

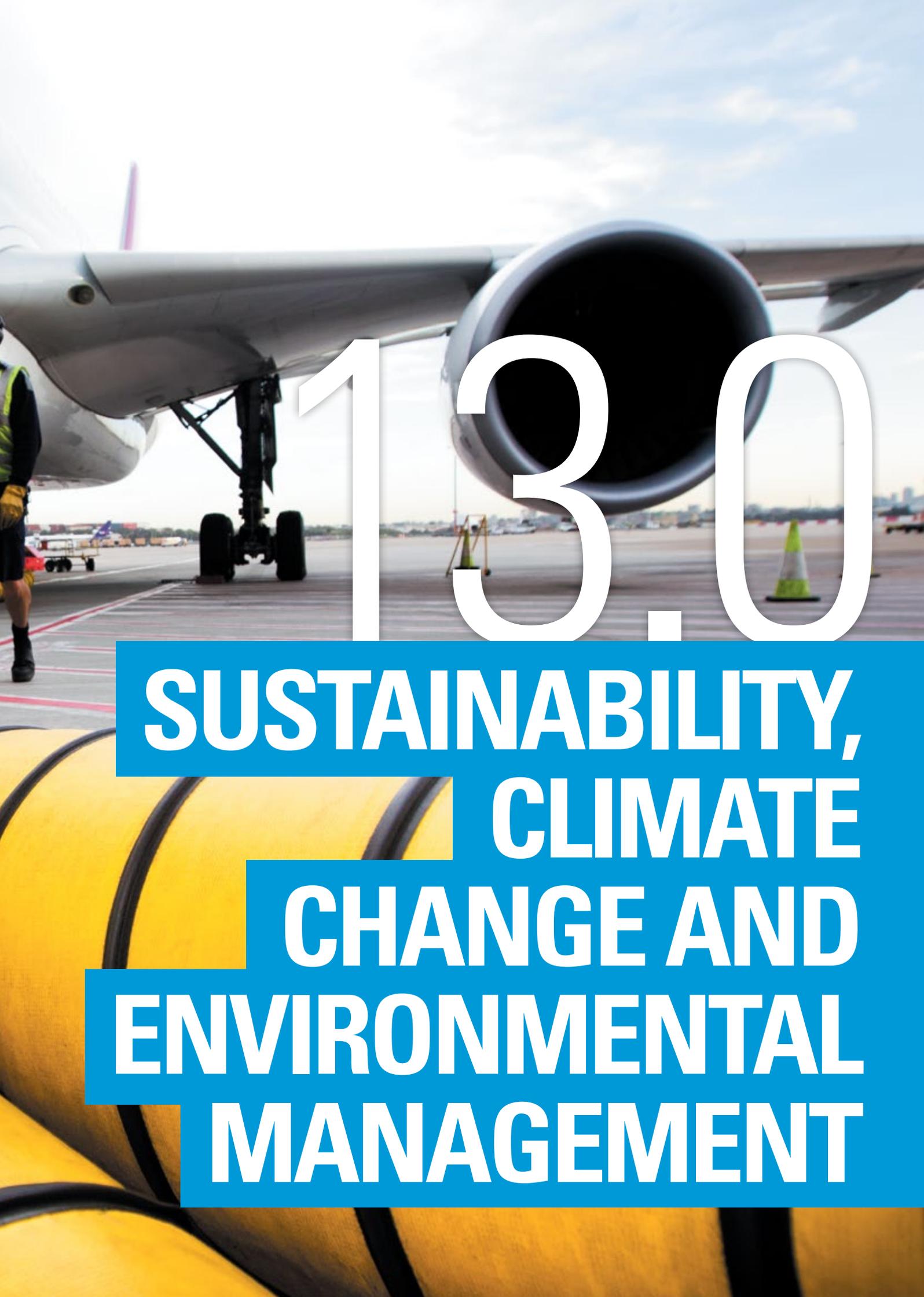


**Sydney
Airport**

The right future.
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Yellow tubes providing pre-conditioned air to parked aircraft reduces the use of auxiliary power units by parked aircraft and therefore ground-based noise and emissions.



13.0

**SUSTAINABILITY,
CLIMATE
CHANGE AND
ENVIRONMENTAL
MANAGEMENT**

13.0 SUSTAINABILITY, CLIMATE CHANGE AND ENVIRONMENTAL MANAGEMENT



Key points

- Sydney Airport and the broader aviation community are working together to reduce environmental impacts:
 - Sydney Airport recognises that its success can be enhanced by conducting business in a way that is environmentally, socially and economically responsible
- This includes meeting voluntary global commitments for reducing carbon emissions and the aviation industry's impact on the environment while continuing to provide the global economy with the benefits of fast, reliable, safe and efficient connectivity:
 - Aviation's contribution to climate change represents only 2% of human induced CO₂ emissions
- Sydney Airport is proactively undertaking initiatives to minimise impacts on the environment (and aims to become a more sustainable business). For example:
 - The new recycled water treatment plant in the Terminal 1 precinct saves an average of 600,000 litres of drinking water every day. The plant has additional capacity and is also planned to be expanded
 - A trigeneration plant supplying cleaner energy is being planned for the airport, with possible reductions of up to 50% of greenhouse gases
 - Investing in fixed electrical ground power, benefiting noise, air quality and reducing carbon emissions
 - Other sustainable energy saving and related initiatives – including the use of solar hot water and LED lighting – are reducing emissions
- A holistic approach will be taken with development envisaged under this Master Plan, integrating innovative sustainable design features that deliver smarter environmental solutions across the airport and enhance passenger experience and comfort
- Sydney Airport is planning to develop an experience centre where members of the community can find out more about the airport – its history, the future, day-to-day operations and environmental initiatives



Sustainability – responsible growth through balancing community and environmental needs with corporate objectives – is a core commitment expressed throughout this Master Plan and the attached Airport Environment Strategy.

All major airports inevitably have some effect on the environment and local communities. Aircraft noise and degraded air quality are a concern for local communities. Airport operations can either directly or indirectly generate carbon emissions and waste, consume water, and can affect local waterways, wildlife and biodiversity values.

Minimising these environmental impacts is essential for Sydney Airport to operate sustainably. Environmental management at the airport focuses on a co-operative, proactive approach with regulatory agencies, airport stakeholders and business partners working together to ensure potential impacts of airport operations are avoided or minimised. Sydney Airport is committed to working with others to ensure that aviation plays its role in protecting the environment.

Aviation’s challenge is to retain the many positive economic and social benefits that aviation provides, including providing the global economy with the benefits of fast, reliable, safe and efficient connectivity while reducing or eliminating its negative environmental impacts through the introduction of technological, operational and efficiency advances.

A number of initiatives have been carried out to minimise the airport’s effect on the environment and to become a more sustainable business. Further detail on these initiatives can be found in Section 13.4 of this chapter. Sydney Airport is also intending to build on these initiatives over the coming master plan period by pursuing cleaner energy supplies such as trigeneration and sustainable water supplies such as recycled water.

In addition, to ensure that the future development of the airport is undertaken in a manner that is sustainable and sympathetic to the environment, a rigorous development assessment process has been established to enable Sydney Airport to comply with its obligations under legislation and also meet corporate objectives, including sustainability commitments. Further detail on how development at the airport, envisaged in this Master Plan, will be undertaken sustainably can be found in this chapter, see Section 13.5 and 13.6.

13.1 Legislative requirements associated with the Master Plan

Airports Act 1996 requirements

The Airports Act 1996 requires a master plan to specify a range of environmental matters including:

- An environment strategy [Section 71(2)(h)]
- Sydney Airport's assessment of environmental issues that might reasonably be expected to be associated with the implementation of the master plan [Section 71(2)(f)]
- Sydney Airport's plans for dealing with these environmental issues, including plans for ameliorating or preventing environmental impacts [Section 71(2)(g)]

The Airport Environment Strategy (AES) is presented in the attachment and describes the strategic direction for the environmental management of the airport over the first five year period of this Master Plan. After this period, the AES will be reviewed and a new AES developed.

The environmental issues expected to be associated with the implementation of the Master Plan and Sydney Airport's plans for dealing with these issues, including plans for ameliorating or preventing environmental impacts, are described in Sections 13.5 and 13.6 of this Master Plan.

13.2 Environmental management framework

Environmental management at the airport is driven by a number of mechanisms including legislation, international and Australian standards, lease agreements, aviation industry standards and Sydney Airport's vision, values and policies.

The legislative framework controlling environmental management at the airport comprises the following commonwealth laws:

- Airports Act 1996 Part 5 and Part 6 (Airports Act)
- Airports (Environment Protection) Regulations 1997
- Airports Regulations 1997
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The Australian Government is the regulatory authority responsible for administering legislation at the airport. An airport environment officer (AEO) has been appointed by Department of Infrastructure and Regional Development (DIRD) to oversee the airport and the implementation of the abovementioned environmental aspects of the legislation. As the airport lessee company, Sydney Airport also has a role in environmental regulation of airport tenants. All tenants whose activities have the potential to impact on the environment are required to develop an environmental management plan and report to Sydney Airport on their actions annually.

Under the terms of Sydney Airport's lease agreement with the Australian Government, and in accordance with Part 5 of the Airports Act 1996, Sydney Airport is required to prepare and implement an AES. The AES and Sydney Airport's environment policy are key documents for ensuring that the forecast growth and development of the airport envisaged in this Master Plan are undertaken in an environmentally responsible manner.

In accordance with the principles of AS/NZS ISO 14001, Sydney Airport has an environmental management system (EMS). The EMS provides the system by which environmental management can be planned, implemented and reviewed in a cycle of continuous improvement. The cornerstone of the EMS is the AES, which provides strategic policies, objectives and targets for environmental management of the airport within the EMS framework. This includes implementing actions outlined in the AES, monitoring progress and reviewing environmental performance.

13.3 Key environmental matters for Sydney Airport

There are a number of key environmental matters or aspects associated with airport operations. These are discussed in detail within the AES and summarised in this section in the following categories:

- Sustainability and corporate responsibility
- Climate change and energy management
- Air quality
- Water management
- Biodiversity and conservation management
- Heritage
- Waste and resource recovery
- Soil and land management

Noise management is discussed in Sections 13.5 and 13.6 and addressed in detail in Chapter 14. Ground transport is addressed in Chapter 7 and Appendix A of this Master Plan.

13.3.1 Sustainability and corporate responsibility

Sydney Airport's commitment to sustainability

Our vision is to deliver a world-class airport experience and foster the growth of the airport for the benefit of Sydney, NSW and Australia. One of Sydney Airport's core values is sustainability – responsible growth through balancing community and environmental needs with corporate objectives.

Furthermore, as stated in the Sydney Airport Environment Policy (2011), Sydney Airport recognises its responsibility in managing Sydney Airport in a sustainable manner and is:

“committed to... sustainability: by adopting measures to conserve natural resources and energy; reducing impacts on the environment; and considering the ecological, social and economic implications of our actions.”

The policy establishes the principles for sustainable use of the airport from which objectives, targets and action programs are developed. The environment policy commits Sydney Airport to adopting best practice measures to enhance environmental performance and ensure continual improvement. A summary of Sydney Airport’s environmental sustainability initiatives are listed in **Table 13.4**.

Corporate responsibility

Sydney Airport believes it is possible for the airport to grow sustainably, enhancing the economic and social benefits while managing and minimising environmental and community impacts.

An important aspect of our vision and values is corporate responsibility. Sydney Airport has a corporate responsibility framework that focuses on three key areas:

- Community and stakeholder consultation – Sydney Airport is committed to effective and genuine consultation with the community, government, aviation industry, tourism, business and other stakeholders about the operation of, proposed development at, and future planning for the airport
- Community support and collaboration – Sydney Airport partners with and supports local community groups, organisations, charities, sporting groups and the arts, and will continue to pursue opportunities to build these relationships
- Business and tourism – Sydney Airport is a key driver for the economy and tourism and recognises its role in supporting major events that drive tourism growth and showcase Sydney as a global city, Australia’s premier destination as well as the great diversity of NSW. Sydney Airport has formed a partnership with Destination NSW and works closely with it to promote key tourism objectives

Sustainable development

Sydney Airport’s sustainable development policy establishes the principles for sustainable development of the airport’s built environment. The principles ensure that all new development proposals in relation to the airport are planned and operated in accordance with current best practice technologies and guidelines for efficient resource use where feasible. This includes using the most appropriate sustainability rating tool for evaluating and guiding the sustainable design and construction of the airport’s built environment.

As part of the terminal redevelopments envisaged under the development plan, Sydney Airport aims to adopt

forward thinking strategies that translate sustainable development principles and commitments to reality. A holistic approach will be taken, integrating green technologies, design and operations with a focus on sustainable energy, water and materials outcomes.

In addition to initiatives that secure a cleaner energy supply such as trigeneration and sustainable water supply such as recycled water, Sydney Airport will pursue innovative opportunities that deliver smarter environmental and efficiency solutions across the airport which enhance passenger experience and comfort.

In the preparation of this plan, Sydney Airport has had regard to the principles of ecologically sustainable development as outlined in the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Sydney Airport experience centre

Sydney Airport is planning to develop an experience centre where members of the community can visit to find out more about the airport and the aviation industry. Visitors will be taken on an engaging journey behind the scenes of one of the world’s busiest airports. The experience centre will invite visitors to explore the history, operational challenges, environmental initiatives and future vision for the airport through a series of engaging and informative installations.

The experience centre is planned to focus on the following key themes:

- Noise – a demonstration of the impact of aircraft noise over Sydney’s suburbs through time, reflecting flight paths, technologies and the decreasing noise footprint
- Heritage and history – a combination of interactive media and historical memorabilia will be used to reflect the story of the airport and communicate its heritage values
- The future – displays and other installations will be used to showcase the vision – the airport of the future
- Behind the scenes – a collection of human stories, imagery and displays will reveal behind the scenes operations of the airport

13.3.2 Climate change and energy management

Climate change is now recognised as real and present, though some uncertainty remains around the extent of change and the magnitude of the expected impacts. In responding to climate change, there are two broad response strategies.

The first response is to reduce greenhouse gas concentrations in the atmosphere in an effort to reduce the rate and overall magnitude of future climate change.

The second response is the adaptation to the impacts

of climate change of all sectors of society and the economy. This helps to build the resilience of, and reduce vulnerability within, local communities and economies and involves a combination of risk management and adjustment activities.

To address these response strategies, Sydney Airport, in association with the broader aviation industry, has been working towards reducing its carbon footprint (see information below), monitoring relevant research and actions by governments, and ensuring any relevant adaptation strategies are, where appropriate, factored into future planning. Sydney Airport is also planning to undertake a climate vulnerability assessment.

Global aviation industry commitment to action on climate change

The Intergovernmental Panel on Climate Change estimated in 2007 that aviation accounts for only around 2% of global carbon dioxide emissions, with most of that relating to in-flight emissions from aircraft. As well as emitting carbon dioxide, aircraft contribute to climate change by the formation of condensation trails and emission of nitrogen oxides that form ozone, a greenhouse gas, when emitted at cruise altitudes. The best estimate of aviation's impact on climate change, given by the International Air Transport Association (IATA), is about 3% of the contribution by human activities. However, with airline travel becoming more popular in Australia and around the world, this contribution could possibly reach 5% by 2050.

Aviation's challenge is to retain the many positive economic and social benefits that aviation provides while reducing or eliminating its negative environmental impacts. Signing of the Global Aviation Industry Commitment to Action on Climate Change by aviation industry leaders – including Sydney Airport – in April 2008 is an important demonstration of aviation's worldwide commitment to introducing technological,

operational and efficiency advances that will reduce aviation's contribution to climate change.

Sydney Airport is committed to working with all relevant organisations across the aviation industry to target carbon-neutral growth by 2020, as a step towards a carbon-free future for aviation. As noted in Section 13.4, Sydney Airport has implemented a range of environmental initiatives aimed at improving the airport's environmental performance and reducing its carbon footprint. Sydney Airport will continue to work with major airlines to implement the following four key strategies outlined in the Global Aviation Industry Commitment:

- Encourage the development and implementation of new technologies, including cleaner fuels
- Further optimise the fuel efficiency of fleets and the way aircraft are flown
- Improve air routes, air traffic management and airport infrastructure
- Implement positive economic measures to achieve greenhouse gas reductions wherever they are cost-effective

Managing climate change is a key challenge, not just for Sydney Airport but for all major airports. Technological innovation will drive environmental improvements at the airport. The same can be said for airlines as the global fleet of commercial aircraft undergoes a significant technological transformation. As a result, jet aircraft are now significantly quieter, cleaner and more fuel efficient than ever before. Being larger, the new generation of aircraft also means that more passengers can be transported per flight with less impact on the environment. In the past 12 years, Sydney Airport has already seen a 46% increase in passengers with very little increase in aircraft movements.

Table 13.1 Scope 1 & 2 emissions by source for Sydney Airport, 2010/11

Source and activity data name	Amount	Unit	Scope	Tonnes CO ₂ -e
Commercial air conditioning – HFC stock	0	Tonnes	1	49
Stationary – diesel oil	57	kL	1	152
Stationary – natural gas	68,905	GJ	1	3,537
Transport - diesel oil	302	kL	1	814
Transport – gasoline (other than for use as fuel in aircraft)	59	kL	1	141
Transport – liquefied petroleum gas	2	kL	1	3
Energy commodities – electricity	100,996,110	kWh	2	90,896
TOTAL				95,593

Source: SCACH NGER Report 2010/11

Sydney Airport recognises and supports the research being undertaken around the world to increase the use of renewable jet fuels in aircraft. This includes aviation biofuels, or aviation fuel derived from biomass (non-food parts of crops, plants, trees, algae, waste and other organic matter). A number of airlines flying to Sydney Airport have participated in biofuel trials.

In Australia, the Sustainable Aviation Fuel Road Map was initiated by the Australasian grouping of the Sustainable Aviation Fuel Users Group (SAFUG), including Air New Zealand, Boeing, Qantas and Virgin Australia, together with the Defence Science and Technology Organisation and CSIRO. SAFUG released the Road Map in May 2011, which identified several key challenges and opportunities for sustainable aviation fuels and recommended a number of actions.

Sydney Airport will monitor the aviation industry's progress on implementing the Road Map.

Energy and carbon strategy 2013+

The airport is a relatively large consumer of energy resources. Most of the energy consumed is electricity used in airport terminals predominantly for heating, cooling and lighting.

Electricity and natural gas consumption make up over 98% of the greenhouse gases accounted for in Sydney Airport's carbon footprint. The Scope 1 and 2 carbon footprint was measured by MJM Environmental in 2010/11 to be 95,593 tonnes (see **Table 13.1**). Sydney Airport reports this data annually to the Australian Government. (Note: this does not include Scope 3 emissions, such as those from aircraft and tenant energy use.)

Sydney Airport has developed an energy and carbon strategy 2013+, which sets out targets for responsible energy use and the reduction of carbon emissions. The strategy includes nine strategic elements that form an energy roadmap. These elements structure and guide the way forward for sustainable energy use.

Energy savings and carbon reduction plan

In 2012, Sydney Airport developed an energy savings and carbon reduction plan, which built on an earlier plan. This plan complements the energy and carbon strategy 2013+ and identifies new energy saving, greenhouse gas emission reduction and energy efficiency opportunities.

As electricity and natural gas consumption are the major sources of carbon emissions, accounting for over 98% of total airport usage, they are a major focus in the energy savings and carbon reduction plan.

Sydney Airport is planning for a trigeneration facility within the airport with initial feasibility assessments being considered. Trigeneration is the simultaneous production of three forms of energy: (low carbon) electricity, heating and cooling. Benefits of trigeneration

include a reduction in greenhouse gas emissions, the potential to save on energy costs, back-up electricity supply and partial independence from the electricity grid.

Sydney Airport will continue to develop and research further sustainable, cost effective energy initiatives, including the use of renewable energy such as solar.

13.3.3 Air quality

Sydney Airport's objective for air quality is to minimise air emissions from ground-based airport operations and activities.

The airport is only one of the contributors to overall emissions in the region. Other contributors in close proximity to the airport include the Port Botany Container Terminal (which generates container ship, rail and heavy truck movements) as well as petrochemical and other heavy industries located in the Randwick – Botany Industrial Complex. Major roads and motorways around the airport are also considered a major contributor to emissions in the region.

The types of activity which result in air pollutant emissions at airports are identified in the National Pollutant Inventory Emission Estimation Techniques for Airports (Department of Environment, Water, Heritage and the Arts, July 2008). These activities – which generate emissions through either fuel combustion or evaporation – include:

- Aircraft main engines
- Aircraft auxiliary power units (APUs)
- Aircraft ground support equipment and other airside vehicles
- Tests on aircraft engines and APUs
- Landside road traffic, including parking facilities
- Heat-generating plant
- Emergency power generators
- Fuel storage and distribution
- Solvent use during aircraft maintenance
- Fire training

Air pollutants assessed are carbon monoxide (CO), oxides of nitrogen (NO_x), volatile organic compounds (VOCs), particulate matter (PM₁₀), and oxides of sulphur (SO_x). A summary of predicted emissions to air from the different types of activity at the airport (for the years 2012, 2018 and 2033) is shown in **Table 13.2**.

The Australian national pollutant inventory (NPI) provides information on air pollutant emissions within the Sydney-Wollongong-Newcastle airshed from industrial and mobile sources for 2010/11. As shown in **Table 13.3**, the emissions from the airport in 2012 were compared with the NPI data for the airshed in 2010/11. The emissions from the airport represent less than 1% of total emissions within the airshed.

Table 13.2 Summary of predicted emissions to air from airport operations (2012, 2018 and 2033)

Category	Emissions (tonnes per year)														
	CO			VOC			NO _x			SO _x			PM ₁₀		
	2012	2018	2033	2012	2018	2033	2012	2018	2033	2012	2018	2033	2012	2018	2033
Aircraft operations	1,969.9	2,383.3	3,444.4	372.5	427.9	657.2	2,395.3	3,001.3	4,547.7	197.9	247.0	367.9	13.9	15.2	20.1
Ground support equipment	1,075.9	435.3	274.5	37.6	17.0	13.0	126.7	57.2	27.7	2.7	2.6	2.9	4.8	3.1	1.8
APUs	42.1	30.2	30.6	4.1	3.1	3.4	54.4	75.8	111.2	7.1	8.6	11.6	7.6	6.5	7.6
Road traffic	188.9	177.1	237.5	17.3	14.1	15.9	24.3	15.2	13.2	0.2	0.2	0.3	0.9	0.8	1.1
Engine tests	75.5	75.5	75.5	17.6	17.6	17.6	292.7	292.7	292.7	16.7	16.7	16.7	1.5	1.5	1.5
Boilers and generators	2.8	2.8	2.8	0.4	0.4	0.4	6.1	6.1	6.1	0.3	0.3	0.3	0.4	0.4	0.4
Fuel storage and distribution	-	-	-	23.3	24.4	25.8	-	-	-	-	-	-	-	-	-
Paint and solvent use	-	-	-	35.6	35.6	35.6	-	-	-	-	-	-	-	-	-
Training fires	30.2	30.2	30.2	0.9	0.9	0.9	0.2	0.2	0.2	0.0	0.0	0.0	6.9	6.9	6.9
Total	3,385.3	3,134.3	4,095.5	509.3	541.0	769.8	2,899.6	3,448.4	4,998.8	225.0	275.5	399.8	35.9	34.3	39.4

Source: PAEHolmes 2012

Table 13.3 Sydney airshed emissions compared with airport emissions

Pollutant	Emissions in Sydney, Wollongong and Newcastle (NPI data for 2010/11 ^(a))	Emissions from the airport in 2012 ^(b)	Emissions from the airport in 2012 ^(b)
	(tonnes/year)	(tonnes/year)	% of NPI for airshed
CO	750,000	3,385	0.45%
NO _x	750,000	2,900	0.39%
SO ₂	1,300,000	225	0.02%
PM ₁₀	640,000	36	0.01%
VOC	95,000	509	0.54%

Sources: (a) NPI: <http://www.npi.gov.au> (accessed September 2012). (b) PAEHolmes 2012

Despite being a relatively minor contributor, Sydney Airport has invested significantly to provide fixed electrical ground power at Terminal 1 (T1) and Terminal 2 (T2) and pre-conditioned air at T1. This allows airlines to minimise the use of an aircraft's auxiliary power unit, which in turn, burns less aviation fuel, minimising impacts on local air quality and reducing carbon and noise emissions.

13.3.4 Water management

Water conservation

With more than 36 million passengers using the airport in 2012, the airport is one of NSW's biggest water users.

Major uses for water include:

- Restroom and toilet facilities within the terminals
- Cooling towers (for air conditioning)
- Construction and maintenance activities
- Vehicle washing facilities

Sustainable water use and security of water supply are a priority for Sydney Airport. Sydney Airport is committed to securing alternative non-potable water supplies across the airport where feasible.

Recycled water system

Sydney Airport has invested in a water recycling system

in the T1 precinct. Wastewater is collected, treated using biological and chemical methods, and then recirculated and reused throughout the precinct for toilet flushing and in cooling towers. In 2012, the plant was saving an average of 600,000 litres of drinking water every day. To accommodate future demand, the plant has additional capacity and Sydney Airport will expand this plant in the near future.

Sydney Airport extracts groundwater for irrigation purposes under a licence issued by the NSW Government. This avoids having to use drinking water for landscaping purposes.

Water savings action plan

In 2012, Sydney Airport developed a water savings action plan to build upon an earlier plan produced to meet legislative requirements. The plan identifies opportunities where drinking water can be used more efficiently and where alternative water sources can replace drinking water.

Examples of water savings measures identified in the plan include:

- a) delivering recycled water to additional cooling towers
- b) delivering recycled water to additional toilets and urinals, and replacing residual single-flush cisterns with dual-flush units
- c) installing additional flow restrictors on taps, and/or installing sensor-operated taps where possible
- d) delivering recycled water to irrigation areas, and managing irrigation more efficiently
- e) encouraging tenants to minimise water consumption
- f) improving leak detection and response
- g) reducing potable water use for runway maintenance activities through use of licenced bore water supplies

Sydney Airport has also developed a Services Master Plan which estimates water demand across the airport and investigates water reduction strategies suitable at the airport. As development of the airport continues, Sydney Airport will implement feasible water reduction strategies.

Surface water quality

The airport is almost entirely surrounded by waterways, with Botany Bay to the south, Botany Wetlands (incorporating Mill and Engine Ponds) to the east, Alexandra Canal to the north and Cooks River to the west.

Various activities on the airport have the potential to impact on the water quality of surrounding waterways including:

- Spills from aircraft servicing and maintenance

- Construction and maintenance activities
- Bulk liquids and hazardous materials storage
- Fire training exercises

To minimise the impact of airport operations on surface water quality in adjacent waterways, Sydney Airport conducts stormwater quality monitoring, works closely with airport tenants, operators and contractors to manage activities that have the potential to impact on water quality, and continues to identify opportunities to improve water quality.

In addition, Sydney Airport has a number of mechanisms in place for managing water quality including gross pollutant traps, a dedicated spill response vehicle and provision of spill control kits on all aircraft parking aprons, pollution control flame traps on all aprons where aircraft refuelling or maintenance takes place, and emergency stop gates on stormwater discharge points. Details of incident response practices can be found in Section 4.12 of the AES.

13.3.5 Biodiversity and conservation management

The natural environment and biodiversity of the airport and surroundings have undergone a dramatic change due to historical development of the area.

The main area of natural biodiversity value remaining is the Sydney Airport Wetlands – which are part of the Botany Wetlands – comprising Engine Pond East, Engine Pond West, the Mill Pond and Mill Stream. This important environmental and historical resource is listed in the Directory of Important Wetlands in Australia and is considered an environmentally significant area under the Airports Act 1996.

Wetlands management plan and enhancement program

Sydney Airport has developed a management plan for the Sydney Airport Wetlands. The plan guides how Sydney Airport manages the wetlands to preserve and where possible enhance this area of the airport.

The on-going implementation of Sydney Airport's wetland enhancement program aims to increase the numbers of native fish species and, more generally, improve the quality and ecological function of the wetlands themselves. Initiatives under the program include native fish stocking, pest management, weed management, revegetation works and gross pollutant control.

13.3.6 Heritage

The airport is one of the oldest continually operating airports in the world. Prior to being an airport, the land on which the airport is situated also played host to a number of other significant pieces of industrial and water supply infrastructure.

Sydney Airport acknowledges that there is heritage value associated with the airport and the airport site. The heritage values are associated with the airport as a whole and are embodied in the location, form and function of its individual elements, including the arrangement of streets, buildings, runways and the ways in which these attributes reflect its history of change and growth.

Sydney Airport has developed a heritage management plan to provide guidance with respect to future conservation policies and management strategies to maintain and protect the heritage values, where practicable. This is balanced with the need for the airport to continue to develop to meet the growing needs of airlines and passengers. Where potential impacts to heritage are identified, Sydney Airport undertakes heritage impact assessments and also implements strategies to mitigate impacts, where possible. Details of Sydney Airport's heritage management assessment procedure can be found in Section 4.9 of the AES.

13.3.7 Waste and resource recovery

Operations at the airport generate a range of solid and liquid wastes from various sources. Sydney Airport aims to manage the impacts of this waste through recycling and recovery of beneficial materials, and disposing of waste to landfill as a last resort.

Sydney Airport has continued to reduce the amount of waste sent to landfill through the use of new technologies and by implementing recycling and recovery initiatives. Through its waste and resource recovery strategy, Sydney Airport will continue to pursue opportunities in the future to minimise work and improve resource recovery initiatives.

13.3.8 Soil and land management

Most of the airport's land has been extensively modified, including by landfilling and terrain flattening. Due to this and the long history of aviation and related uses at the airport (including fuel storage and distribution), the airport site contains a number of areas subject to soil and groundwater contamination. To assist in the ongoing management of these sites, Sydney Airport has developed a contaminated sites strategy.

Contaminated sites strategy

The contaminated sites strategy involves a comprehensive risk classification system, contaminated sites register, groundwater monitoring program, pollution prevention programs and measures, and the identification of remediation opportunities.

Sydney Airport will continue to monitor and manage known contaminated sites in consultation with the AEO and DIRD.

Sydney Airport has been actively remediating the former

joint oil storage facility site by extracting hydrocarbons through a purpose-built remediation system. This site has experienced soil contamination resulting from on-site fuel storage from the mid-1950s.

The continuing risk to soil and groundwater – the majority being from spills, fuel storage tanks and fuel pipelines – are managed through our airport tenant management strategy, workplace inspections, standard operating procedures and independent monitoring and testing.

13.4 Environmental achievements and initiatives

Since the Master Plan 2009 was approved by the Australian Government, and in accordance with the Sydney Airport Environment Strategy 2010 - 2015, there have been many environmental achievements and initiatives implemented. **Table 13.4** provides a summary of these achievements and initiatives.

13.5 Environmental issues associated with the Master Plan

To ensure that the future development of the airport is undertaken in a manner that is sustainable and sympathetic to the environment, a rigorous development assessment process has been established to enable Sydney Airport to comply with its obligations under the Airports (Building Control) Regulations 1996.

All development proposals are subject to a planning and environmental impact assessment carried out or overseen by Sydney Airport. This process ensures that the Environment Strategy, the Master Plan, the Airports Act 1996 and the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) are considered prior to granting a development approval.

If the assessment reveals that the proposed development is likely to have a significant environmental or ecological impact or affects an area identified as environmentally significant in the Environment Strategy, a major development plan (MDP) must be prepared. An exposure draft of the MDP is prepared and referred to DIRD and, in turn, to the Commonwealth Department of the Environment for appraisal under the EPBC Act. The Minister for Infrastructure and Regional Development can either approve or refuse a development proposed in an MDP or impose conditions on it to ensure any environmental impacts are avoided or minimised.

Potential environmental issues associated with implementation of the development plan shown in this Master Plan relate to the following environmental matters:

- Resource use
- Air quality
- Stormwater and groundwater
- Ecology and biodiversity

Table 13.4 Summary of environmental achievements and initiatives

Environmental aspect	Initiative/achievement
Sustainability and environmental management	Developed a new Airport Environment Strategy and obtained approval for the strategy from the minister in May 2010.
	Provided support and funding on an annual basis to local schools, charities, sporting groups and the arts.
	Formed a partnership with Destination NSW to promote key tourism objectives.
	In 2011, Sydney Airport's new CEO endorsed the Sydney Airport Environment Policy.
	Launched a new tenant management strategy including an annual tenant environment forum, development of environmental guidance material for tenants and implementation of an environmental auditing program.
Water savings and efficiency	In November 2009 the water treatment plant became operational and by 2012 was saving an average of 600,000 litres of drinking water every day.
	Sydney Airport developed a new water savings action plan in 2012, building on its previous action plan approved by the NSW Government, identifying further water saving and efficiency opportunities.
	Water saving devices installed as part of new developments and/or upgrades where feasible.
Energy savings and efficiency	Sydney Airport developed a strategic roadmap for sustainable energy use – Energy and Carbon Strategy 2013+.
	A new energy savings and carbon reduction plan was developed in 2012, building on the previous action plan approved by the NSW Government, identifying further energy saving and efficiency opportunities.
	Implemented energy saving projects, including LED lighting retrofits and installation of solar hot water at T1.
Ground-based noise management	Completed installation of fixed electrical ground power at all T1 and T2 gates/aerobridges, reducing air and noise emission from aircraft auxiliary power units.
	Completed a review and update of the engine operating procedures (including the ground run rules) in 2012.
Environmentally sustainable design	New head office for Sydney Airport constructed – the Central Terrace Building – which achieved a 5 star Green Star (Office Design v2) rating for the base building and incorporated environmentally sustainable elements in the fit-out.
Ground transport	Established a joint working group with Transport for NSW and NSW Roads and Maritime Services to develop ground transport solutions for the airport, including road upgrades and improved public transport services.
	Advocated to the NSW Government that the station access fee for users of the two on-airport train stations be reformed to encourage increased travel by rail to and from the airport.
	Advocated to the NSW Government that additional bus services be provided to and from the airport.
	Installed new facilities including bike racks, lockers and showers to support Sydney Airport staff cycling to and from work.
Biodiversity	Continued implementation of the Wetland Enhancement Program, including native fish release, aquatic and terrestrial maintenance activities and pest management.
	Completed a comprehensive ecological assessment of the entire airport site.
	Undertook annual surveys for the threatened green and golden bell frog.
Air quality	All emissions associated with Sydney Airport's vehicle fleet were offset each year through Greenfleet.
	Hybrid vehicles continued to be included in Sydney Airport's vehicle fleet.
Heritage	Developed a comprehensive heritage management plan for the airport.
	With aviation partners, celebrated the 100th anniversary of the first flight from the site that would become Sydney Airport.
Waste and resource recovery	Public place recycling program rolled out throughout T2 and foodcourt (landside) of T1.
	Entered into new waste services contract that targets an additional 30% recovery of beneficial materials through increased recycling and composting.
	Developed a waste and resource recovery strategy in 2012.
Soil and land management	A remediation system was installed to extract hydrocarbons from a site contaminated through historical land uses.

- Heritage
- Soil quality and contaminated land
- Waste and resource recovery
- Ground-based noise

Road traffic generation and Sydney Airport's plans to deal with this issue are addressed in Chapter 7 of this Master Plan.

The following section describes the environmental issues that might reasonably be expected to be associated with the implementation of the development plan shown in this Master Plan. It is noted that some of these developments are consistent with the development plan shown in the current Master Plan 2009.

South East Sector

In the South East Sector, Sydney Airport proposes to develop additional aircraft parking positions, maintenance and engineering facilities, Airservices facilities, vehicle parking facilities, and commercial developments.

Sydney Airport is also intending to extend Taxiway B, which would require land reclamation and the construction of a new sea wall in Botany Bay, in between the parallel runways. Sydney Airport proposes to develop a high intensity approach lighting system (HIAL) at the end of runway 34L to enable aircraft to land more safely in adverse weather conditions such as fog and heavy rain.

The environmental issues that might reasonably be expected to be associated with these developments are:

- Impacts to air, soil and water quality
- Increased ground-based noise generation particularly associated with aircraft, ground support equipment (GSE), vehicles and construction
- Increased resource use
- Ecological impacts, including impacts on the marine environment in Botany Bay (for example, sea grasses)
- Increased generation of waste
- Impacts on airport elements with heritage value
- Impacts on the Sydney Airport Wetlands

South West Sector

Sydney Airport intends to develop additional aircraft parking positions (work commenced in 2012) and commercial developments in the South West Sector.

The environmental issues that might reasonably be expected to be associated with these developments are:

- Increased ground-based noise generation particularly associated with aircraft, GSE and construction
- Impacts on air quality mainly from aircraft and GSE emissions
- Increased resource use

- Impacts on airport elements with heritage value
- Impacts on water quality
- Increased generation of waste

North West Sector

In the North West Sector, development envisaged by Sydney Airport includes expansion of the T1 terminal, upgrade to existing gates and aprons, new gates and aprons, road and ramp widening to airport exits and entries, installation of additional fuel storage within the JUHI facility, expansion of the recycled water treatment facility, installation of a trigeneration facility, vehicle parking facilities and commercial developments.

The environmental issues that might reasonably be expected to be associated with these developments are:

- Increased ground-based noise generation particularly associated with aircraft, GSE and construction
- Impacts on air quality mainly from aircraft and GSE emissions
- Increased resource use
- Impacts on water quality
- Increased generation of waste
- Impacts on soil quality
- Disturbance of a known contaminated site

Northern lands

Development envisaged in the northern lands precinct includes commercial developments, vehicle storage facilities, freight/logistics facilities and bridges to connect parcels of land within the precinct and to the airside of the airport.

The environmental issues that might reasonably be expected to be associated with these developments are:

- Disturbance of a known contaminated site
- Increased ground-based noise generation
- Increased resource use
- Impacts to air and water quality mainly associated with construction
- Increased generation of waste
- Impacts on airport elements with heritage value

North East Sector

In the North East Sector, Sydney Airport intends to develop a new international terminal, extend and reconfigure the existing T2 and T3 terminals, upgrade and reconfigure existing aprons and gates, reconfigure maintenance and engineering facilities, develop new taxiways, aprons and gates, realign taxiways, install a water treatment facility, develop a public transport interchange and pedestrian linkages, reconfigure the road network including road widening, develop vehicle parking facilities and commercial facilities.

The environmental issues that might reasonably be expected to be associated with these developments are:

- Impacts on airport elements with heritage value, including complete removal of a number of elements
- Disturbance of known contaminated sites
- Increased ground-based noise generation particularly associated with aircraft, GSE and construction
- Impacts to air quality mainly from aircraft and GSE emissions
- Increased resource use
- Impacts on water quality
- Increased generation of waste

13.6 Management of environmental issues associated with implementing the Master Plan

The Master Plan must include Sydney Airport's plans for dealing with the environmental issues mentioned in Section 13.5, including plans for ameliorating or preventing environmental impacts.

For each development undertaken to ultimately implement the development plan, Sydney Airport will undertake appropriate environmental assessments to ameliorate or prevent the potential environmental impacts associated with development of the airport. The assessments will ensure that the existing environment is assessed and documented, potential impacts are assessed and appropriate measures are put in place so that impacts can be prevented, minimised and/or ameliorated. Sydney Airport will ensure that all environmental regulatory requirements are met in respect of each development.

The following section provides an overview of Sydney Airport's plans for dealing with potential environmental issues associated with implementing the Master Plan. Implementation of the specific actions included in the Airport Environment Strategy will also contribute to management of these potential environmental issues, especially within the first five years of the Master Plan planning period.

Resource use

Construction and operation of the developments proposed within this Master Plan will require resources including energy (electricity, gas, fuel) and water. Natural resources will also be required for construction materials. The consumption of resources can lead to both local and off-site impacts such as the emission of greenhouse gases and depletion of finite resources.

To limit the impacts associated with resource use, the following strategies will be implemented:

- A trigeneration plant supplying cleaner energy is being considered for the T1 precinct
- Energy saving and efficiency initiatives will be implemented in accordance with the energy saving and carbon reduction plan
- The recycled water treatment plant currently servicing the T1 precinct is planned to be expanded to accommodate future demand, replacing the need for drinking water to be used for toilet flushing and cooling towers
- Water saving and efficiency initiatives will be implemented in accordance with the water savings action plan.
- Implementation of the sustainable development policy
- Selection of building materials will consider products with recycled content and lower embodied energy

Air quality

Impacts on local air quality may occur as a result of the proposed new developments, particularly the developments that facilitate new and additional aircraft operating areas such as hangars, gates and aprons. The impacts are associated with emissions from aircraft auxiliary power units, ground support equipment, vehicles and industrial point source emissions.

To manage and reduce potential impacts on local air quality, the following strategies will be implemented:

- Where potential air quality impacts are identified, assessments will be conducted to inform appropriate management and mitigation for both the construction and operational phase of developments
- Fixed electrical ground power will be installed to new gates to reduce the use of aircraft auxiliary power units which generate emissions
- Continue to work with and encourage airlines to increase the use of fixed electrical ground power and decrease the use of auxiliary power units
- Investigate and adopt practicable air pollutant reduction measures such as the inclusion of hybrid vehicles in the Sydney Airport vehicle fleet
- Work with and lobby the NSW Government and its transport agencies to provide additional public transport services to and from the airport

Stormwater and groundwater

Impacts on stormwater and groundwater may occur as a result of the proposed new developments proposed in the Master Plan, including additional hardstand areas for aircraft infrastructure, expansion of fuel infrastructure within the JUHI facility and construction activities. Water quality of surrounding waterways may also be impacted

by proposals such as land reclamation. The main impacts are associated with changes to drainage patterns, additional aircraft operating areas and fuel infrastructure where most spills and accidental fuel and chemical releases occur, sedimentation and nutrient loading.

To manage and reduce potential impacts on stormwater, groundwater and the water quality of surrounding waterways, the following strategies will be implemented:

- Stormwater and groundwater will continue to be monitored to assist in the planning for new developments
- Where potential impacts on stormwater, groundwater and/or water quality of surrounding waterways are identified, assessments will be conducted to inform appropriate management and mitigation for both the construction and operational phase of developments
- Design features will be incorporated to reduce contaminant loads in stormwater such as gross pollutant traps and interceptors
- Implementation of a stormwater quality management plan
- Implementation of a management plan for the Sydney Airport Wetlands
- Appropriate flood and water inundation mitigation will be incorporated into the design phase of new developments where required

Ecology and biodiversity

Master Plan proposals, particularly within the South East Sector, present the potential for impacts to occur to the ecology and biodiversity of the area including the marine environment of Botany Bay. The main impacts are associated with land reclamation, the placement of structures in Botany Bay to support the proposed HIALs, and the proximity of development to the Sydney Airport Wetlands.

Sydney Airport intends to manage and reduce potential impacts to the ecology and biodiversity of the airport and its surrounds by implementing the following:

- Ecological impact assessments will be undertaken for all major developments, in particular where potential impacts may occur to the Sydney Airport Wetlands, Botany Bay, listed flora and fauna species, and communities
- Marine surveys (including sea grass) will be carried out to establish baseline conditions prior to Taxiway B extension
- Identification and implementation of appropriate management measures and mitigation for both the construction and operational phase of developments to limit the ecological and biodiversity impacts
- Development of a management plan for the fig trees located in the South East Sector

- Development of a management plan for the Sydney Airport Wetlands

Heritage

Master Plan proposals, particularly within the North East Sector, will have substantial adverse impacts on airport elements with heritage value. Staged removal of the Qantas Jet Base, the Wimbles ink factory and other structures such as Hangar 3 and Hangar 13 are required to facilitate growth of the airport to meet the needs of passengers and airlines.

Potential heritage impacts have been identified through the development of a heritage impact assessment (HIA). The HIA also identifies mitigation strategies that will reduce the impacts to heritage values.

The following strategies will be implemented to manage and reduce the potential impacts to heritage values associated with the airport:

- Sydney Airport plans to develop an experience centre that will include a section dedicated to the history and heritage of the airport. Among other features, visitors will be given the opportunity to explore the history and evolution of the airport and aviation through a combination of interactive media and historical memorabilia. See Section 13.3.1 for further detail
- Preparation and implementation of a heritage interpretation strategy
- Where possible, conservation of remaining elements of heritage value, in particular those elements considered to have exceptional value including the Sydney Airport Wetlands, the main north-south and east-west runways, and Keith Smith Avenue
- Full archival recording of elements with heritage value that will be removed. The archival recordings will include oral histories, video, photographic recording and measured drawings
- Development of a management plan for the fig trees located in the South East Sector
- Development of a management plan for the Sydney Airport Wetlands
- Liaison with relevant stakeholders, regulatory agencies and subject matter specialists as required
- Impacts to heritage will be considered and assessed for all major developments and also addressed within construction environmental management plans

Soil quality and contaminated land

New developments at the airport have the potential to impact on soil conditions through vegetation clearing, excavation, installation of fuel infrastructure, erosion and sedimentation, and disturbance of potential or actual acid sulfate soils and contaminated land.

To manage the potential impacts to soil quality and the impacts associated with developing contaminated land, the following strategies will be implemented:

- An assessment of soil quality impacts will be conducted to inform appropriate management and mitigation for both the construction and operational phase of developments, including for the new fuel infrastructure within the JUHI facility
- Infrastructure will be designed to minimise potential impacts on soil where possible
- Opportunities will be pursued to remediate known contaminated sites. Sydney Airport plans to expand the existing JOSF remediation system and install a hydrocarbon extraction system within the T2 taxi holding area
- Work with and lobby the NSW Government and its transport agencies to provide additional public transport services to and from the airport

Waste and resource recovery

Increasing volumes of waste are associated with increasing passenger and aircraft numbers, retail developments and commercial developments such as office buildings and hotels. Over the Master Plan planning period, a substantial amount of construction and demolition waste will also be generated.

Sydney Airport intends to manage the impacts associated with the increased generation of waste by:

- Implementing the waste and resource recovery strategy, developed in 2012 to inform this Master Plan and the Airport Environment Strategy
- Ensuring public place recycling systems are included in terminal expansions (where quarantine restrictions do not apply)
- Ensuring the expansion of docks, waste collection areas and locations, to accommodate demand, are considered at the planning and design phase
- Identifying opportunities for resource recovery and sustainable procurement on a continual basis

- Encouraging tenants and airlines to reduce waste generated, recover beneficial materials and manage waste sustainably

Ground-based noise

New developments have the potential to increase the level of ground-based noise at the airport, particularly developments that facilitate new aircraft operating areas such as hangars, gates and aprons. Ground transport and construction noise may also result in impacts beyond the boundary of the airport.

To limit noise impacts the following strategies will be implemented:

- Sydney Airport has planned for an engine run facility adjacent to new or reconfigured maintenance and engineering facilities. The facility will have acoustic properties that reduce the noise associated with aircraft engine runs, which are considered an essential component of aircraft maintenance and safety
- Where potential noise impacts are identified, noise modelling will be conducted to inform appropriate management and mitigation and to enable noise criteria to be met both for the construction and operational phase of developments
- Noise reduction strategies will be considered at the building/development design phase
- Fixed electrical ground power will be installed to new gates to reduce the use of aircraft auxiliary power units which generate noise
- Sydney Airport will continue to work with and encourage airlines to increase the use of fixed electrical ground power and decrease the use of auxiliary power units
- Implementation of the engine operating procedures and ground running rules to ensure engine runs are carried out at acceptable times and in appropriate locations

