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Our reference: EF15/15611:DOC16/394851-03:PW
Contact: Paul Wearne (02) 4224 4100

Director Land Release
NSW Department of Planning and Environment
(Attention: Bruce Coleman)
GPO Box 39
SYDNEY NSW 2001



Dear Sir

GREATER MACARTHUR PRIORITY GROWTH AREA

I am writing to provide comment on the proposal to establish the Greater Macarthur Priority Growth Area and associated information received by the Environment Protection Authority (EPA) on 5 August 2016.

Based on a review of information to date on the proposal, please find attached comments (**Attachment A**) for the Department of Planning and Environment's (DPE) consideration. These comments include recommended environmental outcomes and approaches in relation to the following:

- Air Quality
- Water Quality
- Noise
- Contaminated Land Management
- Waste Management
- Coal Seam Gas Infrastructure.

We have also provided additional supporting information (**Attachment B**) that guide the outcomes in Attachment A.

The EPA recommends the attached outcomes be included in the planning framework to help ensure future sustainable growth is delivered (if the Strategy is approved). This includes provision setting in the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* and/or any associated supporting instruments.

The EPA is able to meet with DPE at a mutually convenient time to discuss any of the above issues. If you have any questions regarding this matter, please contact Mr Paul Wearne on (02) 4224 4100.

Yours sincerely

G Howard 26/9/16

GISELLE HOWARD
Regional Director Metropolitan Branch
Environment Protection Authority

Attachment



1. AIR QUALITY

1.1 Environmental Outcomes

The Greater Macarthur Priority Growth Area should deliver the following environmental outcomes:

- *Minimise impacts on air quality, to maintain or improve air quality in line with national air quality goals, and minimise exposure of populations to air pollution emissions*
- *Ensure new potential sources of air emissions use best practice controls*
- *Avoid land use conflict.*

1.2 Recommended Approaches

Priority Growth Area Air Technical Working Group

The *Priority Growth Area Air Technical Working Group* which includes DPE, EPA, Office of Environment and Heritage (OEH) and Transport NSW representation is currently developing key air principles and information to inform the Macarthur Growth Area. The EPA in collaboration with DPE and other relevant agencies, will finalise the air principles including any associated supporting guidance for reducing emissions and exposure to incorporate into any relevant instruments and/or Macarthur Land Use and Infrastructure Plans.

Land Use Conflict and Interface Issues with Key Urban Service Lands

Transitioning of land to provide residential growth needs to consider the future operation of any existing key urban service lands. For example the Macarthur to Glenfield extension of the Growth Area includes the commercial/industrial lands of Minto and Ingelburn. Based on current land use approaches and existing activities operating in these lands there is a high potential for land use conflict if housing growth is proposed in the vicinity of these lands.

The future planning for this area needs to carefully plan the future need and operation of these key urban service lands in conjunction with any surrounding residential housing growth. Environmental issues such as the management of noise and air quality (e.g. odour) need complementary land use approaches to manage any potential risks. For example one approach could be a design lead outcome where higher intensive urban services are located within the core of these commercial/industrial lands where they are framed with more compatible land uses. In some instances, co-locating noise generating and noise sensitive development is desirable for reasons such as access to transport corridors and employment. Good planning and design at the outset can ensure coexistence.

Growth is also proposed in areas where there is existing agricultural activities such as poultry operations (eg Appin Broiler Complex) and market gardens. The operation of these agricultural activities also have a range of environmental issues relating to odour, noise and pesticide management.

Action 4.1.2 in a *Plan for Growing Sydney* requires the preparation of a strategic framework for the metropolitan rural area to enhance and protect its broad range of environmental, economic and social assets. Complimenting this framework will be important in understanding where and how agriculture will be managed into the future in the Macarthur area. This will also assist in guiding approaches needed to manage any interface issues with future sensitive land uses. For example, this may require restricting intensive agricultural activities in areas and/or placing specific environmental requirements on future agricultural activities. Other approaches that should be explored by DPE include but limited to:

- Recognising and applying guidelines including the Department of Primary Industry (DPI) guideline *Land Use Conflict Risk Assessment Guide* (Oct 2011). This guideline details a risk based framework that can be used to inform strategic planning decisions.
- The development of a negotiated transitional approach with all existing agricultural operators, land owners and developers. This approach should outline a transitional timeframe and detail actions, including the implementation of mitigation options at the farms or other odour producing facilities and/or a staged release as areas transition over time. Such a process would provide a proactive approach to

mitigate land use conflict. Further information on these approaches is available in the EPA *Technical Framework - Assessment and management of odour from stationary sources in NSW* (Nov 2006).

The Sydney Agriculture Strategic Approaches Working Group has convened a technical working group with key agencies including DPI, DPE, EPA and Councils to explore approaches to manage land use conflict to guide land use change as part of growth. DPE may wish to seek further information from this group on the progress of this work.

Noise and air quality impacts can lead to human health and amenity issue. In some instances these land use incompatibilities can cause community outrage resulting in community conflict with industry, the community and government.

The potential to address noise and air quality issues retrospectively following development can be challenging and expensive. These issues over time can become intractable resulting in industry closure or affect the liveability and well-being of areas. In some situations these centres of urban services are critical for Sydney for future employment and long term economic prosperity.

2. WATER QUALITY

2.1 Environmental Outcome

The Greater Macarthur Priority Growth Area should deliver the following environmental outcomes:

- *Promote development that maintains or restores the community's environmental values and uses of waterways (including human and aquatic ecosystem health) through the achievement of relevant NSW Water Quality and Flow Objectives.*
- *Promotes integrated water cycle management that includes sustainable water supply, wastewater and stormwater management and reuse initiatives where it is safe and practicable to do so and provides the best environmental outcome.*

2.1 Recommended Approaches

Delivering a Water Sensitive Greater Macarthur

An integrated approach to strategic planning that manages the nexus between urban development, waterway health, and the community's expectations for Sydney's waterways is essential for Greater Macarthur. An integrated approach will deliver on the green grid approach identified in a *Plan for Growing Sydney*. It will also help support a healthy water environment and with it achievement of the community's expectations for waterways. This will provide a more liveable, sustainable and prosperous city as Sydney transforms to a Water Sensitive Greater City.

In particular, the Greater Macarthur Priority Growth Area should be delivering the key principles in a *Water Sensitive Greater Sydney (Sydney Water 2016)*. These guideline principles are also informing the development of District Plans across Sydney.

Water quality and flow is closely linked to the surrounding environment and land use. The EPA considers it appropriate that planning authorities adopt a risk-based approach to considering the link between urban development, waterway health and the community's uses and values of waterways. This approach can then consider land use scenarios and treatment measures required to achieve desired outcomes. By considering waterway health in combination with strategic planning decisions, planning authorities can better manage the impacts of development while supporting locally relevant management objectives.

The *EPA/OEH risk-based decision framework for considering waterway health outcomes in strategic planning decisions* (EPA 2016) has been developed to provide an integrated approach for considering waterway health outcomes in strategic planning decisions. The framework combines existing NSW government policy and processes with contemporary catchment and ecosystem response modelling in a structured, risk-based decision making framework that delivers Ecological Sustainable Development (ESD) and provides planning authorities with the ability to:

- gauge the potential impact on waterways of land use scenarios
 - derive sustainable pollutant load and flow targets to meet waterway health outcomes that reflect the community's uses and values of waterways
 - identify the most cost-effective and appropriate methods to achieve the desired waterway outcomes
- consider infrastructure opportunities that suit local landscapes and aesthetic objectives

The application of this framework has been recognised as a key initiative in delivering a *Water Sensitive Greater Sydney* (Sydney Water 2016).

The EPA recommends that the above framework should be adopted for Greater Macarthur to support consideration of water quality outcomes.

Integrated Water Cycle Management

The EPA considers contemporary approaches such as Integrated Water Cycle Management, which includes water sensitive urban design (WSUD), should be encouraged as they can provide a least cost approach to:

- meeting waterway health and urban amenity needs of the community
- the safe conveyance of local flood waters
- increased opportunities to reduce potable demand through the use of innovative lot and/or precinct scale alternative sources, including sewage effluent recycling and stormwater harvesting and use.

While the EPA supports an integrated approach to water management including the proposed use of water conservation and WSUD techniques, these measures are reliant on effective maintenance and monitoring into the future. The EPA recommends that DPE explore opportunities through Special Infrastructure Contribution (SIC) to secure any management arrangements, financial contributions and accountable parties. This will ensure that the integrated system will have an effective governance structure in place maintained in perpetuity and will continue to meet the expected environmental performance outcomes into the future.

Sewage Management

There has been significant investment to consolidate sewerage infrastructure to reduce the environmental impact of local sewage outfalls, improve the quality of local waterways and provide recycled water to industrial, residential, commercial and municipal users in the region. Growth across Western Sydney will utilise either existing sewerage system capacity or require new treatment capacity. There are a range of approaches for the provision of new sewerage infrastructure, including private sector involvement.

Since the introduction of the *Water Industry Competition Act (WICA) 2006* and its associated regulations, there has been an increase in privately owned and operated sewerage management schemes being developed and constructed for new urban release areas. The EPA considers that this trend may increase in the future. This was highlighted with the Wilton Junction Precinct proposal which involved the development of an initial privately owned scheme. This scheme was supported by the EPA as it provided an integrated water management approach that contributed to the achievement of key water quality objectives (WQOs) for the Hawkesbury/Nepean River.

Infrastructure planning for the area should include clear direction for the provision of sewerage services. It should also consider whether proposed growth will result in increased loads of pollution on the receiving environment as a result of additional sewage capacity. It should also identify what practical and cost effective measures can be taken to maintain or restore the community's uses and values of waterways and protect public health. This would include consideration of impacts from sewage overflows from the existing sewage reticulation system (e.g. sewer pipes and pumping stations) and discharges from any existing sewage treatment plant. The EPA's policy is that for new systems there should only be discharge of treated effluent to waters as a last resort, there should be no pollution of waters as a result of overflows during dry weather and that overflows during wet weather should be avoided. Sewage overflows have been identified as one of the major contributors to diffuse source water pollution in urban environments.

The Growth Centres SEPP also encourages water recycling and water reuse initiatives. EPA supports such initiatives in particular, proposed integrated approaches to managing sewage effluent and stormwater. These approaches present a significant opportunity to meet the community's environmental objectives for the lowest cost and provide a source of water to improve the liveability of the development to support a Water Sensitive Greater Sydney.

The EPA is currently examining a potential framework for the regulation of nutrient discharges in the Hawkesbury Nepean River system. The intent of this framework is to ensure that population growth in the catchment does not cause further deterioration in the condition of the river and its ability to meet the community's desired uses. Several options are being considered including a catchment based nutrient load limit. In the interim, the EPA recommends that infrastructure planning for the new area should deliver an outcome that ensures any new sewage treatment scheme will achieve no net increase in nutrient load to the river. Offsets and other measures such as integrated approaches to water management can be used to achieve this outcome. In addition, any proposed discharge would need to be assessed in accordance with the ANZECC (2000) *Guidelines for Fresh and Marine Water Quality*.

3. NOISE

3.1 Environmental Outcome

The Greater Macarthur Priority Growth Area should deliver the following environmental outcome:

- *Promotes development and provides strategies at a local level that ensures that noise emissions do not cause adverse impacts upon the community's amenity or health and prevents land use conflict.*

3.2 Recommended Approaches

EPA considers that implementing noise control at a strategic planning level provides the most effective means of minimising noise impacts on communities. This is best achieved by applying the following hierarchical approach to noise control:

- Spatial separation of incompatible land use through appropriate zoning and placement of activities to minimise noise-related land use conflicts.
- Minimising noise emissions at source through best practice selection, design, siting, construction and operation as appropriate.
- Reducing noise impacts at receivers through best practice design, siting and construction.

4. CONTAMINATED LAND MANAGEMENT

4.1 Environmental Outcome

The Greater Macarthur Priority Growth Area should deliver the following environmental outcome:

- *To ensure land contamination is assessed and managed so that land is suitable for its proposed use and that the contamination does not present an unacceptable risk to human health or any other aspect of the environment.*

4.2 Recommended Approaches

The investigation of land contamination is an important consideration that should be delivered through the land use change process at a local level. A range of activities can result in land contamination and cause significant environmental and health risks if the land is not appropriately investigated, remediated and validated for its proposed land use. There has been no assessment of contaminated land undertaken to inform the strategy. *State Environmental Planning Policy 55 – Remediation of Land* states that it is important that the likelihood of land contamination is assessed as early as possible in the planning and development control process.

In cases where land is potentially contaminated, the investigation and any remediation and validation work is to be carried out in accordance with the guidelines made or approved by EPA under Section 105 of the *Contaminated Land Management Act 1997*. It should also be in accordance with the requirements and procedures in the following:

- *Contaminated Land Management Act 1997*
- *Contaminated Land Management Regulation 2013*

- *State Environmental Planning Policy 55 – Remediation of Land.*

5. WASTE MANAGEMENT

5.1 Environmental Outcome

The Greater Macarthur Priority Growth Area should deliver the following environmental outcomes:

- *Provides sound waste management strategies at a local level which are implemented to achieve the NSW Waste Avoidance and Resource Recovery Strategy (WARR Strategy) addressing the waste management hierarchy of:*
 - *avoidance of unnecessary resource consumption*
 - *resource recovery (including reuse, reprocessing, recycling and energy recovery)*
 - *disposal*
- *Compliments NSW Government's Waste Less, Recycle More initiatives and EPA waste and recycling programs.*

5.2 Recommended Approaches

Regional Waste Strategy

As part of the Waste Less, Recycle More initiative, the Macarthur Regional Organisations of Councils (MACROC) obtained grant monies to develop and implement a regional waste strategy. The strategy identifies the key priorities for the region and outlines the types and quantities of wastes generated across the LGAs. The strategy focuses on current and future waste infrastructure needs, increasing dry recycling and organics, reducing waste to landfill and combatting illegal dumping and littering. Ensuring these initiatives are implemented will deliver waste actions in a *Plan for the Growing Sydney*.

The management of waste will be a significant challenge in LGAs where there will be an expected increase in employment, population and housing growth over the next 20 years. EPA considers development provides an opportunity to include appropriate provisions to guide the management of waste to accommodate future growth, especially future waste and recycling infrastructure needs. Existing waste facilities are important to meet recycling needs and the NSW government's objectives and targets. EPA recommends DPE engage with the Macarthur Regional Organisations of Councils (MACROC) to explore opportunities for addressing the priorities in the regional waste strategy.

Specific Regional Funding for MACROC

The EPA has a strong waste agenda supported by the Waste Less, Recycle More initiative funded from the waste levy. This initiative is a five year \$465.7 million waste and recycling agenda for NSW to deliver economic, employment and environmental benefits for local communities and to transform waste and recycling in NSW. The initiative ends 30 June 2017. The EPA will be seeking approval from the Government for a second tranche of funds to continue this program for the four years from July 2017.

Under the Waste Less, Recycle More program MACROC councils have received the following grants:

- \$276,298 for a Community Recycling Centre at the Campbelltown City Council Waste Depot. This will provide a convenient and accessible drop-off solution for household problem wastes for nearby councils. Residents will be able to drop off free of charge paint, oils and batteries year round.
- in 2016 Camden and Wollondilly Council received funding to establish an illegal dumping data baseline for future analysis and program planning
- Campbelltown Council received a Love Food Hate Waste grant to help educate residents on how to avoid food waste
- over the past four years, the MACROC councils, have received just under \$2 million in Better Waste and Recycling Funding for the councils to run a range of waste and resource recovery projects.
- In 2013-14 MACROC received \$100,000 to prepare the regional waste strategy
- Over 4 years MACROC received \$340,000 for regional waste coordination

Development Control Plan

EPA has developed information to improve waste management associated with new development. DPE should consult the *Waste Not Development Control Plan* model chapter (EPA 2008): <http://www.epa.nsw.gov.au/resources/warrlocal/080353-model-waste-not-dcp.pdf> to assist in guiding the development of provisions in any proposed DCP. This guideline also provides suggested planning approaches and conditions for planning authorities to consider at the development application phase in relation to waste management and resource recovery. This includes consideration of demolition and construction waste and the provision of facilities and services to allow the ongoing separation, storage and removal of waste and recyclables. In particular, these provisions should include but not be limited to:

- Any waste generated during demolition and construction needs to be classified in accordance with EPA's Waste Classification Guidelines and managed in accordance with that classification.
- Waste management planning for the new development needs to consider any regional waste management strategies
- Design considerations in new communities such as in greenfield sites, must allow the relevant council to carryout efficient and safe domestic waste management services to all households and ensure there is adequate space for residents to store the waste and recycling bins supplied by the relevant council. For this to happen DCP provisions must consider the type of waste collection vehicles in the council's fleet, the size of waste and recycling bins supplied by council, frequency of collection and the type of dwelling and how street amenity is not compromised .

In addition, EPA also recommends that any DCP refer to the following guidelines to assist the development of waste management plans for new developments as part of the development application phase:

- *The Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities* (EPA, December 2012). This guide can be accessed at: <http://www.epa.nsw.gov.au/warr/BPGuideCIFacilities.htm>.
- *The Better Practice Guide for Multi-Unit Dwellings provides waste management strategies for multi-unit residential developments* (DECC 2008). This guide can be accessed at: <http://www.epa.nsw.gov.au/warr/BetterPracticeMUD.htm> ; and
- *The Better Practice for Public Place Recycling* (DEC 2005) provides information on standards for recycling systems in public places, such as parks, shopping centres, footpaths, bus-stops, etc. This guideline can be accessed at: <http://www.epa.nsw.gov.au/warr/publicrecycling.htm>.

6. COAL SEAM GAS INFRASTRUCTURE

Urban Encroachment on Existing Coal Seam Gas Infrastructure

Currently, there are inconsistencies in NSW regarding the land use planning approaches to the separation distances between existing coal seam gas (CSG) wells and proposed development. For example:

- The Mining SEPP does not permit petroleum (CSG development) within two kilometres of residential development.
- The Petroleum (Onshore) Act 1991 restricts operations within 200 metres of residential dwellings except with written consent of owners and occupiers.
- The "*Locational Guidelines – Development in the Vicinity of Operating Coal Seam Methane (CSM) Wells*" (NSW Department of Infrastructure, Planning and Natural Resources, May 2004) guideline includes separation distances between existing CSM wells and proposed development. Depending on well configuration and operating conditions, separation distances for residential development range from five to ten metres. Similarly for sensitive development, separation distances range from eight to 20 metres.

The *Greater Macarthur Land Investigation Area Preliminary Strategy and Action Plan* is proposing a buffer of 200 metres from coal seam gas operations. Under the Strategy urban development can only occur on land within 200 metres of coal seam gas operations once:

- The coal seam gas wells have been closed and sealed
- The Rosalind Park Gas Plant has finalised its operation
- The Appin East and Appin West (Tower) gas/power stations have finalised their operations

It is unclear if the 200 metre buffer in the Strategy applies to the gas reticulation system and the Rosalind Park Gas Plant and Appin East/Appin West (Tower) gas/power stations. EPA is seeking clarification from DPE on the application of this separation distance.

To ensure a consistent approach to land use planning in the vicinity of existing CSG infrastructure, DPE should provide clear, considered and agreed guidance on siting residential development near existing CSG infrastructure. While the *“Locational Guidelines – Development in the Vicinity of Operating Coal Seam Methane Wells”* provides guidance, the status and application of this 2004 document is unclear. It does not reflect recent information and findings that has arisen in the NSW Chief Scientists CSG Review. It also conflicts with the Petroleum (Onshore) Act and the Mining SEPP.

The Camden Gas Project will continue until 2023 and any guidance should consider reasonable activities associated with operation of coal seam gas well operation likely to occur during this time. This includes but is not limited to: well workover; remedial works; and, decommissioning. The Strategy should also include guidance for development on or near decommissioned gas wells or gas facilities once gas activities have concluded.

Any guidance on recommended separation distances developed by DPE or included in the Strategy should be evidence-based and demonstrate that human health, safety and the environment will be protected at all times. This includes air, water and noise emissions. Risk assessments should take into account all scenarios relating to CSG. This is to ensure all scenarios are identified and assessed and the associated probability and consequences are documented.

ATTACHMENT B

1. AIR QUALITY

Air Quality in the Greater Sydney Region

In general, air quality in Greater Sydney is comparable with cities in NSW and other Australian jurisdictions, and good by world standards. Based on the OEH Air Quality Index¹, air quality is classified as 'good or very good' for about 70-95% of days across Greater Sydney District Planning Regions (Figure 1). 'Poor or worse' air quality typically occurs on fewer than 10% of days, except during significant bushfire or dust storm affected years.

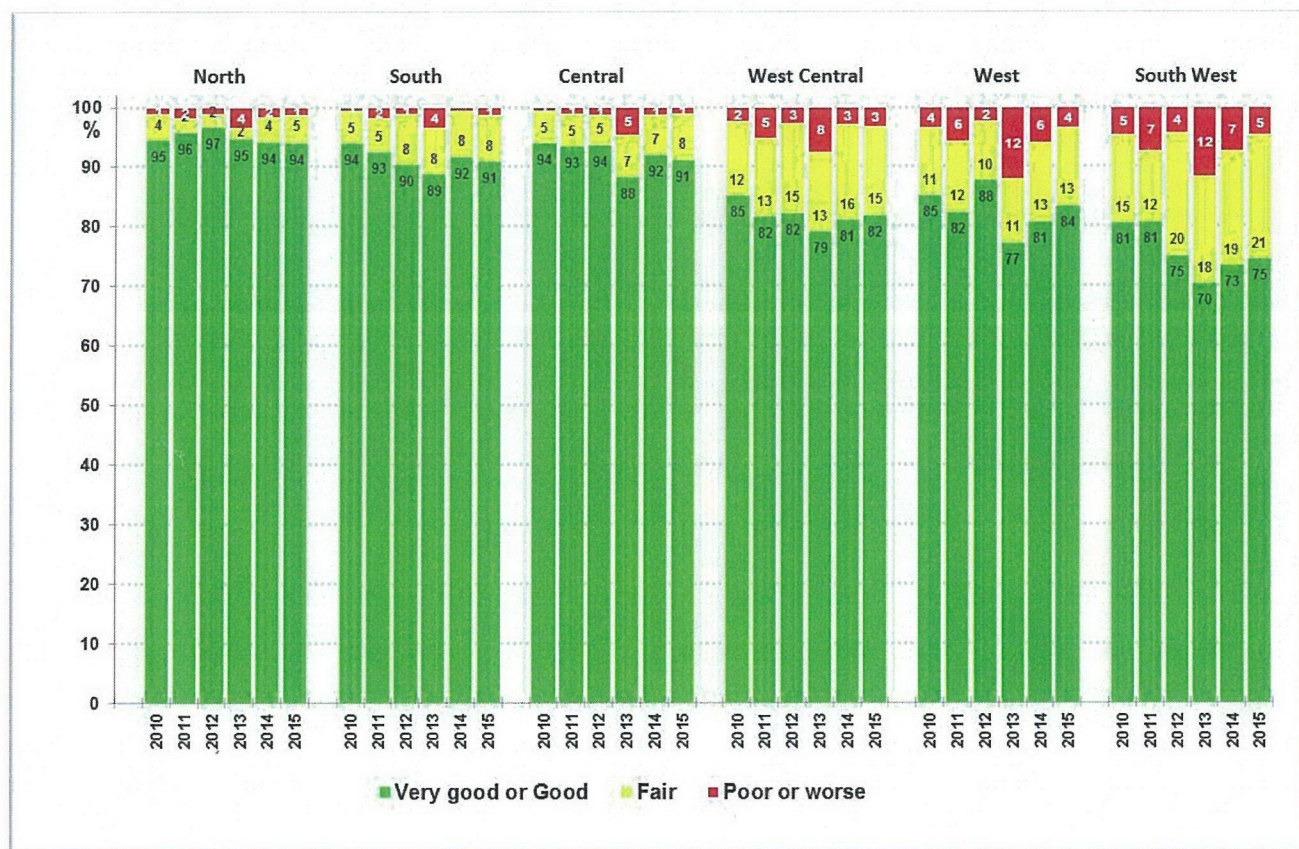


Figure 1: AQI by categories (%) in recent years (2010-2015) for Greater Sydney District Planning Regions².

Poor air quality in Greater Sydney is usually associated with photochemical smog (ground level ozone) or particle (PM₁₀ and PM_{2.5}) pollution. While much progress has been made in improving air quality across the Greater Sydney region, these air pollutants exceed national standards from time to time and are of regional concern. Health effects are also known to occur at air pollutant concentrations that are below national standards with the greatest health benefits being associated with reducing long term, large population exposures to average fine particle (PM_{2.5}) concentrations.

The South West, West and West Central District Planning Regions generally experience more 'poor or worse' air quality days compared to the Central, North and South District Planning Regions due to both ozone and particle pollution (Figure 2). Exceedances of particle standards often coincide with regional dust storms or bushfires (wildfires), with local sources such as smoke from local hazard reduction burns also causing exceedances at some air monitoring stations. Residential wood heater smoke also contributes significantly to fine particle pollution during the winter months, particularly within western Sydney.

¹ <http://www.environment.nsw.gov.au/AQMS/aqi.htm>

² AQIs are calculated by pollutant for each regional air quality monitoring site within the OEH's Sydney Air Quality Monitoring Network. The AQIs for different pollutants are compared at each site, with the highest AQI value at each site becoming the site AQI. Then all site AQIs in a given sub-region are compared and the highest site AQI for a sub-region is taken as the sub-regional AQI.

Exceedances of the ozone standards usually occur in warmer months, with ozone levels peaking during high temperatures.

For further information on air quality trends in Sydney refer to OEH (2014) *Air Quality Trends in Sydney*³.

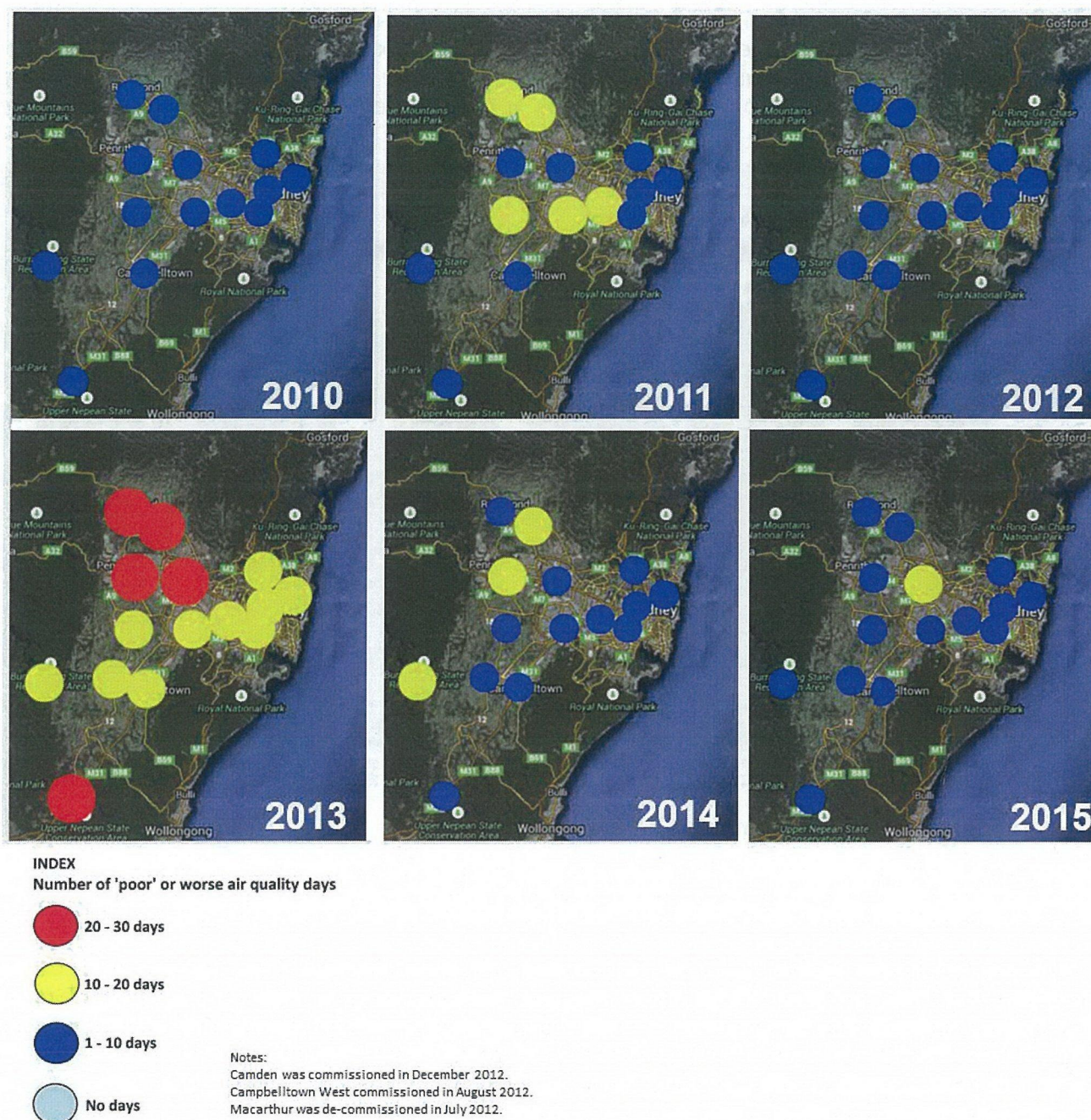


Figure 2: Number of 'poor or worse' air quality days in recent years (2010-2015) for the Greater Sydney region.

For 2013 high temperature and bushfires resulted in a greater number of poor air quality days.

Ground level ozone

Photochemical smog (ground-level ozone) is a secondary pollutant formed in the atmosphere by the reaction of volatile organic compounds (VOC) and oxides of nitrogen (NO_x) in hot, sunny weather conditions. The health effects attributable to ozone are significant. These include respiratory and cardiac

³ http://www.chiefscientist.nsw.gov.au/_data/assets/pdf_file/0003/52986/Road-Tunnels_TP02_Air_Quality_Trends_in_Sydney.pdf

symptoms, exacerbation of existing conditions such as bronchitis, emphysema or asthma, and premature death. In south west Sydney in the last decade, national (1 hour) ozone standards have been exceeded by up to 15 days per year.

In the Sydney region, motor vehicles and non-road engines (construction and earthmoving equipment; shipping and boats; and lawn mowing and garden equipment) are significant human-made sources, contributing around 81 per cent of NO_x and 40 per cent of VOC according to the EPA's [2008 NSW Air Emissions Inventory for the Greater Metropolitan Region](#)¹ (Figures 3 and 4). Other sources of ozone precursors include industry activities, households and commercial businesses.

Figures 3 and 4 show the main sources of ozone precursor emissions in Sydney.

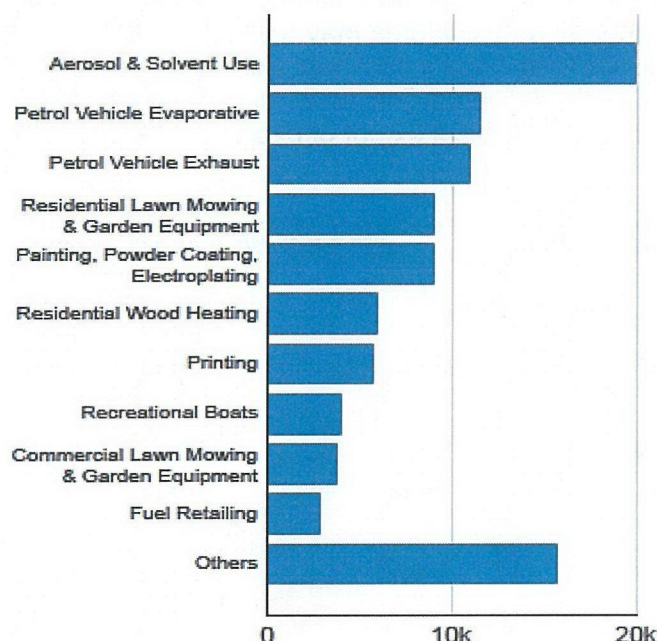


Figure 3: VOC Emissions – Sydney Region (tonnes/year)

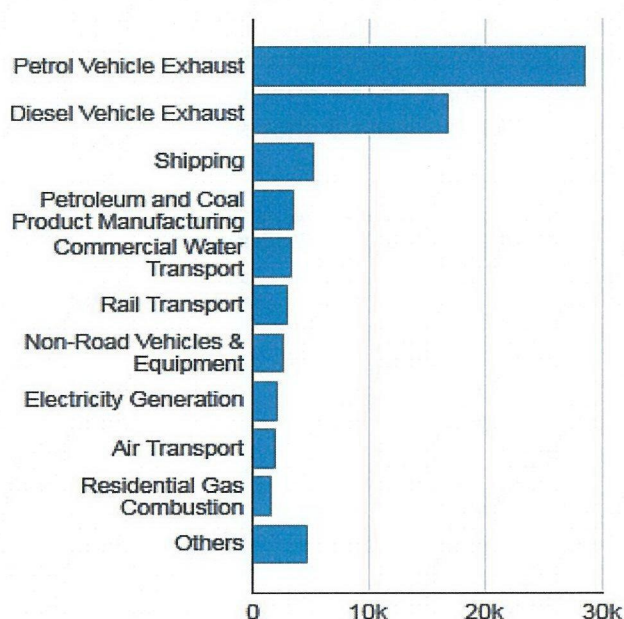


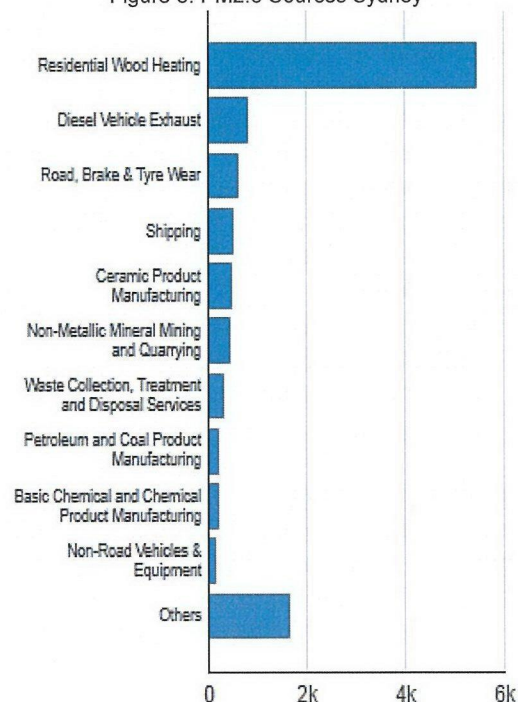
Figure 4: NO_x Emissions – Sydney Region (tonnes/year)

Particle pollution

Reducing particle pollution is a priority for the NSW government and the community as exposure can be particularly harmful to human health. Exposure to particles can cause respiratory and circulatory problems, particularly in elderly people, children and people with existing health conditions resulting in acute and chronic illnesses, hospitalisations and premature death. The national standard for particle pollution (as PM₁₀) can be exceeded on multiple days in a year in Sydney, with up to 11 days per year in the last decade. Exceedances of the fine particle standard (as PM_{2.5}) have also occurred in Sydney up to 14 days per year. Exceedances of the 24 hour average standard are generally associated with extreme events such as bushfires and dust storms.

Wood heaters, industry activities, motor vehicles and non-road diesel engines are the most significant human-made sources in the Sydney region. Figure 5 shows

Figure 5: PM_{2.5} Sources Sydney

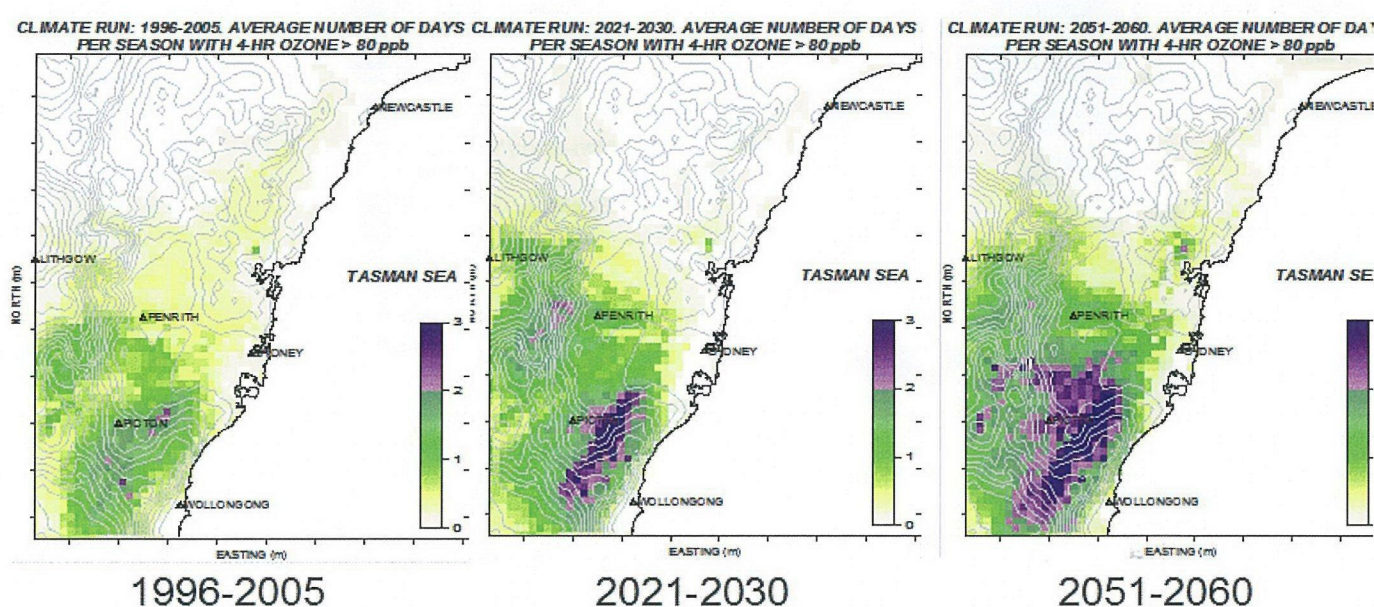


annual human-made PM_{2.5} emissions in the Sydney region by activity.

Particle pollution includes primary particles released directly from sources (as discussed above), and secondary particles produced by chemical reactions between gases or between gases and other particles in the air. On an annual average basis, the split between primary and secondary particles contributing to ambient PM_{2.5} pollution is about 50:50, indicating that both primary particle sources and sources of particle precursor gases (for example, SO₂, NO_x, VOCs, ammonia) are important to airborne fine particles (Cope et al., 2013).

Climate Change Impacts

Changes in climate are likely to affect future air quality in Sydney. Changes to rainfall, temperature and weather patterns (including fire weather) may increase the frequency of dust storms and bushfire-related pollution events, leading to higher particle emissions. Higher air temperatures may result in increases in the occurrence and geographical extent of ozone impacts. OEH is conducting research into the impact of climate change on air quality in NSW based on the recently delivered fine scale climate projections for NSW to 2070. Figure 6 shows the predicted increase in the geographical extent of ozone exceedances.



Health Impacts and Costs of Air Pollution

Health costs of pollution levels in the Greater Sydney Metropolitan area estimated to be approximately \$6.4 billion per annum (2015 dollars).² Health research also indicates both ozone and particle pollution can cause both acute and chronic respiratory and cardio vascular conditions (such as bronchitis, asthma and heart attack). Increased air pollution results in increased school and sick leave, emergency room visits, hospitalisation and premature death. For Sydney, the Air NEPM (National Environment Protection Measure) review health risk assessment for particles showed that around 520 people die prematurely each year due to exposure to fine particles. It found that decreasing air pollution exposures would lead to major health benefits:

- Short term effects such as hospitalisations would reduce with reductions in air pollution.
- Reduction in the health effects of long-term exposure to air pollution, such as deaths, would require sustained reductions in air pollution over longer time periods and health benefits would accrue over a longer time.

Population Exposure and Development Activities

Areas of high population growth and increasing population density can result in higher levels of population exposure to air pollution. This is particularly the case in Western Sydney due to the meteorology and topography of the Sydney basin which can cause pollutants to concentrate in the west and prevent them from dispersing. Vulnerable population groups – children, the elderly and those with pre-existing health

conditions are the most susceptible to the health impacts of air pollution. Additionally, increased development at the rural-urban interface can result in higher population exposure to air pollutants from bushfires and hazard reduction burning and there is also a higher risk of population exposure to air pollutants along major road corridors.

Air Quality Monitoring

OEH operates a comprehensive air quality monitoring network to provide the community with accurate and up-to-date information about air quality. Air quality monitoring sites are set up in Sydney and regional areas of NSW. Data from the monitoring network is presented online as ambient concentrations and air quality index (AQI) values which are updated hourly and stored in a searchable database.

Air pollutants are monitored at a number of sites across the Sydney Region. Air quality data from these sites is available on the web at: <http://www.environment.nsw.gov.au/aqms/index.htm>.³

Further Sources of Air Emission Information

Air pollutant emissions in the NSW Greater Metropolitan Region (GMR) are tracked through the EPA Air Emissions Inventory, with data available from the EPA website:

<http://www.epa.nsw.gov.au/air/airinventory2008.htm>.

The *My Community* web-based tool can provide data for local government areas or specific postcodes:

<http://www.epa.nsw.gov.au/air/airemissionsinmycommunity.htm>.

Key Initiatives to improve the evidence base

- A Sydney Air Quality Study has been commissioned in 2016 by OEH and EPA to improve our understanding of air quality and the impacts of air pollution on human health and the environment within the Greater Sydney region. The study will meet the information needs of decision makers and communities, with the evidence base being expanded to address critical knowledge needs related to air quality and its impacts in the region. This multi-year study will provide valuable information to government, business and communities on past, current and future air quality and its impacts on public health and the environment. It will support evidence-based air policies and programs by identifying emerging issues and highlight opportunities for improving air quality and realising public health benefits through innovative, whole of government actions. Such opportunities may include achieving air quality improvements and health co-benefits through integrating air quality considerations within development planning and energy and resource efficiency programs.
- OEH is collaborating with CSIRO, ANSTO and the federally funded Clean Air and Urban Landscape Hub in the delivery of the Western Air-Shed and Particulate Study for Sydney. This 3 year study (2016-2018) will support evidence-based policies to reduce particle pollution by identifying sources of particle and precursor pollutant sources and quantifying the contribution of such sources to air pollution exposures and health impacts within Western Sydney.
- OEH is a partner with the Low Carbon Living Co-operative Research Centre (CRC) and is involved in a number of research projects aimed at delivering more integrated and sustainable development in urban environments. This includes work on urban heat and integrating lower energy buildings and systems into the urban environment.
- OEH is a partner in an Australian Research Council (ARC) Linkage funded study to investigate the development and use of advanced networks of low cost air quality sensors for air quality assessment and management purposes. This study is being done in collaboration with QUT, RMIT, Curtin University, the Bureau of Metrology and environmental agencies from Queensland, Victoria and South Australia. The EPA and OEH are collaborating with ANSTO in a Sydney Particle Characterisation Study. This study is looking at air pollution changes over the last 15 years. It is anticipated that results will be available in the later part of 2016.

2. WATER QUALITY

A healthy water environment includes elements of water quality and quantity, riparian values, and aesthetic and urban amenity considerations. Healthy rivers and catchments are integral to the economy and lifestyle of the people of NSW and are essential for maintaining and improving the community uses and values of

local waterways, including supporting more sustainable and liveable cities and communities. It is an important consideration in a *“Plan for Growing Sydney”* (DPE 2014).

The proposed area is located in the catchments of the Hawkesbury-Nepean and Georges River Systems. The Hawkesbury-Nepean River continues to experience the pressures of Sydney's development and growth. While long-term monitoring has demonstrated improvements in water quality in sections of the river, there is still significant improvement required.

Aquatic weeds have become more abundant in recent years and there is a continuing history of algal blooms. Severe and immediate threats to aquatic ecosystems continue and emerging issues such as poor flows and salinity are becoming an increasing issue in the upper catchment. Increased urbanisation is expected to put further pressure on the water quality of the Hawkesbury-Nepean River system which is already under stress.

The NSW WQOs provide a framework and benchmarks for the community uses and values of waterways and the water quality that is needed to support these. They were developed using the *Australian and New Zealand guidelines for fresh and marine water quality* (2000) and are the NSW Government endorsed environmental values and long-term goals for NSW's surface waters.

While there have been a range of successful Government programs and initiatives to improve the health of the Hawkesbury-Nepean River, current approaches to development are not delivering the waterway health outcomes that that community expects. Community expectations are not only captured in NSW Government Policy and legislation but they're also increasingly reflected in studies that demonstrate that the community is willing to pay something towards Government-led management actions that improve waterway health outcomes and support waterway uses such as fishing, swimming and boating ⁽¹⁾.

3. NOISE

The *NSW State of Environment Report 2012* notes that noise pollution is the second most common type of complaint received by EPA's Environment Line. Noise is both a human health and amenity issue. The *NSW State of Environment Report 2012* recommends integrated approaches to strategic planning to manage noise impacts associated with population growth and noise generating development for metropolitan and non-metro areas of NSW.

State and local governments need co-ordinated strategies to ensure that land use compatibility is considered upfront in all planning processes, and unless appropriately managed, further growth of employment generating activities, infrastructure and residential developments in the region can lead to land use conflicts and potential development constraints.

EPA considers that the Strategy should seek to avoid land use conflicts between noise generating and noise sensitive development. Noise management strategies need to be considered where development of new noise transport infrastructure near existing noise sensitive land uses and/or the development of noise sensitive land use around existing transport infrastructure is proposed. This is best achieved by avoiding noise-related land use conflicts through appropriate separation of incompatible uses. Urban renewal should be located and designed to minimise noise impacts on residents while recognising the benefits of concentrating housing around transport nodes or corridors. The planning of new release areas should consider potential noise impacts from existing adjoining land uses.

Greenfield sites offer the greatest flexibility to separate incompatible land uses. Management strategies should be developed and goals derived for new noise generating development to provide an equitable distribution of noise while protecting the amenity of noise sensitive areas.

Sustainable land use planning and careful design and location of development offers the greatest opportunity to manage noise. Noise generating activities and noise sensitive areas should be separated by zoning where practicable. For example, separating incompatible land uses with commercial buildings or

recreation space or similar will provide a physical barrier and/or spatial separation. Retrospective control options are usually limited and more expensive.

This type of approach has been applied successfully to provide an early indication to potential developers of expected noise emission requirements, and to preserve the noise amenity in adjacent areas. Examples where this approach has been adopted include the Ingleburn Industrial Estate, Campbelltown; Glendenning Industrial Estate, Blacktown and Breamer Industrial Estate, Mittagong. A further example is the “*West Kembla Grange Employment Lands Strategic Environmental Noise Approach*” commissioned by the former Department of Planning in 2002.

Guidelines including the *Rail Infrastructure Noise Guideline* (EPA, 2013) and the *NSW Road Noise Policy* (DECCW, 2011) provide guidance in relation to land use planning regarding rail and road noise issues.

The *Development Near Rail Corridors and Busy Roads—Interim Guideline* (Department of Planning, 2008) provides planning guidance and recognises the need for judicious land use planning, architectural design, building orientation and good internal layout to achieve acceptable acoustic amenity in close proximity to busy transport corridors.

A range of noise mitigation strategies can also be implemented at the subdivision design stage to manage unavoidable noise impacts. This can include the application of noise control measures into the building design to ensure internal noise levels are acceptable. Advice is provided in the *Noise Guide for Local Government* (EPA, 2013) and the Department of Planning’s *Development Near Rail Corridors and Busy Roads—Interim Guideline*.

Proposed industrial development should be assessed in accordance with the *NSW Industrial Noise Policy* (INP) (EPA, 2000). The INP outlines a strategic approach to ensure noise amenity is not eroded due to the cumulative impact of a group of developments. The benefit of this approach is it can be applied at a precinct stage to inform, for example:

- what industry types could be suitable for particular locations within the precinct
- appropriate noise limits for industries within the precinct - particularly for those established earlier in the process, so as to provide scope for noisy industries that may come later to operate without causing amenity levels to be exceeded.

4. CONTAMINATED LAND

Contaminated land can have major economic, legal and planning implications for the community and can limit land use potential or increase costs for developers and government. Their investigation and clean-up is important to protect human health and the environment.

The Strategy should reference *State Environmental Planning Policy 55* (SEPP 55) and associated guidelines ‘*Managing Land Contamination Planning Guidelines SEPP 55—Remediation of Land*’ (Managing Land Contamination Planning Guidelines). In particular, land cannot be rezoned until the requirements of SEPP 55 are satisfied. SEPP 55 states that as part of the development process, the following key considerations should be addressed when preparing an environmental planning instrument:

- Whether the land is contaminated
- If the land is contaminated, whether it is suitable in its contaminated state (or will be suitable, after remediation) for all the purposes to which the land will be used

Land contamination made known to the EPA can be accessed online via the following links:

- Land contamination notified to the EPA : <http://www.epa.nsw.gov.au/clm/publiclist.htm>
- Land contamination regulated by the EPA: <http://www.epa.nsw.gov.au/prclmapp/aboutregister.aspx>

5. WASTE

Waste Less, Recycle More: Waste and Resource Recovery Initiative is a five year \$465.7 million package that is transforming waste and recycling in NSW. This package is funding new and innovative recycling infrastructure, food and garden organics processors and community drop-off centres, as well as tackling litter and illegal dumping and supporting businesses to improve recycling. The initiative will deliver economic, employment and environmental benefits for local communities. The package focuses on the following key areas:

- waste and recycling infrastructure package
- supporting local communities
- combating illegal dumping
- tackling litter
- improving the operation of the waste levy.

The initiative includes a Waste and Recycling Infrastructure Package that commits \$250 Million over five years to assist in the planning and implementation of key infrastructure. This includes new large-scale waste and recycling infrastructure to support communities that pay the waste levy, recycling facility upgrades, drop-off centres, food and garden organics processing, and recycling innovation, as well as support for businesses to increase recycling on site. In addition, the initiative also provides approximately \$138 Million over five years to help councils support their own waste and recycling initiatives for their local communities, and makes available at least a further \$219 Million in contestable grants.

Non-contestable funding is available to local councils and groups of councils in the waste levy regulated area. This fund is distributing \$70 million over four years to support a broad range of projects that improve recycling, engage communities, reduce waste generation, tackle littering and illegal dumping, and contribute to achieving the NSW recycling targets. Participating organisations tailor these projects and programs for their local communities in response to local waste priorities.

The Regional Coordination Support package provides \$6 million over four years to regional organisations of councils and council groups in the metropolitan levy area. The funding supports regional waste coordinators, waste infrastructure planning and the development and implementation of regional waste strategies. Regional collaboration is essential as regional groups of councils are better able to access services and infrastructure that may be out of reach for individual councils due to financial or geographic reasons.

EPA considers that giving the highest priority to waste avoidance would encourage more efficient and sustainable use of resources. Resource recovery maximises the options for reuse, recycling, reprocessing and energy recovery at the highest net value of the recovered material. This encourages the efficient use of recovered resources while supporting the principles of improved environmental outcomes and ecologically sustainable development. Resource recovery can also embrace new and emerging technologies. In addition, it also assists in extending the life of landfills by reducing waste input rates. In this regard, planning provides an opportunity to drive sustainable waste management outcomes.

Waste and its management will be an important consideration and requires careful planning as land is developed to ensure activities are undertaken to meet legal requirements. EPA legislation and guidelines should be consulted. The use of recovered and recycled resources should also be considered and encouraged wherever possible; from inception through to design, specification, procurement, construction and operation.

¹ <http://www.epa.nsw.gov.au/air/airinventory.htm>

² NSW Department of Environment and Conservation (NSW) 2005, Air Pollution Economics: Health Costs of Air Pollution in the Greater Sydney Metropolitan Region.

³ <http://www.environment.nsw.gov.au/aqms/index.htm>