



Transport for NSW/Sydney Airport Corporation Limited

Sydney Gateway Road Project

Environmental Impact Statement/ Major Development Plan

Chapter 23 Health, safety and hazards



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Chapter 23

Health, safety and hazards

Potential hazards and risks to the operation of Sydney Airport, with a focus on aviation hazards, are considered in Chapter 11 (Airport operations). This chapter considers other potential human health, safety and hazard impacts associated with the project, and how these would be mitigated and managed during construction and operation. Further information about the potential for health and safety impacts is provided in Technical Working Paper 15 (Human Health).

The SEARs relevant to health, safety and hazards are listed below. There are no MDP requirements specifically relevant to health and safety, however there is a requirement under section 91(1) of the Airports Act to assess the potential environmental impacts associated with a development (section 91(1)(h)), and to specify how those impacts may be dealt with (section 91(1)(j)). Full copies of the SEARs and MDP requirements, and where they are addressed in this document, are provided in Appendices A and B respectively.

Reference	Requirement	Where addressed
Key issue SEARs		
15	Health and safety	
15.1	The Proponent must assess the potential health impacts of the proposal, in accordance with the current guidelines.	The full assessment results are provided in Technical Working Paper 15, with a summary of the findings provided in this chapter, as indicated below.
15.2	The assessment must: <ul style="list-style-type: none"> (a) describe the current known health status of the affected population; (b) assess health risks associated with exposure to environmental hazards; (c) assess the effect of the proposal on other relevant determinants of health such as the level of physical activity and access to social infrastructure; (d) assess opportunities for health improvement; (e) assess the distribution of the health risks and benefits; (f) assess the potential for construction fatigue and outline proposed management measures; and (g) discuss how, in the broader social and economic context of the proposal, the proposal will minimise negative health impacts while maximising the health benefits. 	<p>Section 23.2.2</p> <p>Sections 23.3.1 and 23.4.1</p> <p>Sections 23.3.1 and 23.4.1</p> <p>Sections 23.3.1 and 23.4.1</p> <p>Sections 23.3.1 and 23.4.1</p> <p>Section 23.3.1</p> <p>Sections 23.3.1 and 23.4.1</p>
15.3	The Proponent must assess the likely risks of the proposal to public safety, paying particular attention to pedestrian and cyclist safety, subsidence risks, bushfire risks and the handling and use of dangerous goods.	<p>Sections 23.3.2 to 23.3.5 and 23.4.2 and 23.4.4</p> <p>There are no subsidence risks</p>
16	Hazards and risks	
16.1	The EIS must: <ul style="list-style-type: none"> (a) report on the consultation outcomes with all operators of high-pressure dangerous goods (HPDG) pipelines licensed under the <i>Pipelines Act 1967</i> within or in the vicinity of the proposal with regards to the relevant sections of the <i>Australian Standard AS 2885 Pipelines – Gas and liquid petroleum</i>; 	Section 23.3.3

Reference	Requirement	Where addressed
	b) demonstrate that, during the construction and operation phases of the proposal, the proposal would not lead to non-compliance of the existing HPDG pipelines licensed under the <i>Pipelines Act 1967</i> with the current edition of <i>AS 2885 Pipelines – Gas and liquid petroleum</i> ; and,	Sections 23.3.3 and 23.4.4
	c) include a preliminary risk screening completed in accordance with <i>State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33</i> (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the proposal during construction and operation phase. Should preliminary screening indicate that the development is 'potentially hazardous', during construction and or operation phase, a Preliminary Hazard Analysis (PHA) must be prepared in accordance with <i>Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis</i> (DoP, 2011) and <i>Multi-Level Risk Assessment</i> (DoP, 2011).	Section 23.3.5
16.2	The EIS must outline the process for assessing the risks of the proposal on airport operations, including encroachment into the prescribed airspace, potential impacts to airport Communication, Navigation and Surveillance Systems, light spill and landscaping associated with the construction and operation of the proposal.	Chapter 11 and Technical Working Paper 3 (Airport Operations)

23. Health, safety and hazards

23.1 Assessment approach

Major road projects have the potential to cause health and safety impacts during construction and operation. The project site is located in a highly developed urban area, with a mix of transport, commercial, residential, industrial and recreational land uses. A health impact assessment is an important part of the environmental impact assessment process for infrastructure projects as it ensures the potential for health impacts on the community and the public safety risks of the project are considered as part of the approval process. In addition, this chapter also considers the potential for impacts associated with dangerous goods and hazardous materials. The recommended mitigation measures would reduce the potential for health and safety impacts on the public.

An overview of the approach to the assessment is provided below, including the legislative and policy context and a summary of the assessment methodology.

23.1.1 Legislative and policy context

The assessment has been undertaken in accordance with the SEARs and MDP requirements (provided in Appendices A and B) and with reference to the following:

- Relevant legislation, including the EP&A Act, *Dangerous Goods (Road and Rail Transport) Act 2008* (NSW)
- *Dangerous Goods (Road and Rail Transport) Regulation 2014*, *Pipelines Act 1967* (NSW), *Gas Supply Act 1996* (NSW), *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*, the *Airports Act* and associated regulations
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (Department of Planning (DoP), 2011a) (the SEPP33 guidelines)
- *Environmental Health Risk Assessment, Guidelines for assessing human health risks from environmental hazards*, Commonwealth of Australia (enHealth, 2012)
- *Methodology for Valuing the Health Impacts of Changes in Particle Emissions* (NSW EPA, 2013)
- *Health Impact Assessment: A practical guide* (NSW Health, 2007)
- *Health Impact Assessment Guidelines* (enHealth, 2017)
- *Australian Standard AS 2885 Pipelines – Gas and liquid petroleum* (AS 2885)
- *Storage and Handling of Dangerous Goods Code of Practice* (Workcover, 2005)
- *Australian Code for the Transport of Dangerous Goods by Road & Rail* (National Transport Commission, 2017) (The Dangerous Goods Code)
- *Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis* (DoP, 2011b) and *Multi-Level Risk Assessment* (DoP, 2011c)
- *Sydney Airport Master Plan 2039* (SACL, 2019a)
- *Sydney Airport Environment Strategy 2019-2024* (SACL, 2019b).

23.1.2 Methodology

Study area

The study area varies for each health and safety issue addressed in this chapter. This is due to the different study areas used in technical assessments that provided inputs to the health impact assessment (Technical Working Paper 15).

In general, the study area for the air quality assessment is the largest of the individual study areas used by technical assessments. This area is shown in Figure 12.1. The area considered with respect to the potential for public safety impacts is in the immediate vicinity of the project site where the public may come into contact with construction works.

Key tasks

The assessment focuses on construction and operational activities with the potential to result in the following:

- Potential risks to public safety during construction, such as risks to public safety from construction works and the storage, handling and use of dangerous goods
- Potential health impacts during operation arising from changes such as the loss of public space, changes in air quality or noise impacts and road safety.

The human health assessment involved the following:

- Reviewing the relevant regulatory framework and applicable guidelines
- Identifying sensitive receivers and community infrastructure within the existing environment
- Identifying construction and operational activities with the potential to cause health and safety impacts to off-site receivers
- Assessment of potential health risks from the project, including review of the assessment results for other disciplines such as air quality, noise and vibration, surface water, groundwater, contamination, and social impacts, and estimation of short-term (acute), and long-term (chronic) impacts
- Identifying construction and operational activities with the potential to cause risks on human health
- Consideration of cumulative impacts resulting from the project in combination with other projects currently proposed or underway
- Consideration of the recommended mitigation measures identified in the technical working papers and where necessary, additional mitigation measures that may need to be considered to address community health and safety impacts.

This chapter also considers the potential impacts associated with dangerous goods and hazardous materials and the results of a preliminary risk screening undertaken in accordance with the *Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis* (DoP, 2011b) and *Multi-Level Risk Assessment* (DoP, 2011c).

23.1.3 Risks identified

A preliminary environmental risk assessment was undertaken as an input to the impact assessment (see Appendix G). This involved identifying potential environmental risks during construction and operation, and rating the potential risks according to likelihood, consequence and overall level of risk, in accordance with *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines*. Health and safety risks with an overall assessed risk rating of medium or above, identified by the preliminary environmental risk assessment, included:

- Hazardous materials exposure during demolition of buildings/structures and impacts on the surrounding environment, including health impacts on nearby populations
- Accidental damage to, or interference with, live underground services during construction with impacts on utility users, including businesses and individuals
- Working within or adjacent to an operating road and rail environment
- Unauthorised public access to the site during construction, with the potential for public safety risks, as a result of the close proximity to sensitive receivers (such as members of the community travelling in the vicinity of the project site, residents, commercial properties)
- Accidental release of dangerous or hazardous materials to the environment in the event of an incident during operation
- Road safety risks for motorists, pedestrians and cyclists during operation.

The health impact assessment and this chapter included consideration of these potential risks.

The assessment does not take into account potential health and safety risks to site workers associated with normal construction operations, as these are regulated by workplace health and safety legislation (including the *Work Health and Safety Act 2011*), and are not relevant to approval of the project under Division 5.2 of the EP&A Act or section 90 of the Airports Act. Site management would be the responsibility of the construction contractor(s), who would be required (under the *Work Health and Safety Act 2011*) to manage the site in accordance with relevant regulatory requirements and take all necessary precautions in relation to the health and safety of the workforce.

23.2 Existing environment

The existing environment is described in Chapters 9, 10, 12, 13 and 20 in relation to traffic and access, noise and vibration, air quality, contamination and the socio-economic environment, respectively. A description of existing land use patterns and sensitive receivers surrounding the project area is provided in Chapter 19 (Land use and property). A profile of the local communities is provided in Chapter 20 (Socio-economic impacts).

23.2.1 Sensitive receptors and infrastructure

Other aspects relevant to the consideration of health and safety impacts are summarised below. Further information is provided in Chapter 4 of Technical Working Paper 15.

The urban setting of the project means that there is the potential for the community to be impacted. Sensitive receptors include the following:

- Members of the community travelling through the study area or located close to the project site
- Residents living near the project site
- Users on Joyce Drive, O’Riordan Street, Robey Street, Airport Drive and Qantas Drive
- Local businesses and commercial properties.

The suburbs of Mascot, Tempe and St Peters contain a range of community facilities and services including:

- Community/recreational facilities such as Mascot Library and Tempe Golf Range and Academy
- Educational facilities including schools and child care
- Footpaths, shared paths and cycleways
- Accommodation facilities
- Health services such as Mascot Medical and Dental Centre
- Places of worship
- Open space including Tempe Recreation Reserve and Tempe Lands.

As described in section 8.7, the project site and surrounding area contain overhead and underground utilities that are common in a developed urban area.

23.2.2 Health

The health of a local community is influenced by a combination of interacting factors including age, socio-economic status, social networks, behaviours, beliefs and lifestyle, life experiences, country of origin, genetic predisposition and access to health and social care. While it is possible to review existing health statistics for the local health district surrounding the project site and compare them to the Greater Sydney area and NSW, it is not possible to identify a causal source in relation to existing health or specifics for the project site and surrounding communities.

The project site is located in the local health districts of South Eastern Sydney and Sydney. The incidences of health-related behaviours (ie alcohol consumption, smoking, lifestyle factors) in these districts that are linked to poorer health status and chronic diseases (such as cardiovascular and respiratory diseases, cancers and other conditions, which account for much of morbidity and mortality in later life) are generally similar to those reported in the larger local health districts and the wider Sydney metropolitan area, and are slightly lower than the whole of NSW.

The South Eastern Sydney and Sydney local health districts have lower rates of physical inactivity and of being overweight and obese compared with NSW as a whole. A comparison of the rates of the key mortality indicators, for all potentially avoidable causes of cardiovascular disease, lung cancer and chronic obstructive pulmonary disease, indicates that the rates of mortality in the South Eastern Sydney and Sydney local health districts are significantly lower than those reported for NSW as a whole. However, chronic obstructive pulmonary disease and lung cancer were not significant for the Sydney local health district.

The rates of hospitalisations for indicators such as diabetes, cardiovascular disease, asthma (for people aged five to 34 years) and chronic obstructive pulmonary disease (for people aged 65 years and above) show significantly lower statistics for the South Eastern Sydney and Sydney local health districts than those reported for NSW. The rate of high or very high psychological distress for adults in the South Eastern Sydney local health district is slightly lower than the NSW average. The rate in the Sydney local health district is almost the same as the NSW average.

23.3 Assessment of construction impacts

23.3.1 Health impacts

This section considers the potential impacts on the health and wellbeing of the community during construction.

Air quality

Potential air quality impacts are summarised in Chapter 12 and assessed in detail in Technical Working Paper 4 (Air Quality). The assessment approach focused on emissions to air of dust or the generation of dust. This approach was reviewed in terms of the potential impacts on human health.

The risk of dust impacts arising in sufficient quantities to cause annoyance and/or health effects was separately determined by the following construction activity types: demolition, earthworks, construction and track out. The sensitivity of receptors/areas was determined to be either high or medium, and the resultant risk of impacts was similarly determined to be high or medium based on the adopted criteria and risk matrix (see section 12.4.2). The impacts would be temporary and minimised with the implementation of measures provided in section 12.7.

As discussed in section 12.4.3, exhaust emissions from on-site plant and construction traffic during construction are unlikely to substantially impact local air quality. This is not considered to result in any health impacts on the public.

Noise and vibration

Noise and vibration impacts are summarised in Chapter 10 and assessed in detail in Technical Working Paper 2 (Noise and Vibration).

Environmental noise has been identified as a growing concern in urban areas due to the negative effects on quality of life and wellbeing. It also has the potential to cause physiological health effects. Noise impacts have the potential to increase over time due to the growing population and increasingly urbanised societies.

Sound is a natural phenomenon which becomes noise when it has undesirable effects on people or animals. Noise can have both short-term and long-term adverse effects. In relation to short-term construction noise, the key potential health impacts relate to annoyance and sleep disturbance.

In most areas surrounding the project site, there are no exceedances of noise guidelines that are protective of community health. However, as discussed in Chapter 10 (Noise and vibration), construction noise impacts related to the use of noise intensive equipment are predicted at some residential receivers in Tempe to the north-west of Terminal 1 and in Mascot, near Baxter Road. Potential impacts are generally higher during the evening and night-time periods than during the daytime. Only one residential receiver on Baxter Road was identified as highly noise affected. The criteria for sleep disturbance are likely to be exceeded when works occur near residential receivers during the night-time.

There is the potential for ground-borne noise impacts at nearby receivers during works requiring vibration intensive equipment. Some receivers are also within the minimum working distance criteria for human comfort. Where impacts are perceptible, it is likely that they would only be apparent during the relatively short times when vibration intensive equipment such as rockbreakers or vibratory rollers are used. Perceptible vibration has the potential to cause annoyance or sleep disturbance; however, no data is available to evaluate health impacts associated with community exposure to perceptible vibrations.

The implementation of the mitigation measures provided in section 10.7 would minimise the potential for construction noise and vibration to adversely impact community health. However, there may still be some short-term noise impacts, where annoyance and potentially sleep disturbance occurs on some occasions.

Changes in social aspects on community health

There are a wide range of other factors (other than changes in air quality, noise and vibration) that influence health and wellbeing, specifically mental health. How these factors may affect community health has been addressed using a qualitative approach.

Adverse impacts may occur as a result of traffic changes during construction, property acquisitions, visual changes, noise impacts, loss of some green/open space and existing recreation facilities, changes to active transport and changes in access/cohesion of local areas. These may result in reduced opportunities for physical activity and social interaction and/or increased levels of stress and anxiety. In many cases, the impacts identified are either short-term (associated with construction only) and/or mitigation measures have been identified to minimise the impacts on the community.

Potential socio-economic impacts are considered in Chapter 20.

Construction fatigue

Construction fatigue can occur when people experience impacts from projects over an extended period of time with few or no breaks between construction periods. Construction fatigue typically relates to the effects of traffic and access disruptions, noise and vibration, air quality, visual amenity and/or social impacts from projects that have overlapping construction phases or occur one after the other. Construction impacts that occur in this manner are no longer considered to be transient and/or short-term.

The assessment of construction fatigue involved consideration of the cumulative and/or consecutive construction impacts of the Sydney Gateway road project together with other major projects in the study area, such as the Botany Rail Duplication, New M5 and M4-M5 Link projects. Cumulative and consecutive construction activities have the potential to affect the health and wellbeing of the community as a result of air quality impacts, noise and vibration impacts, traffic and transport impacts, and visual amenity impacts. The potential for these cumulative impacts is considered in Chapters 9 (Traffic, transport and access), 10 (Noise and vibration), 12 (Air quality), 20 (Socio-economic impacts) and 21 (Landscape character and visual amenity).

As described in section 12.7, dust would be managed during construction in accordance with standard construction management practices to minimise impacts and associated health risks. Such measures would need to be applied across all construction projects and would be subject to the requirements of the approvals for those projects.

As discussed in section 10.6.1, there is potential for construction fatigue to occur as a result of construction noise from the project and other concurrent/consecutive projects. The potential for construction fatigue would generally be limited to the eastern part of the study area in Mascot (noise catchment areas six, seven and eight). The majority of this area is commercial. However, some residential receivers and hotels are located at the intersection of Joyce Drive and O'Riordan Street.

Implementation of the mitigation measures provided in section 10.7 would minimise the potential for noise impacts. More specific measures would be developed as the design progresses and impacts from other projects (such as Botany Rail Duplication) are known.

During construction, the project team would build a working relationship with the teams for other major projects, to identify stakeholders or community members who may be susceptible to construction fatigue, and put in place appropriate management measures consistent with those provided in relevant chapters.

23.3.2 Public safety

Construction has the potential to affect public safety. The risks to public safety are outlined in Table 23.1. Damage and disruption to utilities are discussed in section 23.3.2. Storage, handling and transport of dangerous goods and hazardous substances are discussed in section 23.3.5. There would be no hazards or risks with the potential to impact public safety following implementation of the proposed mitigation measures.

Table 23.1 Potential safety hazards during construction

Hazard	Assessment of hazard
Contamination	<p>Contamination is known to occur within the project site. There are five project areas with known contamination. These include the former Tempe landfill, Sydney Airport land (two locations), Sydney Airport leased areas and Alexandra Canal.</p> <p>Contamination may pose a safety risk to the surrounding communities when exposed. Exposure may occur as a result of earthworks, interception with contaminated groundwater and runoff from contaminated soil. Off-site, unmitigated risks to human health are characterised as medium and high during construction works in three of the five project areas.</p> <p>Construction activities also have the potential to result in the contamination of soil. This could occur due to accidental spills and leaks of materials, transport of materials, cross-contamination within the site, mobilisation of contaminants encountered during works and as a result of mishandling of potentially contaminated substances.</p> <p>These potential impacts are considered in Chapter 13 (Soils and contamination). The measures provided in that chapter would be implemented to manage these risks. With mitigation measures in place, the risk to public safety is reduced to low.</p>
Landfill gas	<p>During construction, there is a risk associated with the uncontrolled release of methane, hydrogen sulfide and carbon dioxide from works in the former Tempe landfill. In certain circumstances, accumulated landfill gases may result in a safety hazard and risk of explosion. These issues would be managed in accordance with the <i>Work Health and Safety Act 2011</i> in terms of worker health and safety.</p> <p>Chapter 12 (Air quality) assesses the landfill gas and odour impacts as a result of works within the former Tempe landfill. The impacts and associated mitigation measures are described in section 12.4.5.</p>
Flooding	<p>The assessment identified that Alexandra Canal is a major floodway for the area and therefore a number of construction work areas would have the potential to be affected by flooding during storms. Construction also has the potential to change flood behaviour and impact the surrounding environment. This may result in the potential for flooding to impact other properties, assets and infrastructure.</p> <p>The flooding risks during construction are considered to be of a minor nature. With the implementation of mitigation measures, no impacts on existing emergency management arrangements or public safety are expected. A flood mitigation strategy is proposed in Chapter 14 (Flooding) to reduce the risk of flooding impacts on properties, assets and infrastructure.</p> <p>The risk of potential impacts on health and public safety associated with large or multiple pools of stagnant water onsite, such as the risk of mosquitos establishing and attracting wildlife, would be managed in accordance with mitigation measures provided in Chapters 11 and 13 to 16.</p>
Bushfire	<p>The project is not located in a bushfire prone area. The highly urbanised project site does not contain large areas of vegetation that would be associated with bushfire risk. The risk to public safety is considered low.</p> <p>During construction, flammable materials and ignition sources may be used. High risk construction activities, such as welding and metal work, and works within the former Tempe landfill, would be subject to a risk assessment or ban on total fire ban days.</p>
Traffic management during construction	<p>Construction would result in changes to the local road network. Partial and full road closures and traffic diversions may pose a safety risk. This would include a risk to the safety of motorists and other road users using the surrounding road network. Changes to the existing pedestrian and cyclist network have the potential to impact pedestrian and cyclist safety. Construction traffic may impact the local community with the potential for changes to public safety and access.</p> <p>A construction traffic and access management plan would be developed and implemented as discussed in Chapter 9 (section 9.6) and Technical Working Paper 1. This would include, as a priority, measures to maintain public safety at all times. With the implementation of appropriate traffic management during construction, the risk to public safety is considered to be low.</p>

Hazard	Assessment of hazard
Safety during construction	<p>A number of other construction activities, although unlikely, could result in risks to the safety of the local community if improperly managed. These include:</p> <ul style="list-style-type: none"> ■ Items falling off vehicles during the transportation of equipment and material to and from site ■ Settlement risks during construction activities such as ground compaction or dewatering ■ Potential for risks to public safety resulting from unauthorised access to construction work areas. <p>Safety risks during construction and transportation of materials by road would be managed by implementing standard workplace health and safety requirements, including the requirements of the Dangerous Goods Code.</p> <p>The potential for unauthorised access resulting in safety risks is considered to be low, based on NSW workplace safety laws. This requires construction sites to have adequate site security, which includes appropriate fencing and lighting. The construction contractor would need to ensure that construction sites are safe and secure at all times.</p>

23.3.3 Utility management

Preliminary utilities investigations have been undertaken and consultation with asset owners has identified the utilities outlined in section 8.7. There are three broad project areas with a high density of utilities: Airport Drive/Qantas Drive, Sir Reginald Ansett Drive and Shiers Avenue. The majority of these utilities are located underground and include gas mains, fuel and water pipelines. However, some have above ground components including electrical and Telstra cables.

The Sydney Water desalination pipeline traverses the project site between Tempe Recreation Reserve and Canal Road, and includes above and below ground sections. The concept design and construction methodology has been developed to avoid physical interactions with the pipeline and minimise potential integrity risks. This would include providing physical protection for the above ground sections during construction (where required), in consultation with the operator, to ensure uninterrupted operation.

Potential impacts may include accidental damage or rupture, which may lead to disruption of supply and/or a loss of containment and the potential risk of a public safety incident. This risk would be greatest for utilities conveying dangerous goods, such as high pressure gas and fuel, located within the project site. The interface between construction activities and utility adjustments would be managed by the construction contractor in accordance with the *Work Health and Safety Act 2011*.

Three high pressure dangerous goods pipelines intersect the project site. These include primary and secondary gas mains (operated by Jemena) and a 150 millimetre diameter ethylene pipeline (operated by Qenos). The ethylene pipeline is licensed under the *Pipelines Act 1967* while the gas mains are operated in accordance with the *Gas Supply Act 1996*.

The ethylene pipeline is part of the Qenos Botany to Clyde Ethylene Pipeline (pipeline licence number 12), which was commissioned in 1962. The pipeline was designed and constructed in accordance with (now) obsolete standards, but is required to be operated and maintained in accordance with *AS 2885 Pipelines – Gas and liquid petroleum* (AS 2885). The operators of all licensed pipelines are required to undertake periodical monitoring and independent third party audits. A condition assessment of the pipeline was last performed in 2012. The pipeline is currently suspended from operation and charged with an inert gas (nitrogen) at around 400 kilopascals.

The project requires some sections of the ethylene pipeline to be relocated or removed, pending its decommissioning. Meetings with Qenos and the pipeline maintainer are ongoing. Recent meetings have highlighted the potential future use of the pipeline and whether it may be decommissioned at some time during the construction period.

All design, construction, inspection, testing, and any required alterations or relocations of sections of the ethylene pipeline, would comply with the requirements of the *Pipelines Act 1967* and AS 2885. A safety management study, as required by AS 2885, would be undertaken prior to construction. This study requires the identification of all relevant risks, and assessment of likelihood and consequence, to determine a risk ranking. Mitigation measures would be identified to reduce the risk to 'as low as reasonably practicable'. The safety management study would include a workshop with all relevant stakeholders, including the pipeline owner and operator.

Measures to minimise the potential for safety impacts associated with utility adjustments are provided in section 23.6.2. Preliminary consultation with utility providers is ongoing. The nature and extent of adjustments required would be confirmed during detailed design and in consultation with the utility providers. Impacts on critical utilities that service Sydney Airport facilities would be prioritised to safeguard accidental disruption (in terms of contingency management arrangements). With the addition of any measures arising from the AS 2885 safety management study, the risk to public safety is considered low.

23.3.4 Emergency vehicle movements

Temporary traffic diversions, road occupation, road closures and changes to access arrangements may cause delays and/or potential restrictions to emergency services movement. Appropriate access for emergency vehicles would be maintained at all times. This could include traffic control to stop other traffic or works temporarily to allow emergency vehicles to pass.

Impacts from delays and potential access restrictions would be managed by the implementation of measures provided in the construction traffic and access management plan (see section 9.6). Ongoing communication with local councils, Sydney Airport Corporation and emergency services organisations would be undertaken during detailed design and as part of developing the Construction Traffic and Access Management Plan. This would confirm measures to mitigate potential impacts on emergency vehicle movements.

23.3.5 Storage, handling, and transport of dangerous goods and hazardous materials

Dangerous goods are substances and objects that may pose acute risks to people, property and the environment due to their chemical or physical characteristics. Dangerous goods that may be used during construction include diesel, grease, hydraulic oil, acetylene, polyurethane foam, line marking aerosol, epoxies, bitumen and concrete binding agents. Leaks and spills from inappropriate storage and handling of dangerous goods have the potential to impact the surrounding community and environment. Excessive amounts of stored or transported dangerous goods would exacerbate the potential for fire, explosion or inhalation risks.

The preliminary risk screening undertaken in accordance with *State Environment Planning Policy No. 33 – Hazardous and Offensive Development* included a comparison of dangerous goods that may be used during construction with the storage and transport thresholds in the SEPP 33 guidelines. The thresholds in the SEPP 33 guidelines represent the maximum amounts of dangerous goods that can be stored or transported to and from the project site without causing a significant risk to the community or environment.

The preliminary risk screening concluded that the storage, handling and transport of dangerous goods would not exceed the SEPP 33 guideline thresholds. The screening was based on the conservative estimates of dangerous goods likely to be used.

The project includes five main construction compounds that would be used to receive and store the dangerous goods required during construction. The goods would be transported between compounds as required. Dangerous goods likely to be stored off-site and transported to site (without storage) include:

- Bitumen (including bitumen emulsion) (Class 9 – III)
- Concrete surface retarder (Class 3 – III)
- Concrete bonding agent hardener (Class 8 – II).

These materials would be transported to site at a maximum rate of once per day (seven times per week). This is typical of a road construction project. Other dangerous goods would be stored on site and transported on site only when stored quantities are low. The quantities of dangerous goods transported would be below the SEPP 33 transport screening thresholds. Given that movement of dangerous goods would be low, the potential risks during transportation are not considered significant.

The incorrect storage or mishandling of dangerous goods and chemicals could result in contamination and affect air, soils, surface water and/or groundwater. This could result in health and safety impacts on the community through inhalation and/or direct contact, fires and explosions. The storage, handling and transport of dangerous goods would be undertaken in accordance with the Dangerous Goods (Road and Rail Transport) Regulation 2009 and the Dangerous Goods Code. Measures relating to storage requirements and handling protocols would be included in the CEMP. This would minimise the risk of health and safety impacts.

23.3.6 Summary of impacts on Sydney Airport (Commonwealth) land

The potential impacts on Sydney Airport land are discussed in Chapters 9 to 16, 20 and 21.

The assessment of dust impacts considered receptors within Sydney Airport land, identifying a high risk of dust impacts at a number of these receptors. Mitigation measures provided in section 12.7 would minimise the potential for these impacts and protect human health.

Within Sydney Airport land, construction noise impacts would be limited to noise catchment areas five and seven (described in section 10.4.2). These catchment areas include existing or planned hotels, the Qantas Flight Training Centre as well as other commercial premises. Many of these receivers are of lower sensitivity generally and already subject to high levels of background noise. Where mitigation measures are implemented, there would be minimal potential for community health impacts as a result of noise generation during construction. However, there may still be some short duration noise impacts, where annoyance and potentially sleep disturbance occurs on occasion.

The project would require the temporary storage of dangerous goods within construction compounds on Sydney Airport land. However these would not be stored in quantities that exceed SEPP 33 guidelines. Additionally, the storage of these materials would not occur on any other Sydney Airport land.

Utilities adjustments would also be required on Sydney Airport land, including adjustments to high pressure dangerous goods pipelines. All utilities adjustments would be undertaken in accordance with the asset owner's requirements, relevant legislation or plans, and in consultation with Sydney Airport Corporation.

Mitigation measures would be implemented as described in section 23.6 and other relevant chapters. With these measures in place, there would be no health impacts of concern or public safety risks specific to Sydney Airport land.

23.4 Assessment of operation impacts

23.4.1 Health impacts

This section summarises the potential impacts on the health and wellbeing of the community once the project is operational.

Air quality

The air quality assessment considered potential emissions from road traffic associated with the project's operation. The assessment involved a quantitative assessment of exposure and risk. The assessment considered short-term (acute) exposures as well as long-term (chronic) exposures to pollutants derived from vehicle emissions. The assessment evaluated the total exposure that may occur in the community (ie existing air quality with the addition of the project) as well as the change in air quality as a result of the project, which may either increase or decrease.

The project is expected to result in a redistribution of impacts associated with vehicle emissions, specifically in relation to emissions from vehicles using surface roads. This would generally result in no measurable change or a small improvement (ie decreased concentrations and health impacts) for most of the community. However, for some areas located near key surface roads, an increase in pollutant concentrations may occur. These were assessed and determined to be low and not considered to be of significance (ie measurable) or of concern in relation to community health. Where the various changes were considered over the population as a whole, a small benefit to health outcomes was observed.

Noise and vibration

The assessment of health impacts as a result in changes in operational noise considered a range of potential health effects that relate to long-term exposures to road traffic noise. These health effects include annoyance, sleep disturbance, cardiovascular effects and cognitive effects. Increased levels of noise may also affect the use and enjoyment of outdoor space. Guidelines used to assess potential noise impacts are based on levels that are protective of these health effects. Hence, where the project complies with the relevant noise guidelines, community health will be adequately protected.

The project would introduce new road noise sources, with some areas identified as having potentially significant increases in noise levels. The noise assessment identified the potential for exceedances of operational road traffic noise criteria at 246 buildings (231 residential buildings). Without mitigation, the identified receivers would exceed the criteria designed to protect human health.

The approach to minimising the potential for noise impacts during operation is described in section 10.7. This would include consideration of treatment at or near the noise sources (such as noise barriers and low noise pavement) prior to the consideration of at-property treatments. At-property treatments are less certain in terms of acceptance and use, and their presence at a property also has the potential to affect the wellbeing of residents (particularly the use of outdoor spaces).

Receivers identified as requiring at-property noise mitigation would be identified and offered treatment prior to commencement of construction, where feasible and reasonable. Measures are provided in section 10.7.2 to mitigate impacts that cannot be avoided.

Changes in social aspects on community health

Potential socio-economic impacts are considered in Chapter 20. There are a wide range of factors that influence health and wellbeing. Permanent changes in the urban environment that have the potential to result in both positive and negative impacts on health and wellbeing include:

- Improved travel times and access, which may help improve general health and wellbeing. Without the project, worsening traffic conditions, traffic and accident risks could result in increased levels of stress and fatigue leading to potential health impacts.
- The relocation of businesses and impacts to open space areas could disrupt social networks and affect health and wellbeing due to increased levels of stress and anxiety, particularly during the process of negotiation. The mitigation measures provided in section 20.6, including consultation and implementation of business management plans, would assist in minimising potential impacts on businesses.
- On a broader scale, improving access and travel times to Sydney Airport would provide potential health benefits. These may be from improved employment opportunities, more time available for other active, family or community activities, and reduced levels of stress and anxiety.
- The project may result in localised economic impacts (eg to some businesses and land required for the project). However, the improved access and travel times provided by the project would provide economic benefits. These economic benefits are a factor influencing community health with lowered levels of stress and anxiety related to congestion, access to travel and transport and employment opportunities.

23.4.2 Public safety

Spills and leaks may cause minor and diffuse contamination risks during operation. A spill response procedure would be developed as part of the project's incident management protocols, as detailed in section 23.6.1. The former Tempe landfill has been identified for long-term management of contamination. Mitigation measures provided in Chapter 13 (Contamination and soils) will reduce potential safety risks to the community.

The project has been designed to maximise safety and efficiency for road users, which would inherently minimise the likelihood of incidents and crashes. The project may also result in a reduction in traffic volumes on some roadways, which has the potential to reduce crash rates and improve pedestrian and cyclist safety. Overall, the project is expected to result in improvements to the road safety environment for vehicles. An assessment of potential impacts on transport, traffic and access during operation is provided in section 9.4 and Technical Working Paper 1 (Transport, Traffic and Access).

Crime prevention through environmental design principles have been, and would continue to be, incorporated into the project design to reduce safety risks to the local community (see section 7.12).

23.4.3 Emergency vehicle movements

Changes to access arrangements in local roads may change the preferred routes used by emergency services. This would be subject to consultation with emergency services organisations.

23.4.4 Storage, handling, and transport of dangerous goods and hazardous materials

No areas within the operational footprint would be used for the permanent storage of chemicals.

The amount of hazardous materials and dangerous goods that would be used during maintenance activities would be much smaller than the volumes required during construction. Dangerous goods required during maintenance would include bitumen/bitumen emulsion, rubber sealant, line marking paint and aerosols, concrete for repairs and small volumes of greases, lubricants and petrol/diesel used by maintenance equipment. Potential health and safety impacts from exposure to these contaminants through inhalation and/or direct contact are considered to be negligible.

Transport of hazardous materials and dangerous goods along the completed roadways has the potential to impact the surrounding community and the environment through leaks and spills in the event of incidents. The transport of hazardous materials and dangerous goods would be the responsibility of the road operator/s and would be undertaken in accordance with relevant standards and regulatory requirements.

23.4.5 Summary of impacts on Sydney Airport (Commonwealth) land

The potential operational impacts on Sydney Airport land are discussed in Chapters 9 to 16, 20 and 21.

The air quality assessment involved consideration of 162 receptors located on Sydney Airport land. These are mainly commercial/industrial receptors, with a small number of park/sport/recreational and 'other' uses. Some of the maximum increases in pollutants are predicted within Sydney Airport land. There would be some reductions in particulates along Airport Drive to the north of Terminal 1. However, all health impacts from the changes in air quality within Sydney Airport land are considered low and not measurable within the community.

Impacted receivers on Sydney Airport land are mostly commercial premises of relatively low sensitivity. While there are predicted to be increases in noise levels greater than two dB and/or high increases in ground-based aircraft noise, the number of affected receivers is relatively small and would be reduced by implementing the mitigation measures provided in section 10.7. These increases in noise are not considered to be sufficiently elevated to result in health impacts to occupants.

Implementation of the proposed mitigation measures would reduce safety risks and result in no health impacts of concern within Sydney Airport land. This also applies to soil and water contamination that may be present within Sydney Airport land.

Mitigation measures would be implemented as described in section 23.6.2 and other relevant chapters. With these measures in place, there would be no health impacts of concern or public safety risks specific to Sydney Airport land.

Consistency with the Sydney Airport Master Plan

The *Sydney Airport Master Plan 2039* (SACL, 2019a) (the Master Plan) identifies numerous strategies to manage and reduce potential environmental impacts that may result in health and safety impacts. The environmental impacts include:

- Air quality (section 14.6.3 of the plan)
- Ground-based noise (section 14.6.4 of the plan)
- Water quality and water use (section 14.6.5 of the plan)
- Soil and land management (section 14.6.9 of the plan).

The project is generally consistent with the strategies proposed in the plan that relate to these issues. Strategies relating to health, safety and hazards have not been specifically identified in the Master Plan. The project is, however, consistent with strategies that apply to the health and safety of the community. Assessments of these potential impacts are summarised in Chapters 10 (Air quality), 12 (Noise and vibration), 13 (Contamination and soils) and 16 (Surface water).

The *Sydney Airport Environment Strategy 2019-2024* (SACL, 2019b) (the Environment Strategy) underpins Sydney Airport Corporation's commitment to continual improvement of environmental performance at the airport. Environmental action plans are provided for air quality (section 3.4 of the strategy), ground-based noise (section 3.5), ground transport (section 3.6), water quality and water use (section 3.7), soil and land management (section 3.11), and spill response and hazardous materials (section 3.12). These environmental issues have the potential to impact community health.

This assessment and the mitigation measures provided in section 23.6.2 and Chapters 9 to 16, 20 and 21 are consistent with the Master Plan and the Environment Strategy.

23.5 Cumulative impacts

The project would operate at the same time as other major projects underway and/or planned in the surrounding area, including the Botany Rail Duplication, M4–M5 Link and New M5. The cumulative impacts of traffic and access, noise and vibration, air quality, contamination, health, safety and hazards and social impacts are described in Chapters 9, 10, 12, 13 and 20 respectively.

As discussed in section 23.3.1, concurrent and consecutive construction activities from this project and other projects has the potential to increase stress and anxiety in the community as a result of the potential air quality impacts, noise and vibration, changes to traffic and transport conditions and visual amenity. It is noted that the areas where the community may be affected by consecutive construction activities, which may result in construction impacts occurring over a longer period of time, is small and the noise impacts to these areas are also low (see section 10.6).

The project would deliver a cumulative benefit to the health of the community during operation. Together with other infrastructure projects, the project would improve travel times and reduce congestion, provide improved access and connectivity, and improve pedestrian and cycling infrastructure. Potential cumulative health and safety impacts are not anticipated.

Cumulative impacts relating to storage and transportation of hazardous goods and utilities relocation during construction are also possible in relation to activities and work areas associated with the Botany Rail Duplication, which may be adjacent to the project's work areas. However, co-ordination of activities (where relevant) and mitigation measures would help to reduce these impacts and result in a low overall health risk.

23.6 Management of impacts

23.6.1 Approach

Approach to mitigation and management

The human health assessment did not identify any significant impacts on health during construction or operation, or any specific mitigation measures beyond those provided in other chapters. Measures to minimise potential impacts associated with noise, air quality, contamination, visual amenity and socio-economic impacts would assist in minimising the potential for community health impacts. These measures are provided in Chapters 10, 12, 13, 20 and 21.

The key potential safety impacts and hazards identified in sections 23.3 and 23.4 relate to the potential for spills, incidents during utility works, threats to public safety during emergency situations and the management of dangerous goods. A spill response procedure would be developed as part of the project's incident management protocols. An emergency response plan would be prepared to manage emergency situations with threats to public safety. Measures relating to storage requirements and handling protocols would be included in the CEMP.

Expected effectiveness

The proposed measures have been developed based on best management practice, relevant standards and guidelines, and Transport for NSW's experience delivering major road infrastructure projects. Similar measures have been used on comparable large road infrastructure projects, such as the F6 extension, New M5, M4-M5 Link and M4 East.

Potential health and safety risks would be managed by implementing the measures provided in section 23.6.2, in addition to ongoing design development and construction planning, which would aim to avoid and minimise health and safety risks as far as possible. These processes also facilitate ongoing consultation with relevant stakeholders and would provide the detail required to manage safety risks and hazards to acceptable levels to protect community health. These processes and measures are therefore expected to be effective in reducing the identified impacts and issues to acceptable levels.

23.6.2 List of mitigation measures

Measures that will be implemented to address potential impacts on health and safety are listed in Table 23.2.

Table 23.2 Health, safety and hazards mitigation measures

Impact/issue	Ref	Mitigation measure	Timing
Spill response	HS1	A spill response procedure will be developed as part of the project's incident management protocols. The procedure and incident management protocols will detail processes, responsibilities and measures to manage hazardous substances and dangerous goods, including storage, handling and spill response, in accordance with legislative requirements.	Pre-construction, construction
Utility management	HS2	A utilities contingency management plan will be prepared and will include measures to manage any utility service disruptions during construction. This will include procedures to respond to and unplanned outages of services, particularly for critical Sydney Airport infrastructure.	Pre-construction, construction
Alterations to the ethylene pipeline	HS3	A safety management study will be prepared for any proposed alterations to the ethylene pipeline in accordance with <i>AS 2885 Pipelines – Gas and liquid petroleum</i> . The outcomes of the safety management study will be incorporated in construction planning.	Pre-construction, construction
Emergency response	HS4	An emergency response plan will be prepared and will include measures to manage emergency situations during construction, including those associated with fires, flooding or other threats to public safety.	Construction
Fire risk	HS5	All works involving potential ignition sources within the former Tempe landfill will be subject to a risk assessment or ban on total fire ban days.	Construction
Transport of dangerous goods and hazardous materials	HS6	The transport of dangerous goods will be undertaken in accordance with the Dangerous Goods (Road and Rail Transport) Regulation 2009 and the <i>Australian Code for the Transport of Dangerous Goods by Road & Rail</i> (National Transport Commission, 2017).	Construction

23.6.3 Managing residual impacts

Residual impacts are impacts of the project that may remain after implementation of:

- Design measures to avoid and minimise impacts (see sections 6.4 and 6.5)
- Construction planning and management approaches to avoid and minimise impacts (see sections 6.4 and 6.5)
- Specific measures to mitigate and manage identified potential impacts (see section 23.6.2).

Construction and operation may involve some level of residual impact, even with implementation of the proposed mitigation measures. An unplanned incident could still affect safety or result in emissions or harm to the public or the environment. There is the possibility that unplanned incidents could result in severe injury and/or death and may require the partial or full closure of the affected area for an extended period. This risk is inherent in the construction of any complex infrastructure project.

Within the ongoing design and construction planning process, through the continued application of risk avoidance and minimisation measures, as well as the mitigation measures identified in this chapter, the residual health, safety and hazards impacts are considered to be low.