Public Environment Report

Chapter 9

Impacts on the whole of the environment on Commonwealth land

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This chapter focuses on the potential impacts or disturbances that have been identified for the action located on Commonwealth land. This chapter directly responds to Section 2.5.3 of the PER Guidelines. Impacts on Commonwealth land were assessed in accordance with the Significant Impact Guidelines 1.2: Actions on, or impacting upon, Commonwealth land and actions by Commonwealth Agencies (DSEWPAC, 2013).

Detailed discussion and information relating to this chapter can be found in PER Technical Appendix D – Commonwealth land technical report.

9.1 Commonwealth land impacted by the action

Two areas of Commonwealth land would potentially be affected by North East Link:

- Simpson Barracks, and an adjoining publicly accessible area immediately south-west of the Simpson Barracks fence line. This area is used for informal outdoor recreation purposes. Throughout this chapter, all this land is referred to as 'Simpson Barracks'
- A strip of land located about one kilometre north of the Barracks, to the rear of residential properties on Elder Street. This strip of land is an easement for electricity transmission lines, and is referred to as the 'War Services easement'.

The environment and features of these two areas is described in Chapter 5 – Description of the environment.

Impacts of North East Link at Simpson Barracks are discussed in Section 9.2, and impacts on the War Services easement are discussed in Section 9.3 of this chapter.

9.2 Impacts on Simpson Barracks

9.2.1 Flora and fauna

Table 9-1 summarises the assessment of impacts on flora and fauna at Simpson Barracks. For further information on the environment, assessments, impacts, mitigations and outcomes for flora and fauna, refer to Part B of PER Technical Appendix D – Commonwealth land technical report.

Table 9-1 Relevant impacts on flora and fauna – Simpson Barracks

Assessment criteria	Impact
Impacts on plants	
Is there a real chance or possibility that the action will:	
Involve medium or large-scale native vegetation clearance	**Direct native vegetation** North East Link would remove approximately 10.976 hectares of Plains Grassy Woodland (21 per cent of the 52.5 hectares of remnant native vegetation at Simpson Barracks) representing a medium-scale native vegetation clearance. This represents a significant residual impact for which an offset is recommended. These losses would be offset along with the rest of the vegetation being lost due to North East Link (that is outside Commonwealth land) under the Victorian process, meeting the assessment and offset requirements of Victoria's *Guidelines for the removal destruction and lopping of native vegetation* (DELWP, 2017a). A Native Vegetation Removal (NVR) report has been completed that identifies general offset units and species offset units required for the vegetation removals. Enquiries have been made with offset brokers and North East Link Project (NELP) has received assurance that sites are currently available on the market to offset the removal of the 10.976 ha of Plains Grassy Woodland. **Indirect loss of vegetation** A number of large trees on Commonwealth land are likely to rely on groundwater (where depth to groundwater is 10 to 20 metres) under drought conditions and may be negatively affected by groundwater drawdown. Since the numerical groundwater modelling was undertaken for the preparation of the draft PER that was published under Section 98 of the EPBC Act, additional numerical groundwater modelling has been undertaken. The purpose of the further modelling was to incorporate additional groundwater data collected over a period of approximately 12 months to enable transient calibration to seasonal variations in groundwater levels and to assess whether or not the additional calibration efforts result in changes to the assessment of project-induced groundwater impacts. The discussion below describes the findings from both the initial modelling and the further modelling. The initial modelling indicated that, at the end of construction, in the absence of any mitigation measures, seven large trees would have a moderate to high likelihood of being negatively affected, and a further 13 would have a low likelihood of being negatively affected. Nineteen trees would have a moderate to high likelihood of

Assessment criteria	Impact
	being negatively affected by 2075, and so potential to decline in health and/or to die prematurely. Where vegetation has a moderate to high likelihood of being negatively affected by groundwater drawdown, it would be considered lost. All trees predicted to be affected are River Red Gum *Eucalyptus camaldulensis*, apart from three (one moderate, two low risk) Studley Park Gum *Eucalyptus X studleyensis* by the end of construction and six (three moderate, three low risk) Studley Park Gum by 2075. The further modelling indicates that, at the end of construction, in the absence of any mitigation measures, a total of 45 large trees would have a moderate to high likelihood of being negatively affected, and a further one large tree would have a low likelihood of being negatively affected. Eight trees would have a moderate to high likelihood of being negatively affected by 2075, and declining in health and/or to dying prematurely, while a further eight large trees would have a low chance of being impacted in the absence of any mitigation measures. All trees predicted to be affected are River Red Gum *Eucalyptus camaldulensis*, apart from nine (five high, four moderate risk) Studley Park Gum *Eucalyptus X studleyensis* by the end of construction and seven (three moderate, four low risk) Studley Park Gum by 2075. Watering during construction is a mitigation measure that is likely to reduce the number of trees affected in the short-term. Any large trees predicted to be affected over the long-term would need to be offset in accordance with the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP, 2017a). **Planted amenity trees** There are a small number of planted amenity trees at Simpson Barracks. Some of these are native species but their loss is not considered significant.
Involve any clearance of any vegetation containing a listed threatened species which is likely to result in a long-term decline in a population or which threatens the viability of the species	Clearance of vegetation from Simpson Barracks would involve direct permanent removal of three listed threatened plant species: • Matted Flax-lily *Dianella amoena*, Endangered under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999*, listed under Victoria's *Flora and Fauna Guarantee Act 1988*, endangered on the Victorian Department of Environment, Land, Water and Planning (DELWP) Advisory List. Approximately 31% (83 out of 271 plants/patches) of the Simpson Barracks population would likely be impacted. A Salvage and Translocation Plan is provided as part of PER Technical Appendix A – Flora and Fauna technical report. With the implementation of a successful salvage and translocation program, and the translocation risk spread across a number of potential receptor sites in the local area, the residual impact of the action on Matted Flax-lily is not expected to be significant. The overall population size in the local area is expected to increase following construction of North East Link. No offsetting of Matted Flax-lily is proposed. • Arching Flax-lily *Dianella longifolia var. grandis*, vulnerable on the DELWP Advisory List. Two individuals were observed during field assessments at Simpson Barracks. Removal of these individuals would unlikely result in a long-term decline in a population and would not be a significant impact. These would be translocated as part of the Matted Flax Lily Salvage and Translocation Plan discussed above.

Assessment criteria	Impact
	• Studley Park Gum, endangered on the DELWP Advisory List. In Simpson Barracks, Studley Park Gum was sub-dominant to *E. camaldulensis* on low relief mid to lower slopes in Plains Grassy Woodland east of Greensborough Road. During the current study, a total of 44 individuals of Studley Park Gum were recorded and mapped within the project boundary at Simpson Barracks. An additional three individuals of Studley Park Gum may be impacted by groundwater drawdown. Unavoidable loss of large trees within patches and scattered small trees of Studley Park Gum is regarded as a significant impact, and in accordance with the *EPBC Act Environmental Offsets Policy*, this would trigger a requirement to offset the impacts on Studley Park Gum on Commonwealth land. Studley Park Gum itself is not a protected matter however the environment on Commonwealth land is a protected matter. Therefore, instead of delivering direct offsets that secures and manages an existing population or habitat for the Studley Park Gum, NELP proposes to contribute to the conservation of Studley Park Gum by establishing new habitat through the implementation of the Studley Park Gum Management Framework (PER Technical Appendix A – Flora and fauna, Appendix G). This approach is expected to result in a viable outcome noting that the creation of new habitat for a protected matter is a type of direct offset under the EPBC Act Environmental Offsets Policy. Additionally, at the State level, native vegetation offsets would be provided based on the Victorian Guidelines (DELWP 2017a) to offset for the removal of native vegetation (which Studley Park Gum trees form part of) directly impacted by the project, and three Studley Park Gum trees expected to experience premature mortality due to long term groundwater drawdown. Implementing the Studley Park Gum Management Framework (Appendix G) and State offsets is in line with the EPBC Act Environmental Offsets Policy and commensurate with the conservation status of the species.
Introduce potentially invasive species	Appropriate standard mitigation would be applied during the construction of North East Link to prevent the spread of weeds, pathogens or pest species. Given the urban nature of the environment, the introduction of new invasive species to or from Simpson Barracks is considered unlikely.
Involve the use of chemicals which substantially stunt the growth of native vegetation, or	No chemicals are proposed to be used during the construction of North East Link that would substantially stunt the growth of native vegetation to be retained.
Involve large-scale controlled burning or any controlled burning in sensitive areas, including areas which contain listed threatened species?	No controlled burning is proposed for the construction of North East Link.

Assessment criteria	Impact
Impacts on animals	
Is there a real chance or possibility that the action will:	
Cause a long-term decrease in, or threaten the viability of, a native animal population or populations, through death, injury or other harm to individuals	**Terrestrial fauna** Animals most likely to be encountered on a North East Link construction site are common and even abundant species. Death or injury of some animals may occur during vegetation clearance, but is expected to involve small numbers of common animals only, and would most likely affect individuals rather than populations or species. While the death of an individual animal is a permanent impact, the population of a common species would unlikely have any more than a negligible impact. Continuation of existing fencing during the operation of North East Link means that existing levels of death, injury or harm to animals on or around Commonwealth land would unlikely change. **Aquatic fauna** Banyule Creek is the only waterway that would be impacted by construction activities at Simpson Barracks. Banyule Creek has intermittent flow, and only provides habitat for aquatic animals during periods of flow (during or following rain). With appropriate management of construction activities in and near Banyule Creek within Simpson Barracks, North East Link would not cause the death, injury or other harm to aquatic animals that would lead to a long-term decrease in, or threatening of the viability of, a native aquatic animal population or populations downstream of Simpson Barracks.
Displace or substantially limit the movement or dispersal of native animal populations	**Terrestrial fauna** Simpson Barracks is already a closed site for some animal populations. Most of the native animals that persist in Simpson Barracks are adaptable and common species, already coping with a fragmented and degraded habitat landscape. Some animals (such as the Eastern Grey Kangaroo *Macropus giganteus*) may move away from construction sites (and from busy roadways during the operation of North East Link) during noisy periods. The extent of displacement would likely vary, depending on the prevailing noise levels. Disturbance and displacement of some animals at Simpson Barracks would be unavoidable, but expected to be minor. **Aquatic fauna** Construction at Simpson Barracks would not displace or substantially limit the movement or dispersal of native aquatic animal populations.
Substantially reduce or fragment available habitat for native species	**Terrestrial fauna** The proposed habitat loss is expected to be ecologically inconsequential for the Eastern Grey Kangaroo population, and would be highly unlikely to jeopardise the viability of the current Eastern Grey Kangaroo population at Simpson Barracks. Fragmentation may occur due to the blocking of a habitat corridor along the upper reaches of Banyule Creek. However, this section of the corridor is narrow, degraded, and likely used mainly by common and adaptable mobile fauna for local movements only, rather than landscape-scale movements.

Assessment criteria	Impact
	The removal of native vegetation for North East Link would reduce available habitat for native species at Simpson Barracks, but this reduction is not considered substantial and would not be to the extent that it has ecological consequences. **Aquatic fauna** The headwaters of Banyule Creek are the only waterway that would be impacted by construction activities at Simpson Barracks which when flowing, does not provide a link to further aquatic habitat upstream. Construction at Simpson Barracks would not displace or substantially limit the movement or dispersal of native aquatic animal populations.
Reduce or fragment available habitat for listed threatened species which is likely to displace a population, result in a long-term decline in a population, or threaten the viability of the species	**Terrestrial fauna** Occasionally or rarely, habitats within Simpson Barracks are known to attract threatened fauna such as Powerful Owl *Ninox strenua*, Swift Parrot *Lathamus discolour* and Grey-headed Flying-fox *Pteropus poliocephalus*; although this is likely for foraging only, and these species are not expected to frequently or regularly breed or roost there. Other species (White-throated Needletail *Hirundapus caudacutus*, Grey Goshawk *Accipiter novaehollandiae*, Black Falcon *Falco subniger*, Barking Owl *Ninox connivens*) may visit Simpson Barracks occasionally, but are unlikely to be there regularly, or depend on habitat within the site. Loss of habitat from Simpson Barracks due to North East Link is not expected to reduce or fragment available habitat for a listed threatened species to the extent that it displaces a population, results in a long-term decline in a population, or threatens the viability of the threatened species. **Aquatic fauna** Although some aquatic habitat would be lost (ephemeral headwaters of Banyule Creek and a small number of manmade waterbodies at Simpson Barracks) vertebrates and invertebrates present are common species that are adapted to highly modified, degraded aquatic habitats. No threatened aquatic species inhabit Banyule Creek within Simpson Barracks. Removal of those waterbodies would reduce available habitat for aquatic native species on a very local scale, but would not have ecological consequences for broader populations of any native species.
Introduce exotic species which will substantially reduce habitat or resources for native species, or	**Terrestrial fauna** Appropriate standard mitigation would be applied during the construction of North East Link to prevent the spread of weeds, pathogens or pest species. Given the urban nature of the environment, the introduction of exotic species that substantially reduce habitat or resources for native species is considered unlikely. **Aquatic fauna** Appropriate standard mitigation to prevent the spread of weeds, pathogens or pest species would be applied during the construction of North East Link. Given the study area is already highly urbanised and that Banyule Creek is already dominated by exotic aquatic species, it is not expected that an exotic species would be introduced which would substantially reduce habitat or resources for native aquatic animals.

9.2.2 People and communities

Table 9-2 summarises the assessment of impacts on people and communities at Simpson Barracks. For further information on the environment, assessments, impacts, mitigations and outcomes for people and communities, refer to Part C of PER Technical Appendix D – Commonwealth land technical report.

Table 9-2 Relevant impacts on people and communities – Simpson Barracks

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Substantially increase demand for, or reduce the availability of, community services or infrastructure which have direct or indirect impacts on the environment, including water supply, power supply, roads, waste disposal, and housing	North East Link would permanently acquire part of Simpson Barracks, including the unfenced Commonwealth land to the south of the Barracks that is currently publicly accessible for informal open space recreation: • The land to be acquired at Simpson Barracks is not accessible to the public and is not used intensively by the Barracks community. Activities within this area could potentially be relocated to the large area of remaining undeveloped/open space within the Barracks. • Although the publicly accessible Commonwealth land south of Simpson Barracks would no longer be available for informal recreation purposes, there are considerable other areas of open space available within surrounding suburbs and the removal of this area is expected to have only a negligible impact on access to open space. Traffic and transport changes during construction from traffic and road diversions or closures have the potential to alter travel times to and from Simpson Barracks. These changes could also affect the ability of the Barracks community to access business and nearby community services such as medical centres and education facilities. Some community services may have amenity impacts during construction. Access to businesses would be maintained during construction for customers, delivery and waste removal. Most goods and services provided by displaced or impacted businesses are available from other providers within a two-kilometre radius, although the loss of a fuel service station on Greensborough Road would be noticeable for commuters and the travelling public. Any impacts on the ability to access community services are not expected to be significant and would be limited to specific phases of construction. The operation of North East Link is expected to have positive impacts on traffic around and transport to and from Simpson Barracks. North East Link is not expected to have any significant impacts on the supply of utility services and there is no known groundwater abstraction for water use at Simpson Barracks.

Assessment criteria	Impact
Affect the health, safety, welfare or quality of life of the members of a community, through factors such as noise, odours, fumes, smoke, or other pollutants	Amenity impacts during construction could directly impact defence personnel within Simpson Barracks. Some construction activities would be audible within Simpson Barracks and modelling predicted possible noise guideline target exceedances at three locations for excavation works at five metres depth. The implementation of noise mitigation measures as part of a Construction Noise and Vibration Management Plan (CNVMP) would minimise construction noise emissions. Noise impacts from operational traffic and the tunnel ventilation structure are not considered to be significant. Tunnel vibration or regenerated noise is not considered likely to affect the health, safety, welfare or quality of life of people at Simpson Barracks. Defence personnel within Simpson Barracks are not expected to experience direct views of construction sites and activities due to the densely vegetated buffer between uses within the Barracks and North East Link, although they would encounter construction activities entering and leaving the Barracks via the Blamey Road entrance. During construction potential air quality emissions, including dust and odour, from surface works would be localised and occur over a defined period. The implementation of a Dust and Air Quality Management and Monitoring Plan would minimise impacts on nearby sensitive receptors and the receiving environment. During operation, impacts related to combined emissions from the ventilation structure and surface roads are not considered significant. The tunnel ventilation structures would be designed to meet EPA Victoria requirements for air quality and to meet in-tunnel air quality standards for CO and NO_2. In-tunnel and ambient air quality monitoring programmes would be developed and implemented, with remedial action taken to the satisfaction of EPA Victoria if standards are not met. Following the implementation of avoidance and mitigation measures, the temporary social impacts of visual, noise and air quality change on nearby residents are expected to have only minor to moderate impacts on the quality of life of the Barracks community. These are not considered to be significant. No significant or measurable impacts to the health of Defence personnel within Simpson Barracks are predicted to occur from operation of North East Link, assuming proposed mitigation measures are implemented. This assessment considered potential for impacts as a result of changes in air quality (from emissions from the tunnel ventilation structures or changes in road traffic), noise and vibration or indirect impacts from changes in traffic and transport (including pedestrian and cycle movements), permanent property acquisition or access and use of open space areas.
Cause physical dislocation of individuals or communities, or	North East Link would not involve relocating or impeding access for any component of the Simpson Barracks community. The land to be acquired within Simpson Barracks otherwise has limited operational use and any other activities within this area could be relocated to the large area of remaining undeveloped/open space within the Barracks.

Assessment criteria	Impact
Substantially change or diminish cultural identity, social organisation or community resources?	The land to be acquired would include an Assembly Place and Commemorative Plantings located south of Blamey Road within the Barracks. These places were formerly used for ceremonial purposes. Although this area has not been used officially for some time, it may retain some social value for Defence personnel. Assuming the ceremonial and commemorative function is relocated and maintained elsewhere within the Barracks, the removal of the Assembly Place and Commemorative Plantings is expected to have only a minor impact on Defence personnel.

9.2.3 Culture and heritage

Table 9-3 summarises the assessment of impacts on culture and heritage at Simpson Barracks. For further information on the environment, assessments, impacts, mitigations and outcomes for culture and heritage, refer to Part D of PER Technical Appendix D – Commonwealth land technical report.

Table 9-3 Relevant impacts on culture and heritage – Simpson Barracks

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Permanently destroy, remove or substantially alter the fabric (physical material including structural elements and other components, fixtures, contents, and objects) of a heritage place	There are no listed historical heritage places on Commonwealth land in the study area. North East Link would likely require one unlisted historical heritage place to be removed from Simpson Barracks. Consultation would occur with the management of Simpson Barracks to identify suitable protocols for removal or relocation. North East Link would require one listed Aboriginal heritage place (scarred tree SAB 9 (7922-0585)) to be removed from Simpson Barracks. However, this feature was determined, in consultation with the Registered Aboriginal Party (RAP), to be non-cultural and would be de-listed as part of the ongoing Cultural Heritage Management Plan (CHMP) process, so its removal would not represent a cultural heritage impact. Desk studies (which indicate a high degree of disturbance from development and other land uses) and field investigation undertaken on Commonwealth land as part of the preparation of the CHMP indicate it is unlikely that significant cultural heritage places would be present within Simpson Barracks. In the event that previously unknown items of Aboriginal cultural heritage are uncovered during construction works, any discoveries would be managed according to the CHMP which involves consultation with the RAP and Aboriginal Victoria, field and where appropriate, complex survey and management measures and contingences.

Assessment criteria	Impact
Involve extension, renovation, or substantial alteration of a heritage place in a manner which is inconsistent with the heritage values of the place	No relevant impacts.
Involve the erection of buildings or other structures adjacent to, or within important sight lines of, a heritage place which are inconsistent with the heritage values of the place	North East Link may cause visual impacts to the setting and sightlines of the historical heritage feature 138 Signal Squadron Flag Station and Memorial and to the heritage value of Simpson Barracks as a whole from the erection of new structures including the ventilation structure. These would be cumulative with the effects on setting from vegetation loss described in Table 9-1. The flag station and memorial does not rely on a defined broader setting of a particular character and the change is not expected to compromise its visual or presentational qualities. The generalised historical values identified for the Barracks as a whole would not be undermined by the change. Other heritage values at Simpson Barracks are considered to be unaffected.
Substantially diminish the heritage value of a heritage place for a community or group for which it is significant	No relevant impacts, beyond those involving potential to inhibit existing uses discussed below.
Substantially alter the setting of a heritage place in a manner which is inconsistent with the heritage values of the place, or	North East Link may cause visual impacts to the historical heritage feature 138 Signal Squadron Flag Station and Memorial and to the heritage value of Simpson Barracks as a whole directly. This is due to removal of vegetation along the western boundary of Simpson Barracks, indirectly from potential groundwater drawdown affecting mature trees and (as discussed above) from the erection of new structures including the ventilation structure. The flag station and memorial does not rely on a defined broader setting of a particular character and the change is not expected to compromise its visual or presentational qualities. The generalised historical values identified for the Barracks as a whole would not be undermined by the change. Other heritage values at Simpson Barracks are considered to be unaffected. Aboriginal heritage place 7922-0586 (scarred tree) would be impacted by the project's construction and 7922-0584 (scarred tree) is located close to the area of disturbance. However, both of these places have been determined to be a non-cultural item and would be de-listed as part of the CHMP process.
Substantially restrict or inhibit the existing use of a heritage place as a cultural or ceremonial site?	Due to proximity to the project boundary, access to and use of the 138 Signal Squadron Flag station may be affected. Further consultation with Simpson Barracks would occur in relation to access and use of the memorials and any required mitigation or management measures.

9.2.4 Landscape and soil

Table 9-4 summarises the assessment of impacts on landscape and soil at Simpson Barracks. For further information on the environment, assessments, impacts, mitigations and outcomes for landscape and soil, refer to Part E of PER Technical Appendix D – Commonwealth land technical report.

Table 9-4 Relevant impacts on landscape and soil – Simpson Barracks

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Substantially alter natural landscape features	Construction works at Simpson Barracks would disturb and remove what appears to be natural landscape features. The landscape and visual assessment considers the impacts on the 'Ridgeline' landscape character area. The wooded western edge of Simpson Barracks which continues southwards into the publicly accessible Commonwealth land south of Simpson Barracks, although classified as native vegetation, is regrowth on a site that in the 1940s was almost entirely cleared of vegetation (see PER Technical Appendix A – Flora and fauna technical report). The vegetation would not be entirely cleared and post-construction planting would reduce or minimise the landscape and visual impacts. Banyule Creek, the ephemeral headwaters of which run southwards close to the western boundary of the Barracks, is fed by overland flow paths and piped and formed surface drains. It is a heavily altered open drain, is steeply graded with erosion control and check dams showing damage with evidence of outflanking. The temporary diversion during construction would use two culverts, but in the long term the channel would be replaced by a well-engineered open flowpath that removes existing erosion problems (see PER Technical Appendix C – Surface water technical report). In summary, landscape features at Simpson Barracks would be altered by the construction of North East Link but these impacts would be mitigated by landscape and drainage design. However, while natural in appearance the nature and history of the site is such that it is not truly a natural landscape features and North East Link would not have a significant impact on natural landscape features.

Assessment criteria	Impact
Cause subsidence, instability or substantial erosion, or	**Settlement** Excavation of the trench at Simpson Barracks may result in direct settlement within 30 metres of the edge of the excavation. Settlement would potentially affect minor utilities, on which no significant impact is expected, and a single outbuilding at Simpson Barracks which may experience settlement of up to 19 mm and have a slight to moderate risk of damage. Following mitigation measures the residual impact of ground movement on the Simpson Barracks buildings and minor utilities are predicted to not be significant.
	Erosion Land clearance and alterations to drainage patters during construction could cause soil erosion and subsequent changes to water quality. Management of drainage would be a key part of the environmental management of construction activities and would include preventing erosion at source and providing suitable storage and outlet controls to attenuate downstream peak flows. The culverting of Banyule Creek during construction and the improvements to the engineering of the drain during the operation of North East Link would reduce the potential for the erosion currently occurring on the upper reaches of Banyule Creek.
Involve medium or large-scale excavation of soil or minerals?	At Simpson Barracks, North East Link would involve excavating a trench at Simpson Barracks approximately 40 m wide and, at its deepest, approximately 12 m deep. The excavation is not for mineral extraction and the soil layer is relatively thin (1 to 3 m) above the weathered bedrock. The material excavated from Simpson Barracks is a small proportion of the approximately 6.3 million m^3 of spoil that would be generated by North East Link. A Spoil Management Plan (SMP) would be developed that would provide guidance for spoil management and disposal during construction to mitigate potential human health and environmental risks. The SMP is based on a waste management hierarchy where landfill disposal is the least favoured option.

9.2.5 Water resources

Table 9-5 summarises the assessment of impacts on water resources at Simpson Barracks. For further information on the environment, assessments, impacts, mitigations and outcomes for water resources, refer to Part F of PER Technical Appendix D – Commonwealth land technical report.

Table 9-5 Relevant impacts on water resources – Simpson Barracks

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Measurably reduce the quantity, quality or availability of surface or ground water	**Groundwater** A combination of dewatering in excavations, seepage into new below ground structures and use of groundwater by the construction contractor would likely cause drawdown of ground water below Simpson Barracks. Close to the edge of the trench structure this could be up to 3 metres, though the majority of land affected at Simpson Barracks would experience groundwater level changes of less than one metre. This situation would remain post construction, although the area of zero to one metre drawdown would extend eastwards in the decades after construction. Initial modelling of the two monitoring bores at Simpson Barracks (of unknown depth) predict drawdowns of 0.5 to 1 metre during construction and 0.1 to 1.1 metres during operation, although these are not extractive. Further modelling predicted drawdowns of 0.1 to 0.5 metres during construction and operation. Measures would be employed to minimise groundwater drawdown including tanked lining of permanent below water table structures and careful management of construction activities through a Groundwater Management Plan including ongoing monitoring and modelling of groundwater behaviour. A construction contractor would tailor the Groundwater Management Plan to the specific requirements of North East Link, consult with EPA Victoria (and any other relevant authorities) in preparing the plan and develop the plan and requirements to a level that satisfies the independent environmental auditor. No known human uses of groundwater at Simpson Barracks would be affected although some mature trees at the barracks may lose access to groundwater in drought conditions. This is discussed in Table 9-1. There are several means by which groundwater quality could be affected: • Accidental introduction of liquid contaminants as part of construction activities (such as from spills, fluid waste disposal, leaching from fill or use of contaminated fluid for artificial recharge). These would be managed by standard preventative measures and monitoring set out in relevant Construction Environmental Management Plans (CEMPs). • Creation of acid plumes due to exposure of existing potential acid sulfate soils by lowered groundwater levels. However, the risk of this is low as the magnitude of dewatering at Simpson Barracks would not likely expose fresh bedrock. • Creation of plumes of contaminants migrating from existing sources of in-ground contamination. With additional surveys, treatment and preventative measures during construction the risks are considered low.

Assessment criteria	Impact
	Surface water Alterations to Banyule Creek and catchment may increase peak flows with potential for flooding. North East Link would be designed to not increase flood risk, in accordance with the requirements of the relevant drainage authority, and in consultation with other relevant authorities. This could include measures such as flood storage and outlet controls, suitably large inlet grill capacity, design and management of overland bypasses. During construction, risk of spills, mobilisation of pollutants or sediment reducing water quality would be managed using standard preventative measures and monitoring set out in the CEMP and Surface Water Management Plan. Operational runoff quality would be managed by adopting water sensitive urban design and integrated water management principles in the stormwater treatment design.
Channelise, divert or impound rivers or creeks or substantially alter drainage patterns, or	The construction of North East Link would require diversion of Banyule Creek at Simpson Barracks away from construction activities as well as the infrastructure during operation (and particularly the tunnel portal). During construction a temporary diversion would likely comprise pipes either side of the proposed northern portal to pick up the east and west catchments respectively. The diversions, bunding and other 'temporary' features would be in place and operating effectively minimise any adverse impacts. Once North East Link was completed, Banyule Creek would be replaced with a properly engineered solution in combination with flood storage and treatment trains significantly improving waterway stability. Large inlet grill capacity with downstream orifice to regulate outlet capacity and or design and management of overland bypasses may be required to manage inlet blockage during construction. Connections with upstream tributary streams and drains would need to be suitably designed to avoid increased tail water which might lead to flooding or reduced tail water levels which without appropriate management may lead to headward and or gully erosion. Impacts on the aquatic habitat of the diverted section of Banyule Creek are described in Table 9-1.
Measurably alter water table levels?	North East Link is predicted to measurably change ground water levels, as discussed above. However, in the long term, these changes are comparable to the range of current seasonal fluctuations and are not expected to have a significant impact on sensitive receptors, with the possible exception of tall trees on the western edge of Simpson Barracks. Impacts on these are discussed in Table 9-1.

9.2.6 Pollutants, chemicals and toxic substances

Table 9-6 summarises the assessment of impacts of pollutants, chemicals and toxic substances at Simpson Barracks. For further information on the environment, assessments, impacts, mitigations and outcomes for pollutants, chemicals and toxic substances, refer to Part G of PER Technical Appendix D – Commonwealth land technical report.

Table 9-6 Relevant impacts to pollutants, chemicals, and toxic substances – Simpson Barracks

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Generate smoke, fumes, chemicals, nutrients, or other pollutants which will substantially reduce local air quality or water quality	**Air quality** North East Link would generate emissions to air that may impact local air quality. Construction emissions would mainly comprise dust and odour, and would be managed through a CEMP and a Dust and Air Quality Management and Monitoring Plan. Impacts were assessed for operational emissions of particulates (PM_{10} and $PM_{2.5}$), CO, NO_2, BTEX, 1,3-Butadiene, Formaldehyde and PAHs from the tunnel ventilation structure and from changes to surface traffic volumes. In some cases, fine particulates were predicted to exceed the SEPP (Ambient Air Quality) objectives. This was predominantly because of the predicted background levels, rather than emissions from North East Link. The tunnel ventilation structures would be designed to meet EPA Victoria requirements for air quality and to meet in-tunnel air quality standards for CO and NO_2. In-tunnel and ambient air quality monitoring programmes would be developed and implemented, with remedial action taken to the satisfaction of EPA Victoria if standards are not met. **Water quality** There is potential for spills and mobilising sediment and other pollutants in stormwater runoff leading to reduced surface water quality. Groundwater quality could also be reduced by accidental spills or the introduction of contaminated fill. However, with the application of preventative measures and incident response procedures implemented through a CEMP, the potential for adverse impacts would be minimised. Injection fluids that are consistent with State Environment Protection Policy (SEPP) (Waters) would be used to minimise the risk of impacts on groundwater quality from use of inappropriate quality water for artificial recharge.

Assessment criteria	Impact
Result in the release, leakage, spillage, or explosion of flammable, explosive, toxic, radioactive, carcinogenic, or mutagenic substances, through use, storage, transport, or disposal	Construction may require the transportation, storage and use of some hazardous (which could include flammable, explosive, toxic, carcinogenic or mutagenic substances) materials at Simpson Barracks. North East Link would not have the potential for release of radioactive materials. The amount of hazardous material brought onto and stored on-site would be minimised and managed in accordance with all legal requirements. The CEMP would contain requirements for management of chemicals, fuels and hazardous materials. There is potential for contaminated materials to be disturbed during excavation of the trench. In particular, this could include leaked petroleum from the Yallambie Road fuel service station that has migrated beneath the adjoining Simpson Barracks, as well as various potential materials associated with a landfill on Borlase Reserve immediately south of the publicly accessible Commonwealth land south of Simpson Barracks. A detailed contamination survey would be undertaken before construction starts and any hazardous material encountered would be treated, handled, transported and disposed of with procedures to protect health, safety and the environment, implemented through a Spoil Management Plan. Emissions to air are discussed in the row immediately above.
Increase atmospheric concentrations of gases which will contribute to the greenhouse effect or ozone damage, or	Construction of North East Link would create greenhouse gas emissions from construction materials, fuel and electricity consumption. The overall construction emissions for North East Link are not considered significant in the context of Victoria's and Australia's annual greenhouse gas emissions. Operation and maintenance activities including the consumption of fossil fuels for electricity generation, operation of plant and equipment and transportation of materials and equipment would generate greenhouse gas emissions. The operational and maintenance emissions are not considered significant in the context of Victoria's and Australia's annual greenhouse gas emissions. In both cases, the contribution of North East Link at Simpson Barracks is a very small part of this and not significant. In terms of vehicle emissions, the operation of North East Link would change vehicle flow through metropolitan Melbourne which may result in a minor increase or decrease in overall vehicle emissions.

Assessment criteria	Impact
Substantially disturb contaminated or acid-sulfate soils?	Testing as part of the North East Link geotechnical survey identified that although no potential acid sulfate soil samples were detected in the Silurian bedrock underlying Simpson Barracks, there was potential for potential acid sulfate soils material to be encountered in deeper, fresher bedrock, and occur at depths greater than 20 m below the surface. Typically at distances greater than a few hundred metres from the cut-off walls, the drawdowns are between 0.1 to 0.5 metres (for both the initial and further modelling). These drawdowns are within the range of seasonal fluctuation and so potential acid sulfate soils geological materials are likely to have already been oxidised, or drawdowns are too small to result in the unsaturation and oxidation of fresh bedrock. Dewatering would be undertaken at Simpson Barracks, but the magnitude of dewatering is not likely to expose fresh bedrock. The primary control for minimising groundwater drawdowns is to minimise dewatering to the extent practicable during construction and operation. Designers may also need to consider the water chemistry and potentially aggressive nature of groundwater on foundation materials. Groundwater levels and quality would be monitored during construction. A spoil management plan would include measures to manage spoil recovered from excavations that could contain potential acid sulfate soils materials.

9.3 Impact on the War Services easement

9.3.1 Flora and fauna

Table 9-7 summarises the assessment of impacts on flora and fauna on the War Services easement. For further information on the environment, assessments, impacts, mitigations and outcomes for flora and fauna, refer to Section 5 of PER Technical Appendix D – Commonwealth land technical report.

Table 9-7 Relevant impacts on flora and fauna – War Services easement

Assessment criteria	Impact
Impacts on plants	
Is there a real chance or possibility that the action will:	
Involve medium or large-scale native vegetation clearance	The War Services easement contains four isolated trees and some minor amenity planting. Some of these are native species but their removal would not be considered medium or large-scale, and so it is not considered significant.
Involve any clearance of any vegetation containing a listed threatened species which is likely to result in a long-term decline in a population or which threatens the viability of the species	No listed threatened flora species were recorded on the War Services easement.
Introduce potentially invasive species	Appropriate standard mitigation to prevent the spread of weeds, pathogens or pest species would be applied to North East Link. Given the urban nature of the environment, the introduction of new invasive species to or from the War Services easement is considered unlikely.
Involve the use of chemicals which substantially stunt the growth of native vegetation, or	No chemicals that would substantially stunt the growth of native vegetation to be retained are proposed to be used for North East Link.
Involve large-scale controlled burning or any controlled burning in sensitive areas, including areas which contain listed threatened species?	Controlled burning is not proposed during the construction of North East Link.

Assessment criteria	Impact
Impacts on animals	
Is there a real chance or possibility that the action will:	
Cause a long-term decrease in, or threaten the viability of, a native animal population or populations, through death, injury or other harm to individuals	**Terrestrial fauna** Given the limited habitat present on the War Services easement, animals most likely to be encountered are common and even abundant species. Death or injury of some animals may occur during vegetation clearance, but is expected to involve small numbers of common animals only and would most likely affect individuals rather than populations or species. While the death of an individual animal would be permanent, the population of a common species is unlikely to have any more than a negligible impact. **Aquatic fauna** There is no aquatic habitat present on the War Services easement.
Displace or substantially limit the movement or dispersal of native animal populations	**Terrestrial fauna** Given the limited habitat present on the War Services easement, animals most likely to be encountered are common and even abundant species. Movement of fauna to the west of the easement is limited by the existing Greensborough Bypass. Construction works on the War Services easement would not create additional barriers to movement. **Aquatic fauna** There is no aquatic habitat present on the War Services easement.
Substantially reduce or fragment available habitat for native species;	**Terrestrial fauna** Given the limited habitat present on the War Services easement, animals most likely to be encountered are common and even abundant species. North East Link would involve a minor reduction in available habitat on the War Services easement, but would not fragment the remaining habitat. **Aquatic fauna** There is no aquatic habitat present on the War Services easement.
Reduce or fragment available habitat for listed threatened species which is likely to displace a population, result in a long-term decline in a population, or threaten the viability of the species	No listed threatened terrestrial or aquatic fauna species were recorded on the War Services easement.
Introduce exotic species which will substantially reduce habitat or resources for native species, or	Appropriate standard mitigation to prevent the spread of weeds, pathogens or pest species would be applied to North East Link. Given the urban nature of the environment, the introduction of new invasive species to or from the War Services easement is considered unlikely.

9.3.2 People and communities

Table 9-8 communities on the War Services easement. For further information on the environment, assessments, impacts, mitigations and outcomes for people and communities, refer to Section 5 of PER Technical Appendix D – Commonwealth land technical report.

Table 9-8 Relevant impacts on people and communities – War Services easement

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Substantially increase demand for, or reduce the availability of, community services or infrastructure which have direct or indirect impacts on the environment, including water supply, power supply, roads, waste disposal, and housing	The permanent impact from part of the War Services easement being acquired for permanent infrastructure would be minimal; 95 per cent of Frensham SEC Reserve would remain available for informal recreation after construction is completed. As there are considerable other areas of open space available within surrounding suburbs, acquisition of this small area of land is expected to have only a negligible impact on access to open space. Traffic Management Plans would identify a detour route for any closure of the existing shared use path during construction. The upgraded shared use path would enhance pedestrian and bicycle movements. New towers would be built adjacent to the War Services easement to support the existing 220 kV overhead electricity transmission lines. Given the importance of these transmission lines to power supply in the north-east, this would be done in a way that maintains power supply during construction.
Affect the health, safety, welfare or quality of life of the members of a community, through factors such as noise, odours, fumes, smoke, or other pollutants	The War Services easement and Frensham SEC Reserve would be occupied during the construction of North East Link, so no users of the easement would experience noise or vibration impacts. Outside the occupation period, noise and vibration impacts would be audible although intermittent. The implementation of a Construction Noise and Vibration Management Plan would minimise construction noise and vibration impacts. Tunnel construction work would be sufficiently distant to the War Services easement so no vibration impacts on the easement are expected. After construction is completed, the whole of Frensham SEC Reserve including the War Services easement would benefit from new noise walls that would be provided to meet noise criteria at nearby residential properties. Combined impacts of tunnel ventilation and surface road emissions are comparable to impacts predicted for Simpson Barracks with surface road emissions having a greater contribution to total concentrations (due to the relative proximity of North East Link and distance from the ventilation structure).

Assessment criteria	Impact
	No significant or measurable impacts to the community in relation to the use of the War Services easement and Frensham SEC Reserve are expected, where proposed mitigation measures are implemented. The assessment considered impacts as a result of changes in air quality (from emissions from the tunnel ventilation facilities or changes in road traffic), noise and vibration or indirect impacts from changes in traffic and transport (including pedestrian and cycle), temporary acquisition during construction or access and use of open space areas. Alternative open space would continue to be available to enable community members to pursue an active lifestyle.
Cause physical dislocation of individuals or communities, or	As the War Services easement is used for informal recreation and as an electricity easement only, North East Link would not involve dislocation of individuals or communities; 95 per cent of Frensham SEC Reserve would remain available for informal recreation after construction is completed. As there are considerable other areas of open space available within surrounding suburbs, acquisition of this small area of land is expected to have only a negligible impact on access to open space.
Substantially change or diminish cultural identity, social organisation or community resources?	As the War Services easement is used for informal recreation and as an electricity easement only, North East Link would not change or diminish cultural identity or social organisation; 95 per cent of Frensham SEC Reserve would remain available for informal recreation after construction was completed. As there are considerable other areas of open space available within surrounding suburbs, acquisition of this small area of land is expected to have only a negligible impact on access to open space.

9.3.3 Culture and heritage

Table 9-9 summarises the assessment of impacts on culture and heritage on the War Services easement. For further information on the environment, assessments, impacts, mitigations and outcomes for culture and heritage, refer to Section 5 of PER Technical Appendix D – Commonwealth land technical report.

Table 9-9 Relevant impacts on culture and heritage – War Services easement

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Permanently destroy, remove or substantially alter the fabric (physical material including structural elements and other components, fixtures, contents, and objects) of a heritage place	No places of potential Aboriginal or historic heritage significance were identified on or close to the War Services easement. In the event that previously unknown items of Aboriginal cultural heritage are uncovered during construction, this would be managed according to the CHMP which involves consultation with the RAP and Aboriginal Victoria, field and where appropriate, complex survey and management measures and contingences.
Involve extension, renovation, or substantial alteration of a heritage place in a manner which is inconsistent with the heritage values of the place	No relevant impacts.
Involve the erection of buildings or other structures adjacent to, or within important sight lines of, a heritage place which are inconsistent with the heritage values of the place	No relevant impacts.
Substantially diminish the heritage value of a heritage place for a community or group for which it is significant	No relevant impacts.
Substantially alter the setting of a heritage place in a manner which is inconsistent with the heritage values of the place, or	No relevant impacts.
Substantially restrict or inhibit the existing use of a heritage place as a cultural or ceremonial site?	No relevant impacts.

9.3.4 Landscape and soil

Table 9-10 summarises the assessment of impacts on landscape and soil on the War Services easement. For further information on the environment, assessments, impacts, mitigations and outcomes for landscape and soil, refer to Section 5 of PER Technical Appendix D – Commonwealth land technical report.

Table 9-10 Relevant impacts on landscape and soil – War Services easement

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Substantially alter natural landscape features	The War Services easement is a modified landscape and not considered to be natural. The War Services easement and Frensham SEC Reserve would be occupied during the construction of North East Link, meaning no users of the easement would experience changes to landscape features. Any visual impacts would be temporary and mitigated with temporary landscaping where practicable. At completion of construction, there would be significant visual changes to the War Services easement, as relocated electricity transmission towers, new noise walls and a new shared use path overpass would be visually prominent. This impact should be considered in the context of the existing landscape which is dominated by existing electricity transmission towers. The long-term impact is considered to be medium as landscaping would provide some partial screening. It is expected that visual changes would have no impact on the functionality of the War Services easement and Frensham SEC Reserve.
Cause subsidence, instability or substantial erosion, or	**Subsidence and instability** An assessment of ground movement due to North East Link did not identify any impacts on the War Services easement. **Erosion** Removal of vegetation from the War Services easement could cause localised soil erosion and subsequent impacts on water quality. Management of erosion and sedimentation would be a key part of the environmental management of construction activities.
Involve medium or large-scale excavation of soil or minerals?	On the War Services easement, North East Link would involve some minimal excavation associated with the construction of permanent infrastructure. The material excavated from the War Services easement would be negligible in the context of the approximately 6.3 million m^3 of spoil that would be generated by construction of North East Link is. A Spoil Management Plan would be implemented for spoil management and disposal during construction to mitigate potential human health and environmental risks. The SMPis based on a waste management hierarchy where landfill disposal is the least favoured option.

9.3.5 Water resources

Table 9-11 summarises the assessment of impacts on water resources on the War Services easement. For further information on the environment, assessments, impacts, mitigations and outcomes for water resources, refer to Section 5 of PER Technical Appendix D – Commonwealth land technical report.

Table 9-11 Relevant impacts on water resources – War Services easement

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Measurably reduce the quantity, quality or availability of surface or ground water	**Groundwater** Works within or near the War Services easement would have limited interaction with the groundwater environment and risks to groundwater in this area are low. The potential for a spill of hazardous material on the War Services easement during construction impacting groundwater would be managed through appropriate controls to manage risks from chemicals, fuels and hazardous materials. Any accident would likely be localised and an emergency services response is likely to be rapid, reducing the potential for contamination of groundwater. **Surface water** There are no surface water bodies in the War Services easement and no significant changes to nearby drainage or flood levels are anticipated from North East Link. During the operation of North East Link, the potential for pollutants to end up in waterways and groundwater would be minimised by the inclusion of water treatment features along the alignment. One of these features is a water treatment bioretention pond proposed to be located partly on the War Services easement that would filter and treat the stormwater captured by new road surfaces.
Channelise, divert or impound rivers or creeks or substantially alter drainage patterns, or	There are no surface water bodies in the War Services easement. North East Link would not substantially alter drainage patterns on the War Services easement.
Measurably alter water table levels?	Works within or near the War Services easement would have limited interaction with the groundwater environment. North East Link works on the War Services easement would not measurably alter water table levels.

9.3.6 Pollutants, chemicals and toxic substances

Table 9-12 summarises the assessment of impacts of pollutants, chemicals and toxic substances on the War Services easement. For further information on the environment, assessments, impacts, mitigations and outcomes for pollutants, chemicals and toxic substances, refer to Section 5 of PER Technical Appendix D – Commonwealth land technical report.

Table 9-12 Relevant impacts to pollutants, chemicals, and toxic substances – War Services easement

Assessment criteria	Impact
Is there a real chance or possibility that the action will:	
Generate smoke, fumes, chemicals, nutrients, or other pollutants which will substantially reduce local air quality or water quality	**Air quality** North East Link would generate emissions to air that may impact local air quality. Construction emissions would mainly comprise dust and odour, and would be managed through a CEMP and a Dust and Air Quality Management and Monitoring Plan. Combined impacts of tunnel ventilation and surface road emissions are comparable to impacts predicted for Simpson Barracks with surface road emissions having a greater contribution to total concentrations (due to the relative proximity of North East Link and distance from the ventilation structure). **Water quality** There is potential for spills and mobilising sediment and other pollutants in stormwater runoff during construction, leading to reduced surface water quality. Groundwater quality could also be reduced by accidental spills or the introduction of contaminated fill. However, with the application of preventative measures and incident response procedures implemented through a CEMP, the potential for adverse impacts would be minimised. During the operation of North East Link, the potential for pollutants to end up in waterways and groundwater would be minimised by the inclusion of water treatment features along the alignment. One of these features is a water treatment bioretention pond proposed to be located partly on the War Services easement that would filter and treat the stormwater captured by new road surfaces.
Result in the release, leakage, spillage, or explosion of flammable, explosive, toxic, radioactive, carcinogenic, or mutagenic substances, through use, storage, transport, or disposal	Construction may require the transportation, storage and use of some hazardous (which could include flammable, explosive, toxic, carcinogenic or mutagenic substances) materials on the War Services easement. North East Link would not have the potential for release of radioactive materials. The amount of hazardous material brought onto and stored on-site would be minimised, and would be managed in accordance with legal requirements. The CEMP would contain requirements for management of chemicals, fuels and hazardous materials. No contamination issues were identified on the War Services easement, although the presence of an electricity substation adjacent to Frensham SEC Reserve would increase the potential for contamination to be present.

Assessment criteria	Impact
	It is not expected that there would be any significant excavation on the War Service easement. Any excavation would be managed in accordance with a Spoil Management Plan developed in consultation with EPA Victoria to meet relevant regulations, standards and best practice guidelines. Emissions to air are discussed in the row immediately above.
Increase atmospheric concentrations of gases which will contribute to the greenhouse effect or ozone damage, or	Construction of North East Link would generate greenhouse gas emissions from construction materials, fuel and electricity consumption. The overall construction emissions are not considered significant in the context of Victoria's and Australia's annual greenhouse gas emissions. Operation and maintenance activities including consumption of fossil fuels for electricity generation, operation of plant and equipment and transportation of materials and equipment would generate greenhouse gas emissions. The operational and maintenance emissions are not considered significant in the context of Victoria's and Australia's annual greenhouse gas emissions. In both cases, the contribution of North East Link on the War Services easement is a very small part of this and not significant. In terms of vehicle emissions, the operation of North East Link would change vehicle flow through metropolitan Melbourne which may result in little change in overall vehicle emissions.
Substantially disturb contaminated or acid-sulfate soils?	No contamination issues were identified on the War Services easement, although the presence of an electricity substation adjacent to Frensham SEC Reserve would increase the potential for contamination to be present. It is not expected that there would be any significant excavation on the War Service easement. Any excavation would be managed in accordance with a Spoil Management Plan developed in accordance with EPA Victoria to meet relevant regulations, standards or best practice guidelines.