Singleton Shire Healthy Environment Group
"NSW EPA Load Based Licencing "

A community-based group looking to address Environmental issues affecting Singleton Shire residents

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We seek identification as to what is making our Children and Community Sick so they can be mitigated by OH&S Compliance Orders.

SSHEG Focus on Health

SSHEG is Not Anti Mining or Anti Power Stations

Department of Planning and Environment,
23-33 Bridge Street, Sydney NSW 2000

SSHEG Submission "NSW EPA Load based Licencing"

This SSHEG Submission focuses upon the role that the "NSW EPA Load Based Licencing" should play towards the implementation of the World Health Organisations initiatives to achieve "Air Pollution and Particulate Matter Minimisation as a necessary way to reduce Human Disease, especially in the most vulnerable Population Groups in the Hunter Valley".

Additionally, in our somewhat enclosed Rural valleys "Near Neighbours to Mining Operations are especially Health affected and their life suffers disruption of the psychosocial fabric of the community by "Mine Dust & Noise, Road Blockages, Stray Mine Lighting, and particularly Mine blast Plumes, toxic gases and unburnt ANFO and Diesel that return to ground upon unsuspecting Residents and their children.

The Singleton Shire Healthy Environment Group involvement in the Hunter Valley Coexistence Debate is squarely focused on re-establishing the balance between Employment and Community Healthy Living. The Imbalance has resulted from the over-zealous expansion of Open Cut Mining since 2007 in an otherwise Rural Environment.

SSHEG has been working since 2009 with NSW Government Authorities (particularly NSW Environmental Health) and the Hunter Valley Mining Dialogue to better target and refine the Pollution – Human Disease Short Term (15 Minute) Exposure understanding with a view to further enhance Pollution Emission Mitigation Controls in the Hunter Valley.

The fact that Open Cut Mines have been approved to operate as Neighbours to Rural Villages (some with Primary Schools) and farming enterprises and their families is Fundamental to this understanding; this forces Residents to sell until the situation reaches the point such as in the Bulga Village in 2012 where Government Authorities proposed the moving of the entire Heritage Village to establish Buffer zones that should have been established in the first place.

SSHEG considers "Near Neighbours to Open Cut Coal Mining as Occupationally Exposed persons to Mining; and one such farmer is confirmed with :Dusting on the Lungs, while Miners pride themselves that this Disease has been overcome in the Mining Industry.

The NSW EPA Load Based Licencing focuses upon the '*Polluter Pays principle'* and this submission identifies the Community view of the Polluters as they impact on the Health of the Singleton Shire Community, prioritised in four regions from the most significant to the lesser, where air Drifting Patterns mix Pollutants between these regions.

The four regions are;-

1. Coexistence with Villages, Primary Schools, Farmers, Retirees and Mines in Broke – Bulga Microvalley (Figure 1). RED
2. Concentrated Mining and Power Stations Region between Muswellbrook and Singleton now devoid of Ravensworth Village and only remnants of Camberwell Village residents, some with enduring diseases. BLUE
3. Major Population centres, Muswellbrook, Singleton impacted by coal train and Highway Diesel Exhausts.GREEN
4. Overall Hunter Valley Air Pollution Cocktail impacted by inversion layers and Power Station Pollution. YELLOW

On the surface it would appear that Load based Licencing should be in operation in the Hunter Valley, however upon examination of the EPA LBL documents and as a long standing member of Mine Community Consultative Committees it is obvious that the Hunter Valley Mines are effectively being excluded from this process.

While other Mine and Power Station Pollution EPA processes are in place the standards set are not consummate to the Near Neighbours Disease impact being reported hour by hour as Complaints.

The clearest example for Mine Load based Licencing relates to Mine Blasting, where it has been established that Blasting can be conducted to ”Eliminate the Blast Plume and Dust into the Atmosphere” by effective Blast Hole Stemming and or the use of Plastic Stemming plugs.- Convince Orica to establish the appropriate protocols to eliminate the images that adorn the Hunter Valley today. EPA LBL KPI’s on Blast Plume Size is thus proposed.

This submission further identifies the “Broke – Bulga Valley” for consideration as the most short term affected Pollution region as outlined below. Details are outlined to identify what metrics should be considered as an incentive for neighbouring Mines to Minimise their Pollution Controls and thus further Mitigate their Operations below Yearly and Daily Standards but rather be guided by call by the World Health Organisation for the Minimisation of Air Pollution emissions.

Figure 9.1 below from Pacific Environment 2012 Model Study clearly identifies the central Open Cut Mine activity between Muswellbrook and Singleton towns which also includes Power Station Stack emissions Pollution influences. The UHAQMN and recent EPA Daily Average PM air drifting SE & NW Patterns provides Metrics for Camberwell Residents LBL KPI’s.

Figure 9.1 shows the mine lease boundaries and the volume source locations modelled (dots) for the base year scenario (2012). Other years are shown in **Appendix H.**

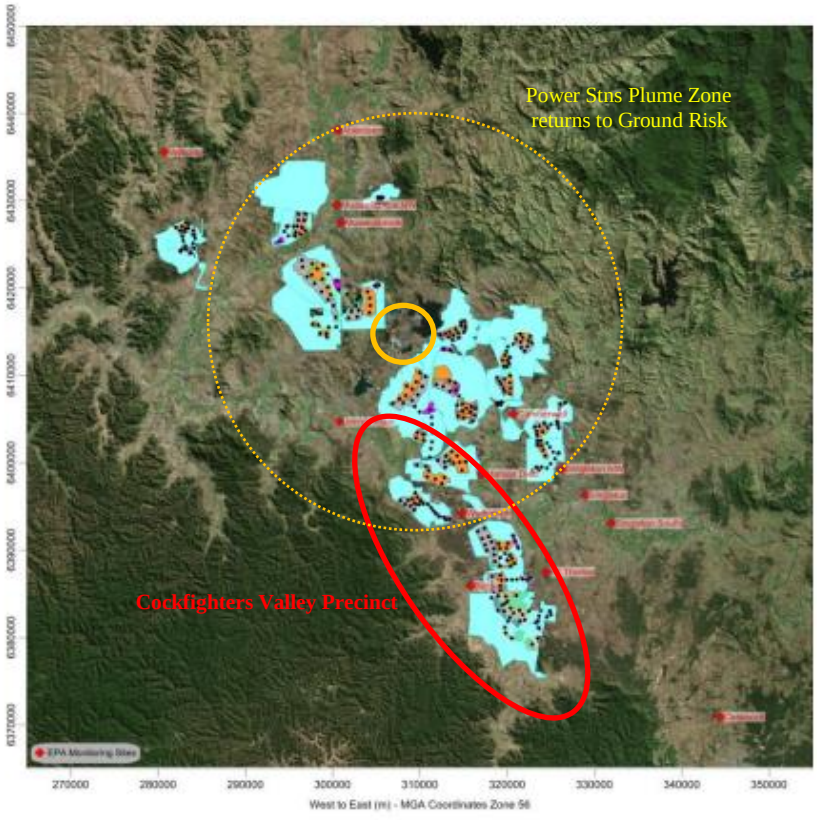
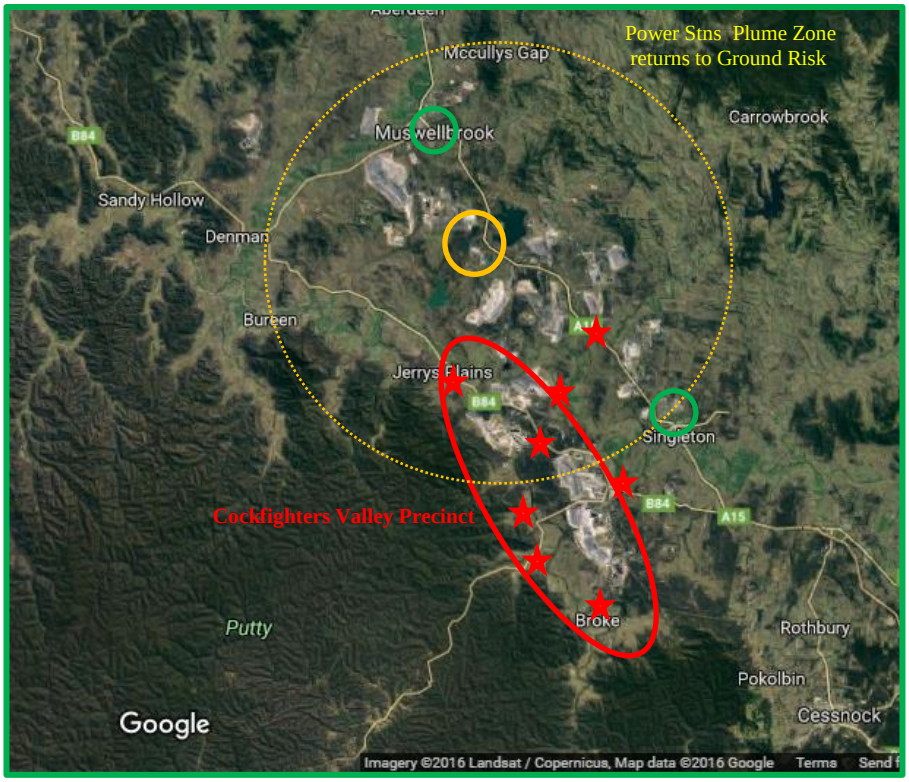


Figure 9.1: Mine sources modelled for base year (2012)

Besides the ongoing unanswered Mine Pollution issues at Camberwell Village, the Micro Valley formed between the line of Mines and the Bulga Mountains escapement by its topography is more influenced by short term – minutes to hours – Air Pollution Drifting Patterns. The Colonial and Aboriginal significance of these lands "Cockfighters Valley Precinct" together with the day by day approaching Mining intrusion all adds to "disrupting the psychosocial fabric of these communities".



Cockfighters Valley Precinct **"Near Neighbour Pollution Disease Impacts"**
Broke, Milbrodale & Jerrys Plains Schools; Bulga, Warkworth, Gouldsville, Long Point and Camberwell Residents.

This "Cockfighters Valley Precinct" forms a blind ended Valley in the Bulga-Broke area which for South Drifting Air Patterns would tend to "concentrate and stagnate" Mine Pollution trapped along the Bulga Mountain Escapement into a "Pollution Rich Pocket" formed by the Pokolbin Forest blockage just South of Broke Village. The distinct Odour of Mining often permeates the area particularly during early still mornings.

Micro Valley Study of Mining coexisting with Residents, Farming, Vineyards and Horse Studs in the Hunter Valley of NSW Australia

"The Cockfighter Creek" flows north between the Pokolbin and Wollomi Forests along the Bulge Mountain into the Hunter River through a picturesque Rural Valley with the Villages of Broke, Fordwich, Milbrodale and Bulga, with Vineyards and Horse Studs. (Figure 1)

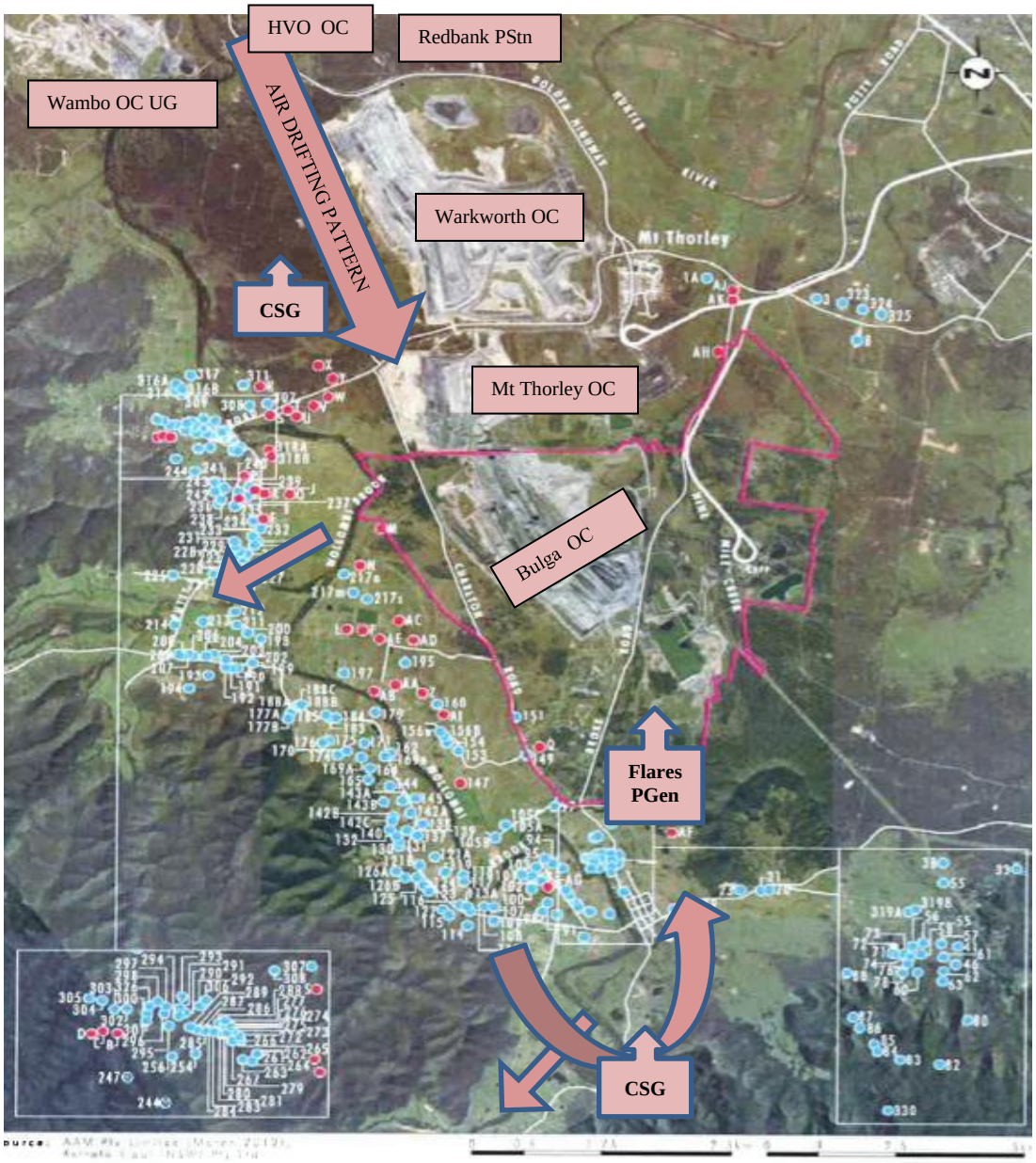


Figure 1 "Cockfighter Creek Micro Valley" RED
Showing the Resident Community exposed to Mine Dust and Noise Pollution

These Hunter Valley South Drifting Air Patterns shown on **Figure 2** first pick up Pollution from Coal Mines and two Power Stations near Muswellbrook on their way to the "Cockfighter Micro Valley" and this enriched Polluted Air then passes over a line of orientation of five Open Cut Coal Mines and two Underground Coal Mines within this Micro Valley, where Broke School Children would be particularly vulnerable to this cumulative Pollution impact.

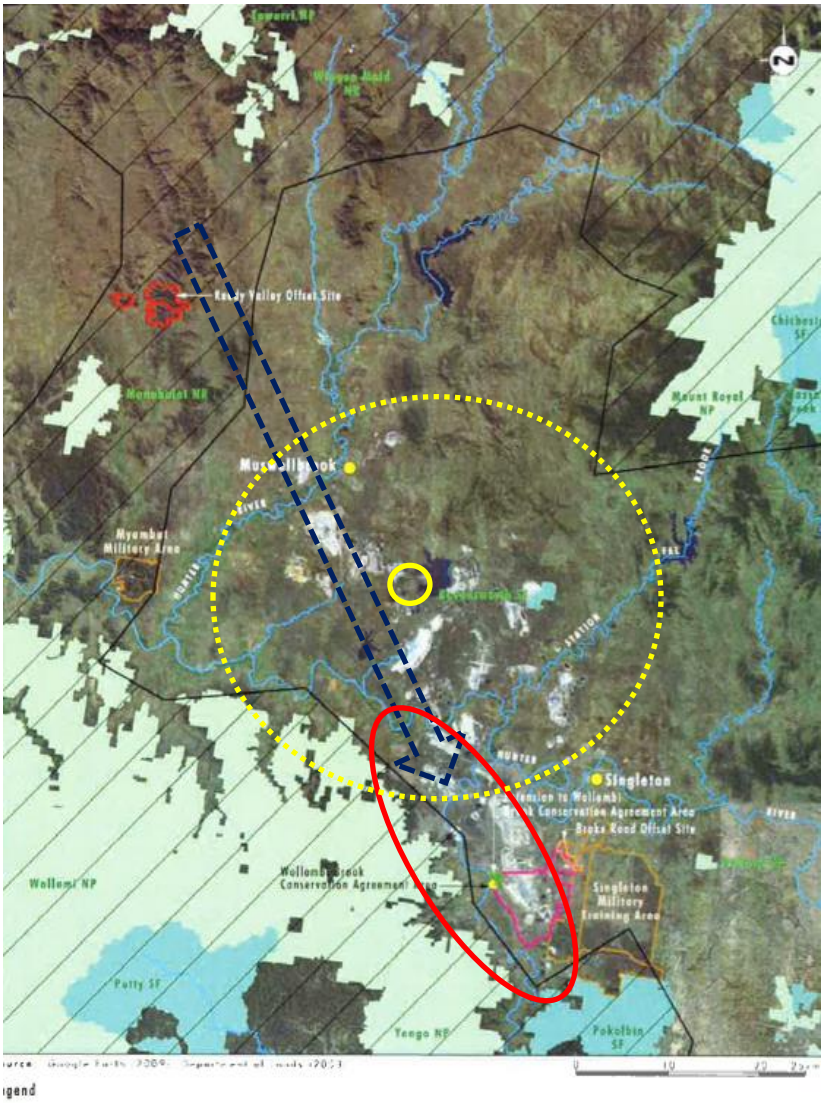


Figure 2 Hunter Valley South Drifting Air pollution Patterns

The Micro Valley scenario of concern relates to Meteorological conditions where this South Drifting Air is drawn along and towards the Escapement aided by the natural tendency to be drawn firstly to the south west up the Milbrodale Brook Valley and then near Broke Village drawn also up the Wollombi Brook Valley between the Pokolbin and Targo State Forest Escapements as indicated on **Figure 1**. Thus the tendency especially under light wind conditions is for Airbourne Mine Pollution to also drift West while nominally South Drifting Air, making Broke Villagers particularly vulnerable.

The complex land contours of the Bulga-Broke Micro Valley is characterised in cross section at the open Bulga end with Escapement to the West across the Wollombi Brook to the East and Saddle Ridge of Warkworth –Mt Thorley Open Cut Mines. Further South the cross section passing through Milbrodale Brook Valley and Escapement to the West across the Wollombi Brook to the East and over the Fordwich Ridge to Bulga Open Cut Mine. At the Broke Village, the cross section passes through Wollomi Brook Valley and Escapement, then across the Plains and Broke Village to the East before encountering the restriction of the protruding Pokolbin State Forest Escapement; where a gap to the Military Range Forest Ridge opens to the East North East into an open Plain Valley further to the East.

It is the complexity of the land contours leading into the "Broke Pollution Stagnation Pocket" that warrants consideration with respect to the Air Pollution Health Risk from the cluster of Power Station and five Open Cut and two Underground Coal Mines that feed and emit Pollution in this area.

In this case LBL considerations should be an incentive for Mines to Minimises their 15 Minute PM10 and PM2.5 Air and Noise and Light Pollution to achieve the health outcomes detailed by the World health organisation.

Below is an example of the Air Pollution drifting Patterns related to Bulga Mines near Broke Village at the southern end of the Cockfighters Valley Precinct showing Seasonal Meteorological Station Data. Although the Wind Direction is Averaged over a three monthly period (Seasonal) there remains sufficient indication of Mine Air Pollution Drifting Patterns passing over Residents along the Valley.

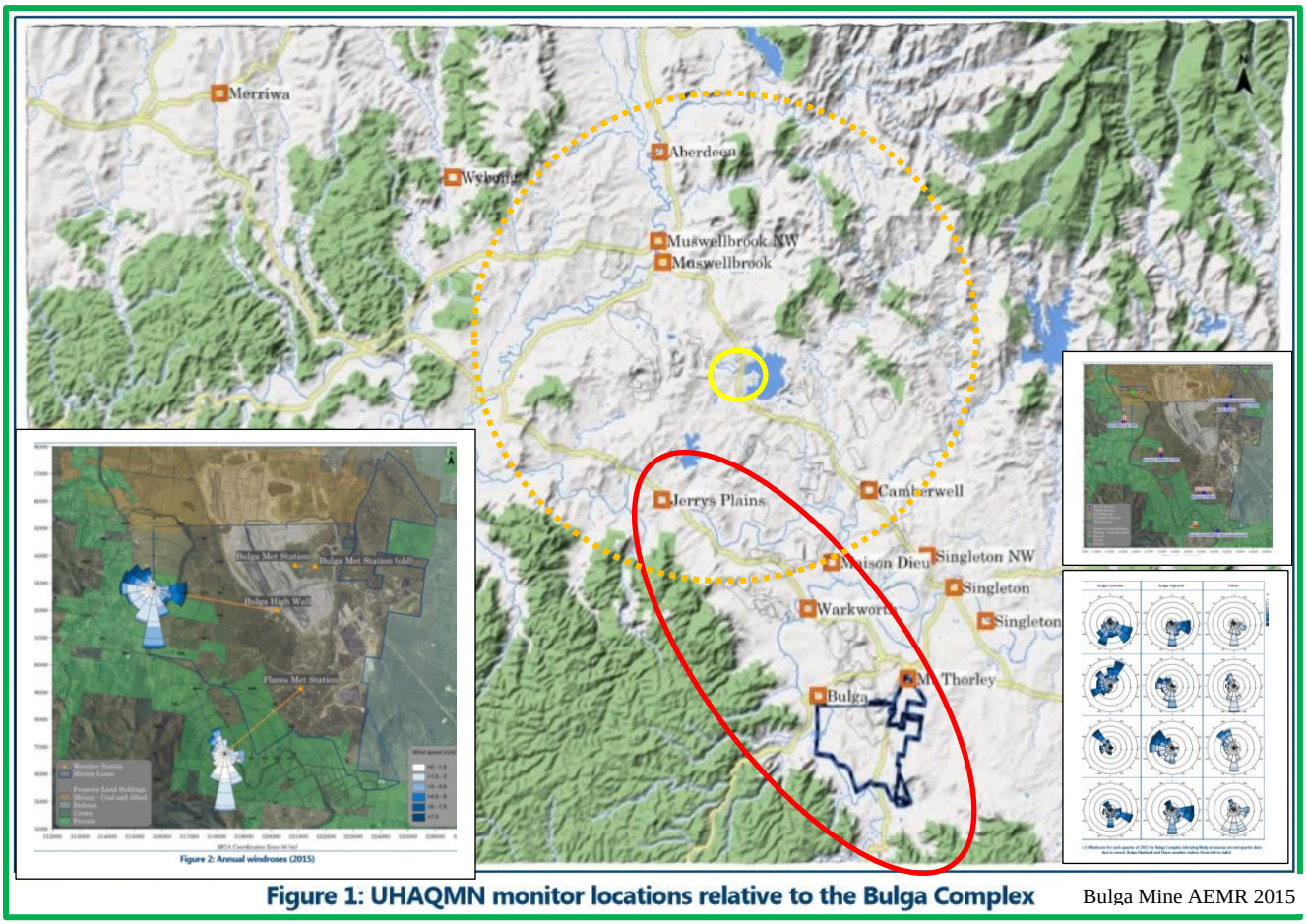


Figure 1: UHAQMN monitor locations relative to the Bulga Complex Bulga Mine AEMR 2015

The "*Cumulative Pollution Scenario of Concern"* is theorised for South Drifting Air entering the Hunter Valley over the Great Dividing Range to the West at around PM10.5ug/m3, which rises to 15ug/m3 on leaving Muswellbrook Pollution, where it moves over Hunter Valley Operations Open Cut Mines perhaps rising to 25ug/m3 as it enters the more concentrated Mining Zone in the Bulga-Broke Micro Valley; - firstly the Wambo Open Cut and Underground Mines, Bulga Open Cut and Underground Mines, Warkworth Open Cut Mine, Mt Thorley Open Cut Mine, Bulga Open Cut and Underground Mine, where PM10 in the Broke Village with School would tend to fluctuate as a result from 50 to 75ug/m3 or above. A simular scenario exists for cumulative PM2.5 Air Pollution Drifting Patterns.

In recent years, in addition to the continuing threat of Drifting Mine Blasting Plumes, the implementation of Underground Mine "Methane" drainage, Ventilation Conversion, Flaring, and Power Generation all now along with Coal Seam Gas Flaring activities in the past in the area introduces the added Health Risk from Products of Combustion. The Explosive Risk in Buildings, Wells etc needs also to be considered.

SSHEG therefore identifies that additional Real Time Air Pollution Monitoring (TSP, PM10 and PM2.5) with Gases and Particulates Matter Sampling and Analysis located in the Broke School Environs is overdue for inclusion specifically as Bulga Compliance Licence Conditions to be used for Real Time Pollution Mitigation Controls at both the Bulga Open Cut and Bulga Underground Mine Operations.

Appendix 4 Critical Zones and Weightings does now adequately cater for the Mining and Power Station Air Pollution Emission Load released into these Valley areas.

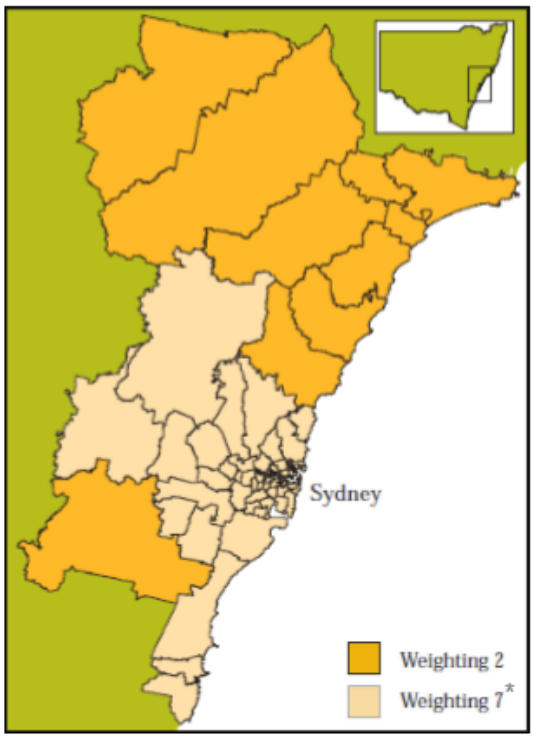
Appendix 4: Critical zones & weightings

Table A4a: Critical zones and weightings for *air pollutants*

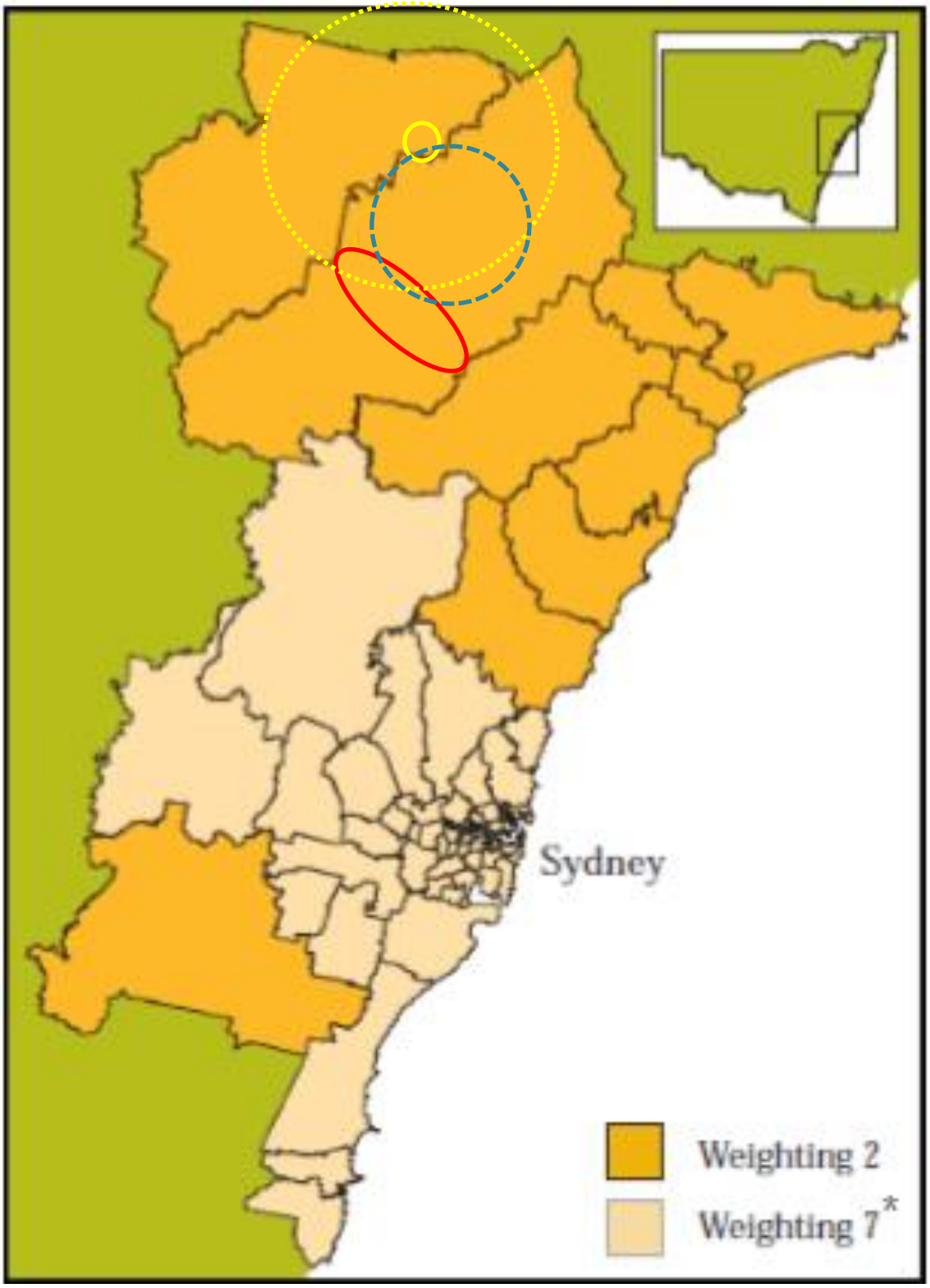
Pollutant	Local government areas (LGAs) in zone	Weighting
NO_x and VOCs	LGAs in the Sydney basin area* Blue Mountains City Kiama Shellharbour City Wollongong City	7 (or 28)*
NO_x and VOCs	Cessnock City Gosford City Lake Macquarie City Maitland City Muswellbrook Newcastle City Port Stephens Singleton Wollondilly Wyong	2

Note: CZ equals 1 for NO_x and VOC released outside the areas listed above and for all other air pollutants.

* A CZ weighting of **28** applies in the **Sydney basin area** during the summer months for NO_x and VOCs



The concentrated Power Station Stack Pollution Gases of SOx, NOx and COx along with the Toxic Fly Ash particulates in the central Region has identified zones where they have been reported as returning to ground as illustrated,



Specifically LBL Critical Zones and Weightings should be increased and applied for the Singleton Shire region separate to the rest to include the two distinct Coal Mining Pollution Emission areas; being the Cockfighters Valley Precinct (red), and the Camberwell Village and Maison Dieu areas(green). Power Stations Pollution mostly as Hunter Valley Blue Brown Haze or grounding outside the Yellow- orange areas.

SSHEG finds it hard to rationalise how the NSW EPA can reconcile their inaction regarding LBL for Mining Air Pollution Emission sources in the Hunter Valley. Perhaps this reflects the way that EPA Gov'n Acts do not consider the Humans as part of the Environment; while Health Authorities are effectively precluded from influencing EPA considerations except in exceptional cases.

Coal mining in the Hunter Valley

Figure 3-4 also shows that **coal mining** is emitting generally increasing loads of PM_{10} in the Hunter Region in particular. Coal production in the Hunter Valley is increasing and this is expected to continue (e.g. ACIL Tasman 2009 projected a 26% increase in coal movements production in the Hunter Valley-Newcastle between 2014 and 2024).

Box 3-2 below describes how this growth is likely to result in annual average $PM_{2.5}$ concentrations that exceed the **AAQ NEPM** (National Environment Protection (Ambient Air Quality) Measure) **standards for $PM_{2.5}$** in Singleton and Muswellbrook. Further information on particulates can also be found in Appendix D.

Neither coal mining nor $PM_{2.5}$ (as a stand-alone pollutant) are currently included in the LBL scheme. This review of LBL will be considering whether the range of pollutants and scheduled activities captured by the LBL scheme remain appropriate, or whether changes may be required (see sections 4.2.1 and 4.2.3). The EPA will consider a range of relevant information sources (including the results of relevant studies) and data when considering whether any additional pollutants or activities should be included in the LBL scheme.

Review of the Load-based Licensing Scheme: Issues paper

Appendix E: Data for selected charts

Figure 3-4: Trends in PM_{10} emissions (millions kg) to air by source in NSW, 2009–10 to 2013–14, National Pollutant Inventory

Source	2009–10 (Millions kg)	2010–11 (Millions kg)	2011–12 (Millions kg)	2012–13 (Millions kg)	2013–14 (Millions kg)
Mining for coal, Hunter* (non-LBL)	50.49	64.08	79.78	86.45	81.56
Mining for coal, NSW (except Hunter*) (non-LBL)	8.49	13.36	23.79	24.34	22.30
Mining for minerals, NSW (non-LBL)	14.86	17.24	17.57	21.36	20.53
Electricity generation, NSW (LBL)	3.08	3.44	4.02	3.31	4.60
Other activities, NSW (mix of LBL and non-LBL)	8.74	10.70	8.92	8.50	10.31

*'Hunter' includes: Dungog, Gloucester, Great Lakes, Muswellbrook, Singleton and Upper Hunter local government areas.

The above extracts, suggest that the NSW EPA has stood idly by while the Particulate Matter PM10 Emissions has risen in three Years by 60% and is

projected to continue at this rate over the coming years as Coal Production rate doubles. The EPA Dust stop Program is most likely responsible for the around 5% drop reported in 2014 along with the impact of NSW Planning Compliance Officers stationed at Singleton; while the existing so called Best Practice approaches are clearly unable to effectively curtail Mine Pollution Emissions further in the future..

In view of the Hunter Valley Mining Pollution prominence greater transparency is justified, in terms of Mine Annual Air Quality Reports to identify the extent of Pollution Mitigation achieved related to Load based Licencing, including detailed calculations of the LBL Formulae and Zone weightings utalised along with the cumulative mitigation LBL outcomes achieved.

The **pollutant weighting (PW)** accounts for the impact of the pollutant. Each assessable pollutant has been given a weighting, ranging from zero (salt discharged to open coastal waters) to 930,000 (pesticides and PCBs to all waters), to reflect its potential to cause environmental damage. The approach to developing weightings for assessable pollutants was based on internationally accepted Life Cycle Impact Assessment methodology (ISO14040). For water pollutants, weightings vary depending on the type of receiving water (open coastal, estuarine or enclosed). Refer to **Appendix 3** for pollutant weightings.

The pollutant **critical zone weighting (CZ)** accounts for the sensitivity of a specific geographical area of NSW to a specific pollutant. Such weightings are used where there is a need to reduce pollutants released to the environment that may contribute to an adverse cumulative impact. Some receiving environments are already constrained in their ability to assimilate particular types of pollutants; for example the Sydney airshed, where nitrogen oxides and volatile organic compounds are discharged from a range of sources and may result in exceedances of ground-level ozone standards. Refer to **Appendix 4** for critical zones and weightings.

The **pollutant fee unit (PFU)** is the dollar value component of the load fee calculation formula and it is applied consistently regardless of the pollutant or activity in question. Increasing PFU amounts are included in the Regulation to ensure that the fee is not eroded by inflation. It is currently set at $44.78 (for the 2014–15 financial year).

The **more complex formula** is applied when a licensee is considered to be a 'poor performer' under the scheme. This formula is used where the licensee's assessable load of a pollutant is greater than a pre-determined **fee rate threshold (FRT)**.

Formula B: $$\text{Pollutant load fee (\$)} = \frac{(2AL - FRT) \times PW \times CZ \times PFU}{10{,}000}$$

The licensee determines the **FRT** by multiplying their production (for example, tank capacity or electricity generation) for the reporting period by the relevant FRT **factor** (an emissions intensity threshold set out in Schedule 1 of the Regulation for each pollutant and activity). If the licensee's assessable load of the pollutant exceeds the FRT, the licensee must pay double the 'assessable load' fee for the portion of emissions that exceed the FRT.

Box 1-1: Objectives of the LBL scheme as set out in clause 13 of the POEO General Regulation

(a) To provide incentives to reduce the load of pollutants emitted based on the polluter pays principle and to do so within an equitable framework.
(b) To reduce pollution (in particular, assessable pollutants) in a cost-effective and timely manner.
(c) To give industry incentives for ongoing improvements in environmental performance and the adoption of cleaner technologies.
(d) To provide incentives that are complementary to existing regulation and education programs for environment protection.

The extent of the **World Health Organisation** deliberations of the Global Burden of Non Communicable Diseases placed Air Pollution and Particulate Matter carcinogenicity findings on the same Priority Health Page as the 2008 Singleton Shire Community associations of Air Pollution and Residents Diseases. More importantly, since the WHO Carcinogenicity declaration in Oct 2013, the WHO by May 2015 focused on Minimisation with its "Roadmap to Answers to the very Diseases identified in 2008 in the Hunter Valley by Singleton Residents and children particularly for Near Neighbours Families to Open Cut Mining".

While the NSW EPA LBL Objectives as outlined in Box 1-1 above suggest incentives to reduce the load of Pollutants emitted in Hunter Valley Mines, currently the Mines consider its their right to operate as long as they Comply with their Annual and Daily Average PM10 levels.

With respect to the more appropriate Community Disease associated Particulate Matter PM2.5, NSW EPA has not been able to come to terms in the Hunter Valley with this change in International Pollution Monitoring Practices and the Chemical Speciation, Particulate Sampling and Microscopy Analysis that defines modern Air Quality and Community Health understanding. NSW EPA LBL Monitoring and Mitigation initiatives of PM2.5 is needed.

The Hunter Valley Atmosphere is a mixture of Air constituent Gases - O2 - N2 – Ar – water vapour - trace gases; Pollutants - Gases , Ozone, Dioxin – Vapours - liquid droplets – Composite Particulates – Fly Ash, VOC's - aerosols, Pollens, Spores, Fungi, and other Biological materials and Organisms.

The Time of Day Measurement variations of each component part of the Air is the mixture the Community breaths; PM40, PM10, PM2.5, PM1 & PM0.1, and it is not unreasonable to expect the above constituent Measurements would form the level of detail knowledge needed to establish a definitive Air Composition and Speciation Analysis, from which the Health Risk considerations may be evaluated, leading to better targeted Pollution Mitigation Controls to safeguard the Health of the Community.

Thanking you in anticipation of your acknowledgement

Dr Neville Hodkinson
Singleton Shire Healthy Environment Group

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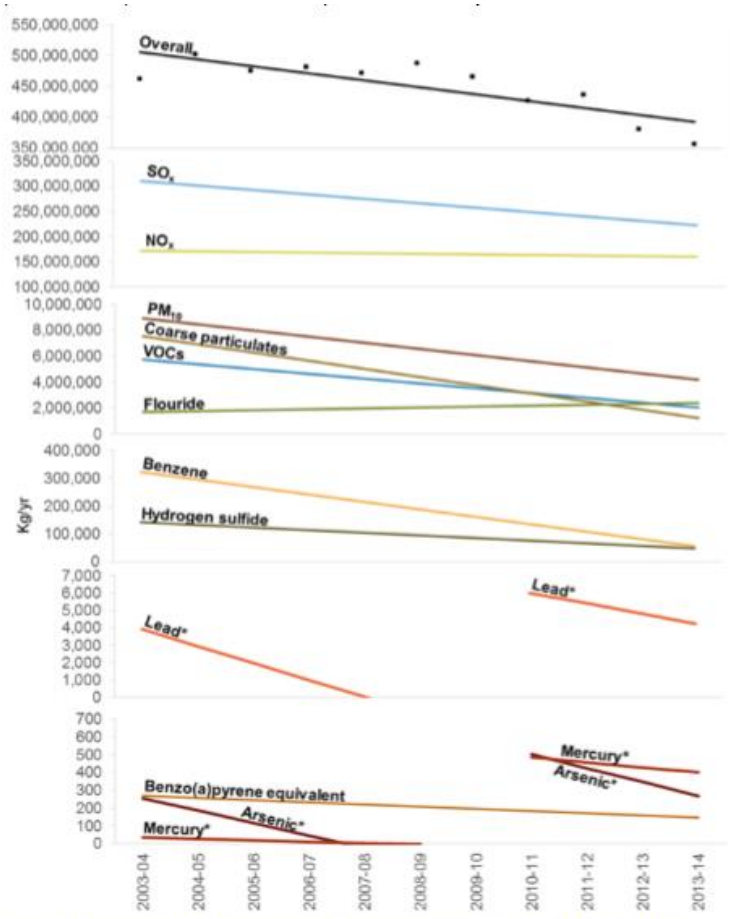

Figure 3-1: Emissions of LBL assessable air pollutants in NSW from 2003–04 to 2013-14, by mass (linear trend lines)

3.4.5 If LBL pollutant loads are decreasing, what does this mean for the future of the LBL scheme?

NSW still has many **significant and complex environmental issues** that a strengthened and better targeted LBL scheme may help to address. The following outlines how standard regulatory approaches are producing diminishing returns and cumulative impacts are expected to develop or worsen unless new complementary environment protection measures are put into place.

Increasing loads of PM_{10} emitted to air from mining

Total loads of LBL assessable pollutants emitted to NSW from LBL premises have generally been reducing over the last eleven years (see Figure 3-1 and Figure 3-2); however, this is not the whole picture. Other data sets illustrate that emissions from some industrial activities are growing significantly and suggest that cumulative impacts have developed in specific geographic areas. For example, while PM_{10} emissions to air from LBL premises decreased from 2003–04 to 2013–14, NPI data from 2009–10 to 2012–13 shows an increase in PM_{10} from mining; coal mining in particular, with a small decrease in PM_{10} emissions in 2013–14 (see Figure 3-4 below and Figure 4-1). Mining is not currently captured by the LBL scheme, so these emissions are not reflected in the LBL trend data.

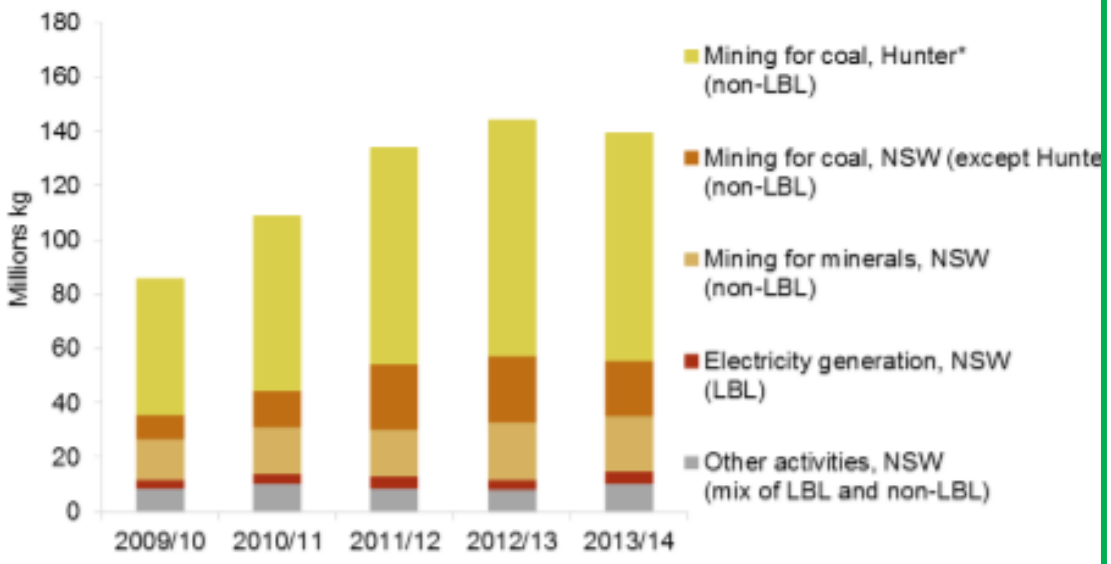

Figure 3-4: Trends in PM_{10} emissions to air by source in NSW, 2009–10 to 2013-14, National Pollutant Inventory [7]

[7] *'Hunter' in figure 3-4 includes: Dungog, Gloucester, Great Lakes, Muswellbrook, Singleton and Upper Hunter local government areas. See Appendix E for a table of data for Figure 3-4

The LBL scheme aims to encourage cleaner production through a 'polluter pays' principle that requires some environment protection licensees to pay part of their licence fees based on the load of pollutants their activities release to the environment.

Box 3-2 Challenges meeting the $PM_{2.5}$ standard in Muswellbrook and Singleton

Following the recent review of the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM), Commonwealth, state and territory Environment Ministers met on 15th December 2015 and agreed to new Ambient Air Quality Standards for $PM_{2.5}$ and an annual average Ambient Air Quality Standard for PM_{10} as part of the National Clean Air Agreement.

$PM_{2.5}$ is a subset of PM_{10} and is mainly produced from combustion processes; e.g. on-road and non-road vehicle exhaust (including mine machinery) and wood fires (see Box 4-1 and Appendix D for more detail).

The new AAQ NEPM Ambient Air Quality Standards for $PM_{2.5}$ are 8µg/m^3 (average annual – i.e. long term) and 25µg/m^3 (24-hour – i.e. short term). Previously the AAQ NEPM only prescribed an annual $PM_{2.5}$ 'Advisory Reporting Standard' of 8µg/m^3 (not an ambient air quality standard).

Predictive modelling commissioned by the EPA (Pacific Environment 2014) shows that an annual average $PM_{2.5}$ Ambient Air Quality Standard of 8 µg/m^3 is unlikely to be attained in Singleton and Muswellbrook into the future as coal production in the Hunter Valley is expected to continue to increase (e.g. ACIL Tasman 2009).

The modelling also shows that all man-made particulate emissions need to be reduced by 50% to meet the new standard. Adding mines to the LBL scheme and including $PM_{2.5}$ as an assessable pollutant could be part of the solution to ensuring that any AAQ NEPM Ambient Air Quality standard for $PM_{2.5}$ can be met in Singleton and Muswellbrook into the future. Other initiatives may include measures applied through the environmental planning regime and incentives for upgrading domestic wood heaters to cleaner alternatives.

Reducing human exposure to $PM_{2.5}$

LBL also has a role in providing an increased and ongoing incentive for licensees to reduce emissions of $PM_{2.5}$ emissions to air more generally by bringing $PM_{2.5}$ into the LBL scheme. $PM_{2.5}$ has human health impacts at even low concentrations (this is further discussed in Section 4.2.1). Relatively higher pollutant fees for $PM_{2.5}$ could be charged for licensees in areas located around highly populated areas and areas where the new AAQ NEPM Ambient Air Quality standards may not be met in the near future due to pressures from industrial activities.

Secondary $PM_{2.5}$ particulates

The formation of secondary $PM_{2.5}$ and its contribution to regional air quality is another complex issue where standard regulatory approaches need to be complemented by other measures. Primary $PM_{2.5}$ is emitted directly from stationary and mobile fuel burning activities (such as coal-fired power stations and on-road and off-road diesel vehicles). Secondary $PM_{2.5}$ is formed in complex atmospheric reactions from precursors such as sulfur dioxide,

nitrogen oxides, ammonia and reactive organic gas emissions. These reactions generate secondary $PM_{2.5}$ in the form of sulfates, nitrates and carbon.

Coal-fired electricity generation emits $PM_{2.5}$ **and** the secondary particle precursors sulfur dioxides (SO_2) and nitrogen oxides (NO_X).

A recent study by The Australian Nuclear Science and Technology Organisation (ANSTO 2012) analysed eleven years of air sampling data collected in the Richmond area of **Western Sydney** to determine the contribution of NSW coal fired power stations to loads of $PM_{2.5}$ in the greater Sydney metropolitan area. It found that NSW power stations, despite being many kilometres outside the greater Sydney metropolitan area, still had a significant impact on the mass of $PM_{2.5}$ measured in Richmond; i.e. within the metropolitan area. Up to 50% of the total mass of sulfate (secondary $PM_{2.5}$) and 18% of the total $PM_{2.5}$ in the greater Sydney region can be attributed to emissions from NSW's eight coal-fired power stations.

Increasing the LBL incentives for licensees to reduce emissions of SO_2 may assist to address this issue.

1.3 Purpose and objectives of the LBL review

The purpose of the LBL review is to ensure the scheme is fulfilling its potential in achieving emission reductions effectively and efficiently.

The objectives of the review are to:

- assess whether changes are needed to ensure the LBL scheme achieves its objectives as per clause 13 of the POEO General Regulation (see Box 1-1)
- improve the effectiveness of the LBL scheme in driving reductions in air and water pollutant emissions, where required
- improve the efficiency and ease of use of the LBL scheme for licensees and the EPA
- ensure the LBL scheme has a complete range of tools.

Box 4-1: Particulate matter and LBL: how an improved understanding of pollution may lead to changes in LBL

Under LBL, particulate matter to air is classified as 'fine particulates' (PM_{10} – less than 10 micrometres (µm) in diameter, including the internationally recognised PM_{10} and $PM_{2.5}$ fractions) and 'coarse particulates' (greater than 10 µm in diameter).

PM_{10} is associated with significant health impacts, including a variety of lung and heart problems. Both long-term (years) and short-term (hours or days) exposure to PM_{10} has been linked to health problems. Size determines the extent of penetration of particulates into the respiratory tract (with very small particles even able to enter the blood stream), which directly influences the potential health effects. While there is no safe level of $PM_{2.5}$ exposure, the risk of health impacts decreases with lower levels of exposure (WHO 2000).

The latest evidence shows that ambient levels of PM_{10} and $PM_{2.5}$ can exceed AAQ NEPM Ambient Air Quality standards in both rural and urban areas (see DECCW 2010a, EPA 2012a, Pacific Environment 2014). Therefore, they are pollutants of high concern in those regions. The AAQ NEPM was recently reviewed and varied on 15 December 2015, An environment protection standard for $PM_{2.5}$ was introduced, along with a new standard for PM_{10}.

The LBL review will consider whether to split the current 'fine particulates' category into $PM_{2.5}$ and $PM_{2.5-10}$, to reflect the weight of scientific evidence and growing concern around the significance of the health impacts associated with the $PM_{2.5}$ fraction. This would enable the EPA to specifically target $PM_{2.5}$ where evidence shows that this is warranted (see Box 3-2), including potentially assigning a higher pollutant weighting.

It is now widely acknowledged that concerns about particulates larger than PM_{10} are generally related to amenity rather than serious health impacts. Coarse particulates make up only a very small proportion of overall LBL air emission fees (<1%). The review will consider whether to remove coarse particulates from the LBL scheme, thus enabling the EPA to focus its LBL incentives on smaller particulates. An additional benefit of this approach is that actions which address $PM_{2.5}$ and PM_{10} often also address coarse particulates.