



Transport for NSW

# Western Harbour Tunnel and Warringah Freeway Upgrade

Submissions report

September 2020







Transport for NSW

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September 2020



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## Glossary and abbreviations

Abbreviation	Definition
100-year flood	A 100-year flood is the flood that will occur or be exceeded on average once every 100 years. It has a 1% probability of occurring in any given year. The same principle applies to other flooding events, such as 10-year, 20-year and 50-year flood
AAQ NEPM	Ambient Air Quality National Environment Protection Measure
ABS	Australian Bureau of Statistics
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACTAQ	Advisory Committee on Tunnel Air Quality
ADCP	Acoustic doppler current profiler
AEP	Annual exceedance probability
AHD	Australian height datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal heritage impact permit
AHO	Aboriginal Heritage Office
AILA	Australian Institute of Landscape Architects
AIS	Automatic identification system
AM peak	Time period between 8 am and 9 am
ANSI	American National Standards Institute
ANZAC	Australian and New Zealand Army Corps
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG (2018)	Australian and New Zealand Guidelines 2018
APPEA	Australian Petroleum Production Exploration Association
Aquitard	A zone within the earth that restricts groundwater flow from one aquifer to another
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ARR	Australian rainfall and runoff
AS	Australian Standard
ASRIS	Australian Soil Resource Information System
ASS	Acid sulfate soils
Average recurrence interval	The long-term average number of years between the occurrence of a flood larger than the selected event
BC Act	<i>Biodiversity Conservation Act 2016</i>
Beaches Link	The Beaches Link and Gore Hill Freeway Connection project which comprises a new tolled motorway tunnel connection across Middle Harbour from the Warringah Freeway and Gore Hill Freeway to Balgowlah and Killarney Heights and including the surface upgrade of Wakehurst Parkway from Seaforth to Frenchs Forest and upgrade and integration works to connect to the Gore Hill Freeway at Artarmon



Abbreviation	Definition
BDAR	Biodiversity Development Assessment Report
BFPL	Bush Fire Prone Land
Biodiversity Assessment Method (BAM)	Established under section 6.7 of the BC Act to assess impacts on threatened species and threatened ecological communities (TECs), and their habitats, and the impact on biodiversity values, where required under the BC Act
B-Line	Northern Beaches Bus Rapid Transit
The Blue Book	Managing Urban Stormwater, Soils and Construction guidelines, Volumes 1 (Landcom, 2004) and 2 (2008)
BOM	Bureau of Meteorology
BS	British Standard
BTEX	Benzene, toluene, ethylbenzene and xylene
Burra Charter	<i>Australia ICOMOS Charter for Places of Cultural Significance</i>
CALMET	A meteorological model that is a component of CALPUFF modelling system
CALPUFF	A modelling system that calculates the dispersion of plumes within a three-dimensional meteorological field
CASA	Civil Aviation Safety Authority
CBD	Central business district
CEO	Chief Executive Officer
CCTV	Closed circuit television
CCT	Cross City Tunnel
CEMP	Construction environmental management plan
CH <sub>4</sub>	Methane
Chart datum	The level of water from which charted depths displayed on a nautical chart are measured
CLM Act	<i>Contaminated Land Management Act 1997</i>
CNVIS	Construction Noise and Vibration Impact Statement
CNVMP	Construction noise and vibration management plan
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
Cofferdam	A temporary enclosure within a body of water that is constructed to allow dewatering of an enclosed area
Collector road	Major and minor roads that connect local roads and streets with arterial roads
Complaint fatigue	An impact that may occur where community perceptions of project complaint management systems result in failure to report concerns about construction impacts. This impact may be compounded where multiple agencies are responsible for issues in the same area where construction of multiple projects occurs
Construction fatigue	An impact that may be experienced by receivers that are in the vicinity of concurrent or consecutive project construction activities where the activities overlap or have little or no break between the activities of one project, or multiple adjacent projects

Abbreviation	Definition
Construction footprint	The total area required to facilitate the construction of the project
Construction support sites	Parcels of land on which construction-related activities would be carried out
COVID-19	COVID-19 is a disease caused by a new strain of coronavirus. 'CO' stands for corona, 'VI' for virus, and 'D' for disease
CPTED	Crime prevention through environmental design
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTMP	Construction traffic management plan
Cumulative impact	An impact that may occur when impacts from one project interact or overlap with impacts from other projects and potentially result in a larger overall effect on the environment, businesses or local communities. Cumulative impacts may also occur when projects are constructed consecutively with construction activities occurring over extended periods of time with little to no break in between
Cut and cover tunnel	Tunnels that are typically constructed at locations where the tunnel alignment does not have enough rock cover to support the construction of traditional driven tunnels
dB	Decibel
dB(A)	A-weighted decibels
DCP	Development control plan
DDA	<i>Disability Discrimination Act 1992</i>
DEC	Department of Environment and Conservation (former)
DECC	Department of Environment and Climate Change (former)
DECCW	Department of Environment Climate Change and Water (former)
DEWHA	Department of the Environment, Water, Heritage and the Arts (former)
Dioxins	Polychlorinated dibenzo-para-dioxins
DIPNR	Department of Infrastructure, Planning and Natural Resources (former)
DLWC	Department of Lands and Water Conservation (former)
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
DUAP	Department of Urban Affairs and Planning (former)
Drained structures	Underground structures designed to allow the inflow of groundwater, which is then captured, treated and discharged
Drawdown	The localised lowering of groundwater levels as a result of water extraction
Dredging	Excavation carried out underwater or partially underwater
Driven tunnel	Tunnels excavated using roadheaders
ECL	Environmental concern level
EIS	Environmental impact statement
EMS	Environmental management system
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>

<b>Abbreviation</b>	<b>Definition</b>
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
EPL	Environment protection licence
ESD	Ecologically sustainable development
ESP	Electrostatic precipitator
Floodway	Floodplains that transmit large quantities of water
Flood fringe	Floodplains that do not play a significant role in either storing or conveying water
Flood storage	Floodplains that store a significant volume of water
FM Act	<i>Fisheries Management Act 1994</i>
GHG	Greenhouse gas
Gore Hill Freeway Connection	Connection and integration works along the existing Gore Hill Freeway and surrounding roads at Artarmon
GPS	Global positioning system
GRAL	Graz Langrangian model
GRAMM	Graz Mesoscale model
Groundwater	All waters occurring below the land surface. The upper surface of the soils saturated by groundwater in any particular area is called the water table
GSC	Greater Sydney Commission
HAT	Highest astronomical tide
HCA	Heritage Conservation Area
HGV	Heavy goods vehicle
HMAS	Her Majesty's Australian Ship
IAQM	UK Institute of Air Quality Management
IBC	Intermediate bulk containers
ICOMOS	International Council on Monuments and Sites
IDA Tunnel	A road and rail tunnel ventilation and fire simulation software
Immersed tube tunnel	A series of steel tunnel segments placed on top, or within the top layers, of harbour rock and sediment
IMT	Immersed tube tunnel
IPCC	International Panel on Climate Change
ISCA	Infrastructure Sustainability Council of Australia
ISO	International Organisation for standardisation
ITS	Intelligent transport systems
kg	Kilogram
km	Kilometre
km/h	Kilometres per hour
kN	Kilonewtons
ktCO <sub>2</sub> -e	Kilotonnes of carbon dioxide equivalent



Abbreviation	Definition
kV	Kilovolt
L <sub>A90</sub>	Noise level exceeded for 90% of the measurement period
L <sub>Aeq</sub>	Sound level in decibels equivalent to the total A-weighted sound energy measured over a stated period of time
L <sub>Amax</sub>	Maximum A - weighted sound pressure level
LALC	Local Aboriginal Land Council
LCT	Lane Cove Tunnel
LCZ	Landscape character zone
LDV	Light duty vehicle
LED	Light-emitting diode
LEP	Local environmental plan
LGA	Local government area
LoS	Level of service
L/s/km	Litres per second per kilometre
LTADEL	Long term average annual extraction limit
m	Metre
m/s	Metres per second
mm	Millimetres
mm/s	Millimetres per second
m <sup>2</sup>	Square metres
m <sup>3</sup>	Cubic metres
m <sup>3</sup> /s	Cubic metres per second
Mainline tunnel	Tunnels connecting the approved M4-M5 Link at Rozelle to the Warringah Freeway and to the Beaches Link tunnels at Cammeray
mg	Milligrams
mg/L	Milligrams per litre
mg/m <sup>3</sup>	Milligrams per cubic metre
Midblock	A general location on a road between two intersections
ML/year	Megalitres per year
MEMA	Marine Estate Management Authority
MNES	Matters of National Environmental Significance
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
NAG	Naremburn Action Group
NAGD	National Assessment Guidelines for Dredging
NBN	National Broadband Network
NCA	Noise catchment area
NEPC	National Environment Protection Council

Abbreviation	Definition
NHMRC	National Health and Medical Research Council
NML	Noise management level
NO	Nitrogen oxide
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Nitrogen oxides
NOHSC	National Occupational Health and Safety Commission
North Sydney Program	North Sydney Integrated Transport Program
NSW	New South Wales
NSW Approved Methods	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW
NTU	Nephelometric turbidity unit
NZS	New Zealand Standard
OCP	Organochlorine pesticides
OCSE	Office of the Chief Scientist and Engineer
OEH	Office of Environment and Heritage (former)
OEMP	Operational environmental management plan
OLS	Obstacle limitation surface
OOHW	Out of hours work
OPP	Organophosphorus pesticides
OU	Odour unit
PACHCI	Procedure for Aboriginal cultural heritage consultation and investigation
PAH	Polycyclic aromatic hydrocarbons
PANSW	Port Authority of NSW
PAN	Proposed acquisition notice
PANS-OPS	Procedures for air navigation services - aircraft operations
PASS	Potential acid sulfate soil
PCB	Polychlorinated biphenyls
PCDD/Fs	Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-p-furans
PCT	Plant community type
PCU	Passenger car unit
PFAS	Poly-fluoroalkyl substances
PFAS NEMP	Poly-fluoroalkyl substances National Environment Protection Measure
PFBA	Perfluorobutanoic acid
PFH <sub>x</sub> S	Perfluorohexane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid

Abbreviation	Definition
pH	A measure of the degree of acidity or alkalinity expressed on a logarithmic scale of 1-14, on which 1 is most acid, 7 is neutral and 14 is most basic (alkaline)
PIARC	Permanent International Association of Road Congress
Pile	Heavy stake or post installed to support the foundations of a structure
PM peak	Time period between 5 pm and 6 pm
PM <sub>2.5</sub>	Particulate matter less than or equal to 2.5 micrometre diameter
PM <sub>10</sub>	Particulate matter less than or equal to 10 micrometre diameter
PMF	Probable maximum flood
POEO Act	<i>Protection of the Environment Operations Act 1977</i> (NSW)
Probable maximum flood event	The largest flood that could conceivably occur (a worst-case flood event)
ppm	Parts per million
RAP	Remediation Action Plan
RBL	Rating background level
REF	Review of Environmental Factors
Residual lands	Lots that would be wholly or partially occupied during construction of the project, but would not be required for permanent operational infrastructure or other operational activities (also referred to as surplus lands)
RFS	Rural Fire Service
Roadheader	An excavation machine that has a rotating, rock-cutting head on the front, mounted to a boom
Roads and Maritime	NSW Roads and Maritime Services (RMS) (now part of Transport for NSW)
RSL	Returned & Services League of Australia
RTA	Roads and Traffic Authority of NSW (former)
RWC scenario	Regulatory worst case scenario
RWR	Residential, workplace and recreational
SCATS	Sydney Co-ordinated Adaptive Traffic System
SEARs	Secretary's environmental assessment requirements
SEPP	State environmental planning policy
SHFT	Sydney Harbour Federation Trust
SHR	State Heritage Register
SHT	Sydney Harbour Tunnel
SIDRA	A software package used for intersection and network capacity, level of service and performance analysis, and signalised intersection and network timing calculations
SMPM	Sydney Motorway Planning Model
SMCMA	Sydney Metropolitan Catchment Management Authority

Abbreviation	Definition
Social infrastructure	Facilities, spaces, services and networks that support the quality of life and wellbeing of communities
SO <sub>2</sub>	Sulphur dioxide
Spadeable	A consistency which allows the material to be spaded or shovelled
SRA	State Rail Authority
SREP	Sydney regional environmental plan
SSC	Suspended sediment concentrations
SSI	State Significant Infrastructure
SSTV	Site specific trigger values
Standard construction hours	7 am to 6 pm Monday to Friday, 8 am to 1 pm Saturday and no construction works on Sundays or public holidays
STARS	Significance of a Tree Assessment Rating System
STM	Strategic Travel Model
Substratum acquisition	The acquisition of land below the surface of the ground
TAFE	Technical and further education
TAGG Workbook	Transport Authorities Greenhouse Group Workbook
TAPM	The Air Pollution Model
TBT	Tributyltin
TECs	Threatened ecological communities
TEQ	Toxic Equivalence Quotient
THC	Total hydrocarbon
The project	Western Harbour Tunnel and Warringah Freeway Upgrade project
Transport for NSW	Transport for New South Wales
TRAQ	Tools for Roadside Air Quality
TRH	Total recoverable hydrocarbons
Trough structure	Similar to cut and cover structure, except a cover is not required
TSC Act	<i>Threatened Species Conservation Act 2016 (NSW)</i> (repealed by the <i>Biodiversity Conservation Act 2016</i> )
TSP	Total suspended particles
TSS	Total suspended solids
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNSW	University of New South Wales
µg/m <sup>3</sup>	Microgram per cubic metre
USEPA	United States Environmental Protection Agency
VENM	Virgin Excavated Natural Material
VIS	Vegetation Information System



Abbreviation	Definition
VISSIM	Traffic simulation software that simulates all modes of traffic and analyses their interactions
VOCs	Volatile organic compounds
VHT	Vehicle hours travelled
VKT	Vehicle kilometres travelled
Warringah Freeway Upgrade	Upgrade and integration works along the existing Warringah Freeway, including infrastructure required for connections to the Beaches Link and Gore Hill Freeway Connection project
WBCSD	World Business Council for Sustainable Development
Western Harbour Tunnel	A new crossing of Sydney Harbour involving twin motorway tunnels connecting the M4-M5 Link at Rozelle and the existing Warringah Freeway at North Sydney
WFU	Warringah Freeway Upgrade
WHO	World Health Organisation
WHT	Western Harbour Tunnel
WQO	NSW water quality objectives
WRI	World Resources Institute
WSP	Water Sharing Plan
WSUD	Water Sensitive Urban Design
WWTP	Wastewater Treatment Plant