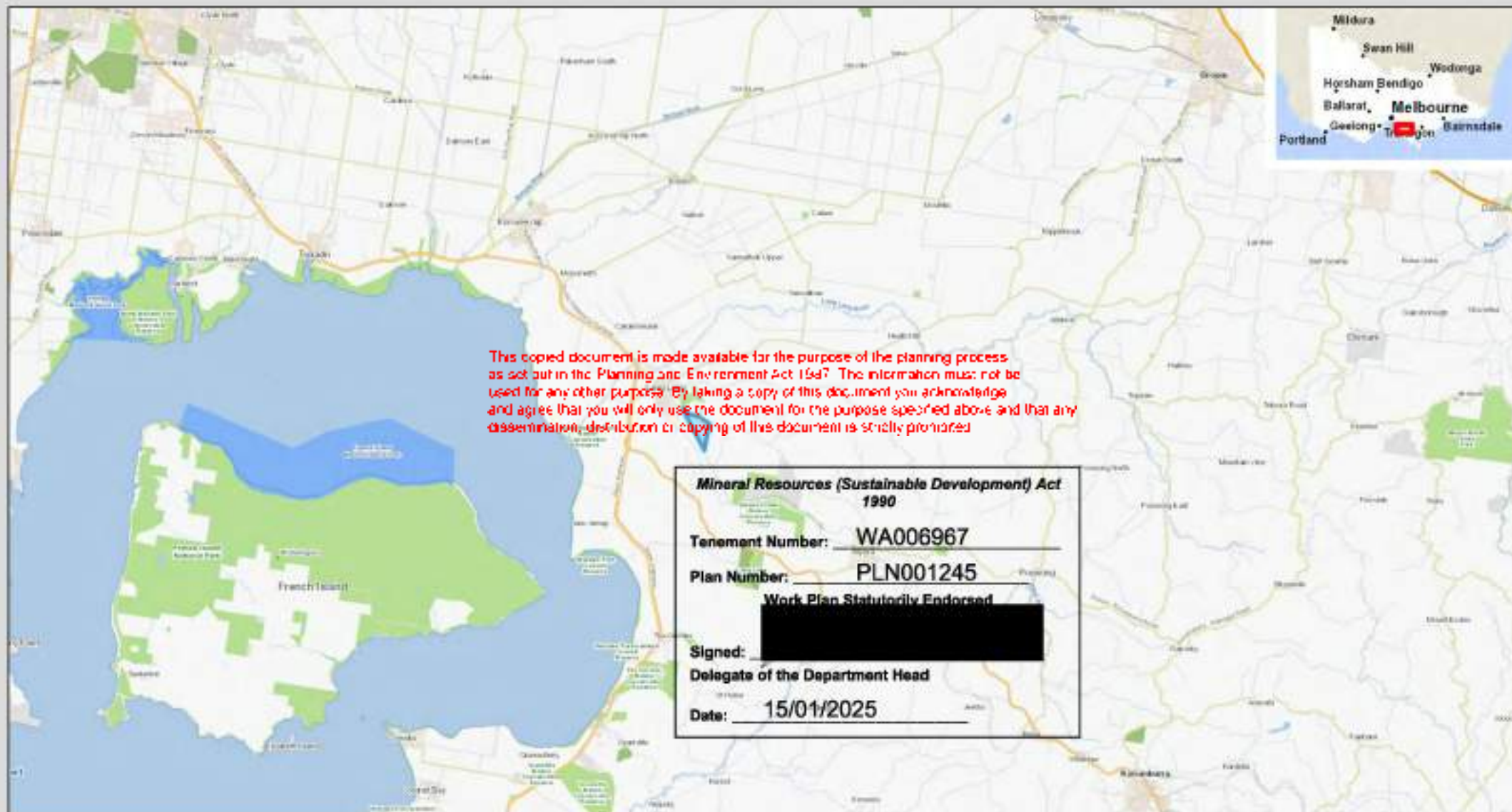
Attachment A - Work Authority Map

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Attachment B – Locality Map

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Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA006967

Plan Number: PLN001245

Work Plan Statutorily Endorsed

Signed: 
Delegate of the Department Head

Date: 15/01/2025

12,700 0 6,350 12,700 Meters



Attachment C - Regional Aerial Map

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2,540 0 1,270 2,540 Meters



Disclaimer: This map is a snapshot generated from Victorian Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

Map Created on 17-Dec-2021

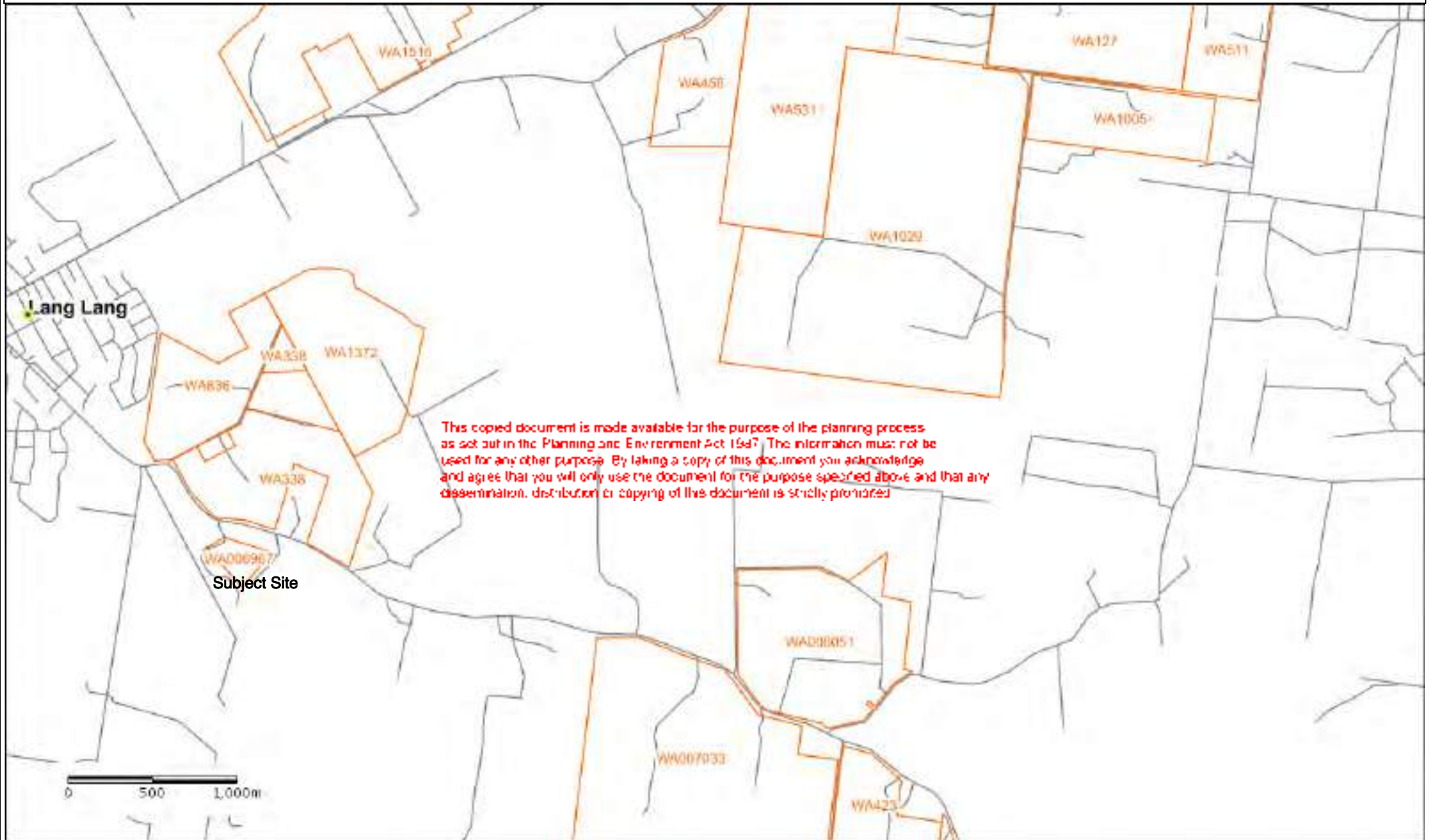
Scale 1:50,000

Attachment D – Sensitive Receptor Map

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Attachment E – Nearby Extractive Industries Map

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Disclaimer: This map is a snapshot generated from Victoria Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

Map Scale:
Projection:

1:29,838
MGA94 55





Attachment F - Community enquiry/complaint form

Date	
Licensee details	
Licensee name:	Sandbelt Industries
Work Authority:	WA 6967
Complainant/enquiry contact details	
Name:	
Address:	
Phone:	
Issue details:	
Received by:	
Action taken:	
Responsible person:	
Date action taken:	
Follow up:	
Date issue resolved:	



Our Ref: 1201660 / SP474199

[REDACTED]
CEO, Sandbelt Industries (Vic) Pty Ltd
C/- [REDACTED]
Director
Briar Solutions Pty Ltd
PO Box 45
ANNADALE NSW 2038

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Dear [REDACTED]

**APPLICATION FOR LANDOWNER CONSENT FOR WORKS ON CROWN LAND
ROAD ACCESS FOR WORK AUTHORITY, UNUSED ROAD SOUTHWEST OF LOT 2 ON PS817451, PARISH OF
LANG LANG, UNRESERVED CROWN LAND**

Thank you for your email dated 18 October 2021 requesting an amendment to the landowner consent issued on 18 February 2021, pursuant to condition 2 of the consent.

The existing consent is for use of two sections of unused road for access purposes only and inclusion of these sections within the Work Authority boundary for the adjacent sand extraction and processing operations:

1. The northern section of unused road is approximately 240m long and works include the development and maintenance of the existing entry/exit access tracks with road base.
2. The existing bridge over Adams Creek and approximately 50m of unused road either side.

This proposal does not include any road base construction or bridge upgrade works for heavy vehicle access over Adams Creek, which will be subject to a future engineering report and landowner consent request.

The amended application requests use of the full section of unused road adjacent to Lot 2 on PS817451 for access purposes only and inclusion in the Work Authority boundary for the adjacent sand extraction and processing operations, and removal of the restriction on new access points into the Crown land. The works include the development and maintenance of the existing entry/exit access tracks with road base, and the construction and maintenance of new entry points and sections of access track with road base as required.

I advise that pursuant to condition 2 of the landowner consent dated 18 February 2021, conditions 1 and 7 (now condition 10) are amended, and conditions 4, 5, 6 and 14 are added to the consent. The consent conditions now read:

1. The use and works are to be carried out generally in accordance with:
 - The landowner consent application and site maps received via email dated 13 January 2021 from Michelle Kapnoullas, Sandbelt Industries;

Privacy Statement

Any personal information about you or a third party in your correspondence will be protected under the provisions of the Privacy and Data Protection Act 2000. It will only be used or disclosed to appropriate Ministerial, Statutory Authority, or departmental staff in regard to the purpose for which it was provided, unless required or authorised by law. Enquiries about access to information about you held by the Department should be directed to the Privacy Coordinator, Department of Environment, Land, Water and Planning, PO Box 500, East Melbourne, Victoria 8002

- Email correspondence dated 15 and 16 February 2021 from Michelle Kapnoullas, Sandbelt Industries, responding to DELWPs further information request dated 27 January 2021; and
 - The amended consent request and Proposed Work Authority Boundary (translated over Survey ver. 1 dated 24/06/2021) received via email dated 18 October 2021 from Lisa Honan, Director, Briar Solutions Pty Ltd.
2. Any modification to the access or works proposed will require further approval by the Program Manager Planning Approvals, Land and Built Environment Programs, Port Phillip Region, DELWP.
 3. Prior to any heavy vehicle access across the Adams Creek bridge, or any works to upgrade the Adams Creek bridge or construct approach roads, an engineering report must be prepared by a suitably qualified person and landowner consent obtained from DELWP for the access and works.
 4. There must be no works or activities within the gas pipeline licence area without prior approval from the relevant authorities.
 5. The impact of road construction and associated works on remnant vegetation within the unused road and adjacent rail corridor must be assessed by a qualified Arborist. Any works within a Tree Protection Zone will require further approval from DELWP.
 6. Within any Tree Protection Zone associated with the permitted works, any actions or activities that may result in adverse impacts to native vegetation is prohibited.
 7. Indigenous vegetation must not be damaged or removed as a result of the works or road access.
 8. All planting of vegetation within the Crown land must utilise indigenous species.
 9. Any clearing or construction activity associated with the works, should be carried out in accordance with the with EPA Publication No. 275 *Construction Techniques for Sediment Pollution Control* (May 1991).
 10. There must be no:
 - a. storage of materials (including temporary stock sites) or spoil;
 - b. truck turning areas;
 - c. parking of vehicles;
 - d. vegetation removal;
 - e. buildings and works; or
 - f. discharge of storm water or other concentrated flow of wateron the Crown land as part of the adjacent development and its future use.
 11. Ongoing maintenance of the access road will be the responsibility of Sandbelt Industries.
 12. On completion of the sand extraction and processing operations, the Crown land must be remediated to the satisfaction of DELWP.
 13. Any site remediation associated with the use and/or development must protect retained native vegetation.
 14. The applicant must enter into and/or amend licence agreements with DELWP over the subject Crown land on which the works are located within (6) six months of this approval.
 15. This consent will expire if the Work Authority is not granted within two years of the date of issue, or at the expiry of the approved Work Authority, unless an extension of time is applied for and granted by the Program Manager Planning Approvals, Land and Built Environment Programs, Port Phillip Region, DELWP.

There is a requirement to enter into and/or amend licence agreement(s) with DELWP over the subject Crown land on which the works are located within (6) six months of this approval. This will include licence tenure for the Crown land outside of the current grazing licence. In addition to the approvals required for works and/or activities within a gas transmission pipeline corridor, any proposed works within the gas pipeline licence area may also require landlord consent from DELWP. Please contact property.portphillip@delwp.vic.gov.au to discuss.

Yours sincerely

A/PROGRAM MANAGER
PLANNING APPROVALS
PORT PHILLIP REGION

DATE: 24th December 2021

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AGRICULTURAL LICENCE

LAND ACT 1958

Section 130

THIS LICENCE is granted by the Licensor to the Licensee and commences on the date set out in the Schedule.

In consideration of the payment of the licence fee and the conditions contained in this Licence, the Licensor or a person authorised by the Licensor, at the request of the Licensee **HEREBY AUTHORISES** the Licensee to use the Crown land described in the Schedule for the specified purposes set out in the Schedule.

This Licence is subject to the provisions of the *Land Act 1958* and Regulations thereunder, the licence conditions attached and any Statutory and other Special Conditions set out in the Schedule.

Signature of Licensor or Authorised person

Program Manager
Land and Built Environment
(Transaction Centre)

The Licensee hereby agrees that payment of the Licence Fee, shown in Item 7 of the Schedule, by the Licensee shall constitute acceptance by the Licensee of this Licence and shall constitute an undertaking by the Licensee that the Licensee shall comply with the terms and conditions of this Licence.

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NOTE:

- | | |
|---|--|
| 1 | <i>This licence is not valid until payment of the Licence Fee shown in Item 7 of the Schedule is received by the Department of Environment, Land, Water & Planning.</i> |
| 2 | <i>This Licence is an important document and should be stored in a secure and safe place. It will be needed if you sell your property. In the event of loss, a replacement fee may be charged.</i> |

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SCHEDULE

PLAN

LICENCE CONDITIONS

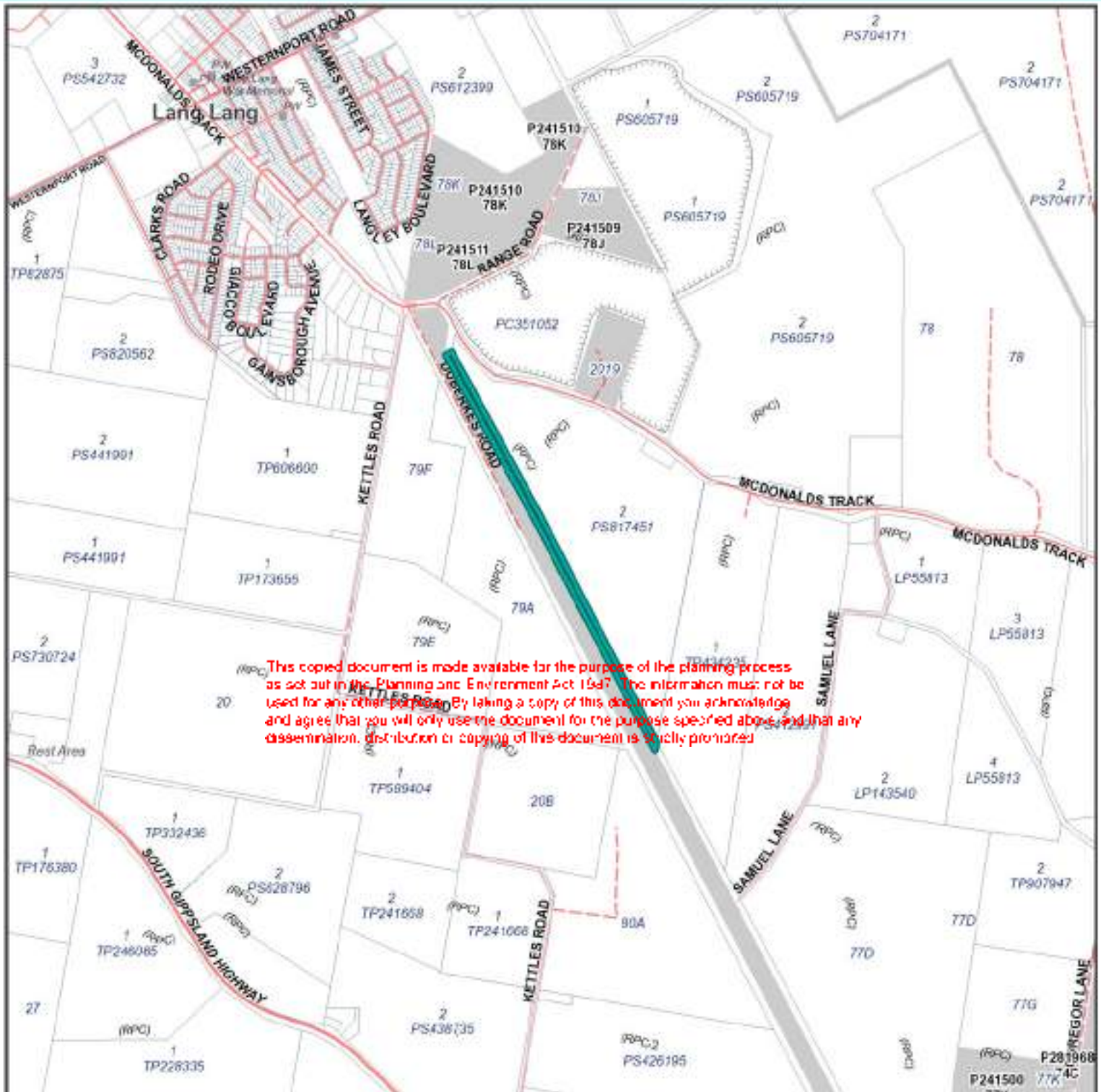
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LICENCE SCHEDULE

1. Licence No. 1201660
2. Licensor Minister for Environment and Climate Action
3. Licensee The Lang Lang Property Trust
4. Address 350 McDonalds Track, Lang Lang, Victoria, 3984, Australia
5. Commencement Date 01 October 1994
6. Term 99 Years
7. Licensee Fee [REDACTED]
8. Payable [REDACTED]
9. Licensed Land All that land being:
- Municipality of Bass Coast
Unused Road South West of Lot 2 on PS817451,
Parish of Lang Lang
- AS INDICATED ON ATTACHED PLAN/S.
10. Area (Ha) 6.08
11. Powers under which land is granted Land Act 1958, Sec 130/133
12. Specified Purpose GRAZING
13. Department Address 8 NICHOLSON STREET, EAST MELBOURNE, Victoria, 3001, Australia
14. Statutory and other Conditions
THE LICENSEE MUST IF DIRECTED TO DO SO IN WRITING BY THE LICENSOR MAINTAIN SUITABLE UNLOCKED SWING GATES, CATTLE PITS, RAMPS OR OTHER SUITABLE MEANS OF PASSAGE IN ANY FENCE ACROSS THE LICENSED LAND.
15. Special Conditions
Licencee is able to use the licenced area for grazing and vehicle access (work authority vehicles) as agreed upon. These are used for Primary Production vehicles to maintain the land.
Grazing primary production/vehicle access road- access into the quarry by management vehicles and freehold vehicles.

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Disclaimer: This map is a snapshot generated from Victorian Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

LICENCE CONDITIONS

1 **Grant**

The rights conferred by this Licence are non-exclusive, do not create or confer upon the Licensee any tenancy or any estate or interest in or over the licensed land or any part of it, and do not comprise or include any rights other than those granted or to which the Licensee is otherwise entitled by law.

2 **Licensee's Obligations (Positive)**

The Licensee **Hereby Covenants** with the Licensor that during the term the Licensee will: -

2.1 **Licence fee**

Duly and punctually pay or cause to be paid the licence fee to the Licensor at the payment address advised by the Licensor from time to time on the days and in the manner provided in Item 8 of the Schedule without demand, deduction, set-off or abatement.

2.2 **Rates and Taxes**

2.2.1 Duly and punctually pay as and when they respectively fall due all rates and taxes on the licensed land.

2.2.2 If requested to do so by the Licensor, produce receipts to the Licensor evidencing payment of the rates and taxes.

2.2.3 Duly and punctually pay to the Licensor at the same time and in the same manner as the licence fee is payable to the Licensor (or as otherwise notified to the Licensee by the Licensor) under clause 2.1 above the amount of any GST payable on or in relation to this licence and/or the rent payable thereunder or that becomes payable by the Licensor during the period covered by the fee.

2.3 **Indemnity**

Indemnify the Crown in respect of any claim or liability for property damage and/or injury or death of any person which arises directly or indirectly out of negligence, tort, contract, or breach of a statutory duty by the Licensee or any associated party consequential to the use or occupation of the licensed land, including, but without restricting the generality of the foregoing, the pollution or contamination of land or water, and any costs, charges and expenses incurred in connection therewith.

2.4 **Maintenance**

2.4.1 Throughout the term keep the licensed land in good order and condition and the improvements (if any) on it in good order and condition having regard to their condition at the commencement date or, if constructed or added to the licensed land after the commencement date, at the date of such construction or addition as the case may be and in particular but without restricting the generality of the foregoing will: -

2.4.1.1 Keep the licensed land free of pest animals and weeds;

2.4.1.2 Remedy every default of which notice is given by the Licensor to the Licensee within a reasonable time specified in the notice but in any event the time specified in the notice will not be less than 14 days.

2.5 **Fire Protection Works**

Undertake all fire protection works on the licensed land required by law to the satisfaction of the Licensor and the responsible fire Authority

2.6 **Condition at Termination**

On expiry or prior determination of this Licence return the licensed land to the Licensor in good order and condition and otherwise in accordance with the Licensee's obligations.

2.7 **Notice of Defects and other matters**

2.7.1 Give the Licensor prompt notice in writing of any accident to or defect in the licensed land and of any circumstances likely to cause any damage risk or hazard to the licensed land or any person on it;

2.7.2 Give to the Licensor within 7 days of its receipt by the Licensee a true copy of every notice, proposal or order given, issued or made in respect of the licensed land and full details of the circumstances of it;

2.7.3 Without delay take all necessary steps to comply with any notice, proposal or order referred to in paragraph 2.7.2 with which the Licensee is required to comply; and

2.7.4 At the request of the Licensor make or join with the Licensor in making such objections or representations against or in respect of any notice, proposal or order referred to in paragraph 2.7.2 as the Licensor deems expedient.

2.8 **Compliance with Law**

Comply at the Licensee's cost with the provisions of all statutes, regulations, local laws and by-laws relating to the licensed land and all lawful orders or direction made under them;

2.9 **Compliance with Directions**

2.9.1 At the Licensee's cost forthwith comply with any written direction given by the Secretary during the term as to the:-

- 2.9.1.1 grazing or management of the licensed land (including fencing), or the number and type of stock which may be depastured on the licensed land;
- 2.9.1.2 frequency, timing and method of cultivation;
- 2.9.1.3 water supply and other improvements;
- 2.9.1.4 reclamation of eroded areas and land degradation; or
- 2.9.1.5 retention or clearance of native vegetation.

2.10 **Arrears and Interest**

2.10.1 Pay to the Licensors:-

- 2.10.1.1 on any moneys payable by the Licensee to the Licensors and outstanding for thirty (30) days or on any judgment for the Licensors in an action arising under the Licence, interest at the penalty rate of interest for the time being made payable under the *Penalty Interest Rates Act 1983* computed from the date the moneys or judgment became payable until all moneys (including interest on them) are paid in full;
- 2.10.1.2 on demand all the Licensors' legal costs and disbursements payable in respect of or in connection with any assignment of this Licence or under-licensing of the licensed land, any surrender of this Licence, the giving of any consent by the Licensors or any failure by the Licensee to perform and observe this Licence, or any deed or other document executed in connection with this Licence.

2.11 **Further Conditions**

Comply with the Statutory and other Conditions contained in Item 13 of the Schedule and with the Special Conditions contained in Item 14 of the Schedule.

3 **Licensee's Obligations (Negative)**

The Licensee **Hereby Covenants** with the Licensors that during the term the Licensee will not -

3.1 **Use of Licensed land**

Use the licensed land for any purpose other than the specified purpose referred to in Item 12 of the Schedule or any additional purpose specified in Item 14 of the Schedule without first obtaining the Licensors' written consent which can be given or withheld at the absolute discretion of the Licensors or be given subject to conditions.

3.2 **Allow rubbish**

Permit any rubbish to accumulate in or about the licensed land.

3.3 **Hazardous Chemicals**

Keep any hazardous chemical on the licensed land without the Licensors' written consent which can be given or withheld at the absolute discretion of the Licensors or be given subject to conditions.

3.4 **Burning**

Undertake any burning of vegetation or any other matter on the licensed land without first obtaining any necessary permit and the written approval of the Licensors which can be given or withheld at the absolute discretion of the Licensors or be given subject to conditions PROVIDED HOWEVER that the consent of the Licensors is not required for the burning of crop stubble.

3.5 **Assignment**

Without first obtaining the written consent of the Licensors assign, under-license, mortgage, or charge this Licence or part with or share possession of the licensed land or any part of it.

3.6 **Licensors' Entry**

3.6.1 Prevent, attempt to prevent or in any other way hinder, obstruct or permit the hindrance or obstruction of the Licensors or the Licensors' employee or agent at any time from entering and remaining on the licensed land either with or without motor vehicles or other equipment for any purpose and in particular, but without restricting the generality of the foregoing, for any of the following purposes:-

- 3.6.1.1 retaking or attempting to retake possession of the licensed land;
- 3.6.1.2 inspection; or
- 3.6.1.3 any other lawful purpose.

3.7 **Void insurance**

Do or allow anything to be done which might result in any insurance's relating to the licensed land becoming void or voidable or which might increase the premium on any insurance.

3.8 Cultivation and Use of Licensed land

3.8.1 Without the Licensor's prior written approval, which can be given or withheld at the absolute discretion of the Licensor or be given subject to conditions, :-

- 3.8.1.1 fell, ringbark, injure, destroy or remove any living or dead vegetation (except weeds) or fallen timber on the licensed land;
- 3.8.1.2 plough, cultivate, work, break up or remove soil or construct any earthworks on the licensed land;
- 3.8.1.3 plant any vegetation, seed or crop on the licensed land; or
- 3.8.1.4 apply fertilizer to the licensed land.

3.9 Erection of Improvements

Erect or permit the erection of any improvement on the licensed land without the Licensor's prior written approval, which can be given or withheld at the absolute discretion of the Licensor or be given subject to conditions.

4 General Conditions

4.1 Termination upon Default

If the Licensor is satisfied, after giving the Licensee a reasonable opportunity to be heard, that the licensee has failed to comply with any terms or conditions of the licence, the Licensor may, by notice published in the Government Gazette, declare that the licence is cancelled, and upon cancellation the licensee will not be entitled to any compensation whatsoever.

4.2 Termination without Default

4.2.1 In addition to and not in substitution for the power to cancel this Licence under clause 4.1, the Licensor may by giving to the Licensee three months' written notice to that effect cancel this Licence upon a date to be specified in that notice notwithstanding that there has been no breach by the Licensee of any term or condition of this Licence.

4.2.2 If the licence is terminated under this clause the Licensee is entitled to receive and will be paid by the Licensor a refund of an amount of the licence fee paid.

4.2.3 The amount of refund will be determined by the Licensor on a pro rata basis, taking into account any period of the licence remaining at the date of cancellation.

4.2.4 Except as provided in sub clause 4.2.2 above no compensation is payable in respect of the cancellation of the licence.

4.3 Licensee's Improvements

4.3.1 The Licensee's improvements shall remain the property of the Licensee.

4.3.2 On the cancellation or expiration of the Licence the Licensee must, within a period of time specified by the Secretary, remove all Licensee's improvements from the licensed land and forthwith make good all damage caused to the licensed land by the affixing, retention or removal of Licensee's improvements to the satisfaction of the Secretary.

4.4 Secretary may remove and dispose of property

If the Licence expires, or is cancelled under clauses 4.1 or 4.2, the Secretary may at the end of the period of time specified under Clause 4.3.2 remove the Licensee's chattels and improvements and store them at the Licensee's expense without being liable to the Licensee for trespass, detinue, conversion or negligence. After storing them for at least one month, the Secretary may sell or dispose of them by auction, private sale, gift, distribution or otherwise and apply the net proceeds towards the payment of any moneys owed by the Licensee to the Licensor.

4.5 Licensor's/Secretary's Agents

Every act or thing to be done, decision to be made or document to be signed pursuant to this Licence by the Licensor or the Secretary and not required by law to be done, made or signed by the Licensor or the Secretary personally may be done made or signed by any person to whom such power has been delegated by the Licensor or the Secretary.

4.6 Notices

Any notice consent or demand or other communication to be served on or given to the Licensee by the Licensor under this Licence shall be deemed to have been duly served or given if it is in writing signed by the Licensor and delivered or sent by pre paid post to the Licensee's address set out in Item 4 of the Schedule or to the latest address stated by the Licensee in any written communication with the Licensor.

4.7 Review of Licence fee

[REDACTED]

4.8 Debt recovery

All moneys payable by the Licensee to the Licensor under this Licence are recoverable from the Licensee as liquidated debts payable on demand.

5 Definitions

Unless inconsistent with the context or subject matter each word or phrase defined in this clause has the same meaning when used elsewhere in the licence.

"**commencement date**" means the date described in Item 5 of the Schedule and is the first day of the term;

"**Crown**" means the Crown in right of the State of Victoria and includes the Secretary and each employee and agent of the Crown or the Secretary;

"**GST**" means a goods and services tax within the meaning of the *A New Tax System (Goods and Services Tax) Act 1999*.

"**Department**" means the Department of Environment, Land, Water & Planning or its successor in law;

"**flora**" has the same meaning as in the *Flora and Fauna Guarantee Act 1988*;

"**hazardous chemical**" includes gas, inflammable liquid, explosive substance, pesticide, herbicide, fertiliser and other chemicals;

"**improvement**" includes building, dam, levee, channel, sign, permanent fence, or other structure and any addition to an existing improvement;

"**licensed land**" means the land described in Item 9 of the Schedule;

"**Licence fee**" means the licence fee described in Item 7 of the Schedule as varied during the term;

"**Licensee**" means the person named in Item 3 of the Schedule and includes the permitted assigns and successors in law to a Licensee;

"**Licensee's Improvements**" includes growing crop, building, structure, sign, fence and any other structural improvement including dam, levee, channel or any other earthworks but does not include any such improvement shown in Item 14 of the Schedule as being or becoming the property of the Licensor.

"**Licensor**" means the Minister of the Crown for the time being administering Division 8 of Part 1 of the *Land Act 1958* or such other Minister of the Crown or Government Authority to whom responsibility for this Licence may at any time be given;

"**person**" includes a body corporate as well as an individual;

"**pest animals**" has the same meaning as in the *Catchment and Land Protection Act 1994*;

"**rates and taxes**" means all existing and future rates (including excess water rates and any special rates or levies) taxes, charges, tariffs, assessments, impositions and outgoings whatsoever now or at any time imposed, charged or assessed on or against the licensed land or the Licensor or the Licensee or payable by the owner or occupier of the licensed land;

"**schedule**" means the schedule to this Licence;

"**Secretary**" means The Secretary to the Department of Environment, Land, Water & Planning, the body corporate established under the *Conservation, Forests and Lands Act 1987*;

"**sign**" includes names, advertisements and notices;

"**soil**" includes gravel, stone, salt, guano, shell, sand, loam and brick earth;

"**term**" means the period of time set out in Item 6 of the Schedule, as and from the commencement date;

"**weeds**" include noxious weeds within the meaning of the *Catchment and Land Protection Act 1994*, and prescribed flora within the meaning of the *Flora and Fauna Guarantee Act 1988*;

"**writing**" includes typewriting, printing, photography, lithography and other modes of representing or reproducing words in a visible form and "written" has a corresponding meaning.

6 Interpretations

6.1 A reference importing the singular includes the plural and vice versa.

6.2 The index and headings are included for ease of reference and do not alter the interpretation of this Licence.

6.3 If any day appointed or specified by this Licence falls on a Saturday, Sunday or a day appointed under the *Public Holidays Act 1993* as a holiday for the whole day the day so appointed or specified is deemed to be the first day succeeding the day appointed or specified which is not a Saturday, Sunday or day appointed as a holiday.

6.4 References to an Act of Parliament or a section or schedule of it shall be read as if the words "or any statutory modification or re-enactment thereof or substitution therefor" were added to the reference.

6.5 If the Licensee comprises more than one person, the covenants and agreements contained in this Licence shall be construed as having been entered into by, and are binding, both jointly and severally on all and each of the persons who constitute the Licensee.

6.6 References to clauses, sub-clauses and Items are references to clauses, sub-clauses and Items of this Licence respectively.

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Lang Lang Quarry

Noise Impact Assessment

Prepared for Sandbelt Industries Pty Ltd

December 2024

Lang Lang Quarry

Noise Impact Assessment

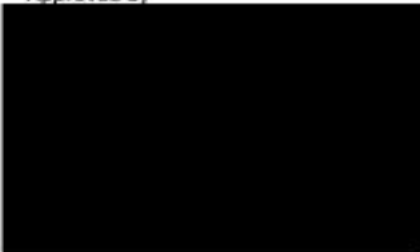
Sandbelt Industries Pty Ltd

E240531 RP1

December 2024

Version	Date	Prepared by	Reviewed by	Comments
V1	9 October 2024	Matthew Cheesman	Frank Butera	Final
V2	11 December 2024	Matthew Cheesman	Frank Butera	Revision A

Approved by



Associate Director
11 December 2024

Suite 9.01 Level 9
454 Collins Street
Melbourne VIC 3000
ABN: 28 141 736 558

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1 Introduction

1.1 Project overview

Sandbelt Industries (VIC) Pty Ltd (the Client) has engaged EMM Consulting Pty Limited (EMM) to prepare a noise impact assessment (NIA) in support of a work plan application for extraction of sand operations (open pit, dry sand extraction) at 350–430 McDonalds Track, Lang Lang (Subject Site) under Extractive Industry Work Authority 6979.

The proposed work plan seeks to extract the following volumes across a 45 hectare (ha) area, with a maximum disturbance footprint of 30 ha at any one time:

- 5,670,000 cubic metres (m³) of dry sand to a maximum depth of 15 metres (m) from surface level
- 125,000 m³ of topsoil to a depth of approximately 300 millimetres (mm)
- 2,441,000 m³ of overburden to a depth of approximately 6 m.

The purpose of this NIA is to assess potential noise impacts from quarrying operations for submission as part of the workplan application.

1.2 Assessment guidelines and requirements

This NIA has been prepared with reference to the following guidelines and policies:

- VIC Environmental Protection Authority (EPA) 2017, *Environmental Protection Act 2017* (EP Act, the Act)
- VIC Environmental Protection Authority (EPA) 2021, Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (2021). (Noise Protocol)
- VIC Environmental Protection Authority (EPA) 2022, *Environmental Reference Standard*
- VIC Environmental Protection Authority (EPA) 2018, *Assessing and controlling risk: A guide for business*
- VIC Environmental Protection Authority (EPA) 2021, *Noise guideline – assessing low frequency noise*

Numerous technical terms have been utilised throughout this report for the discussion of noise and vibration. These are explained in Appendix A.

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2 Project description

2.1 The Subject Site

The Subject Site is located at 350–430 McDonalds Track, south-east of the township of Lang Lang in South Gippsland Victoria. The Subject Site is bordered on the north by McDonalds Track and on the south by the disused South Gippsland railway reserve.

The area surrounding the Subject Site can be characterised as agricultural and earth resources industry within a Green Wedge Zone. Extractive operations by other commercial businesses are located to the north and east of the Subject Site. The surrounding land uses are detailed below:

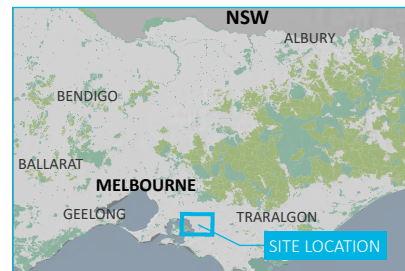
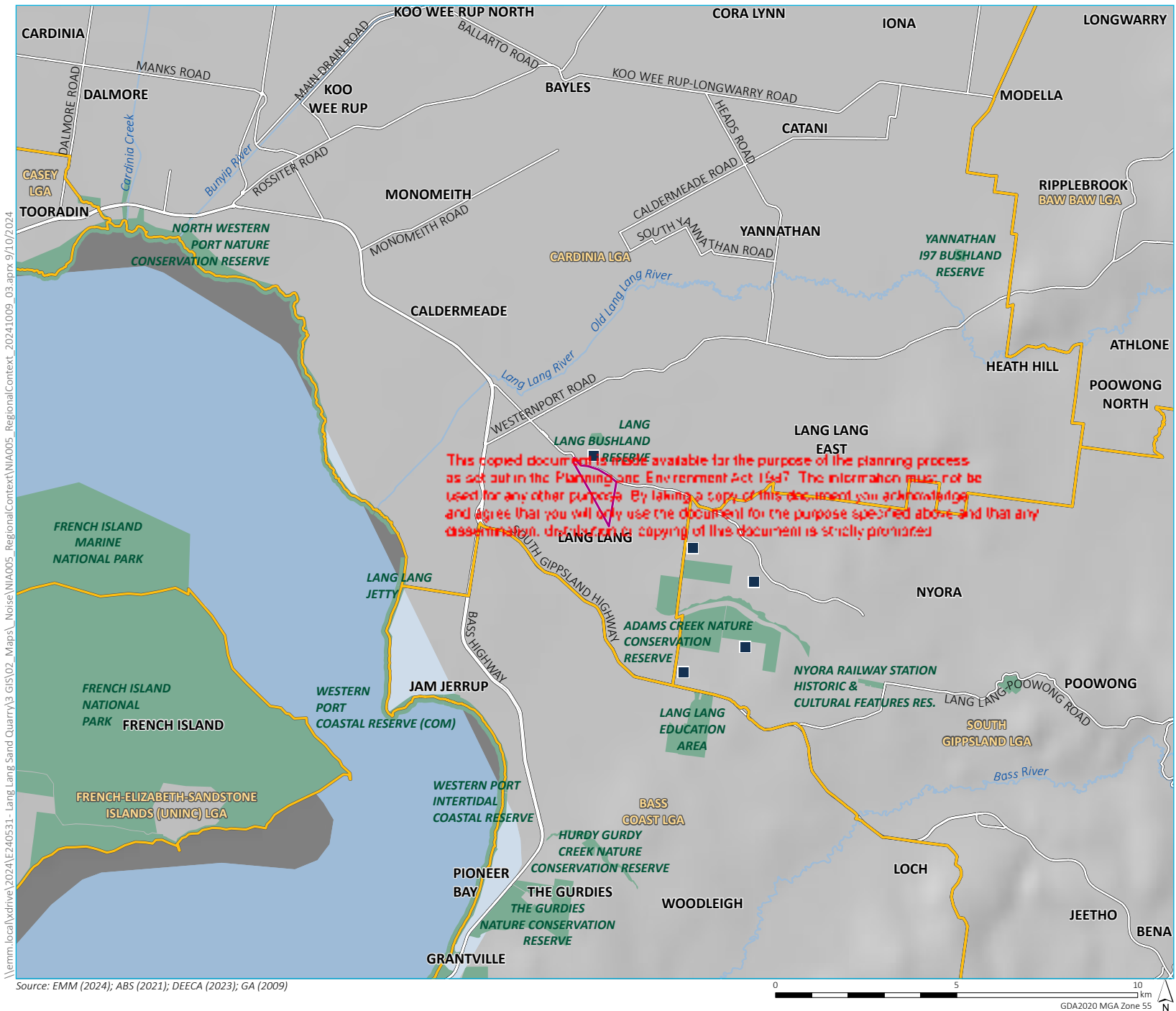
- To the north – McDonalds track is a rural road highly trafficked by heavy vehicles generated by adjacent earth resource sites. These sites are Mountain View Quarries, Hanson and Holcim Quarry.
- To the east – Land Lang Township and McDonalds Track (as described above).
- To the south – Duberkes Road borders existing agricultural land in a Green Wedge zone. A rural road highly trafficked by heavy vehicles generated by surrounding earth resources industry.

The land parcels upon which the Work Authority is applicable are as follows:

- Lot 1 PS817451
- Lot 2 PS817451
- Crown Land known as ‘Unreserved Crown Land - Unused Road Southwest of Lot2 PS817451, Parish of Lang Lang’.

Figure 2.1 provides the regional context of the site in relation to surrounding industry, with local context provided in Figure 2.2. Zoning maps are reproduced from VicPlan mapping tool in Figure 2.3.

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KEY

- Work authority boundary
- Existing environment
 - Surrounding earth resource
 - Major road
 - Named watercourse
 - National park/reserve
 - Local government area

INSET KEY

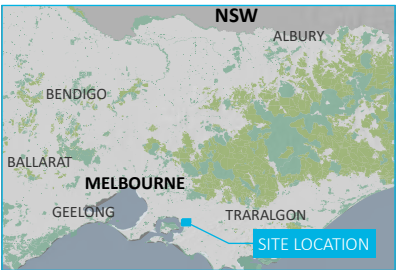
- State forest
- National park/reserve

Regional context

Lang Lang Quarry
Noise Impact Assessment
Figure 2.1



\\emm.local\drive\2024\1240531 - Lang Lang sand Quarry\3 GIS\02_Maps\Noise\NIA004_LocContext_20241009_03.aprx 9/10/2024



- KEY**
- Work authority boundary
 - Sensitive receiver
- Stage**
- Stage 1A
 - Stage 1B
 - Stage 2A
 - Stage 2B
- Existing environment**
- Surrounding earth resource
 - Major road
 - Minor road
 - Named watercourse
 - Cadastral boundary
 - National park/reserve
- INSET KEY**
- State forest
 - National park/reserve

Local context

Lang Lang Quarry
Noise Impact Assessment
Figure 2.2



Source: EMM (2024); ABS (2021); DEECA (2023); GA (2009); MetroMap (2024)



PLANNING PROPERTY REPORT

From www.planning.vic.gov.au at 09 October 2024 03:07 PM

PROPERTY DETAILS

Address: **350 MCDONALDS TRACK LANG LANG 3984**

Lot and Plan Number: **Lot 2 PS817451**

Standard Parcel Identifier (SPI): **2\PS817451**

Local Government Area (Council): **CARDINIA**

Council Property Number: **5000026482**

Planning Scheme: **Cardinia**

Directory Reference: **Vicroads 96 B6**

www.cardinia.vic.gov.au

[Planning Scheme - Cardinia](#)

UTILITIES

Rural Water Corporation: **Southern Rural Water**

Melbourne Water Retailer: **South East Water**

Melbourne Water: **Inside drainage boundary**

Power Distributor: **AUSNET**

STATE ELECTORATES

Legislative Council: **EASTERN VICTORIA**

Legislative Assembly: **BASS**

OTHER

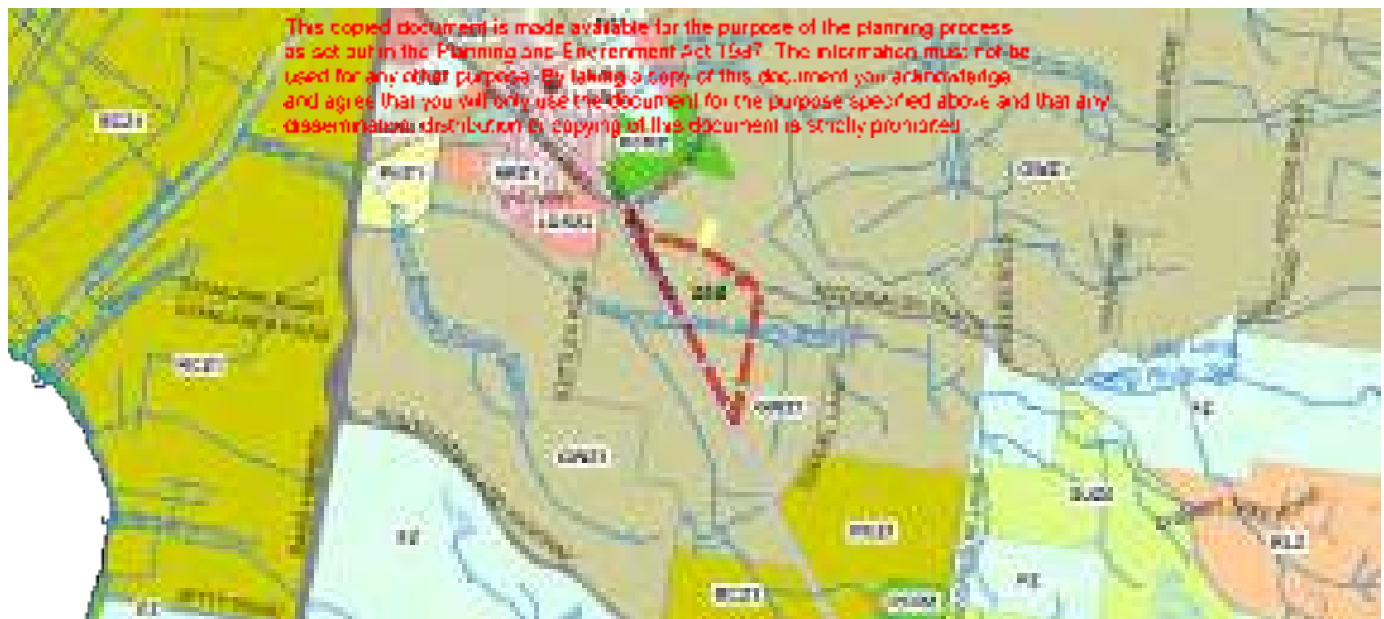
Registered Aboriginal Party: **Bunurong Land Council Aboriginal Corporation**

[View location in VicPlan](#)

Planning Zones

[GREEN WEDGE ZONE \(GWZ\) \(CARDINIA\)](#)

[GREEN WEDGE ZONE - SCHEDULE 1 \(GWZ1\) \(CARDINIA\)](#)



	C1Z - Commercial 1		FZ - Farming		GWZ - Green Wedge
	IN1Z - Industrial 1		LDRZ - Low Density Residential		MUZ - Mixed Use
	NRZ - Neighbourhood Residential		PCRZ - Public Conservation and Resource		PPRZ - Public Park and Recreation
	PUZ1 - Public Use-Service and Utility		PUZ2 - Public Use-Education		PUZ5 - Public Use-Cemetery/Crematorium
	PUZ6 - Public Use-Local Government		RCZ - Rural Conservation		RLZ - Rural Living
	SUZ - Special Use		TRZ1 - State Transport Infrastructure		TRZ2 - Principal Road Network
	TRZ3 - Significant Municipal Road		Railway station		Water area
	Water course				

Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

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Notwithstanding this disclaimer, a vendor may rely on the information in this report for the purpose of a statement that land is in a bushfire prone area as required by section 32C (b) of the Sale of Land 1962 (Vic).

PLANNING PROPERTY REPORT: 350 MCDONALDS TRACK LANG LANG 3984

Page 1 of 7

2.2 Proposed activities

The proposed quarrying activities are outlined in Sandbelt Industries – Lang Lang Work Plan (February 2024).

It is proposed to extract the sand using open pit quarrying methods, with the mine depth extending to 15 m from ground level (or to 2 m above the groundwater table whichever is the shallower).

The extraction activity will be undertaken in four general stages. Extraction will commence with Stage 1A. When extraction of Stage 1A is nearing completion, Stage 1B will commence. There will be a time where both Stage 1A and Stage 1B are 'active' to ensure ongoing supply of sand to meet quality requirements. Stage 2A will be extracted and backfilled prior to Stage 2B commencing.

Noise emitting equipment used in quarrying operations as per the Work Plan include:

- 3 x Striker SQ1862 (or similar) mobile screening plants
- 3 x Liebherr L556 front end loaders (or similar)
- 1 x Hino Ranger (or similar) with an agitator.

The transportation of materials is expected to generate up to 25 vehicle trips (including 20 movements generated by 10 trucks) per hour and 90 vehicle trips per day as per the TIA prepared by Stantec dated 25 January 2022.

The proposed hours of operation are reproduced from the Work Plan provided in Table 2.1 below.

Table 2.1 Proposed operating hours

Operating hours for activity type	Monday–Friday		Saturday		Sunday		Work on public holidays
	Start	Finish	Start	Finish	Start	Finish	
Above ground	5:30	18:00	5:30	17:00	N/A	N/A	N/A
Sales	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Processing	5:30	18:00	5:30	17:00	N/A	N/A	N/A

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3 Existing environment

3.1 Assessment locations

The Subject Site is located approximately 1 kilometre (km) to the south-east of the township of Lang Lang, Victoria.

The nearest noise sensitive residential properties in proximity to the Subject Site have been identified for the purpose of assessing potential noise impacts. These locations were selected to represent the limits of compliance from operation from the Subject Site, whereby compliance with these receptors implies compliance with all others in the region. Site location details are presented in Table 3.1 and their locations are visualised in Appendix E. They are referred to in this report as noise sensitive receivers.

Table 3.1 **Assessment locations**

No.	Address	Distance from the limit of extraction	Position relative to Subject Site
R1	470 Kettles Road, Lang Lang 3984	255 m	East
R2	435 McDonalds Track, Lang Lang 3984	162 m	West
R3	485 McDonalds Track, Lang Lang 3984	453 m	West
R4	460 McDonalds Track, Lang Lang 3984	250 m	West
R5	510 McDonalds Track, Lang Lang 3984	580 m	West
R6	165 Kettles Road, Lang Lang 3984	913 m	East
R7	350 Kettles Road, Lang Lang 3984	1065 m	East
R8	40 Duberkes Road, Lang Lang 3984	352 m	East

3.2 Background noise environment

3.2.1 Noise measurement methodology

EMM conducted noise monitoring to characterise the existing noise environment at the Subject Site and surrounding sensitive receptors.

Monitoring was conducted at two locations as shown in Figure 3.1 from Tuesday 3 September 2024 to Thursday 12 September 2024, noting that the monitoring equipment was located close proximity to the property boundary and the noise sensitive receivers located at R1 and R4.

Noise monitoring was conducted in accordance with AS 1055:2018 *Acoustics- Description and measurement of environmental noise*, with background levels for the purpose of setting noise limits for the rural area method determined in accordance with Section 4.0 of the Noise Protocols.

Atmospheric data was sourced from the closest Bureau of Meteorology (BOM) site at Warragul (site ID 085313) and was used to exclude monitoring data affected by wind or rain from the analysis.

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\\emh.local\drive\2024\E240531 - Lang Lang Sand Quarry\3 GIS\02 Maps\Noise\NIA003 UnattendedMonitoring_20241009_03.aprx 9/10/2024



KEY

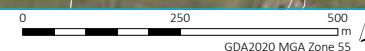
- Work authority boundary
- Unattended monitoring location
- Existing environment
- Named watercourse
- Cadastral boundary

Unattended monitoring locations

Lang Lang Quarry
Air Quality Impact Assessment
Figure 3.1



Source: EMM (2024); DEECA (2023); GA (2009); MetroMap (2024)



3.2.2 Instrumentation

Noise monitoring equipment used is described in Table 3.2 below. NATA certified calibration certificates are available in Appendix B.

Table 3.2 Measurement equipment

Location	Measurement equipment
Eastern boundary	ARL NGARA noise logger (serial number 878017)
Western boundary	ARL NGARA noise logger (serial number 878123)

3.2.3 Monitoring results

The results from the noise monitoring program at each location are summarised in Table 3.3 below, with measurement periods impacted by adverse weather conditions excluded from data analysis.

It is noted that the night-time levels are derived only from the measurement periods between 5:30 am and 7:00 am on all days as per Section 4.2 of the Noise Protocols.

Based on observations made during attended measurements, the noise environment at both monitoring locations is dominated by extractive industry vehicle movements along McDonalds Track, not associated with the Subject Site.

Table 3.3 Summary of monitoring results

Location	Leq dBA		L ₉₀ dBA	
	Day (7 am to 6 pm)	Night (5:30 am to 7 am)	Day (7 am to 6 pm)	Night (5:30 am to 7 am)
Eastern boundary	54	55	42	43
Western boundary	66	50	41	43

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4 Assessment criteria

4.1 General Environmental Duty

General Environmental Duty (GED) underpins the EP Act, and states that a person who is engaging in an activity that may increase risk to human health or the environment must minimise those risks, so far as is reasonably practicable.

The Act describes harm, in relation to human health of the environment, as an adverse effect on human health or the environment and is inclusive of:

- an adverse effect on the amenity of a place or premises that unreasonably interferes with or is likely to unreasonably interfere with enjoyment of the place or premises, or
- a change to the condition of the environment to make it offensive to the senses of human beings, or
- anything prescribed to be harm for the purposes of the Act or the regulations.

The reasonability and practicability of risk minimisation must consider the following under the Act:

- the likelihood of those risks eventuating
- the degree of harm that would result if those risks eventuated
- what the person concerned knows, or ought reasonably to know, about the harm or risks of harm and any ways of eliminating or reducing those risks
- the availability and suitability of ways to eliminate or reduce those risks
- the cost of eliminating or reducing those risks.

Within the hierarchy of risk minimisation with regard to noise, priority is given primarily to the elimination of risk as far as possible and secondarily to reducing the risks as far as is reasonably practicable. The risk assessment process is to look at all stages of the development including site planning, equipment selection, establishment, operations, maintenance and rehabilitation, and should consider risks from all activities as relevant to human health and the environment.

4.2 Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (2021)

The *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues 2021* (the Noise Protocols) complement the EP Act by offering clearer guidance and specific details for duty holders on how to meet their responsibilities. The Noise Protocols address detailed matters and may impose penalties for non-compliance.

The Noise Protocols outline the method for determining the noise limit (the maximum permissible noise level emitted from a premise) when measured in a noise-sensitive area. According to the Noise Protocols, noise-sensitive areas are defined as the portion of land within 10 m of the external walls of locations where people typically sleep (such as homes, dormitories, hotels, hospitals, correctional facilities, etc.), as well as schools (including childcare centers) and tourist establishments in rural areas (such as campgrounds and caravan parks).

Noise is assessed over a worst case 30-minute period, with adjustments for duration, annoying characteristics and measurement position applied to determine the effective noise level for assessment against project specific criteria per assessment period.

Assessment periods as defined by the Noise Protocols are provided in Table 4.1.

Table 4.1 Assessment periods

Period	Day	Time
Day	Monday to Saturday (except public holidays)	7 am–6 pm
Evening ¹	Monday to Saturday	6 pm–10 pm
	Sunday and public holidays	7 am–10 pm
Night	Monday to Sunday	10 pm–7 am

1. No operations are proposed to occur during this period

4.2.1 Noise limits in rural areas for earth resources

The Noise Protocols define earth resources as follows:

Earth resources premises include sites such as mines and quarries, and ancillary infrastructure (such as evaporation pond facilities, ventilation shafts, tailings dams or pumping stations) located within the site's approved working area.

Both the generating and receiving zones are situated within a Green Wedge A Zone and Low Density Residential Zone, the Subject Site classified as an earth resources premises. As such, the assessment criteria are derived through the methodology prescribed within Section 2.7 of the *Noise Protocols – Noise limits in rural areas for earth resources*.

4.2.2 Project-specific noise limits

In accordance with Section 2.4 of the Noise Protocols, a background level assessment was undertaken to determine project specific noise limits. These are defined in Table 4.2 and Table 4.3 below with comparison drawn against general earth resource levels, with the greater of the two taken as the project-specific noise limit (PSNL).

Residential noise sensitive receivers are categorised based on their position relative to the site (east or west), with the relevant PSNL applied.

Table 4.2 Eastern PSNLs L_{eq} dBA

Background levels	Assessment period						Relevant assessment locations
	Weekday			Saturday			
	Day (7:00 am to 6:00 pm)	Evening (6:00 pm to 10:00 pm)	Night (5:30 am to 7:00 am)	Day (7:00 am to 6:00 pm)	Evening (6:00 pm to 10:00 pm)	Night (5:30 am to 7:00 am)	
Earth resource level	46	41	36	46	41	36	R1, R6, R7, R8
Background assessment level ¹	50	42	48	47	N/A	41	
PSNL (dBA)	50	42	48	47	N/A	41	

Notes: 1. Background assessment level is based on RBL + 8/5/5 dB for Day/Evening/Night respectively.

Table 4.3 Western PSNLs

Background levels	Assessment period						Relevant assessment locations
	Weekday			Saturday			
	Day (7:00 am to 6:00 pm)	Evening (6:00 pm to 10 pm)	Night (5:30 am to 7:00 am)	Day (7:00 am to 6:00 pm)	Evening (6:00 pm to 10:00 pm)	Night (5:30 am to 7:00 am)	
Earth resource level	46	41	36	46	41	36	R2, R3, R4, R5
Background assessment level ²	49	42	48	49	N/A	42	
PSNL (dBA)	49	42	48	49	N/A	42	

4.3 Cumulative noise

Cumulative noise from two or more premises that are likely to emit noise which contributes to the effective noise level are addressed in the EPA document *Technical Guide: Measuring and analysing industry noise and music noise* publication number 1997 (2021).

As discussed in Section 3.2.1, the existing operational extractive industry to the north of the Subject Site is likely to contribute to the noise environment at nearest affected noise sensitive receivers. In the absence of noise impact assessment reports relating to this site, EMM has taken a conservative approach whereby a 3 decibel (dB) reduction is to be applied to the project-specific noise limit to limit the impact of cumulative noise. The noise limits reflecting this adjustment are displayed in Table 4.4 and Table 4.5 below.

Table 4.4 Eastern PSNLs inclusive of cumulative noise adjustment

Relevant noise limits	Assessment period						Relevant assessment locations
	Weekday			Saturday			
	Day	Evening	Night	Day	Evening	Night	
Earth resource level	43	38	33	43	38	33	R1, R6, R7, R8
Background assessment level ²	47	39	45	44	N/A	38	
Noise limit (dBA)	47	39	45	44	N/A	38	

Table 4.5 Western PSNLs inclusive of cumulative noise adjustment

Relevant noise limits	Assessment period						Relevant assessment locations
	Weekday			Saturday			
	Day	Evening	Night	Day	Evening	Night	
Earth resource level	43	38	33	43	38	33	R2, R3, R4, R5
Background assessment level ²	46	39	45	46	N/A	39	
Noise limit (dBA)	46	39	45	46	N/A	39	

4.4 Specific noise limit variation for mines, quarries and landfills

The Noise Protocols outline instances where variations to the noise limit for the Subject Site may be applied, specific to the activity being undertaken. These activities and the noise limit variations are reproduced from the Noise Protocols in Table 4.6 below.

Table 4.6 Specific noise limit variations

Activity	Application of variations	Variations to noise limits
Installation of construction noise control works	<p>The variation applies to the construction of structures that are specifically designed for a noise-control purpose, (such as walls or earth bunds) to meet the noise limits.</p> <p>The variation applies to noise control works to protect different noise sensitive areas at a later stage in the project e.g. where extraction works take place in a different part of a large site.</p> <p>The variation does not include mining or quarrying works carried out during the project that have a coincidental, secondary noise-control benefit e.g. general overburden stockpiling, or building construction or demolition.</p>	Noise from the activity may be exempted from noise limits during the day period.
Site clearing and preparation works	<p>The variation applies to vegetation removal, topsoil removal, subsoil removal, road construction and civil works such as site drainage where the activity will happen before acoustic mounds can feasibly be constructed.</p> <p>The variation does not apply to overburden removal.</p>	<p>Noise from the activity may be exempted from noise limits during the day period.</p> <p>Site clearance works will comply with the project daytime noise limits, due to the reduced number of the mobile equipment in use during this period.</p> <p>On that basis the daytime noise limit will be achieved and no additional mitigation is required.</p>
Site rehabilitation	<p>The variation applies to progressive and final site rehabilitation, occurring at the final surface level.</p> <p>The variation does not apply to backfilling of a pit.</p>	During the day period, the noise limit may be increased by up to 10 dB, to a maximum of 68 dB(A).
Necessary unshielded work	The variation applies to waste dump extensions (at a mine or quarry) or tailings dam construction that is necessary but cannot practicably be shielded by barriers, landforms or natural topography.	During the day period, the noise limit may be increased by up to 10 dB, to a maximum of 68 dB(A).

4.5 Low frequency noise guidelines

Low frequency noise is to be assessed as it is identified as unreasonable noise due to its tonal character under the EP Act.

Low frequency noise (LFN) can be characterised as noise containing dominant energy within the low frequency range (i.e. less than 200 Hz). Examples of noise sources with LFN characteristics can include screens and centrifuges, as well as pumps, fans, boilers, ventilation plant, electrical installations, and wind turbines.

The EPA document *Noise guidelines: Assessing low frequency noise* publication number 1996 (2021) provides guidance on the assessment of low frequency noise between 10 Hz and 160 Hz.

Low frequency noise is to be assessed through the comparison of linear measurements in one-third octave bands to threshold levels defined within the above document. These are reproduced in Table 4.7 below, noting that the threshold levels are based on the assumed façade noise reductions given in Downey and Parnell (2017).

Table 4.7 Outdoor one-third octave low frequency noise threshold levels

Outdoor one-third octave low frequency threshold levels													
One-third octave (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Leq (dB)	92	89	86	77	69	61	54	50	50	48	48	46	44

A screening assessment was also undertaken in the absence of plant and equipment sound power data under 31.5 Hz to provide further robustness to the methodology of identifying potential low frequency noise impacts. This assessment involves the comparison C-weighted and A-weighted predictions, with a difference of 15 dB being indicative of the potential for an unbalanced spectrum and potential increased annoyance.

The A-weighting is commonly used in assessment of impacts. It represents the human ear's response to noise, which is more sensitive to mid-range frequencies and less sensitive to high and low frequencies. The C-weighting is relevant for measurement of LFN, which is less perceptible by the human ear.

An example of A-weighting and C-weighting frequency responses to noise (unrelated to Lang Lang Quarry) is shown graphically in Figure 4.1. This example shows that C-weighting is more responsive in the lower frequency range than A-weighting, in particular (in this case) at ≤ 630 Hz where typical quarrying noise levels at relatively large distances from site reside.

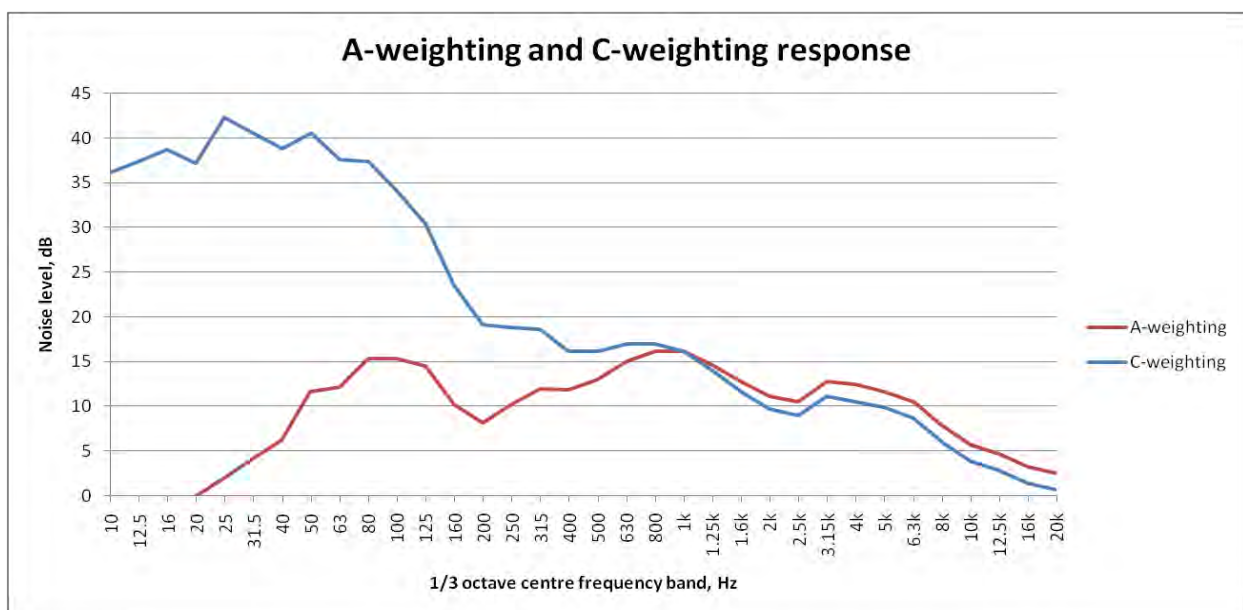


Figure 4.1 A-weighted and C-weighted frequency response example (unrelated to Lang Lang Quarry)

4.6 Environmental reference standard (ERS)

The Environment Reference Standard (ERS) tool is defined in the EP Act, and is used to achieve:

- identifying environmental values that the Victorian community want to achieve and maintain
- providing a way to assess those environmental values in locations across Victoria.

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The ERS is comprised of four components relative to the ambient noise environment:

- environmental values
- areas of application
- indicators
- objectives.

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The ERS outlines a framework of assessing the ambient noise environment based on the land use category of the assessment area. Table 4.8 reproduces the relevant land use categories based on planning zones, and Table 4.9 reproduces the indicators and objectives relative to each land use category.

The Subject Site is identified as being in a Green Wedge Zone A (GWZ) with Public Conservation and Resource Zones (PCRZs) to both the north-east and south-east, along with residential zones and public use zones to the east and north-east.

Table 4.8 Land use categories for the ambient noise environment

Land use category	General description	Planning zones
Category III	Lower rise building form including lower density residential development and detached housing typical of suburban residential settings or in towns of district or regional significance.	<ul style="list-style-type: none"> • Residential Growth Zone (RGZ) • General Residential Zone (GRZ) • Neighbourhood Residential Zone (NRZ) • Urban Floodway Zone (UFZ) • Public Park and Recreation Zone (PPRZ) • Urban Growth Zone (UGZ)
Category IV	Lower density or sparse populations with settlements that include smaller hamlets, villages and small towns that are generally unsuited for further expansion. Land uses include primary industry and farming.	<ul style="list-style-type: none"> • Low Density Residential Zone (LDRZ) • Township Zone (TZ) • Rural Living Zone (RLZ) • Green Wedge A Zone (GWAZ) • Rural Conservation Zone (RCZ) • Public Conservation and Resource Zone (PCRZ) • Green Wedge Zone (GWZ) • Farming Zone (FZ) • Rural Activity Zone (RAZ)

Table 4.9 Indicators and objectives for the background noise environment

Land use category	Indicators	Objectives, dB(A)
Category III	Outdoor LAeq,8 h from 10 pm to 6 am	40
	Outdoor LAeq,16 h from 6 am to 10 pm	50
Category IV	Outdoor LAeq,8 h from 10 pm to 6 am	35
	Outdoor LAeq,16 h from 6 am to 10 pm	40

Where noise that is not assessable under the Noise Protocols is generated as part of the project it is to be evaluated against the ERS in accordance with EPA Publication 1992: *Guide to the Environment Reference Standard*.

5 Assessment methodology

5.1 Overview

This section presents the methods and base parameters used to model operational and construction noise and vibration emissions from construction and operation of the Project.

Operational and construction noise levels were predicted using SoundPLAN GmbH version 8.2 proprietary modelling software, SoundPLAN (the model). This model calculates using International Standard ISO 9613-2:1996 'Acoustics – Attenuation of sound during propagation outdoors' algorithms. As per Section 1 of the Standard:

The method predicts the equivalent continuous A-weighted sound pressure level (as described in parts 1 to 3 of ISO 1996) under meteorological conditions favourable to propagation from sources of known sound emission.

These conditions are for downwind propagation, as specified in 5.4.3.3 of ISO 1996-2:1987 or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.

The model calculates total noise levels at assessment locations from concurrent operation of multiple noise sources. It considers factors that influence noise propagation such as:

- equipment sound power levels and locations
- screening from structures
- receiver locations
- ground topography
- noise attenuation due to geometric spreading
- ground absorption
- atmospheric absorption.

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The noise model was populated with 3-D topography of the project and surrounding area, extending beyond noise sensitive receivers. Plant and equipment representing the range of operational scenarios was placed at locations to replicate worst case noise levels. The receiver position has been identified as within 10 m of a dwelling in the free field.

Table 5.1 **Model inputs**

Input	Author	Date of receipt
Topography	Spatial Vision	17 July 2024
Staging plans	Briar Consulting	2 July 2024
Sensitive receivers	Briar Consulting	2 July 2024

5.2 Plant and equipment

Plant and equipment proposed for undertaking quarrying activities with associated sound power levels is presented in Table 5.2 below.

The sound power levels assigned to each item have been derived from technical manuals where possible, otherwise they have been sourced from one of the following:

- EMM's internal database of representative sound power level measurements, or
- Department of Environment, Food and Rural Affairs (DEFRA) 2005, *Update of Noise Database for Prediction of Noise on Construction and Open Sites*.

Table 5.2 Equipment and plant sound power levels

Noise source	No. of items per 30 min period	Utilisation (%)	Sound power level per item (L _{Aeq}) dB
Striker SQ1862 mobile screener (or similar)	3	100	105
Liebherr L556 front end loader (or similar)	3	100	104
Hino Ranger with an agitator (or similar)	1	100	111
Truck and Dog	10	100	107
Dewatering pump	1	100	92
Articulated dump truck	3	100	109

Unless otherwise noted, all equipment is modelled as being operational for 100% of the assessment period and is thus considered a conservative approach.

5.3 Noise assessment scenarios

Figure A15-V6 of the Work Plan (reproduced in Appendix D.1) provided by the Client specifies four stages in which material will be extracted from the Subject Site, which form the basis of noise modelling.

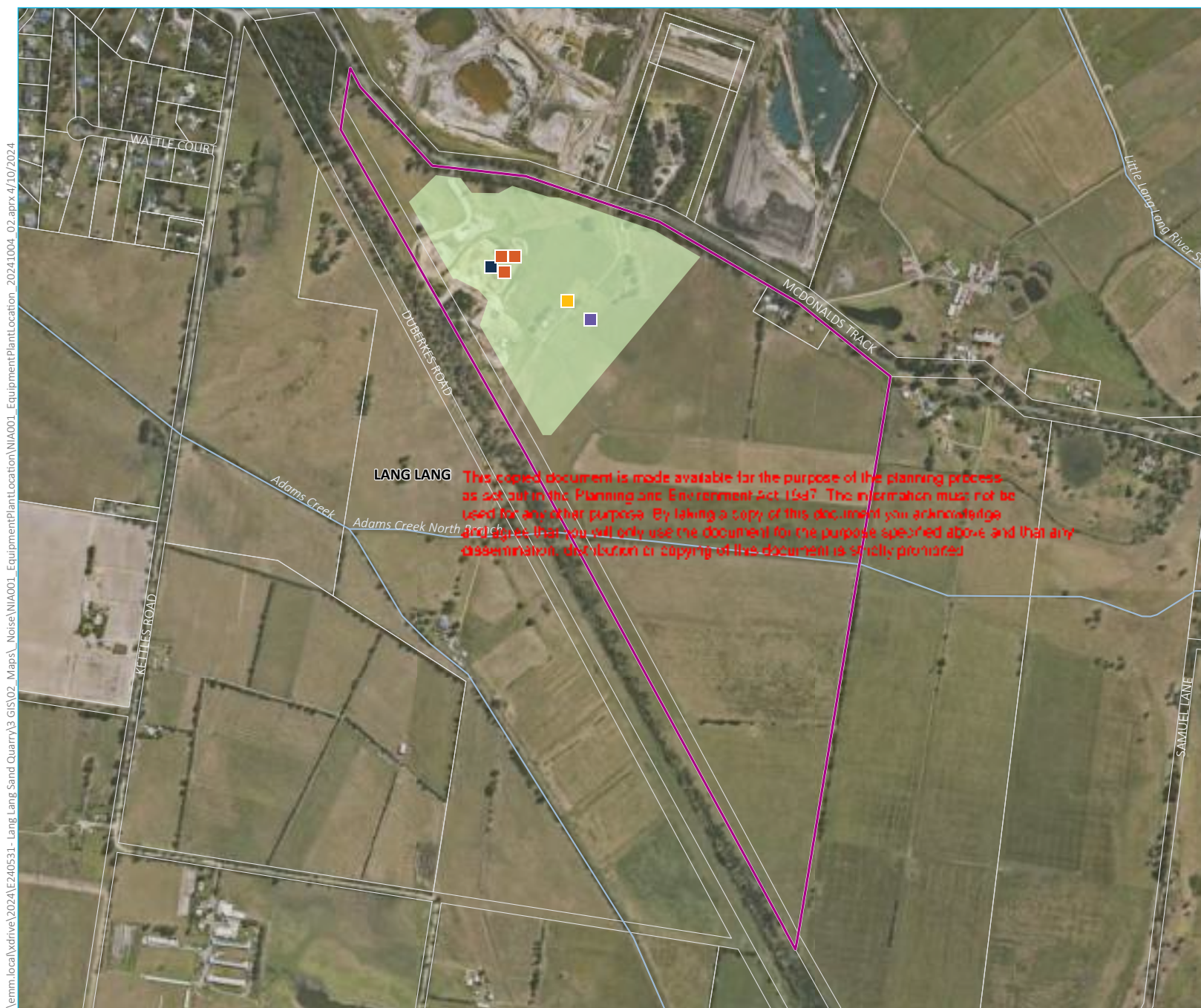
Noting that surface works are exempt from noise limits during the daytime period as per the Noise Protocols specific noise limit variations for quarries, the works predicted to have the highest impact to the noise sensitive receivers take place at the upper extraction height, which is approximately 5 m below existing ground level as visualised in Figure A06-P10 of the Work Plan (Appendix D.2).

The equipment utilised only varies by location as the stages of extraction progress, with the number of equipment as per Section 5.2 remaining constant throughout the operational lifespan of the quarry. Equipment location per stage is visualised in Figure 5.1 through Figure 5.4.

Saturday night-time (5.30 am to 7.00 am) will be limited to process and procedures associated with the product sales. There will be no extractive works or mobile screen processing during this period.

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\\emm.local\drive\2024\E240531 - Lang Lang sand Quarry\3 GIS\02_Maps\Noise\NIA001_EquipmentPlantLocation_20241004_02.aprx 4/10/2024



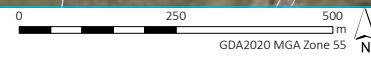
- KEY**
- Work authority boundary
 - Equipment**
 - Extraction work
 - Front end loader
 - Mobile screen
 - Pump
 - Stage**
 - Stage 1A
 - Existing environment**
 - Named watercourse
 - Cadastral boundary

Equipment and plant location-
Stage 1A

Lang Lang Quarry
Noise Impact Assessment
Figure 5.1



Source: EMM (2024); DEECA (2023); GA (2009); MetroMap (2024)



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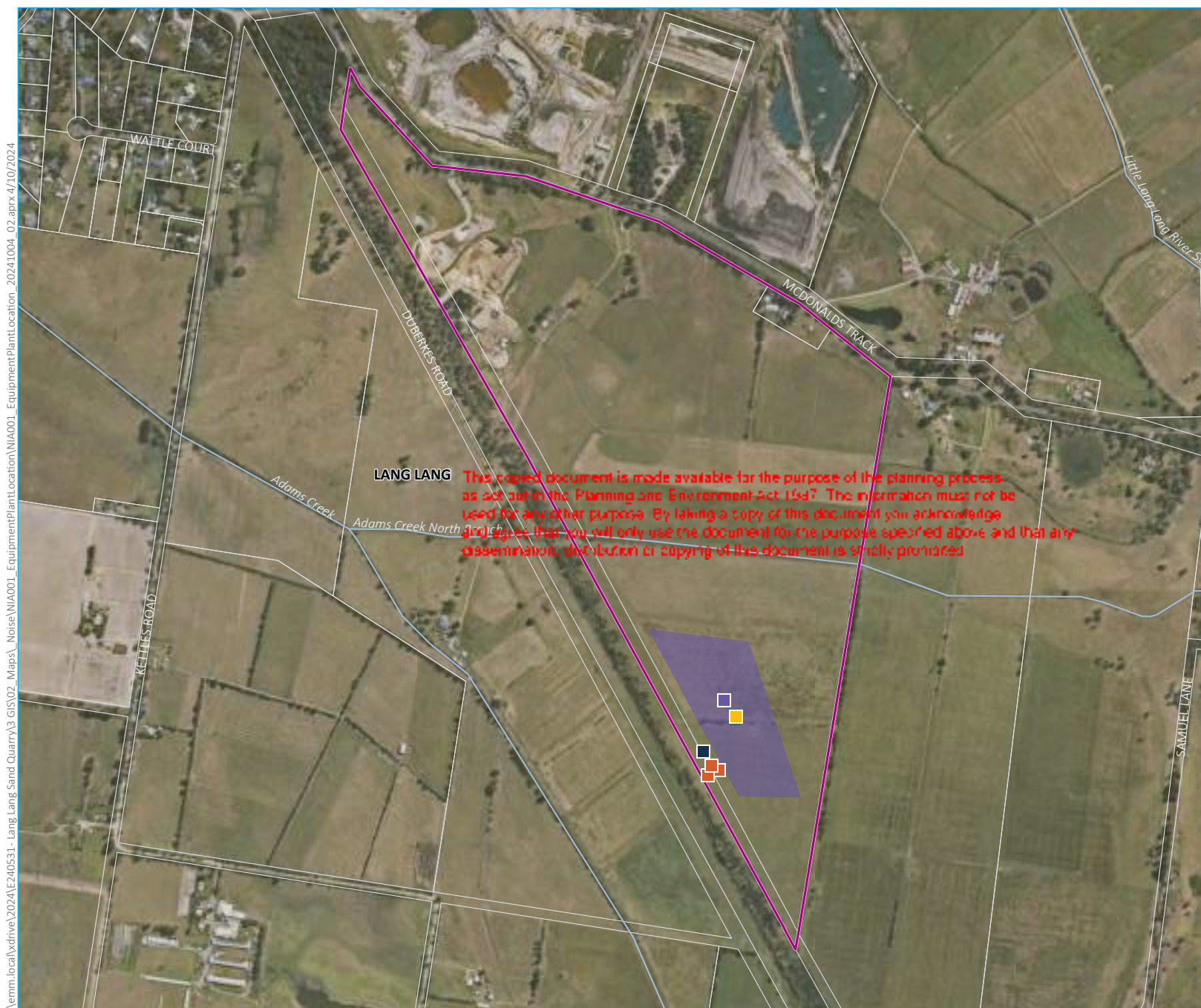
- KEY**
- Work authority boundary
 - Equipment**
 - Extraction work
 - Front end loader
 - Mobile screen
 - Pump
 - Stage**
 - Stage 1B
 - Existing environment**
 - Named watercourse
 - Cadastral boundary

Equipment and plant location-
Stage 1B

Lang Lang Quarry
Noise Impact Assessment
Figure 5.2



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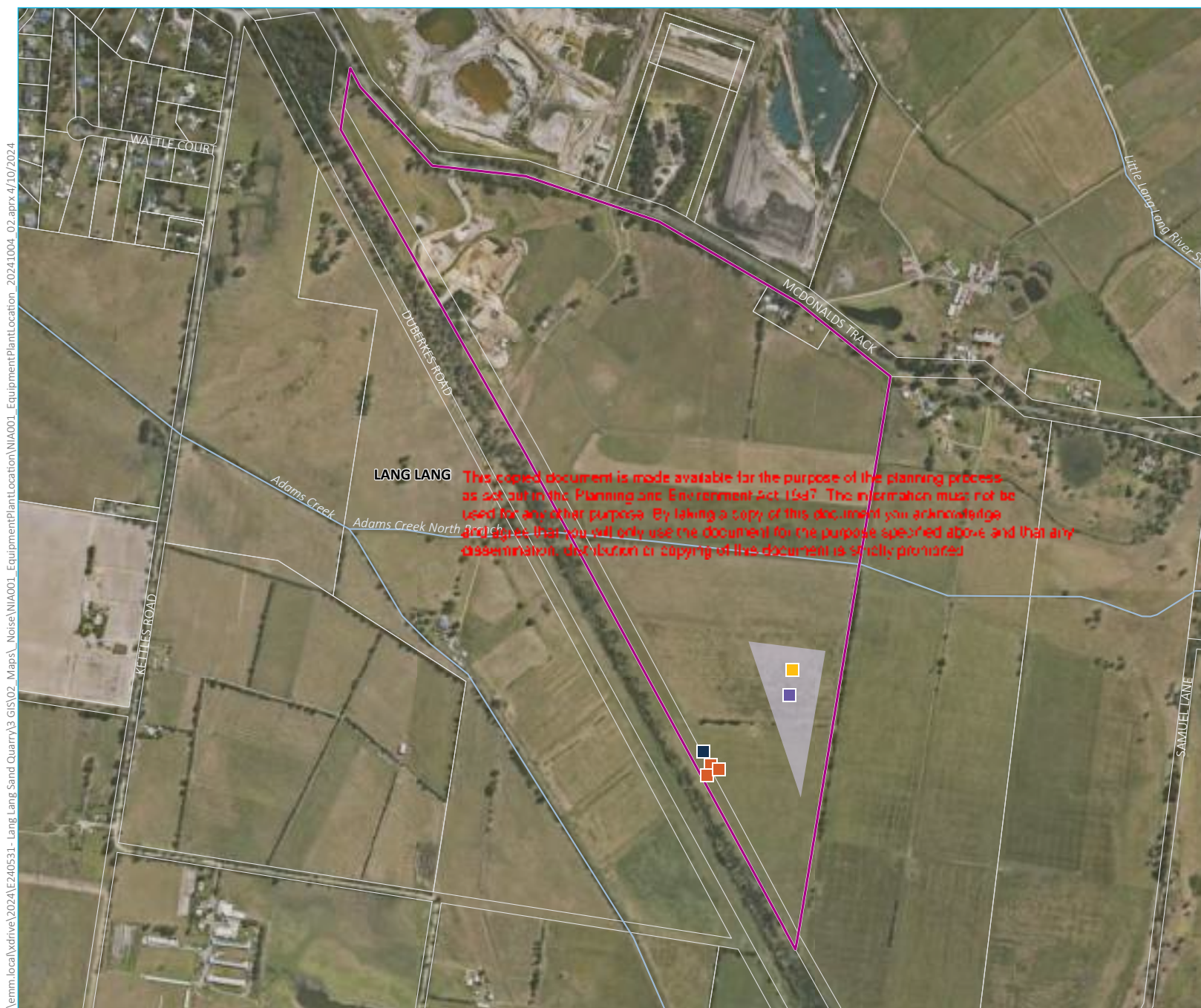
- KEY
- Work authority boundary
- Equipment
- Extraction work
 - Front end loader
 - Mobile screen
 - Pump
- Stage
- Stage 2A
- Existing environment
- Named watercourse
 - Cadastral boundary

Equipment and plant location-
Stage 2A

Lang Lang Quarry
Noise Impact Assessment
Figure 5.3



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- KEY
- Work authority boundary
- Equipment
- Extraction work
 - Front end loader
 - Mobile screen
 - Pump
- Stage
- Stage 2B
- Existing environment
- Named watercourse
 - Cadastral boundary

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Equipment and plant location-
Stage 2B

Lang Lang Quarry
Noise Impact Assessment
Figure 5.4



5.4 Assumptions

Assumptions made in the modelling of noise emissions from the site are as follows:

- Pit operations consist of 2 x front end loader (FEL) and 1 x water cart.
- Processing operations consist of 1 x FEL and 3 x mobile.
- 2 x Articulated dump trucks travelling on proposed access routes in pit.
- 20 truck movements per hour along the access track during operational hours (as per Work Plan).
- Dewatering pumps located in work area sump pit.
- Noise-enhancing meteorological conditions.

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6 Results

6.1 Predicted effective noise levels

Table 6.1 presents the predicted effective noise levels for each proposed extraction stage for weekdays. These are visualised as noise contours plots presented in Appendix C.

Table 6.1 Weekday effective noise levels L_{eq} dBA

Assessment location	Stage 1A		Stage 1B		Stage 2A		Stage 2B		Weekday PSNL	
	Day	Night ¹	Day	Night ¹	Day	Night ¹	Day	Night ¹	Day	Night
R1	44	44	44	43	40	38	39	38	47	45
R2	41	41	43	43	41	41	38	38	46	45
R3	30	30	32	32	30	29	28	28	46	45
R4	42	42	44	44	43	43	42	42	46	45
R5	32	32	36	36	33	33	31	31	46	45
R6	32	32	32	32	38	38	34	34	47	45
R7	37	37	37	37	38	38	35	35	47	45
R8	44	44	44	44	42	42	42	42	47	45

Notes: 1. Night-time period only considers the hours within the assessment period during which the site is operational, specifically 5:30 am to 7:00 am.

Table 6.2 presents the predicted effective noise levels for each proposed extraction stage for Saturdays with operations modified during the nighttime period (5.30 am to 7.00 am) to only include sales activities.

Table 6.2 Saturday effective noise levels (dBA)

Assessment location	Stage 1A		Stage 1B		Stage 2A		Stage 2B		Saturday PSNL	
	Day	Night ¹	Day	Night ¹	Day	Night ¹	Day	Night ¹	Day	Night
R1	44	38	44	38	40	36	39	36	44	38
R2	41	34	43	35	41	32	38	31	46	39
R3	30	21	32	23	30	21	28	22	46	39
R4	42	35	44	38	43	33	42	35	46	39
R5	32	23	36	25	33	24	31	27	46	39
R6	32	24	32	23	38	29	34	27	44	38
R7	37	30	37	29	38	30	35	29	44	38
R8	44	37	44	35	42	34	42	35	44	38

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6.2 Discussion

6.2.1 Assessment against the Noise Protocols

The modelling results presented in Table 6.1 and Table 6.2 demonstrate that the effective noise levels predicted during the both the daytime and night-time periods for the operation of all stages are compliant with the PSNLs, in accordance with the Victorian EPA Noise Protocols.

It is further noted that these predictions are conservative due to the following factors:

- As stated in Section 5.4, predicted levels are based on 100% utilisation of plant and equipment at full power, with exception of the Saturday morning period (5:30 am to 7.00 am) whereby only plant and equipment associated with sales is operational.
- It is predicted based on source contribution calculations that pit extraction operations control the noise emissions to all assessment locations. Noise levels associated with quarrying activities are expected to decrease in a proportional manner relative to extraction pit depth due to increased barrier effects.

6.2.2 Assessment against the GED

The GED requires that, irrespective of compliance with the Noise Protocols, that a person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste, must minimise those risks, so far as reasonably practicable. Therefore, noise control measures are to be implemented as standard practice where feasible and practicable. These management and mitigation strategies are outlined in Section 8.

Table 8.1 outlines the relative expected noise reductions based on EMM's experience in quarrying projects, quantifying the expected effectiveness of the proposed mitigation and management strategies. It is expected that after implementation of the work practices and training outlined, combined with the extremely conservative nature of this assessment, that noise levels will be between 8 and 15 dB lower than the predicted effective noise levels, and as such the project meets GED requirements in regard to the elimination and minimisation of risk in alignment with the hierarchy of noise controls.

6.2.3 Assessment against the ERS

Noise emissions with the potential to natural areas was assessed both qualitatively and against the objectives presented in Table 4.9. The objective of the assessment is to maintain a sound quality that is conducive to human tranquillity and enjoyment with regard to the ambient noise environment.

The predicted quarry contributions to the closest natural areas are presented in Table 6.3 below.

Table 6.3 Effective noise levels at closest natural areas

Natural area	Operational stage				ERS objective	
	Stage 1A	Stage 1B	Stage 2A	Stage 2B	Outdoor LAeq,8h from 10 pm to 6 am	Outdoor LAeq,16h from 6 am to 10 pm
Lang Land Bushland Reserve	29	29	29	29	35	40
Adams Creek Nature Reserve	22	22	23	23	35	40

EMM's assessment indicates that noise emissions from Subject Site are compliant with ERS objectives for natural areas for all operational stages, with low risk of exceedance due to the conservative nature of this assessment.

Further, the qualitative assessment of the ambient noise environment, both Lang Lang Bushland Reserve and Adams Creek Nature Reserve are expected to be exposed to high levels of existing ambient noise from Lang Lang township and South Gippsland Highway respectively. As such, it is not expected that contributions from the Subject Site will impact the sound quality that is conducive to human tranquillity and enjoyment.

6.2.4 Low frequency noise assessment

Low-frequency noise was assessed as described in Section 4.5. It is noted that the threshold levels are not set limits, nor represent a risk of harm or health impact, rather, they are levels that indicate a potential risk of problematic LFN from the perspective of annoyance.

The Victorian EPA LFN Guideline represents a conservative method for evaluating potential additional LFN disturbance for generally steady state day-time operations due to a lack of relaxation in threshold levels for these conditions.

i Limitations of low-frequency noise measurement and prediction

The guideline acknowledges the difficulty and limitations of being able to reliably predict low frequency, noting a lack of suitable manufacturer or test data and limitations of the prediction algorithms at low frequencies.

Additionally, it is understood the ISO 9613 air absorption, ground absorption and barrier attenuation algorithms are not validated for below 63 Hz frequency bands. It also applies these losses to octave band levels, presumably the losses are interpolated by SoundPLAN for one-third octave results.

It is noted that manufacturer sound power data did not extend below 31.5 Hz. As such, these have not been assessed. These limitations are to be considered when reviewing the results.

ii Low-frequency noise results

The most highly impacted assessment locations (namely R1 during Stage 1A and 1B, and R4 during Stage 2A and 2B) were assessed for low-frequency noise. The findings are summarised in Table 6.4 below.

Low-frequency noise exceedances are predicted throughout the life of the project and are generally attributable to pit extraction works. The exceedances are limited to the range of 50 Hz to 100 Hz and may be 11 dB above the threshold levels. It is noted that despite the absence of plant and equipment sound power data below 31.5 Hz, it is apparent that the predicted spectral levels relative to the threshold levels are trending downwards and no exceedances at frequencies below 31.5 Hz is expected.

It is common practise, that recognising the difficulty in assessing low-frequency noise whilst still considering the modelled results, mitigation and management will be implemented as standard practice through the hierarchy of controls approach as follows:

- Installation of noise attenuation mufflers on the equipment fleet.
- Regular maintenance of equipment to ensure operational noise levels do not increase over time. Particular care should be paid to engine maintenance, potential vibration from loose parts and any acoustic enclosures.
- Reduction of operating times by turning off idling equipment.

It is also to be noted that the level of exceedance is expected to decrease along each stage as the extraction pit depth increases, resulting in increased barrier attenuation.

Based on EMM's assessment methodology, it is expected that the predicted low-frequency exceedances noted in Table 6.4 are mitigated to acceptable levels and noise emissions and not classified as unreasonable under the EP Act.

Table 6.4 Low-frequency assessment results

Operational stage	One-third Octave Leq, dB								LCeq – LAeq, dB
	31.5	40	50	63	80	100	125	160	
Stage 1A	49	44	61	57	53	49	46	43	16
Stage 1B	48	44	62	58	54	49	45	43	15
Stage 2A	48	43	61	57	53	48	44	42	9
Stage 2B	48	43	61	57	53	47	44	40	13
Threshold Level	61	54	50	50	48	48	46	44	15

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7 Risk assessment

A risk assessment was conducted in accordance with *Assessing and controlling risk: A guide for business 2021* (publication number 1695.1). The identified hazards and associated risks are presented in Table 7.1 below. Where unmitigated risks are assessed as medium or higher, it is necessary to apply additional mitigation measures to reduce the risk as far as practicable.

As noted below, the mitigated risk rating for all stages of the development is categorised as low. As such, the requirements of the GED have been satisfied.

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Table 7.1 Hazard and risk register

Stage	Hazard	Potential harm	Unmitigated risk assessment			What controls are required?	Actions			Mitigated risk assessment		
			Consequence	Likelihood	Risk rating		Action by	Due date	Date complete	Consequence	Likelihood	Risk rating
Site Planning	Impact on residential amenity due to excessive noise (including low frequency).	Sleep disturbance, stress, annoyance, high blood pressure.	Moderate	Possible	Medium	• Adequate buffer distances between operations and sensitive receivers.	Sandbelt Industries			Minor	Unlikely	Low
	Noise exposure above the occupational noise exposure standard.	Hearing damage, stress, cardiovascular disease.	Moderate	Possible	Medium	• Staff training and appropriate PPE to be worn.	Sandbelt Industries			Minor	Unlikely	Low
Equipment selection	Impact on residential amenity due to excessive noise (including low frequency).	Sleep disturbance, stress, annoyance, high blood pressure.	Moderate	Possible	Medium	• Installation of noise attenuation mufflers on the equipment fleet. • Regular maintenance of equipment to ensure operational noise levels do not increase over time. Particular care should be paid to engine maintenance, potential vibration from loose parts and any acoustic enclosures. • Reduction of operating times by turning off idling equipment. • Attended compliance measurements throughout the operational lifetime of the quarry. • Selection of quieter equipment where feasible when selecting new equipment for on-site use.				Minor	Unlikely	Low
	Noise exposure above the occupational noise exposure standard.	Hearing damage, stress, cardiovascular disease.	Moderate	Possible	Medium	• Staff training and appropriate PPE to be worn.	Sandbelt Industries			Minor	Unlikely	Low
Establishment	Impact on residential amenity due to excessive noise (including low frequency).	Sleep disturbance, stress, annoyance, high blood pressure.	Low	Unlikely	Low	• Application of recommended mitigation and management measures				Low	Rare	Low
	Noise exposure above the occupational noise exposure standard.	Hearing damage, stress, cardiovascular disease.	Moderate	Possible	Medium	• Staff training and appropriate PPE to be worn.	Sandbelt Industries			Minor	Unlikely	Low
Operations	Impact on residential amenity due to excessive noise (including low frequency).	Sleep disturbance, stress, annoyance, high blood pressure.	Moderate	Possible	Medium	• Undertake works in accordance with EPA approval. • Apply recommended noise management strategies.	Sandbelt Industries			Minor	Unlikely	Low
	Noise exposure above the occupational noise exposure standard.	Hearing damage, stress, cardiovascular disease.	Moderate	Possible	Medium	• Staff training and appropriate PPE to be worn.	Sandbelt Industries			Minor	Unlikely	Low
Maintenance and rehabilitation	Impact on residential amenity due to excessive noise (including low frequency).	Sleep disturbance, stress, annoyance, high blood pressure.	Low	Unlikely	Low	• Site rehabilitation to be undertaken during the daytime period.				Minor	Rare	Low
	Noise exposure above the occupational noise exposure standard	Hearing damage, stress, cardiovascular disease	Moderate	Possible	Medium	• Staff training and appropriate PPE to be worn.	Sandbelt Industries			Minor	Unlikely	Low

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8 Management and mitigation

8.1 Overview

Recommended noise mitigation and management measures are described in the following sections. Approximate noise reductions provided by some of these measures are provided in Table 8.1.

Table 8.1 Relative effectiveness of various forms of noise control

Noise control	Nominal noise reduction possible, in total A-weighted sound pressure level, dB
Increase source to receiver distance ¹	approximately 6 dB for each doubling of distance
Reduce equipment operating times or turn off idling machinery ²	approximately 3 dB per halving of operating time
Operating training on quiet operation ²	up to 3 to 5 dB
Screening (e.g. noise barrier) ¹	normally 5 dB to 10 dB, maximum 15 dB
Enclosure (e.g. shed/building) ¹	normally 15 dB to 25 dB, maximum 50 dB
Silencing (e.g. exhaust mufflers) ¹	normally 5 dB to 10 dB, maximum 20 dB

Notes: 1. Sourced from AS2436-2010.
2. Based on EMM's measurement experience at construction and mining sites

8.2 Work practices

Work practice noise reduction methods include:

- regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration particularly during night-time periods
- regular identification of noisy activities and adoption of improvement techniques
- where possible, avoiding the use of equipment that generates impulsive noise
- minimising the movement of materials and plant and unnecessary metal-on-metal contact.

8.3 Plant and equipment

Additional measures for plant and equipment include:

- where possible, choosing quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks
- replacement of movement alarms and beepers with non-tonal, level varying quackers or equivalent
- operation of plant and equipment in the quietest and most efficient manner
- regular inspections and maintenance of plant and equipment to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.

8.4 Low-frequency noise

Measures to be taken to minimise the risk of harm from low-frequency noise consistent with the GED include:

- attended measurement at each stage of quarrying activities with comparisons drawn against criteria outlined within Section 4.5
- installation of noise attenuation mufflers on the equipment fleet
- regular maintenance of equipment to ensure operational noise levels do not increase over time. Particular care should be paid to engine maintenance, potential vibration from loose parts and any acoustic enclosures
- reduction of operating times by turning off idling equipment.

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9 Conclusion

Sandbelt Industries (VIC) Pty Ltd has engaged EMM Consulting Pty Limited (EMM) to prepare a noise impact assessment (NIA) in support of a work plan application for extraction of sand operations (open pit, dry sand extraction) at 350–430 McDonalds Track, Lang Lang under Extractive Industry Work Authority 6979.

This NIA has been prepared to assess potential noise impacts from extractive operations for submission as part of the workplan application.

Operational noise from the site has been assessed in accordance with the Noise Protocols for earth resources. Project specific noise levels (PSNLs) were established based on the results of ambient noise monitoring undertaken from 3 September 2024 to 12 September 2024.

Noise emissions are expected to comply with the relevant PSNLs during all proposed periods of operation at all assessment locations under noise enhancing meteorological conditions.

Surrounding natural areas were assessed against the terms of the ERS both quantitatively and qualitatively and comply with the noise limits.

Based on EMM findings, operations at the Subject Site will not impact general amenity or sleep disturbance at the nearest noise sensitive receivers. Risk ratings for proposed operational activities are low in regard to excessive noise emissions.

Best practice work methods are outlined in Section 8 and are to be followed to minimise noise impacts as far as practicable. Expected risk of noise exceedances is low after the implementation of mitigation and management, and as such, the requirements of the GED have been satisfied.

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Appendix A

Glossary

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A.1 Glossary

Technical terms typically utilised in a noise assessment report are explained in Table A.1.

Table A.1 Glossary of acoustic terms and abbreviations

Abbreviation or term	
ABL	The assessment background level (ABL) is defined in the INP as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L_{A90} statistical noise levels.
Amenity noise criteria	The amenity noise criteria relate to the overall level of industrial noise. Where existing levels of industrial noise (excluding the subject development) approach the acceptable amenity noise criteria, then noise levels from new industries need to demonstrate that they will not be an additional contributor to existing industrial noise.
A-weighting	There are several different weightings utilised for describing noise, the most common being the 'A-weighting'. This attempts to closely approximate the frequency response of the human ear.
CEMP	Construction environment management plan
C-weighting	There are several different weightings utilised for describing noise, with the 'C-weighted' scale typically used to assess low frequency noise and is also utilised in the assessment of occupational noise.
Day period	Monday to Saturday: 7:00 am to 6:00 pm, on Sundays and public holidays: 8:00 am to 6:00 pm.
dB	Noise is measured in units called decibels (dB).
EA	Environmental assessment
EMM	EMM Consulting Pty Limited
EP&A Act	Environmental and Planning Assessment Act 1979 (NSW)
EPA	The Victorian Environment Protection
Evening period	Monday–Saturday: 6:00 pm to 10:00 pm, on Sundays and public holidays
ICNG	Interim Construction Noise Guideline
Intrusive noise criteria	The intrusive noise criteria refer to noise that intrudes above the background level by more than 5 dB.
L_{A1}	The A-weighted noise level exceeded for 1% of the time.
L_{A10}	The A-weighted noise level which is exceeded 10% of the time. It is roughly equivalent to the average of maximum noise level.
L_{A90}	The A-weighted noise level that is exceeded 90% of the time. Commonly referred to as the background noise level.
L_{Aeq}	The A-weighted energy average noise level. This is the equivalent continuous sound pressure level over a given period. The $L_{Aeq}(15\text{-minute})$ descriptor refers to an L_{Aeq} noise level measured over a 15-minute period.
Linear peak	The peak level of an event is normally measured using a microphone in the same manner as linear noise (i.e. unweighted), at frequencies both in and below the audible range.
L_{Amax}	The maximum A-weighted sound pressure level received during a measurement interval.
Night period	Monday–Saturday: 10:00 pm to 7:00 am, on Sundays and public holidays: 10:00 pm to 8:00 am.
NMP	Noise management plan

Abbreviation or term	
PNTL	Project noise trigger level
PSNL	The project-specific noise level (PSNL) is criteria for a particular industrial noise source or industry. The PSNL is the lower of either the intrusive noise criteria or amenity noise criteria.
RBL	The rating background level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the average background levels.
Sound power level (L_W)	A measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

It is useful to have an appreciation of decibels (dB), the unit of noise measurement. Table A.2 gives an indication as to what an average person perceives about changes in noise levels. Examples of common noise levels are provided in Figure A.1.

Table A.2 Perceived change in noise levels

Change in sound level (dB)	Perceived change in noise
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or quarter) as loud

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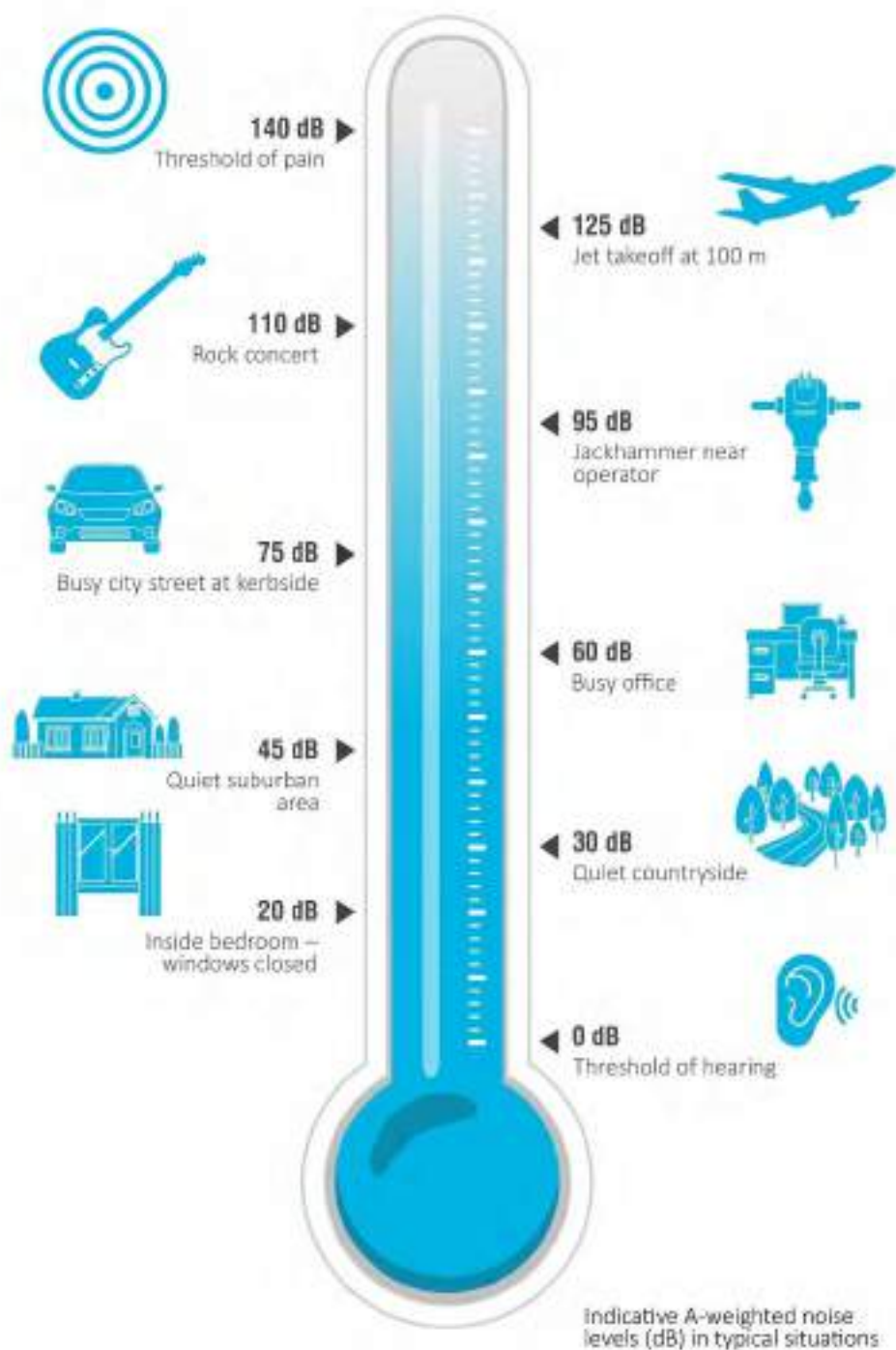


Figure A.1 Common noise levels

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Appendix B

Unattended noise logging instrumentation

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Sound Level Meter

IEC 61672-3:2013

Calibration Certificate

Calibration Number C22695

Client Details		EMM Consulting Level 3/175 Scott Street Newcastle NSW 2300	
Equipment Tested/ Model Number :		ARL Ngara	
Instrument Serial Number :		878017	
Microphone Serial Number :		21991	
Pre-amplifier Serial Number :		27806	
Firmware Version :		12.6	
Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature : 22.4°C		Ambient Temperature : 22.8°C	
Relative Humidity : 48.6%		Relative Humidity : 50.1%	
Barometric Pressure : 100.91kPa		Barometric Pressure : 100.86kPa	
Calibration Technician : [REDACTED]		Secondary Check: [REDACTED]	
Calibration Date : 8 Nov 2022		Date : 9 Nov 2022	
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Clause and Characteristic Tested		Result	
12: Acoustical Sig. tests of frequency weightings		Pass	
13: Electrical Sig. tests of frequency weightings		Pass	
14: Frequency and time weightings at 1 kHz		Pass	
15: Long Term Stability		Pass	
16: Level linearity on the reference level range		Pass	
Clause and Characteristic Tested		Result	
18: Toneburst response		Pass	
19: C Weighted Peak Sound Level		N/A	
20: Overload Indication		Pass	
21: High Level Stability		Pass	

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement - Environmental Conditions			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13dB	Temperature	±0.1°C
1kHz	±0.13dB	Relative Humidity	±1.9%
8kHz	±0.14dB	Barometric Pressure	±0.014kPa
Electrical Tests	±0.13dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report.

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The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

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Sound Level Meter IEC 61672-3:2013 Calibration Test Report

Calibration Number **C22695**

Client Details EMM Consulting
Level 3/175 Scott Street
Newcastle NSW 2300

Equipment Tested/ Model Number : ARL Ngara
Instrument Serial Number : 878017
Microphone Serial Number : 21991
Pre-amplifier Serial Number : 27806
Firmware Version : 12.6

Pre-Test Atmospheric Conditions
Ambient Temperature : 22.4°C
Relative Humidity : 48.6%
Barometric Pressure : 100.91kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 22.8°C
Relative Humidity : 50.1%
Barometric Pressure : 100.86kPa

Calibration Technician [REDACTED]
Calibration Date : 8 Nov 2022

Secondary Check: [REDACTED]
Report Issue Date : 9 Nov 2022

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Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	N/A
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13dB	Temperature	±0.1°C
1kHz	±0.13dB	Relative Humidity	±1.9%
8kHz	±0.14dB	Barometric Pressure	±0.014 kPa
Electrical Tests	±0.13dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This report applies only to the item tested and shall only be reproduced in full, unless approved in writing by Acoustic Research Labs.



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1. OVERVIEW

This report presents the calibration test results of a ARL Ngara Sound Level Meter, and associated equipment. Calibration is carried out in accordance with *IEC 61672-3:2013, Electroacoustics - Sound Level Meters - Part 3: Periodic Tests*.

Relevant clauses from this standard have been used for periodic testing in conjunction with Acoustic Research Labs internal test methods described in Section 1 of the calibration work instruction manual.

Where required, reference is made to manual version 2.11 as provided by the manufacturer.

1.1 UNCERTAINTIES

For each test performed, the associated measurement uncertainties are derived at the 95% confidence level and are given with a coverage factor of 2.

The uncertainty applies at the time of measurement only, and takes no account of any drift or other effects that may apply afterwards. When estimating uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specifications.

1.2 DOCUMENT CONVENTIONS

Test results which highlight non-conformances relative to the standard, and the sound level meter type specified by the manufacturer have been marked with an **F** in the respective tests.

Any tests that are not required, due to sound level meter configuration, are marked N/A.

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2. GENERAL

2.1 ENVIRONMENTAL CONDITIONS DURING TEST

No corrections have been applied to any results obtained to compensate for the environmental conditions.

2.2 CALIBRATION TESTS

Where applicable the following tests were performed in accordance with the requirements of IEC 61672-3:2013. These clauses are used to define the periodic testing of Sound Level Meters.

Clause 10	Indication at the Calibration Check Frequency
Clause 11	Self Generated Noise
Clause 12	Acoustical Signal Tests of Frequency Weighting
Clause 13	Electrical Signal Tests of Frequency Weightings
Clause 14	Frequency and Time Weightings at 1kHz
Clause 15	Long Term Stability
Clause 16	Level Linearity on the Reference Level Range
Clause 17	Level Linearity including the level range control
Clause 18	Toneburst Response
Clause 19	Peak C Sound Level
Clause 20	Overload Indication
Clause 21	High Level Stability

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2.3 TEST EQUIPMENT USED

All test equipment used during periodic testing are calibrated every 12months by an accredited laboratory, traceable to SI units.

The performance of all equipment during these calibrations and the effects of instrument stability are used to determine the measurement uncertainty of each reported result.

2.3.1 Multi-function Acoustic Calibrator

A Bruel & Kjaer 4226 Multi-function calibrator (S/N - 2985012) was used for frequency response testing of the entire instrument (including microphone). This instrument was used as a reference calibrator and for frequency response verification.

2.3.2 Microphone Electrical Equivalent Circuit

Calibration of most instrument parameters is carried out using electrical signals fed to the unit via a two-port electrical equivalent circuit of the microphone.

A 12pF capacitance dummy microphone was used during testing.

2.3.3 Adjustable Attenuator

A means for varying the attenuation of electrical signals via the dummy microphone was provided by a JFW Industries dual rotary attenuator (S/N - 792819 2132). The attenuator is switchable in 1dB steps between 0dB and 60dB.

2.3.4 Arbitrary Function Generator

A Hewlett Packard 33120A (S/N - US36047448) was used to generate the required electrical signals.

2.3.5 Environmental Monitoring

A MHB-382SD (S/N – AH.88227) was used for measuring environmental conditions during device calibration. It is capable of providing temperature, relative humidity and pressure measurements.

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3. CALIBRATION TEST RESULTS

3.1 INDICATION AT THE CALIBRATION CHECK FREQUENCY

The indication of the sound level meter at the calibration check frequency was checked by application of an acoustic signal at the reference sound pressure level and frequency.

Stated reference conditions as found in manual are

Reference Level : 94.0 dB

Reference Frequency : 1000.0 Hz

Indications before and after adjustments were recorded and are shown in Table 1 (all measurements in dB) -

Table 1 - Check Frequency Calibration Results

Frequency Weighting	Initial Response	B&K 4226 Corrected	FreeField Corrected	Final Corrected Response
A	94.33	94.08	94.08	94.00
C	94.28	94.03	94.03	93.95
Z	N/A	N/A	N/A	N/A

Free field adjustment data as provided by the manufacturer. Windscreen correction factors applied.

3.2 SELF GENERATED NOISE

3.2.1 Microphone Installed

Self generated noise was measured with the microphone installed on the sound level meter, in the configuration submitted for periodic testing. The sound level meter was set to the most-sensitive level range and with frequency weighting A selected.

Ten (10) time weighted observations were made over a period of 60 seconds.

Random Readings dB(A)

18.70	18.70	18.80	18.90	18.80
18.80	18.80	18.80	18.90	18.90

Acoustic Noise Floor : 18.8 dB(A)

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3.2.2 Electrical Input Signal Device

With the microphone replaced by the electrical input signal device and terminated as specified, the sound level meter was set to the most-sensitive level range and with frequency weightings Z, C and A selected as provided.

Ten (10) time weighted observations were made over a period of 60 seconds.

Random Readings dB(A)

15.10	15.10	15.20	15.20	15.20
15.20	15.20	15.20	15.10	15.10

Random Readings dB(C)

14.10	14.20	14.10	14.00	14.20
14.20	14.10	14.20	14.00	14.10

Random Readings dB(Z)

N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A

Electric Noise Floor :

dB(A)	dB(C)	dB(Z)
15.2	14.1	N/A

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3.3 ACOUSTICAL SIGNAL TESTS OF A FREQUENCY WEIGHTING

The sound level meter was set to measure frequency weighting C with a FAST response. The test was carried out using a multi-function acoustic calibrator set to pressure mode.

Three (3) readings were made at each test frequency. The average of the readings was then corrected to the multi-function acoustic calibrator.

Table 2 - Frequency Weighting C Response

Freq Hz	Reading 1	Reading 2	Reading 3	U95
125	93.9	93.9	93.9	0.13
1 000	94.0	94.0	94.0	0.13
8 000	88.0	88.0	88.0	0.14

Actual Freq Hz	B&K 4226 Corrections	Corrected Response dB(C)		Uexp
		Actual	re 1kHz	
125.90	-0.06	93.84	-0.08	0.13
1005.10	-0.08	93.92	0.00	0.13
7915.10	0.00	88.00	-5.92	0.14

Adjustments were then applied to correct for free field and sound level meter body effects with data supplied by the manufacturer as per Table 3. Windscreen correction factors applied.

Table 3 - Correction Data

Actual Freq Hz	FreeField Corrections	U95	BodyEffects Corrections	U95	Windscreen Corrections	U95
125.90	0.00	0.25	0.00	0.00	0.000	0.200
1005.10	0.00	0.25	0.00	0.00	-0.100	0.200
7915.10	3.00	0.35	0.00	0.00	0.000	0.300

Finally, the corrected responses are normalised to the response at 1kHz and compared to the tolerances stated in Table 2 of IEC 61672.1-2013.

Table 4 - Acoustic C Response

Actual Freq (Hz)	Corrected Response dB(C)		Expected Response dB(C)		Deviation	P/F	Uexp
	Actual	re 1kHz	re 1kHz	Tolerance			
125.90	93.84	0.02	-0.2	±1.0	0.22	P	0.35
1005.10	93.82	0.00	0.0	±0.7	0.00	P	0.35
7915.10	91.00	-2.82	-3.0	+1.5 / -2.5	0.18	P	0.49

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3.4 ELECTRICAL SIGNAL TESTS OF FREQUENCY WEIGHTINGS

Frequency weighting responses for Z, C and A were determined relative to the response at 1kHz using steady sinusoidal electrical input signals.

On the reference level range, and for each frequency weighting under test, the level of a 1kHz input signal was adjusted to yield 75dB. At test frequencies other than 1kHz, the input signal level was adjusted to compensate for the design goal attenuations as specified in Table 2 of IEC 61672.1-2013.

Table 5 - Measured Electrical Frequency Response

Freq Hz	A Weighting (dB)	C Weighting (dB)	Z Weighting (dB)	U95
63	74.8	74.8	N/A	0.13
125	74.9	75.0	N/A	0.11
250	74.9	75.0	N/A	0.10
500	75.0	75.0	N/A	0.10
1 000	75.0	75.0	N/A	0.10
2 000	75.0	75.0	N/A	0.10
4 000	75.0	75.0	N/A	0.10
8 000	74.9	74.9	N/A	0.10
15 850	72.2	72.2	N/A	0.14

Adjustments were then applied to correct for a uniform free field response and sound level meter body effects with data supplied by the manufacturer as per Table 6. Windscreen correction factors applied.

Table 6 - Correction Data

Freq Hz	Ufreq	U95	Body Effects	U95	WS Effects	U95
63	0.100	0.250	0.000	0.000	0.000	0.200
125	0.100	0.250	0.000	0.000	0.000	0.200
250	0.100	0.250	0.000	0.000	0.000	0.200
500	0.000	0.250	0.000	0.000	-0.100	0.200
1 000	0.000	0.250	0.000	0.000	-0.100	0.200
2 000	0.000	0.250	0.000	0.000	-0.300	0.200
4 000	0.100	0.250	0.000	0.000	-0.300	0.200
8 000	0.000	0.350	0.000	0.000	0.000	0.300
15 850	-0.800	0.450	0.000	0.000	0.700	0.300

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Finally, the corrected responses were referenced to the response at 1kHz and compared to the tolerances stated in Table 2 of IEC 61672.1-2013.

Table 7 - A Weighted Electrical Response

Freq Hz	Response		Tolerance (dB)	P/F	Uexp
	Corrected	re 1kHz			
63	74.90	0.00	±1.0	P	0.35
125	75.00	0.10	±1.0	P	0.34
250	75.00	0.10	±1.0	P	0.34
500	74.90	0.00	±1.0	P	0.34
1 000	74.90	0.00	±0.7	P	0.34
2 000	74.70	-0.20	±1.0	P	0.34
4 000	74.80	-0.10	±1.0	P	0.34
8 000	74.90	0.00	+1.5 / -2.5	P	0.48
15 850	72.10	-2.80	+2.5 / -16	P	0.56

Table 8 - C Weighted Electrical Response

Freq Hz	Response		Tolerance (dB)	P/F	Uexp
	Corrected	re 1kHz			
63	74.90	0.00	±1.0	P	0.35
125	75.10	0.20	±1.0	P	0.34
250	75.10	0.20	±1.0	P	0.34
500	74.90	0.00	±1.0	P	0.34
1 000	74.90	0.00	±0.7	P	0.34
2 000	74.70	-0.20	±1.0	P	0.34
4 000	74.80	-0.10	±1.0	P	0.34
8 000	74.90	0.00	+1.5 / -2.5	P	0.48
15 850	72.10	-2.80	+2.5 / -16	P	0.56

Table 9 - Z Weighted Electrical Response

Freq Hz	Response		Tolerance (dB)	P/F	Uexp
	Corrected	re 1kHz			
63	N/A	N/A	±1.0	N/A	0.35
125	N/A	N/A	±1.0	N/A	0.34
250	N/A	N/A	±1.0	N/A	0.34
500	N/A	N/A	±1.0	N/A	0.34
1 000	N/A	N/A	±0.7	N/A	0.34
2 000	N/A	N/A	±1.0	N/A	0.34
4 000	N/A	N/A	±1.0	N/A	0.34
8 000	N/A	N/A	+1.5 / -2.5	N/A	0.48
15 850	N/A	N/A	+2.5 / -16	N/A	0.56

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3.5 FREQUENCY AND TIME WEIGHTINGS AT 1KHZ

A steady sinusoidal electrical input signal of 1kHz at the reference sound pressure level was applied to the reference level range.

The deviations of the indicated level of C and Z frequency weightings were recorded, along with the deviations of the indication of A weighted time averaged, and SLOW weighted response.

Table 10 - Frequency and Time Weighting Results

Frequency Weighting	Time Weighting	Response (dB)	Deviation (dB)	P/F	Tolerance (dB)	U95
A	Fast	94.0	0.0	P	±0.2	0.10
	Leq	94.0	0.0	P	±0.2	0.10
	Slow	94.0	0.0	P	±0.2	0.10
C	Fast	94.0	0.0	P	±0.2	0.10
Z	Fast	N/A	N/A	N/A	±0.2	0.10

3.6 LONG-TERM STABILITY

Long-term stability was tested by comparing a steady sinusoidal electrical signal applied at the start, and at the end of testing. The applied signal level was set to the reference level and frequency and was maintained constant. The difference between the indicated levels was recorded.

Table 11 - Frequency and Time Weighting Results

Signal Level (mV)	Initial Response (dB)	Final Response (dB)	Deviation (dB)	P/F	Tolerance (dB)	U95
63.0	94	94.0	0.0	P	±0.1	0.10

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3.7 LEVEL LINEARITY ON THE REFERENCE LEVEL RANGE

Level linearity was tested with a steady sinusoidal electrical signal at a frequency of 8kHz, with the meter set to display frequency weighted A, FAST response.

The starting point for level linearity testing was set to 94.0dB as stated in the instruction manual.

Level linearity was measured in 5dB steps of increasing input signal level from the starting point up to within 5dB of the stated upper limit, then at 1dB steps up to (but not including) the first indication of overload.

Table 12 - Level Linearity - Increasing

Ideal (dB)	Response (dB)	Deviation (dB)	Tolerance (dB)	P/F	U95
94.0	94.0	0.0	±0.8	P	0.1
99.0	99.0	0.0	±0.8	P	0.1
104.0	104.0	0.0	±0.8	P	0.1
109.0	109.0	0.0	±0.8	P	0.1
114.0	114.0	0.0	±0.8	P	0.1
115.0	115.0	0.0	±0.8	P	0.1
116.0	116.0	0.0	±0.8	P	0.1
117.0	117.0	0.0	±0.8	P	0.1
118.0	118.0	0.0	±0.8	P	0.1
119.0	119.0	0.0	±0.8	P	0.1
120.0	120.0	0.0	±0.8	P	0.1
121.0	120.9	-0.1	±0.8	P	0.1

Overload indication at 122.0dB.

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Level linearity test was the continued in 5dB steps of decreasing input signal level from the starting point up to within 5dB of the stated lower limit, then at 1dB steps up to (but not including) the first indication of under range.

Table 13 - Level Linearity - Decreasing

Ideal (dB)	Response (dB)	Deviation (dB)	Tolerance (dB)	P/F	U95
94.0	94.0	0.0	±0.8	P	0.1
89.0	89.0	0.0	±0.8	P	0.1
84.0	84.0	0.0	±0.8	P	0.1
79.0	79.0	0.0	±0.8	P	0.1
74.0	74.0	0.0	±0.8	P	0.1
69.0	69.0	0.0	±0.8	P	0.1
64.0	64.0	0.0	±0.8	P	0.1
59.0	59.0	0.0	±0.8	P	0.1
54.0	54.0	0.0	±0.8	P	0.1
49.0	49.0	0.0	±0.8	P	0.1
44.0	44.0	0.0	±0.8	P	0.1
39.0	39.0	0.0	±0.8	P	0.1
34.0	34.1	0.1	±0.8	P	0.1
30.0	30.1	0.1	±0.8	P	0.1
29.0	29.1	0.1	±0.8	P	0.1
28.0	28.2	0.2	±0.8	P	0.1
27.0	27.2	0.2	±0.8	P	0.1
26.0	26.3	0.3	±0.8	P	0.1
25.0	25.4	0.4	±0.8	P	0.1

No under range indicated.

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3.8 TONEBURST RESPONSE

The response of the sound level meter to short-duration signals was tested on the reference range with 4kHz tone bursts.

The tone bursts were generated from a steady sinusoidal signal at a level of 117.0dB.

Table 14 - FAST Weighted Response

Burst Length	Response dB(A)	Deviation (dB)	Tolerance (dB)	P/F	U95
200ms	116.0	0.0	±0.5	P	0.1
2ms	99.0	0.0	+1.0 / -1.5	P	0.1
0.25ms	89.9	-0.1	+1.0 / -3	P	0.1

Table 15 - SLOW Weighted Response

Burst Length	Response dB(A)	Deviation (dB)	Tolerance (dB)	P/F	U95
200ms	109.6	0.0	±0.5	P	0.1
2ms	90.0	0.0	+1.0 / -3	P	0.1

3.9 PEAK C RESPONSE

Indication of Peak C sound level was tested on the least sensitive level range. Test signals used were -

- A single complete cycle of an 8kHz sinusoid, starting and stopping at zero crossings
- Positive and negative half cycles of a 500Hz sinusoid, starting and stopping at zero crossings.

The level of the steady 8kHz sinusoid was adjusted to display dB(C).

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3.10 OVERLOAD INDICATION

The overload indication was tested on the least sensitive level range, with the sound level meter set to display frequency weighted A, time averaged values.

Positive and negative half cycle sinusoidal electrical signals at 4kHz were used. The test began at an indicated time averaged level of 119.0dB(A).

Using the positive half cycle signal, the signal level was increased in steps of 0.5dB up to, but not including, the first indication of overload. The level of the input signal was then increased in steps of 0.1dB until the first indication of overload. These steps were repeated using the negative half cycle signal.

Table 16 - Overload Indication

Signal Orientation	Overload Response	Difference	Tolerance	P/F	Uncertainty
Positive	120.4	0.0	±1.5	P	0.1
Negative	120.3				

Overload indication was verified.

Overload latch indication was verified.

3.11 HIGH LEVEL STABILITY

High level stability was tested by measuring the response of the meter to high signal levels. The result was evaluated as the difference between the A-Weighted indicated levels in response to a steady 1kHz signal applied over 5 minutes.

Table 17 - FAST Weighted Response

Time Weighting	Initial Response (dB)	Final Response (dB)	Deviation (dB)	Tolerance (dB)	P/F	U95
Fast	119.0	119.0	0.0	±0.1	P	0.10
Slow	N/A	N/A	N/A	±0.1	N/A	0.10
Leq	119.0	119.0	0.0	±0.1	P	0.10

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Sound Level Meter

IEC 61672-3:2013

Calibration Certificate

Calibration Number C23794

Client Details		EMM Consulting Ground Floor, Suite 01, 20 Chandos Street St Leonards NSW 2065
Equipment Tested/ Model Number :		Ngara
Instrument Serial Number :		878123
Microphone Serial Number :		20271
Pre-amplifier Serial Number :		28217
Firmware Version :		V12.5
Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions
Ambient Temperature : 25.3 °C		Ambient Temperature : 25.3 °C
Relative Humidity : 38.9 %		Relative Humidity : 36.8 %
Barometric Pressure : 99.95 kPa		Barometric Pressure : 100.01 kPa
Calibration Technician : [REDACTED]		Secondary Check: Dh [REDACTED]
Calibration Date : 31 Oct 2023		Report Issue Date : 6 Nov 2023

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Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of frequency weighting	Pass	18: Linearity in the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	19: C Weighted Peak Sound Level	N/A
14: Frequency and time weightings at 1 kHz	Pass	20: Overload Indication	Pass
15: Long Term Stability	Pass	21: High Level Stability	Pass
16: Level linearity on the reference level range	Pass		

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13 dB	Temperature	±0.1 °C
1kHz	±0.13 dB	Relative Humidity	±1.9 %
8kHz	±0.14 dB	Barometric Pressure	±0.11 kPa
Electrical Tests	±0.13 dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

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Sound Level Meter IEC 61672-3:2013 Calibration Test Report

Calibration Number **C23794**

Client Details EMM Consulting
Ground Floor, Suite 01, 20 Chandos Street
St Leonards NSW 2065

Equipment Tested/ Model Number : Ngara
Instrument Serial Number : 878123
Microphone Serial Number : 20271
Pre-amplifier Serial Number : 28217
Firmware Version : V12.5

Pre-Test Atmospheric Conditions
Ambient Temperature : 25.3 °C
Relative Humidity : 38.9 %
Barometric Pressure : 99.95 kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 25.3 °C
Relative Humidity : 36.8 %
Barometric Pressure : 100.01 kPa

Calibration Technician : [REDACTED]
Calibration Date : 31 Oct 2023

Secondary Check: [REDACTED]
Report Issue Date : 6 Nov 2023

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Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	N/A
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13 dB	Temperature	±0.1 °C
1kHz	±0.13 dB	Relative Humidity	±1.9 %
8kHz	±0.14 dB	Barometric Pressure	±0.11 kPa
Electrical Tests	±0.13 dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This report applies only to the item tested and shall only be reproduced in full, unless approved in writing by Acoustic Research Labs.



Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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1. OVERVIEW

This report presents the calibration test results of a Ngara Sound Level Meter, and associated equipment. Calibration is carried out in accordance with *IEC 61672-3:2013, Electroacoustics - Sound Level Meters - Part 3: Periodic Tests*.

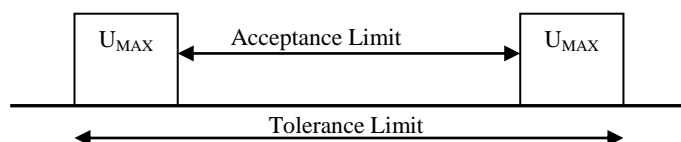
Relevant clauses from this standard have been used for periodic testing in conjunction with Acoustic Research Labs internal test methods described in Section 1 of the calibration work instruction manual.

Where required, reference is made to manual version 25 as provided by the manufacturer.

1.1 UNCERTAINTIES

For each test performed, the associated measurement uncertainties are derived at the 95% confidence level and are given with a coverage factor of 2.

The uncertainty applies at the time of measurement only, and takes no account of any drift or other effects that may apply afterwards. When estimating uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specifications.



Where deviations from the design goals are provided to determine conformance to performance specifications, each measurement is reported with:

- The measured deviation from the design goal
- Associated acceptance limits for the test
- Maximum allowable uncertainty of measurement for the test
- Actual expanded uncertainty for each measurement

1.2 DOCUMENT CONVENTIONS

Test results which highlight non-conformances relative to the standard, and the sound level meter type specified by the manufacturer have been marked with an **F** in the respective tests.

Any tests that are not required, due to sound level meter configuration, are marked N/A.

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2. GENERAL

2.1 ENVIRONMENTAL CONDITIONS DURING TEST

No corrections have been applied to any results obtained to compensate for the environmental conditions.

2.2 CALIBRATION TESTS

Where applicable the following tests were performed in accordance with the requirements of IEC 61672-3:2013. These clauses are used to define the periodic testing of Sound Level Meters.

Clause 10	Indication at the Calibration Check Frequency
Clause 11	Self Generated Noise
Clause 12	Acoustical Signal Tests of Frequency Weighting
Clause 13	Electrical Signal Tests of Frequency Weightings
Clause 14	Frequency and Time Weightings at 1kHz
Clause 15	Long Term Stability
Clause 16	Level Linearity on the Reference Level Range
Clause 17	Level Linearity including the level range control
Clause 18	Toneburst Response
Clause 19	Peak C Sound Level
Clause 20	Overload Indication
Clause 21	High Level Stability

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2.3 TEST EQUIPMENT USED

All test equipment used during periodic testing are calibrated every 12months by an accredited laboratory, traceable to SI units.

The performance of all equipment during these calibrations and the effects of instrument stability are used to determine the measurement uncertainty of each reported result.

2.3.1 Multi-function Acoustic Calibrator

A Bruel & Kjaer 4226 Multi-function calibrator (S/N - 3215300) was used for frequency response testing of the entire instrument (including microphone). This instrument was used as a reference calibrator and for frequency response verification.

2.3.2 Microphone Electrical Equivalent Circuit

Calibration of most instrument parameters is carried out using electrical signals fed to the unit via a two-port electrical equivalent circuit of the microphone.

A 13pF capacitance dummy microphone was used during testing.

2.3.3 Adjustable Attenuator

A means for varying the attenuation of electrical signals via the dummy microphone was provided by a JFW Industries dual rotary attenuator (S/N - 792819 2132). The attenuator is switchable in 1dB steps between 0dB and 60dB.

2.3.4 Arbitrary Function Generator

A Keysight 33511B (S/N – MY58001621) was used to generate the required electrical signals.

2.3.5 Environmental Monitoring

A MHB-382SD (S/N – AH.88227) was used for measuring environmental conditions during device calibration. It is capable of providing temperature, relative humidity and pressure measurements.

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3. CALIBRATION TEST RESULTS

3.1 INDICATION AT THE CALIBRATION CHECK FREQUENCY

The indication of the sound level meter at the calibration check frequency was checked by application of an acoustic signal at the reference sound pressure level and frequency.

Stated reference conditions as found in manual are

Reference Level : 94.0 dB

Reference Frequency : 1000.0 Hz

Indications before and after adjustments were recorded and are shown in Table 1 (all measurements in dB) -

Table 1 - Check Frequency Calibration Results

Frequency Weighting	Initial Response	B&K 4226 Corrected	FreeField Corrected	Final Corrected Response
A	93.90	94.09	94.09	94.00
C	93.85	94.05	94.05	93.96
Z	N/A	N/A	N/A	N/A

Free field adjustment data as provided by the manufacturer. Windscreen correction factors applied.

3.2 SELF GENERATED NOISE

3.2.1 Microphone Installed

Self generated noise was measured with the microphone installed on the sound level meter, in the configuration submitted for periodic testing. The sound level meter was set to the most-sensitive level range and with frequency weighting A selected.

Ten (10) time weighted observations were made over a period of 60 seconds.

Random Readings dB(A)

19.20	19.10	19.20	19.15	19.20
19.30	19.40	19.30	19.30	19.20

Acoustic Noise Floor : 19.2 dB(A)

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3.2.2 Electrical Input Signal Device

With the microphone replaced by the electrical input signal device and terminated as specified, the sound level meter was set to the most-sensitive level range and with frequency weightings Z, C and A selected as provided.

Ten (10) time weighted observations were made over a period of 60 seconds.

Random Readings dB(A)

16.80	17.00	17.00	17.00	17.00
17.00	17.00	17.00	16.80	16.90

Random Readings dB(C)

18.70	18.70	18.80	18.70	18.80
19.00	19.00	19.00	19.50	19.80

Random Readings dB(Z)

N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A

Electric Noise Floor :

dB(A)	dB(C)	dB(Z)
17.0	19.0	N/A

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3.3 ACOUSTICAL SIGNAL TESTS OF A FREQUENCY WEIGHTING

The sound level meter was set to measure frequency weighting C with a FAST response. The test was carried out using a multi-function acoustic calibrator set to pressure mode.

Three (3) readings were made at each test frequency. The average of the readings was then corrected to the multi-function acoustic calibrator.

Table 2 - Frequency Weighting C Response

Freq Hz	Reading 1	Reading 2	Reading 3	Uncertainty (dB)
125	93.9	93.9	93.9	0.13
1 000	94.1	94.1	94.1	0.13
8 000	88.3	88.3	88.3	0.14

Actual Freq Hz	B&K 4226 Corrections	Corrected Response dB(C)		Uncertainty (dB)
		Actual	re 1kHz	
125.90	-0.03	93.82	-0.14	0.13
1005.10	-0.09	93.96	0.00	0.13
7915.10	-0.11	88.22	-5.74	0.14

Adjustments were then applied to correct for free field and sound level meter body effects with data supplied by the manufacturer as per Table 3. Windscreen correction factors applied.

Table 3 - Correction Data

Actual Freq (Hz)	Pressure to Freefield (dB)	Uncertainty (dB)	Body Effects (dB)	Uncertainty (dB)	WS Effects (dB)	Uncertainty (dB)
125.90	0.00	0.20	0.00	0.00	0.00	0.20
1005.10	0.00	0.20	0.00	0.00	0.10	0.20
7915.10	3.00	0.30	0.00	0.00	0.20	0.30

Finally, the corrected responses are normalised to the response at 1kHz and compared to the tolerance limits stated in Table 2 of IEC 61672.1-2013.

Table 4 - Acoustic C Response

Actual Freq (Hz)	Corrected Response dB(C)		Expected Response dB(C)		Deviation (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
	Actual	re 1kHz	re 1kHz	Tolerance Limit				
125.90	93.82	-0.24	-0.2	±1.0	-0.04	P	0.31	0.60
1005.10	94.06	0.00	0.0	±0.7	0.00	P	0.31	0.60
7915.10	91.42	-2.64	-3.0	+1.5 / -2.5	0.36	P	0.45	0.70

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3.4 ELECTRICAL SIGNAL TESTS OF FREQUENCY WEIGHTINGS

Frequency weighting responses for Z, C and A were determined relative to the response at 1kHz using steady sinusoidal electrical input signals.

On the reference level range, and for each frequency weighting under test, the level of a 1kHz input signal was adjusted to yield 75dB. At test frequencies other than 1kHz, the input signal level was adjusted to compensate for the design goal attenuations as specified in Table 2 of IEC 61672.1-2013.

Table 5 - Measured Electrical Frequency Response

Freq (Hz)	A Weighting (dB)	C Weighting (dB)	Z Weighting (dB)	Uncertainty (dB)
63	74.8	74.8	N/A	0.13
125	74.9	74.9	N/A	0.11
250	74.9	75.0	N/A	0.10
500	74.9	75.0	N/A	0.10
1 000	75.0	75.0	N/A	0.10
2 000	75.0	75.0	N/A	0.10
4 000	75.1	75.0	N/A	0.10
8 000	75.0	74.9	N/A	0.10
15 850	72.4	72.3	N/A	0.13

Adjustments were then applied to correct for a uniform free field response and sound level meter body effects with data supplied by the manufacturer as per Table 6. Windscreen correction factors applied.

Table 6 - Correction Data

Freq (Hz)	Ufreq (dB)	Uncertainty (dB)	Body Effects (dB)	Uncertainty (dB)	WS Effects (dB)	Uncertainty (dB)
63	0.10	0.30	0.00	0.00	0.00	0.20
125	0.10	0.30	0.00	0.00	0.00	0.20
250	0.10	0.20	0.00	0.00	0.00	0.20
500	0.00	0.20	0.00	0.00	0.00	0.20
1 000	0.00	0.20	0.00	0.00	0.10	0.20
2 000	0.00	0.30	0.00	0.00	0.40	0.20
4 000	0.10	0.30	0.00	0.00	0.20	0.20
8 000	0.00	0.30	0.00	0.00	0.20	0.30
15 850	-0.80	0.50	0.00	0.00	0.40	0.30

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Finally, the corrected responses were referenced to the response at 1kHz and compared to the tolerance limits stated in Table 2 of IEC 61672.1-2013.

Table 7 - A Weighted Electrical Response

Freq (Hz)	Response (dB)		Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
	Corrected	re 1kHz				
63	74.90	-0.21	±1.0	P	0.39	0.60
125	74.96	-0.15	±1.0	P	0.38	0.60
250	75.00	-0.11	±1.0	P	0.30	0.60
500	74.93	-0.18	±1.0	P	0.30	0.60
1 000	75.11	0.00	±0.7	P	0.30	0.60
2 000	75.44	0.33	±1.0	P	0.38	0.60
4 000	75.35	0.24	±1.0	P	0.38	0.60
8 000	75.15	0.04	+1.5 / -2.5	P	0.44	0.70
15 850	71.97	-3.14	+2.5 / -16	P	0.60	1.00

Table 8 - C Weighted Electrical Response

Freq (Hz)	Response (dB)		Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
	Corrected	re 1kHz				
63	74.90	-0.20	±1.0	P	0.39	0.60
125	75.03	-0.07	±1.0	P	0.38	0.60
250	75.07	-0.03	±1.0	P	0.30	0.60
500	75.02	-0.08	±1.0	P	0.30	0.60
1 000	75.10	0.00	±0.7	P	0.30	0.60
2 000	75.40	0.30	±1.0	P	0.38	0.60
4 000	75.33	0.23	±1.0	P	0.38	0.60
8 000	75.14	0.04	+1.5 / -2.5	P	0.44	0.70
15 850	71.92	-3.18	+2.5 / -16	P	0.60	1.00

Table 9 - Z Weighted Electrical Response

Freq (Hz)	Response (dB)		Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
	Corrected	re 1kHz				
63	N/A	N/A	±1.0	N/A	0.39	0.60
125	N/A	N/A	±1.0	N/A	0.38	0.60
250	N/A	N/A	±1.0	N/A	0.30	0.60
500	N/A	N/A	±1.0	N/A	0.30	0.60
1 000	N/A	N/A	±0.7	N/A	0.30	0.60
2 000	N/A	N/A	±1.0	N/A	0.38	0.60
4 000	N/A	N/A	±1.0	N/A	0.38	0.60
8 000	N/A	N/A	+1.5 / -2.5	N/A	0.44	0.70
15 850	N/A	N/A	+2.5 / -16	N/A	0.60	1.00

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3.5 FREQUENCY AND TIME WEIGHTINGS AT 1KHz

A steady sinusoidal electrical input signal of 1kHz at the reference sound pressure level was applied to the reference level range.

The deviations of the indicated level of C and Z frequency weightings were recorded, along with the deviations of the indication of A weighted time averaged, and SLOW weighted response.

Table 10 - Frequency and Time Weighting Results

Frequency Weighting	Time Weighting	Response (dB)	Deviation (dB)	P/F	Tolerance Limit (dB)	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
A	Fast	94.0	0.0	P	±0.2	0.10	0.20
	Leq	94.0	0.0	P	±0.2	0.10	0.20
	Slow	94.0	0.0	P	±0.2	0.10	0.20
C	Fast	94.0	0.0	P	±0.2	0.10	0.20
Z	Fast	N/A	N/A	N/A	±0.2	0.10	0.20

3.6 LONG-TERM STABILITY

Long-term stability was tested by comparing a steady sinusoidal electrical signal applied at the start, and at the end of testing. The applied signal level was set to the reference level and frequency and was maintained constant. The difference between the indicated levels was recorded.

Table 11 - Frequency and Time Weighting Results

Signal Level (mV)	Initial Response (dB)	Final Response (dB)	Deviation (dB)	P/F	Tolerance Limit (dB)	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
71.3	94	94.0	0.0	P	±0.1	0.10	0.10

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3.7 LEVEL LINEARITY ON THE REFERENCE LEVEL RANGE

Level linearity was tested with a steady sinusoidal electrical signal at a frequency of 8kHz, with the meter set to display frequency weighted A, FAST response.

The starting point for level linearity testing was set to 94.0dB as stated in the instruction manual.

Level linearity was measured in 5dB steps of increasing input signal level from the starting point up to within 5dB of the stated upper limit, then at 1dB steps up to (but not including) the first indication of overload.

Table 12 - Level Linearity - Increasing

Ideal (dB)	Response (dB)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
94.0	94.0	0.0	±0.8	P	0.1	0.3
99.0	99.0	0.0	±0.8	P	0.1	0.3
104.0	104.0	0.0	±0.8	P	0.1	0.3
109.0	109.0	0.0	±0.8	P	0.1	0.3
114.0	114.0	0.0	±0.8	P	0.1	0.3
115.0	115.0	0.0	±0.8	P	0.1	0.3
116.0	116.0	0.0	±0.8	P	0.1	0.3
117.0	117.0	0.0	±0.8	P	0.1	0.3
118.0	118.0	0.0	±0.8	P	0.1	0.3
119.0	119.0	0.0	±0.8	P	0.1	0.3
120.0	120.0	0.0	±0.8	P	0.1	0.3
121.0	121.0	0.0	±0.8	P	0.1	0.3

Overload indication at 122.0dB.

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Level linearity test was the continued in 5dB steps of decreasing input signal level from the starting point up to within 5dB of the stated lower limit, then at 1dB steps up to (but not including) the first indication of under range.

Table 13 - Level Linearity - Decreasing

Ideal (dB)	Response (dB)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
94.0	94.0	0.0	±0.8	P	0.1	0.3
89.0	89.0	0.0	±0.8	P	0.1	0.3
84.0	84.0	0.0	±0.8	P	0.1	0.3
79.0	79.0	0.0	±0.8	P	0.1	0.3
74.0	74.0	0.0	±0.8	P	0.1	0.3
69.0	69.0	0.0	±0.8	P	0.1	0.3
64.0	64.0	0.0	±0.8	P	0.1	0.3
59.0	59.0	0.0	±0.8	P	0.1	0.3
54.0	54.0	0.0	±0.8	P	0.1	0.3
49.0	49.0	0.0	±0.8	P	0.1	0.3
44.0	44.0	0.0	±0.8	P	0.1	0.3
39.0	39.1	0.0	±0.8	P	0.1	0.3
34.0	34.1	0.1	±0.8	P	0.1	0.3
30.0	30.2	0.2	±0.8	P	0.1	0.3
29.0	29.3	0.3	±0.8	P	0.1	0.3
28.0	28.3	0.3	±0.8	P	0.1	0.3
27.0	27.5	0.5	±0.8	P	0.1	0.3
26.0	26.6	0.6	±0.8	P	0.1	0.3
25.0	25.7	0.7	±0.8	P	0.1	0.3

No under range indicated.

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3.8 TONEBURST RESPONSE

The response of the sound level meter to short-duration signals was tested on the reference range with 4kHz tone bursts.

The tone bursts were generated from a steady sinusoidal signal at a level of 117.0dB.

Table 14 - FAST Weighted Response

Burst Length	Response dB(A)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
200ms	116.0	0.0	±0.5	P	0.1	0.3
2ms	99.0	0.0	+1.0 / -1.5	P	0.1	0.3
0.25ms	89.9	-0.1	+1.0 / -3	P	0.1	0.3

Table 15 - SLOW Weighted Response

Burst Length	Response dB(A)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
200ms	109.6	0.0	±0.5	P	0.1	0.3
2ms	90.0	0.0	+1.0 / -3	P	0.1	0.3

Table 16 - Sound Exposure Level Response

Burst Length	Response dB(A)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
200ms	109.9	-0.1	±0.5	P	0.1	0.3
2ms	89.8	-0.2	+1.0 / -1.5	P	0.1	0.3
0.25ms	80.8	-0.2	+1.0 / -3	P	0.1	0.3

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3.9 PEAK C RESPONSE

Indication of Peak C sound level was tested on the least sensitive level range. Test signals used were -

- A single complete cycle of an 8kHz sinusoid, starting and stopping at zero crossings
- Positive and negative half cycles of a 500Hz sinusoid, starting and stopping at zero crossings.

The level of the steady 8kHz sinusoid was adjusted to display dB(C).

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3.10 OVERLOAD INDICATION

The overload indication was tested on the least sensitive level range, with the sound level meter set to display frequency weighted A, time averaged values.

Positive and negative half cycle sinusoidal electrical signals at 4kHz were used. The test began at an indicated time averaged level of 119.0dB(A).

Using the positive half cycle signal, the signal level was increased in steps of 0.5dB up to, but not including, the first indication of overload. The level of the input signal was then increased in steps of 0.1dB until the first indication of overload. These steps were repeated using the negative half cycle signal.

Table 17 - Overload Indication

Signal Orientation	Overload Response (dB)	Difference (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
Positive	119.9	-0.3	±1.5	P	0.10	0.25
Negative	120.2					

Overload indication was verified.

Overload latch indication was verified.

3.11 HIGH LEVEL STABILITY

High level stability was tested by measuring the response of the meter to high signal levels. The result was evaluated as the difference between the A-Weighted indicated levels in response to a steady 1kHz signal applied over 5 minutes.

Table 18 - FAST Weighted Response

Time Weighting	Initial Response (dB)	Final Response (dB)	Deviation (dB)	Tolerance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)
Fast	119.0	119.0	0.0	±0.1	P	0.10	0.10
Slow	N/A	N/A	N/A	±0.1	N/A	0.10	0.10
Leq	119.0	119.0	0.0	±0.1	P	0.10	0.10

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Annex C

Annex C

Annex C

Appendix C

Predicted noise contours

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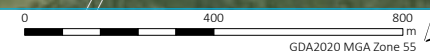
- KEY**
- Work authority boundary
 - Stage 1A
 - Sensitive receiver
 - Existing environment
 - Named watercourse
 - Cadastral boundary
 - National park/reserve
 - Noise contour
 - <25
 - 25- 35
 - 35- 45
 - 45- 55
 - 55+

Predicted noise contours-
Stage 1A

Lang Lang Quarry
Noise Impact Assessment
Figure D.1



Source: EMM (2024); DEECA (2023); GA (2009); MetroMap (2024)



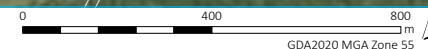
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- KEY**
- Work authority boundary
 - Stage 1B
 - Sensitive receiver
 - Existing environment
 - Named watercourse
 - Cadastral boundary
 - National park/reserve
 - Noise contour
 - <25
 - 25- 35
 - 35- 45
 - 45- 55
 - 55+

Predicted noise contours-
Stage 1B

Lang Lang Quarry
Noise Impact Assessment
Figure D.2



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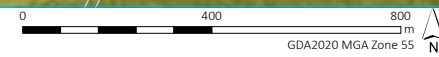
- KEY
- Work authority boundary
 - Stage 2A
 - Sensitive receiver
 - Existing environment
 - Named watercourse
 - Cadastral boundary
 - National park/reserve
 - Noise contour
 - 25- 35
 - 35- 45
 - 45- 55
 - 55+

Predicted noise contours-
Stage 2A

Lang Lang Quarry
Noise Impact Assessment
Figure D.3



Source: EMM (2024); DEECA (2023); GA (2009); MetroMap (2024)



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- KEY
- Work authority boundary
 - Stage 2B
 - Sensitive receiver
 - Existing environment
 - Named watercourse
 - Cadastral boundary
 - National park/reserve
 - Noise contour
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 - 25- 35
 - 35- 45
 - 45- 55
 - 55+

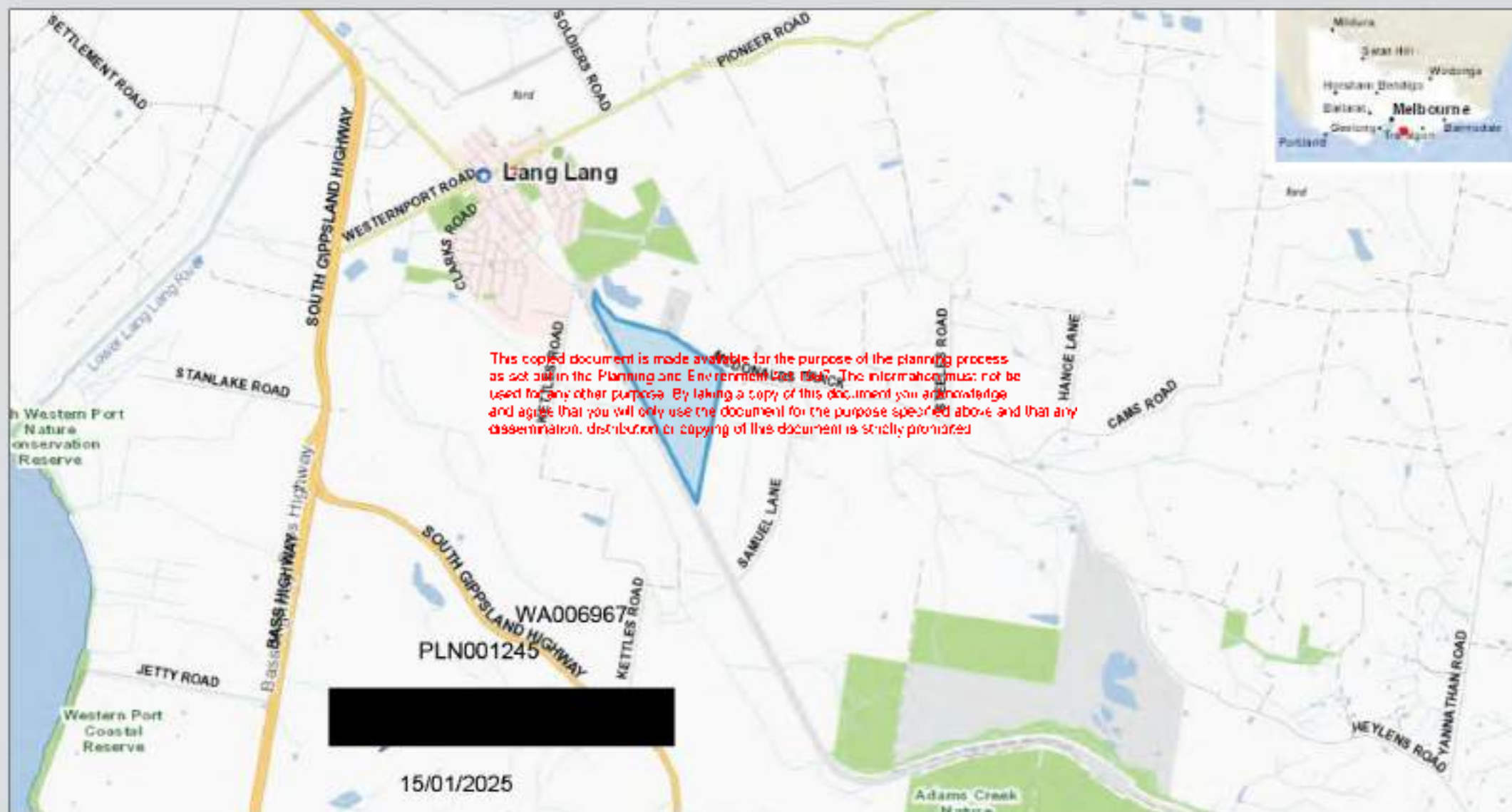
Predicted noise contours-
Stage 2B

Lang Lang Quarry
Noise Impact Assessment
Figure D.4



Source: EMM (2024); DEECA (2023); GA (2009); MetroMap (2024)





2,540 0 1,270 2,540 Meters

GDA, 1994, VICGRID94

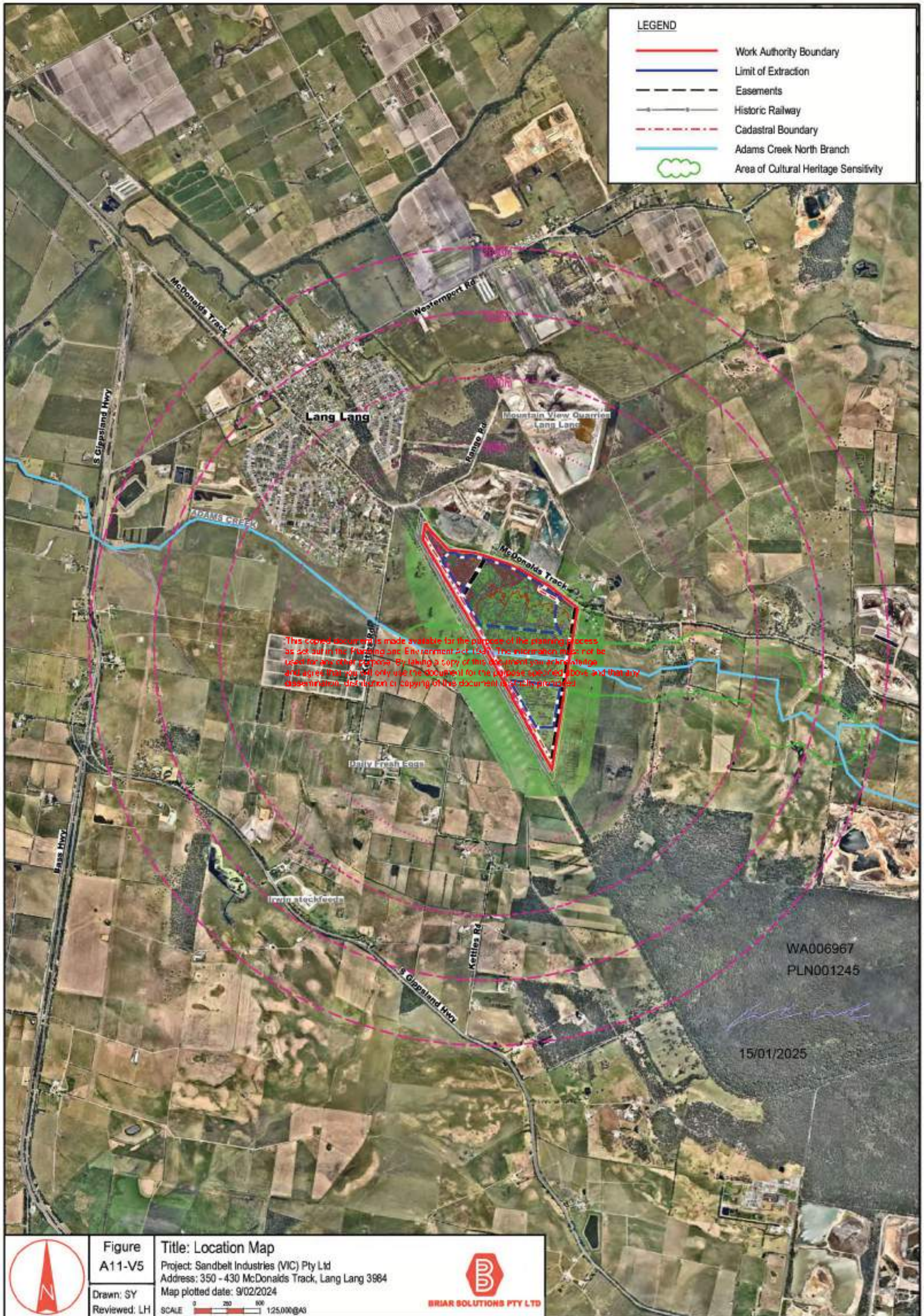
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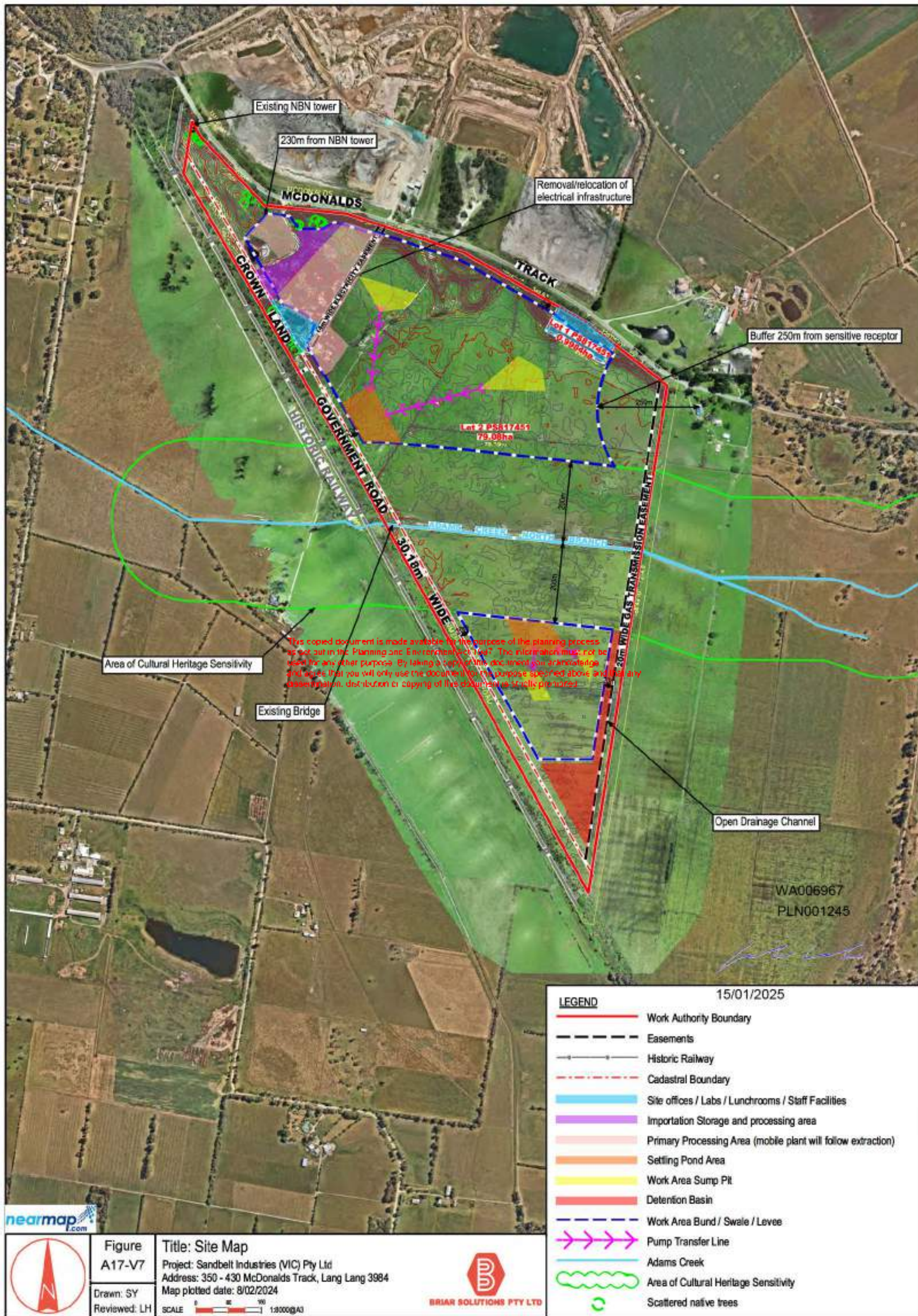


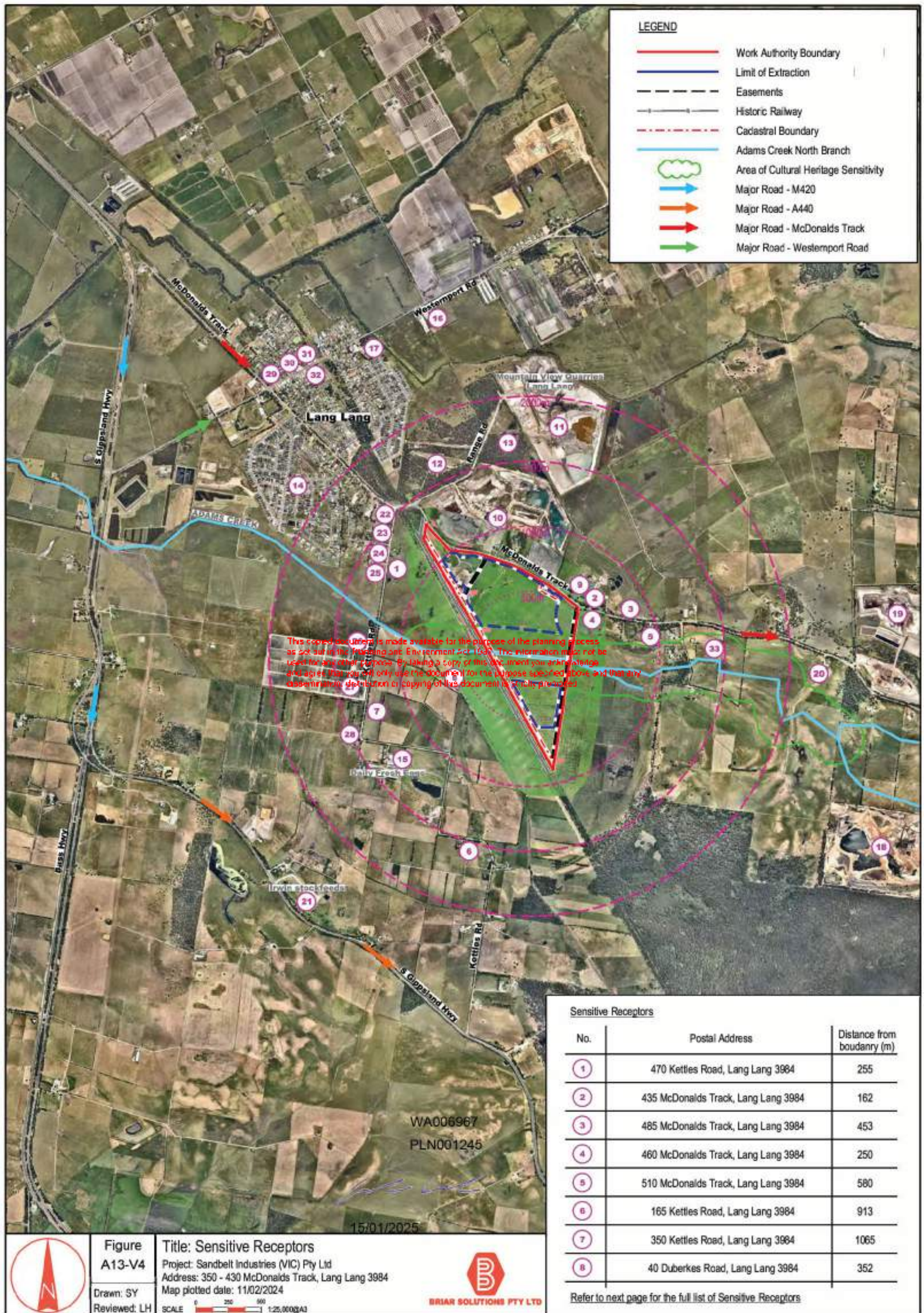
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Map Created on 17-Dec-2021

Scale 1:50,000







Sensitive Receptors

No.	Postal Address	Distance from boundary (m)
1	470 Kettles Road, Lang Lang 3984	255
2	435 McDonalds Track, Lang Lang 3984	162
3	485 McDonalds Track, Lang Lang 3984	453
4	460 McDonalds Track, Lang Lang 3984	250
5	510 McDonalds Track, Lang Lang 3984	580
6	165 Kettles Road, Lang Lang 3984	913
7	350 Kettles Road, Lang Lang 3984	1065
8	40 Duberkes Road, Lang Lang 3984	352
9	Lang Lang Cemetary	145
10	Metro Quarry Sand Group	306
11	Mountain View Quarries	111
12	Lang Lang Recreational Reserve	464
13	Lang Lang Bushland Reserve	879
14	Housing estates	1028
15	Egg Farm	976
16	Lang Lang Sands (Quarry)	1577
17	Lang Lang Primary School	1405
18	Hanson Australia (Quarry)	2587
19	Burdetts Lang Lang Quarry	2450
20	Dairy Farm	1902
21	Irwin Stockfeeds	2149
22	280 McDonalds Track	324
23	495 Kettles Road	324
24	475 Kettles Road	361
25	455 Kettles Road	450
26	395 Kettles Road	831
27	365 Kettles Road	1058
28	325 Kettles Road	1238
29	Lang Lang Kindergarten	1654
30	Lang Lang Childcare	1620
31	Lang Lang Community Centre	1594
32	Shopping strip	1421
33	510 McDonalds Track, Lang Lang	1080

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Figure
A13-V4

Drawn: SY
Reviewed: LH

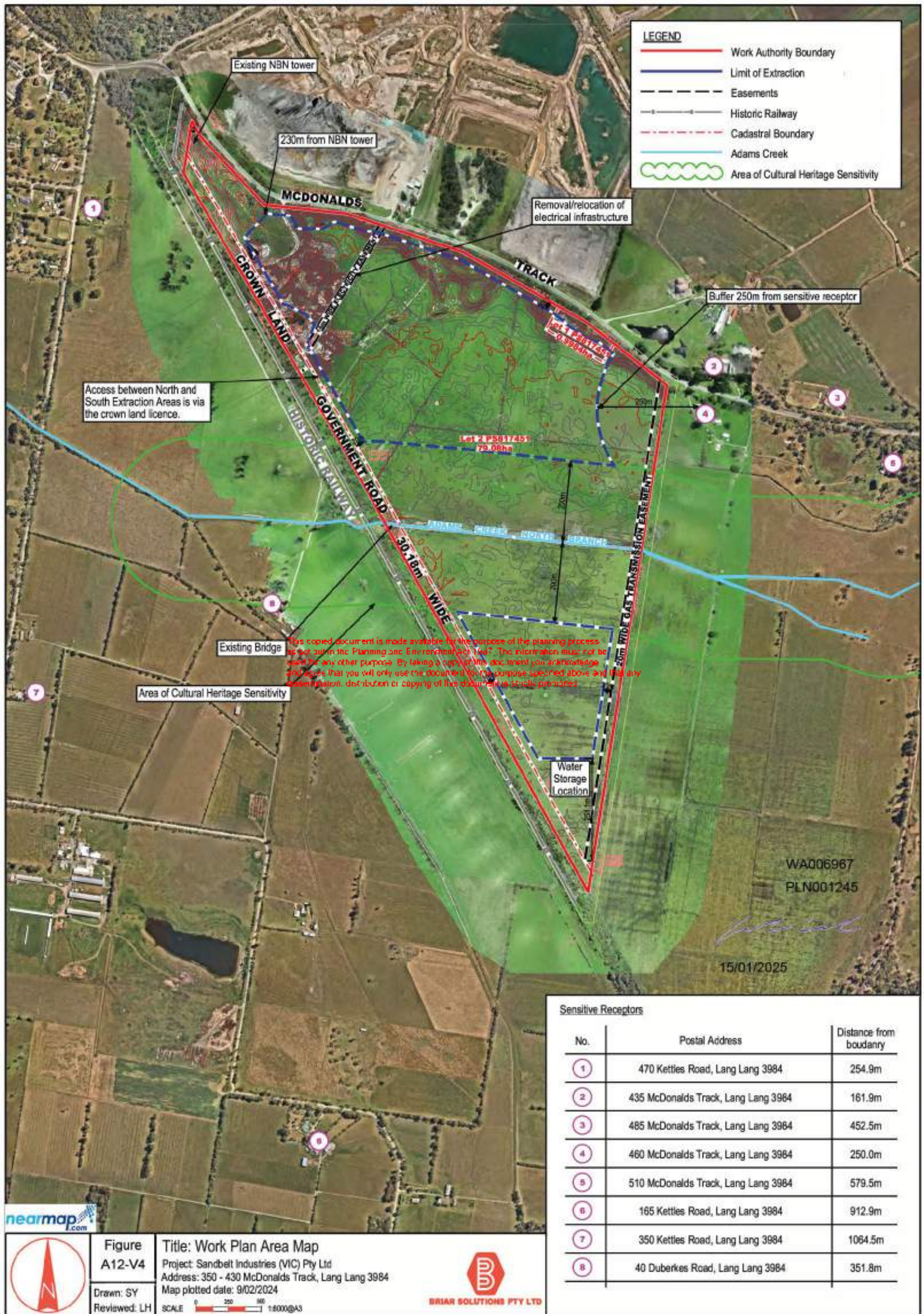
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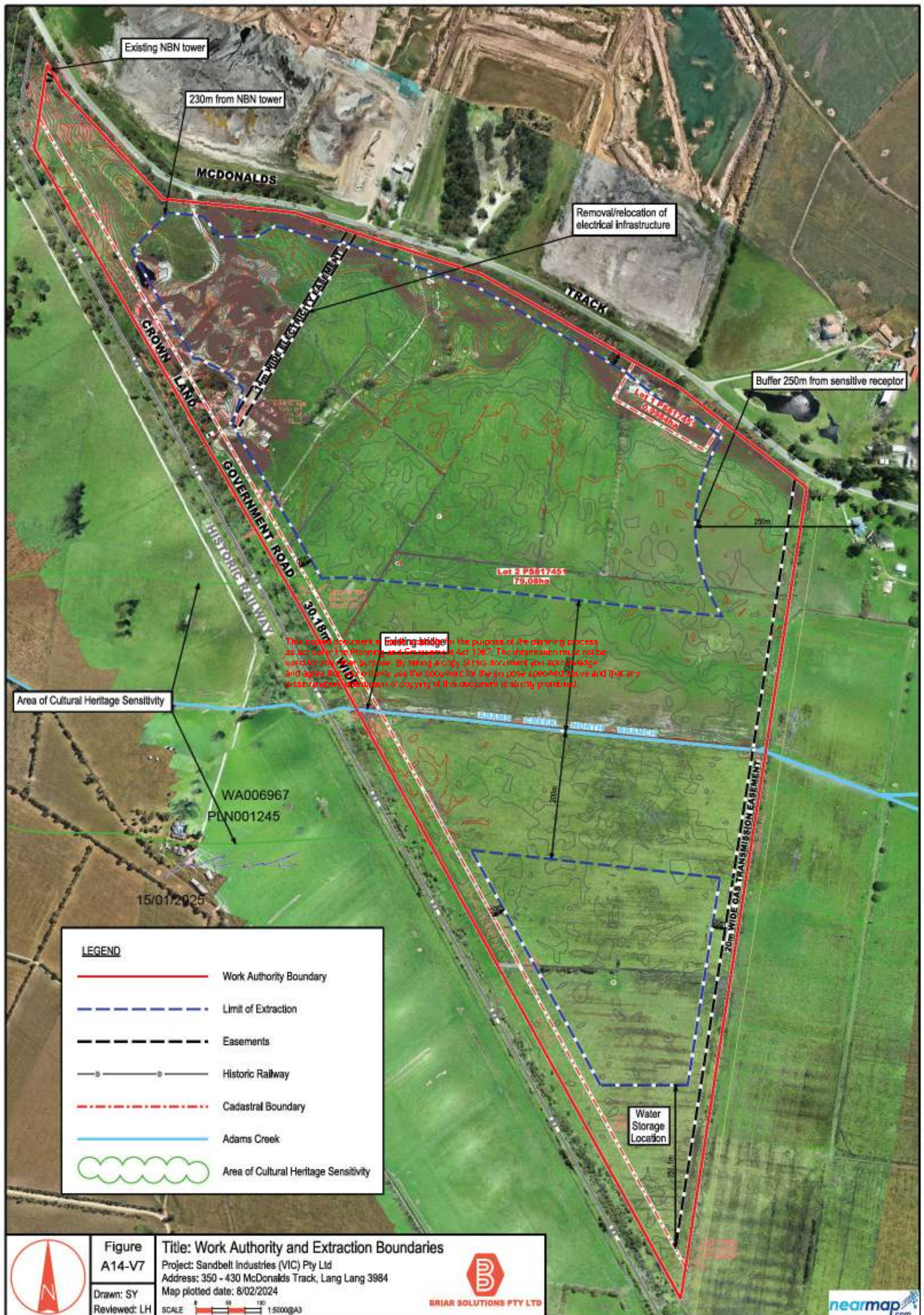
Project: Sandbelt Industries (VIC) Pty Ltd
Address: 350 - 430 McDonalds Track, Lang Lang 3984
Map plotted date: 11/02/2024

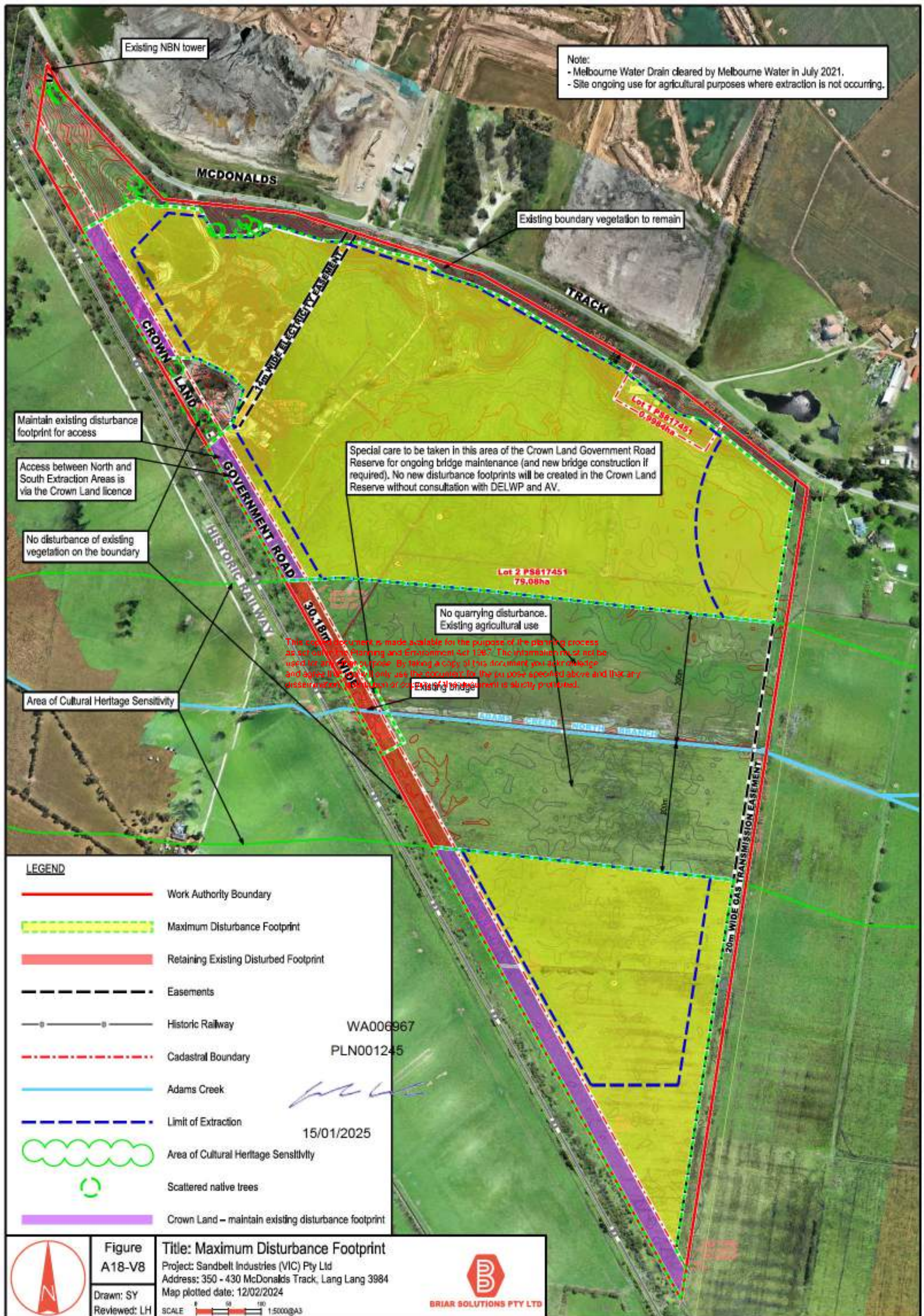
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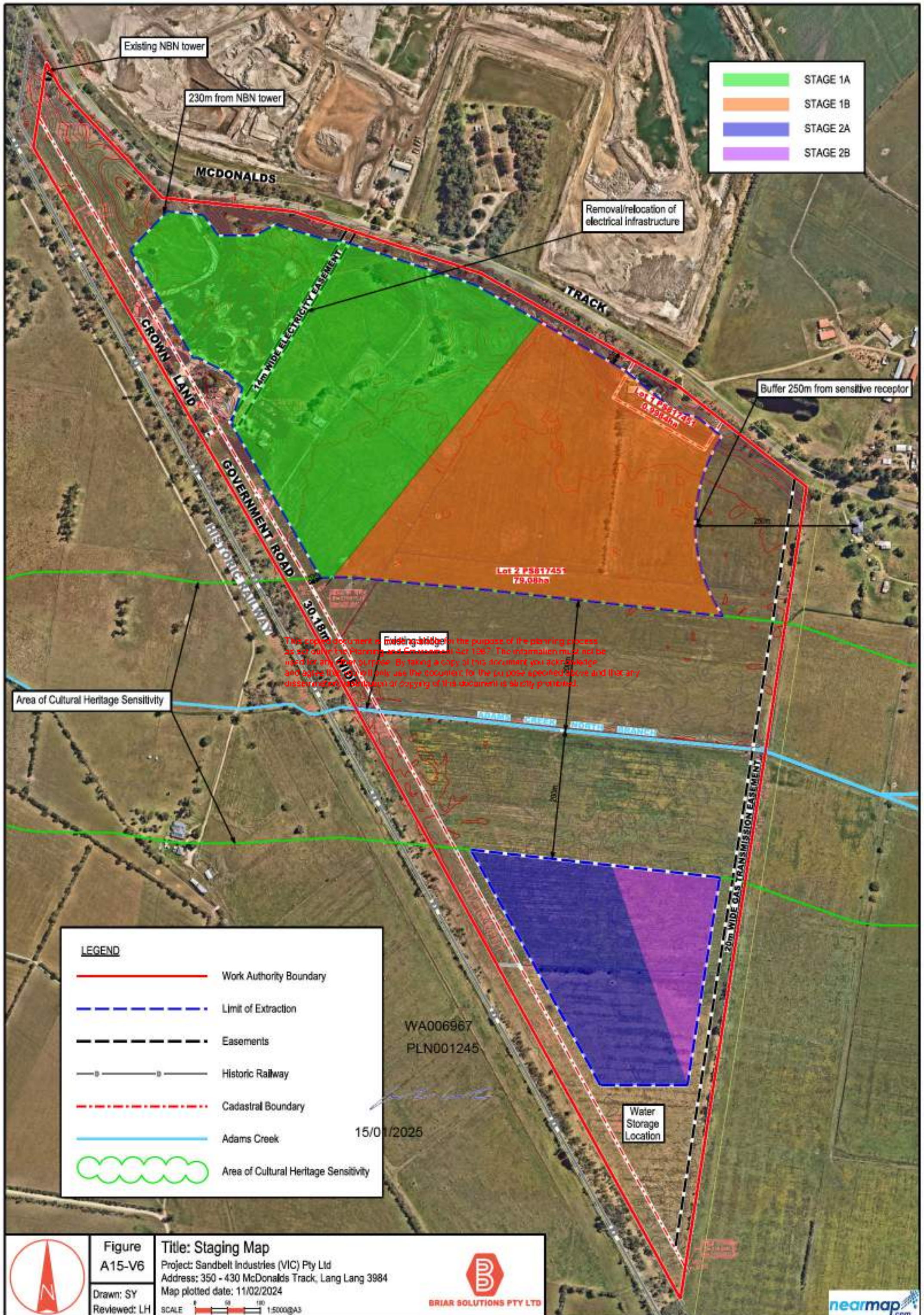


BRIAR SOLUTIONS PTY LTD

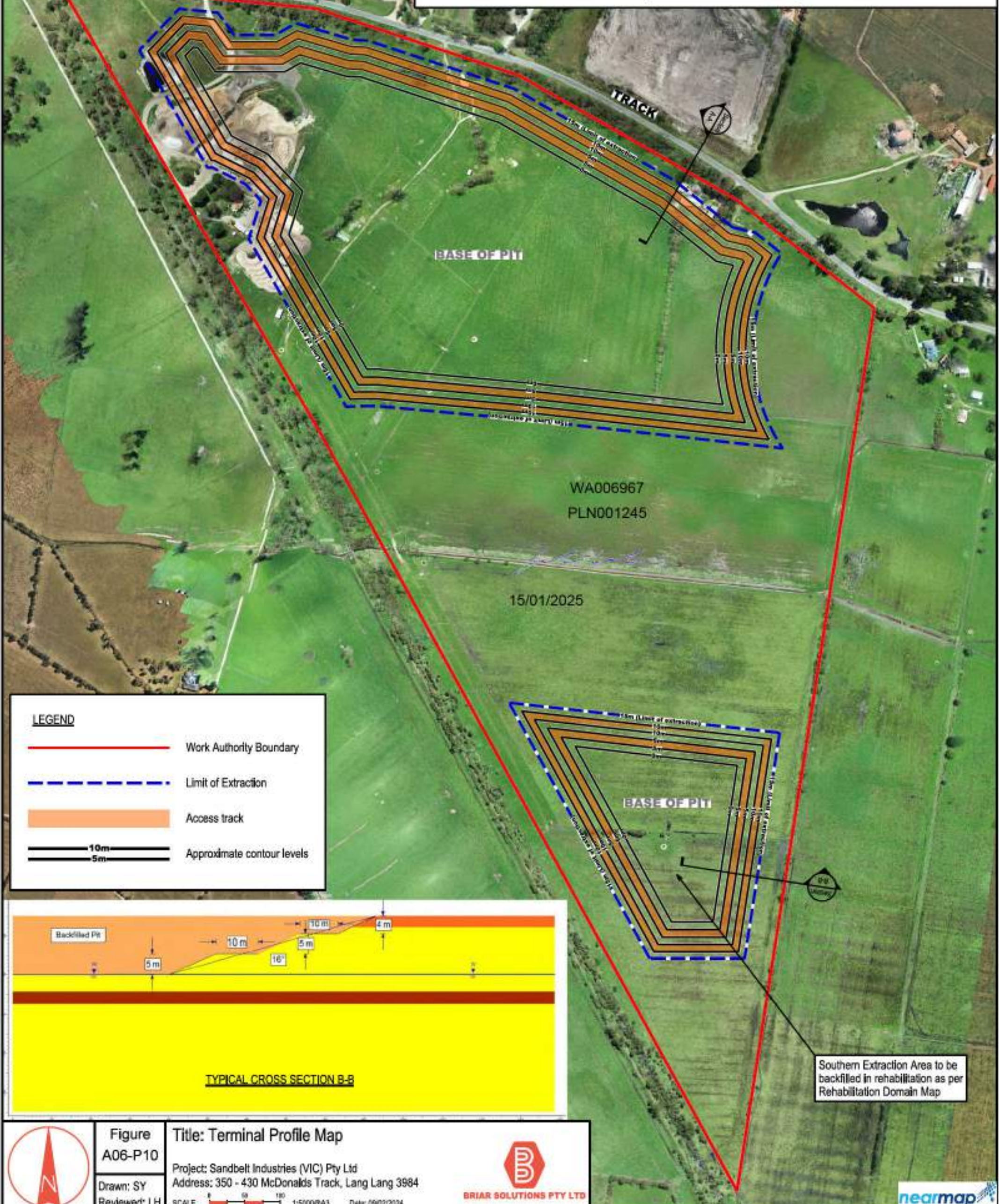
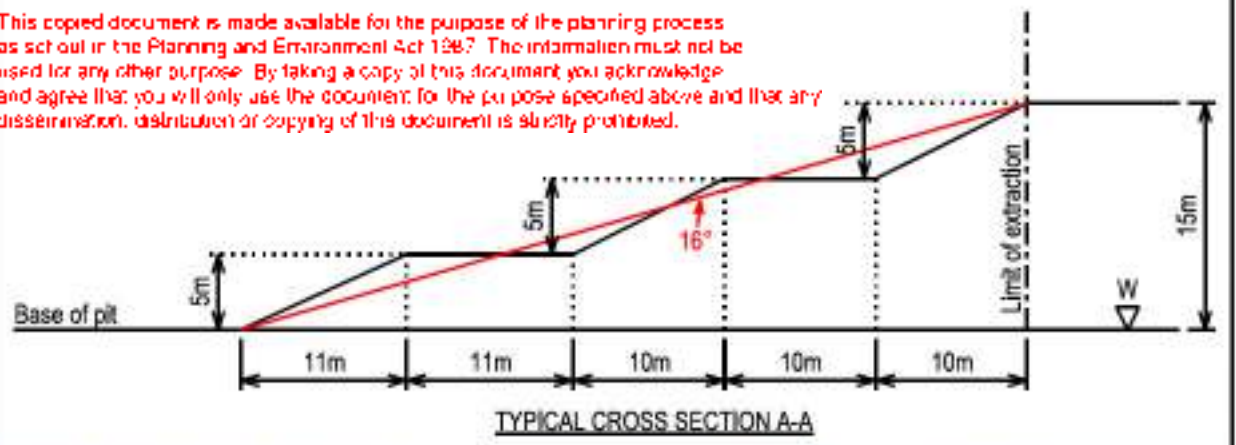








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LEGEND

- Work Authority Boundary
- Limit of Extraction
- Access track
- Approximate contour levels



