MAJOR ROAD PROJECTS AUTHORITY

OCTOBER 2018

MORDIALLOC BYPASS (FREEWAY)

ENVIRONMENT EFFECTS STATEMENT

VICTORIA'S BIG BUILD

VICTORIA State Government

Authorised and published by the Victorian Government, 1 Treasury Place, Melbourne

FOREWORD

On behalf of the Major Road Projects Authority (MRPA), I am pleased to present the Environment Effects Statement (EES) for the Mordialloc Freeway.

The 9km Mordialloc Freeway will improve access to Melbourne's south-eastern suburbs, completing the missing link from Frankston to Clayton. The project will save up to 10 minutes travel time and give local roads back to local people.

The freeway is a significant and important project for Melbourne's growing south-eastern suburbs.

Congestion will be reduced by connecting Mornington Peninsula Freeway to Dingley Bypass, in addition to building bridges over Springvale, Governor, Lower Dandenong, Centre Dandenong and Old Dandenong Roads. New walking and cycling paths will also encourage alternative transport options and connect communities to nearby parks and open spaces.

In September 2017, the Minister for Planning determined that the Mordialloc Freeway required assessment under the *Environment Effects Act 1978* (Vic). MRPA has prepared this EES to provide an assessment of the potential environmental, social, cultural and economic impacts associated with the proposed construction [and operation] of the Mordialloc Freeway, recognising that the new road is close to residential suburbs, wetlands and recreational parks.

Community and stakeholder feedback is a key element in the development of the EES. This feedback has been incorporated into the studies that have been completed and the environmental management approach presented in this EES. MPRA has made some significant changes to the design based on community feedback which include the project now being delivered as a freeway, new entry and exit ramps at Thames Promenade and a pedestrian underpass from Woodlands Industrial Estate to Braeside Park.

MRPA was assisted in preparing the EES by a Technical Reference Group (TRG) convened by the Department of Environment, Land, Water and Planning. MRPA would like to thank the TRG and everyone who has contributed to the EES. This consultation lead to design improvements that facilitate wildlife movement, preserve habitat and reduce the impact to residents by adding additional culverts in key habitat areas, building a dual bridge over the sensitive wetlands and the construction of noise walls where the freeway is close to homes.

The EES recommends Environmental Performance Requirements that define the environmental outcomes that must be achieved during the design, construction and operation of the freeway to avoid, manage or mitigate these impacts.

I encourage you to read the EES documents and have your say. By participating, you can ensure that all potential impacts are identified and managed, to keep the environment safe for future generations.

Allen Garner
Chief Executive Officer
Major Road Projects Authority

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Appendix J	Surface water impact assessment
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Appendix L	Contaminated land impact assessment
Appendix M	Social impact assessment
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Abbreviations

Acronym	Meaning
AASS	Actual acid sulfate soils
ABS	Australian Bureau of Statistics
ACH	Aboriginal Cultural Heritage
ACHRIS	Aboriginal Cultural Heritage Register and Information System
ACM	Asbestos containing material
AEP	Annual Exceedance Probability
AGRD	Austroads Guide to Road Design
AHD	Australia Height Datum
AQM	Air Quality Management
ASL	Above sea level
ASS	Acid sulfate soils
ASSMP	Acid Sulfate Soil Management Plan
BH	Biodiversity and Habitat
BoM	Bureau of Meteorology
BPEMG	Best Practice Environmental Management Guidelines
BTEX	benzene, toluene, ethylbenzene and xylene
CaLP Act	*Catchment and Land Protection Act 1994* (Victorian)
CAMBA	China-Australia Migratory Bird Agreement
CASS	Coastal Acid Sulfate Soil
CBD	central business district
CEMP	Construction Environmental Management Plan
CHMP	Cultural Heritage Management Plan
CMA	Catchment Management Area
CNVMP	Construction Noise and Vibration Management Plan
CO	carbon monoxide
CPTED	Crime Prevention Through Environmental Design
CRG	Community Reference Group
D&C	design and construct
DBH	Diameter at Breast Height
DEDJTR	Department of Economic Development, Jobs, Transport and Resources (Victorian)

Acronym	Meaning
DELWP	Department of Environment, Land, Water and Planning (Victorian)
DoEE	Department of Environment and Energy (Commonwealth)
DO	Dissolved oxygen
DPCD	former Department of Planning and Community Development (Victorian)
DSE	former Department of Sustainability and Environment (Victorian)
EC	Electrical conductivity
EE Act	*Environment Effects Act 1978*
EES	Environment Effects Statement
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPR(s)	Environmental Performance Requirement(s)
ERA	Environmental risk assessment
ESA	Environmental Site Assessment
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988* (Victorian)
GDE	Groundwater Dependent Ecosystem
NGER	National Greenhouse and Energy Reporting
GDE	Groundwater Dependent Ecosystems
GIS	Geographic Information System. A system for storing and manipulating geographical information on computer.
GPS	Global Positioning System- a navigational tool which uses radio receivers to pick up signals from four or more special satellites to provide precise determination of location.
HCO	Holocene Climatic Optimum
HEPA	Heads of EPA
HIL	Health Investigation Level
HO	Heritage Overlay
IS	Infrastructure sustainability
ISCA	Infrastructure Sustainability Council of Australia
IWRG	Industrial Waste Resource Guidelines
JAMBA	Japan-Australia Migratory Bird Agreement

Acronym	Meaning
LAC Act	*Land Acquisition and Compensation Act 1986* (Vic)
LCA(s)	Landscape Character Area(s)
LDAD	Low Density Artefact Distributions
LPPF	Local Planning Policy Framework
LSIO	Land Subject to Inundation Overlay
LVIA	Landscape and Visual Impact Assessment
LXR(s)	Level Crossing Removal(s)
LXRA	Level Crossing Removal Authority
m/s	metres per second
m^3/s	cubic metre per second
ML/d	megalitres per day
MMBW	Melbourne and Metropolitan Board of Works
MNES	Matters of National Environmental Significance – Matters listed pursuant to the *Environment Protection and Biodiversity Conservation Act 1999*.
MP	Member of Parliament
MPF	Mornington Peninsula Freeway
MRPA	Major Road Projects Authority
MSS	Municipal Strategic Statement
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
NEIC(s)	National Employment Innovative Cluster(s)
NEPM	National Environment Protection Measures
NO	nitrogen dioxide
NRA	Natural Resource Areas
NWQMS	National Water Quality Management Strategy
OEMP	Operational Environmental Management Plan
OMM	Operations, Maintenance and Monitoring (OMM) Manual
OGA	Open Graded Asphalt
OH&S	occupational health and safety
OSAR	Outer Suburban Arterial Roads
P&E Act	*Planning and Environment Act 1987* (Victorian)
PAO	Public Acquisition Overlay
PASS	potential acid sulfate soils
PEPS	Project Environment Protection Strategy

Acronym	Meaning
PFAS	perfluoroalkyl substances
PM	particulate matter
PONLs	Project Objective Noise Limits
PPF	Planning Policy Framework
PSA	Planning Scheme Amendment
PSI	Preliminary Site Investigation
PTV	Public Transport Victoria
PUZ	Public Use Zone
RAP	Registered Aboriginal Party
RMS	Roads and Maritime Services
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RORB	RunOff Routing Burroughs
SBO	Special Building Overlay
SEIFA	Socio-Economic Indexes for Areas
SEPP	State Environment Protection Policy
SEPP AQM	State Environment Protection Policy Air Quality Management
SHLD	Road shoulder
SIA	Social Impact Assessment
SMP	Soil Management Plan
sp.	Abbreviation of species (single)
spp.	Abbreviation of species (multiple)
subsp.	Abbreviation of subspecies
SUP	Shared User Path
TAGG	Transport Authorities Greenhouse Group
TDS	total dissolved solids
TI Act	Transport Integration Act 2010 (Vic)
TMP	Transport Management Plan
TN	total nitrogen
TNRP	Traffic Noise Reduction Policy
TP	total phosphorous
TPZ	tree protection zone
TRG	Technical Reference Group
TSP	total suspended particles

Acronym	Meaning
TSS	total suspended solids
TUFLOW	Two-dimensional Unsteady FLOW
TWA	Trade Waste Agreement
UFZ	Urban Floodway Zone
VAF	Victorian Aquifer Framework
VAHR	Victorian Aboriginal Heritage Register
VHR	Victorian Heritage Register
VITM	Victorian Integrated Transport Model
VPO	Vegetation Protection Overlay
VPPs	Victoria Planning Provisions
WMMP	Water Management and Monitoring Plan
WoNS	Weed of National Significance – weed listed by the Commonwealth of Australia based on invasiveness, potential for spread and environmental, social and/or economic impacts.
WoV	Waters of Victoria
WQI	Water Quality Index
WQO	Water Quality Objectives
WRSD	Wire rope safety barrier
WSRD	Water Sensitive Road Design
WSUD	Water Sensitive Urban Design
WVC	Wildlife-vehicle collisions
WW	Wetlands and Waterways

Glossary

Term	Definition
Acid sulfate soil	Any soil, sediment, unconsolidated geological material or disturbed consolidated rock mass containing metal sulfides which exceeds criteria for acid sulfate soils specified in the *Environment Protection Authority Victoria (EPA) (July 2009) Publication 655.1 Acid Sulfate Soil and Rock*.
Alignment	The geometric layout of a road
Alluvial	Sediments deposited by flowing water.
Ambient noise	The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area. Ambient Noise is usually assessed as an energy average over a set time period 'T' ($L_{Aeq, T}$).
Annual Exceedance Probability (AEP)	The AEP is the likelihood of occurrence of a flood of given size or larger occurring in any one year. A 1% AEP is equivalent to a 1 in 100 year storm event.
Aquifer	Rock or sediment in a formation, group of formations or part of a formation that is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs.
Aquitard	Saturated geological unit with a relatively low permeability that can store large volumes of water but does not readily transmit or yield significant quantities of water to bores or springs. An aquitard can sometimes, if completely impermeable, be called an aquiclude.
Archaeological potential	A term used to identify locations within the study area that have the potential to contain archaeological deposits. Archaeological potential is an unrealised, latent form of sensitivity that defines the spatial extent of known historical activity sites.
Archaeological Site	A place/location of either Aboriginal or non-Aboriginal origin. Aboriginal archaeological sites have been formed prior to the European settlement of Australia, and may be in various forms.
Artefact	Any product made by human hands or caused to be made through human actions.
Artefact scatter	A scatter of cultural material, most commonly stone artefacts. Artefact scatters are often the only physical remains of places where Aboriginal people have camped, prepared and eaten meals and worked stone material.
Attenuation	The reduction of sound energy as a function of distance travelled, when it travels from a source to a receiver, by means such as distance, screening, air absorption, etc.
A-weighting	A frequency weighting devised to attempt to take into account the fact that human response to sound is not equally sensitive to all frequencies; it consists of an electronic filter in a sound level meter, which attempts to build in this variability into the indicated noise level reading so that it will correlate, approximately, with human response.
Background noise level	Total silence does not exist in the natural or built-environments, only varying degrees of noise. The Background Noise Level is the typical minimum level of noise measured in the absence of the noise under investigation and excluding other short-term noises such as those caused by all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc. It is generally quantified by the noise level that is exceeded for 90% of the measurement period 'T' ($L_{A90, T}$).
Baseflow	The component of river or stream flow that is derived from groundwater discharge to the river or stream.

Term	Definition
Baseline	A basic standard or level, usually regarded as a reference point for comparison.
B-Doubles	B-Doubles are trucks with two semitrailers; the first trailer (or carriage) is attached to the prime mover and the second is attached to the first, not the prime mover. As B-doubles are tall, and longer than 19 m (usually 23–25 m), suitable approved freight networks are mapped and displayed in *Victoria's gazetted roads for B-Doubles*.
Beneficial use	Environmental values and human uses which needs protection in the defined area of the environment, as defined in *EPA (June 2002) Publication 854 Prevention and management of Contamination of Land in Victoria* (EPA Publication 854).
Biodiversity	The biological diversity of life is commonly regarded as being made up of the following three components: • Genetic diversity — the variety of genes (or units of heredity) in any population. • Species diversity — the variety of species. • Ecosystem diversity — the variety of communities or ecosystems.
Bioregion (region)	A bioregion defined in a national system of bioregionalisation. The project area is located within the Gippsland Plain Bioregion.
Bio-retention systems	Specially-designed garden beds that filter stormwater runoff from surrounding areas or stormwater pipes. They use soil, plants and microbes to biologically treat stormwater.
Birthing tree	A sacred and culturally significant place Aboriginal women once visited to give birth, and which men are banned from seeing.
Bore	Artificially constructed or improved groundwater cavity used for the purpose of accessing or recharging water from an aquifer. Interchangeable with borehole, piezometer.
Braeside Park Wetlands	The wetlands in the southwestern part of Braeside Park.
Canopy Tree	Defined under Guidelines 2017 as a native mature tree (i.e. it can flower) that is greater than 3 metres in height and is normally found in the upper layer of the relevant EVC. It can be a Scattered Tree or a tree in a patch (Refer to 'Scattered Tree' and 'Remnant Patch').
Carbon dioxide equivalent (CO_2-e)	This unit normalises greenhouse gasses per their global warming potential (GWP). For example, 1kg of methane is equal to 25kg CO2-e as it has a GWP of 25 (Department of the Environment 2015).
Class 1 Indicators	Common environmental indicators in the SEPP(AQM)
Clay	Deposit of particles with a diameter less than 0.002 mm, typically contain variable amounts of water within the mineral structure, and exhibit high plasticity.
Confined aquifer	An aquifer bounded above and below by impervious (confining) layers. In a confined aquifer, the water is under sufficient pressure so that when wells are drilled into the aquifer, measured water levels rise above the top of the aquifer.
Contamination	The condition of land or water where any chemical substance or waste has been added as a direct or indirect result of human activity at above background level and represents, or potentially represents, an adverse health or environmental impact
Core	An artefact from which flakes have been detached using a hammer stone. Core types include blade, single platform, multiplatform and bipolar forms. These artefacts exhibit a series of negative flake scars, each of which represents the removal of a flake.

Term	Definition
Cultural significance	Relates to the aesthetic, historic, scientific or social value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.
Cumulative impact	The combined impact to one or more environmental values delivered by multiple projects being undertaken simultaneously within the same sphere of physical influence.
Decibel	The decibel (dB) is a logarithmic scale that allows a wide range of values to be compressed into a more comprehensible range, typically 0 dB to 120 dB. Noise levels in decibels cannot be added arithmetically, because they are logarithmic numbers. The human ear has a vast sound-sensitivity range of over a thousand billion to one so the logarithmic decibel scale is useful for acoustical assessments.
Declared road	Major arterial roads (freeways, arterial roads and some non-arterial state roads) in Victoria's road network for which VicRoads are responsible for the overall management and development.
Drawdown	The change in groundwater level in a bore, or the change in water table elevation in an unconfined groundwater system, due to the extraction of groundwater.
Dune	A mound or ridge of wind-blown granular material (usually sand) that is partially, fully or bare of vegetation, and capable of being moved from one location to another while still retaining its characteristic shape.
Ecological community	An assemblage of species occupying a particular area.
Ecological Vegetation Class (EVC)	A type of native vegetation classification that is described through a combination of its floristics, life form and ecological characteristics, and through an inferred fidelity to particular environmental attributes. Each EVC includes a collection of floristic communities (i.e. lower level in the classification that is based solely on groups in the same species) that occur across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating.
Edithvale wetlands	The Edithvale component of the Edithvale-Seaford Ramsar site, comprising northern and southern sections which are separated by Edithvale Road.
Effluent	Liquid waste or sewage discharged into a river or the sea.
Exotic	Introduced from outside the area. Used in the context of this report to refer to species introduced from overseas.
Experiential impact	The accumulation of different human senses (seeing, hearing, touching, smelling and tasting), experiences and instincts combine to create certain feelings about or within an area; impacts upon human enjoyment or feelings within an area are highly qualitative, however, professional judgments can be made based on human experience
Frequency	The number of oscillations or cycles of a wave motion per unit time. The standard international unit is the hertz (Hz).
Groundwater	Water found in the subsurface in the saturated zone below the water table or piezometric surface i.e. the water table marks the upper surface of groundwater systems.
Groundwater flow	The movement of water through openings and pore spaces in rocks below the water table (i.e. in the saturated zone).
Groundwater resource	Groundwater available for beneficial use, including human usage, aquatic ecosystems and the greater environment.
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic components.

Term	Definition
Health screening levels (HSLs)	For petroleum hydrocarbons are the concentrations above which further appropriate investigation and evaluation will be required. HSLs depend on physicochemical properties of soil, as these affect hydrocarbon vapour movement in soil, and the characteristics of building structures. HSLs apply to different soil types, land uses and depths below surface to >4 m and have a range of limitations.
Hearth	Usually a subsurface feature found eroding out of a river or creek bank or in a sand dune - it indicates a place where Aboriginal people cooked food. The remains of a hearth are usually identifiable by the presence of charcoal and sometimes clay balls (like brick fragments) and hearth stones. Remains of burnt bone or shell are sometimes preserved within a hearth.
High integrity occupation deposit	The laying down of deposits by human activities that bury artefacts to form distinct stratigraphic entities such as layers (e.g. dense lens of stone artefacts & bone between environmental deposits, stratified shell deposits) or features (hearths, occupation mounds). High integrity occupation deposits have a high degree of spatial and temporal integrity.
Holocene period	The time from the end of the Pleistocene Ice Age (c 10,300 BP) to the present day.
Human response to noise level changes	• Less than 3 dBA = No perceivable difference • 3 dBA = Barely perceptible difference • 5 dBA = Readily perceptible difference • 10 dBA = 'Doubling' (or 'halving') of sound level
Hydraulic conductivity	Measure of the ease with which water will pass through earth material; defined as the rate of flow through a cross-section of one square metre under a unit hydraulic gradient at right angles to the direction of flow (metres per day).
Hydrogeology	The study of the interrelationships of geological materials and processes with water, especially groundwater.
Incorporated document	Documents that are incorporated in a planning scheme by reference, rather than by including them in the scheme itself, as allowed by the Planning and Environment Act 1987.
Indigenous species	Native to the area: not introduced.
Introduced species	Not native to the area: not indigenous. Refers to both exotic and non-indigenous Australian native species of plants and animals.
Investigation levels and screening levels	Concentrations of a contaminant above which further appropriate investigation and evaluation will be required. Investigation and screening levels provide the basis of Tier 1 risk assessment.
L_{Aeq}	The A-weighted sound pressure level in decibels of a continuous steady sound that has, within a specified time interval, T, the same energy as the sound being measured. It can be considered the 'average' noise over time interval, T.
L_{A10}	The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T.
L_{A90}	The A-weighted sound pressure level in decibels exceeded for 90% of a given time interval, T. L_{A90} is typically considered to be representative of background noise.
$L_{10,18hour}$	Arithmetic average of the hourly L_{10} values for the 18 hour period between 0600hrs and 0000hrs.
$L_{eq,16hour}$	Logarithmic average of L_{eq} values for the 16 hour period between 0600hrs and 2200hrs.
$L_{eq,8hour}$	Logarithmic average of L_{eq} values for the 8 hour period between 2200hrs and 0600hrs.

Term	Definition
Landfill gas	Formed by the decomposition of organic material in landfills. It is composed mainly of methane and carbon dioxide and a small amount of other organic compounds such as hydrogen sulphide. Methane is a potent greenhouse gas.
Landscape character area (LCA)	Distinct areas of landscapes that are relatively similar in visual character and land use; similarities typically occur due to similar geology, topography, vegetation, historical and recent land use, materials and urban formation
Large tree	Defined under Guidelines 2017 as a native canopy tree with a Diameter at Breast Height (DBH) greater than or equal to the large tree benchmark for the relevant bioregional EVC. A large tree can be either a large scattered tree or a large tree contained within a patch.
Likely	Taken to be a real chance or possibility.
Limits of acceptable change	In relation to Ramsar sites, these limits are the range of variation in the components, processes and benefits or services that can occur without causing a change in the ecological character of the site.
Locality	The area within a 5 km radius of the project area.
Local population	The population that occurs within the site, unless the existence of contiguous or proximal occupied habitat and the movement of individuals or exchange of genetic material across the boundary can be demonstrated. The local population of migratory or nomadic fauna species comprises those individuals likely to occur in the study area from time to time or return year to year.
Matters of National Environmental Significance (MNES)	Matters listed pursuant to the *Environment Protection and Biodiversity Conservation Act 1999*. These include: listed threatened species and ecological communities, Migratory species protected under international agreements, wetlands of international importance (listed under the Ramsar Convention), Commonwealth marine environment, World Heritage Properties, National Heritage Places, the Great Barrier Reef Marine Park, Commonwealth marine areas, nuclear actions, and a water resource (in relation to coal seam gas development and large coal mining development).
Middens	Midden is a term borrowed from the Danish. It originally applied to the accumulations of shell and other food remains left by Mesolithic man. Australian middens are an accumulation of hearth and food debris, which has built up a deposit over a length of time. Middens are generally comprised of charcoal and either freshwater or coastal shell species, depending on the place's location. Middens may also contain stone artefacts, and the food refuse of other native animals such as small mammals. The thick deposit of burnt shells and dark grey/black deposit can distinguish middens within the landscape. Coastal shell middens are often found in close association with rock platforms. Freshwater shell middens are found in close proximity to areas with freshwater mussels.
Migratory species	Capitalisation of the term 'Migratory' in this report refers to those species listed as Migratory under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. The listing of these species relates to international agreements to which Australia is a signatory. These include Japan-Australia Migratory Bird Agreement, China-Australia Migratory Bird Agreement, Republic of Korea-Australia Migratory Bird Agreement and the Bonn Convention on the Conservation of Migratory Species of Wild Animals.
Modelling	The creation of a computerised model that simulates natural environment, allows simulations to project future outcomes.
Monitoring bore	A bore used to monitor groundwater levels or quality.
Mortuary trees	A significant type of Aboriginal place where human remains and grave goods have been placed within the hollow of a tree trunk or branch.

Term	Definition
No-go zones	Areas of native vegetation which will be retained and are excluded from the calculation of impacts.
Noise	Noise is unwanted, harmful or inharmonious (discordant) sound.
Noxious weed	An introduced species listed under the Noxious Weeds Act 1993. Under the Act, noxious weeds have specific control measure and reporting requirements.
Particulate matter (PM)	The sum of all solid and liquid particles suspended in air, many of which are hazardous. This complex mixture includes both organic and inorganic particles, such as dust, pollen, soot, smoke and liquid droplets. Two particle sizes of interest for this project are PM_{10} and $PM_{2.5}$.
Permeability	The ease with which a fluid can pass through a porous medium and is defined as the volume of fluid discharged from a unit area of an aquifer under unit hydraulic gradient in unit time (metres per day).
PM_{10}	'Coarse particles' are those between 10 and 2.5 micrometres (µm) in diameter.
$PM_{2.5}$	'Fine particles' are those with a diameter of 2.5µm ($PM_{2.5}$) or less. Particles that are smaller than 0.1µm are called ultrafine particles. Being smaller, $PM_{2.5}$ particles can be transported further and persist for longer in the atmosphere.
Project area	Defined as the entire extended footprint of the project works. This includes areas of land that are outside the proposed Right of Way where works are expected to be completed.
Protected flora (Victoria)	Protected flora are: • plants that have been declared to be protected under section 46 of the FFG Act. • plants that are listed as threatened under section 10 of the FFG Act • plants that belong to communities that are listed as threatened under section 10 of the FFG Act.
Public Acquisition Overlay (PAO)	A reservation placed on land within a local planning scheme identifying it as land proposed for acquisition by a public authority.
Ramsar	A site protected by an international treaty on the conservation and wise use of wetlands and their resources
Recharge	Recharge is defined as the process by which water is added from outside to the zone of saturation of an aquifer, either directly into a formation, or indirectly by way of another formation.
Reference design	The reference design is the preliminary design of the project within a defined project boundary which provides scope for innovation in the ultimate design to be developed to achieve optimum environmental outcomes.
Remnant patch	An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native, or any area with three or more native trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or any mapped wetland included in the Current wetlands map, available in DELWP systems and tools.
Revegetation	Establishment of native vegetation to a minimum standard in formerly cleared areas, outside of a Remnant Patch
Risk (contamination)	The probability in a certain timeframe that an adverse outcome will occur in a person, a group of people, plants, animals and/or the ecology of a specified area that is exposed to a particular dose or concentration of a chemical substance, that is, it depends on both the level of toxicity of the chemical substance and the level of exposure to it.

Term	Definition
Runoff	All surface and subsurface flow from a catchment, but in practice refers to the flow in a river i.e. excludes groundwater not discharged into a river.
Sand sheet	A thin, continuous deposit of sand with no large topographic features on the surface.
Scarred tree	Scarred trees are trees which have had bark removed by indigenous Australians for the creation of bark canoes, shelters, shields and containers, such as coolamons. Scarred trees are significant evidence of Aboriginal occupation and can provide information on Aboriginal activities in the area in which they are located.
Scattered tree	Defined under Guidelines 2017 as a Canopy Tree that does not form part of a remnant patch.
Scientific significance	Contribution made by the artefact, place, or object to advancing scientific knowledge and understanding.
Scope 1 emissions	Direct emissions from owned or controlled sources. A project example would be emissions from construction machinery.
Scope 2 emissions	Emissions from the indirect consumption of an energy commodity. A project example would be emissions from the generation of electricity purchased to power street lights along the project.
Scope 3 emissions	All indirect emissions not included in Scope 2 that would occur as a result of the project, but from sources not owned or controlled. A project example would be emissions from the vehicles that would use the bypass once constructed.
Semi-confined aquifer	An aquifer that is partly confined by layers of lower permeability material through which recharge and discharge may occur, also referred to as a leaky aquifer.
Sensitive receptors	People or places that may be impacted by air emissions or noise. Examples of sensitive locations include '*hospitals, schools or residences*' (EPA 2001).
Sensitive land use	A sensitive land use is '*any land uses which require a focus on protecting the beneficial uses of the air environment relating to human health and wellbeing, local amenity and aesthetic enjoyment, for example residential premises, childcare centres, pre-schools, primary schools, education centres or informal outdoor recreation sites*' (EPA 2013).
Significant impact	A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity.
Significant species	Important, weighty or more than ordinary; typically used to describe the importance of a species or community at local, regional, state or federal levels.
Small tree	Defined under Guidelines 2017 as a native canopy tree with a Diameter at Breast Height (DBH) less than the large tree benchmark for the relevant bioregional EVC.
Sound pressure level (SPL)	The basic unit of sound measurement is the sound pressure level. The pressures are converted to a logarithmic scale and expressed in decibels (dB).
Sound pressure	The RMS (root-mean-square) sound pressure measured in pascals (Pa).
State Environment Protection Policy (SEPPs)	Describes environmental quality and how it is to be maintained for the protection of any beneficial use, describes the community expectations for protection and use of environment, as defined in EPA Publication 854.
Study area	The study area is the project area plus a buffer of 20+ metres. This is to ensure sufficient data collection to provide context to the project area and allow more accurate impact assessment to occur.

Term	Definition
Swales	Swales are linear, depressed channels that collect and transfer stormwater. They can be lined with grass or more densely vegetated and landscaped.
The project	The Mordialloc Bypass (Freeway) project.
Threatened species, populations and ecological communities	Species, populations and ecological communities listed as Vulnerable, Endangered or Critically Endangered (collectively referred to as Threatened) under state and/or Commonwealth legislation (including TSC Act, FM Act or the EPBC Act). Capitalisation of the terms 'Threatened', 'Vulnerable', 'Endangered' or 'Critically Endangered' in this report refers to listing under the relevant state and/or Commonwealth legislation.
Victorian Integration Transport Model (VITM)	VITM is the in-house strategic transport demand model owned by the Victorian Department of Economic Development, Jobs, Transport, and Resources (DEDJTR). VITM is a comprehensive database and model of freight and transport movements, which acts as an analytical tool to forecast travel and understand alternate travel in response to various transport infrastructure and land use planning scenarios.
Visibility	Refers to the degree to which the surface of the ground can be observed. It is generally expressed in terms of the percentage of the ground's surface visible for an observer on foot (Bird 1992). For example 10% visibility equates to 10cm2 per 1 m2 of ground surface that is not covered by vegetation or soil deposit.
Visual amenity	Amenity is a broad term that generally means the qualities, attributes and characteristics of a place that make a positive contribution to quality of life. Amenity values can include both visual amenity, and the ability for people to live and recreate within their surroundings without any unreasonable interference with their health, welfare, convenience and comfort. Natural landscapes and views often contribute to visual amenity, such as areas of high heritage, cultural or social significance due to their natural features or scenic quality. Amenity values can be highly subjective; what may have amenity value for one person, may not be valued by another. Similarly, people have different levels of perception or tolerance for things that may impact amenity. (References: GLVIA, 2013 and EPA, Environmental Factor Guideline: Social Surroundings)
Water table	The surface in an unconfined aquifer or confining bed at which the pore water pressure is atmospheric; it can be measured by installing shallow wells extending a few feet into the zone of saturation and then measuring the water level in those wells.
Waterways Wetlands	The wetlands constructed as part of the development of Waterways (suburb) along Mordialloc Creek.
Weed	A plant growing out of place or where it is not wanted: often characterized by high seed production and the ability to colonise disturbed ground quickly. Weeds include both exotic and Australian native species of plant naturalised outside of their natural range.
Wetland	In Victoria, wetlands are defined as areas whether natural, modified or artificial, subject to permanent or temporary inundation, that hold static or very slow moving water and develop, or have the potential to develop, biota adapted to inundation and the aquatic environment. Wetlands may be formed by natural processes or human activities. Wetlands include freshwater and saline lakes, swamps and shallow waters in Victoria's estuaries, bays and inlets.
Wetland cell	Different individual pools or ponds of water within a wetland.
Woodlands Industrial Estate wetlands ('Woodlands Wetlands')	The Melbourne Water retention ponds and associated wetland vegetation/shallow wetlands within the same block.