Submission opposing

Development Application SSD-5156

The Rocky Hill Coal Project

Prepared by the Forbesdale Resident Action Group

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Prepared by Forbesdale Resident Action Group

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Looking south over Forbesdale, November 2012

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Forbesdale Resident Action Group Members

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Mr & Mrs Jackson and family, 85 Fairbairns Road
Ms Mills, 12 Forbesdale Close
Mr & Mrs Morris, 10 Forbesdale Close
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Mr & Mrs Reynolds and family, 19 Grantham Road
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Personal letters to the Director-General are included as part of this documentation in **Appendix A**

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Position Statement

The Forbesdale Resident Action Group (FRAG) was formed as a direct consequence of Gloucester Resources Limited (GRL) indicating its intention to seek approval for the Rocky Hill open cut mine just hundreds of metres from our homes.

We know there are other groups within the Gloucester Valley who will making submissions in relation to the Rocky Hill project and will be writing about the many negatives associated with this particular project and providing evidence as to why this project shouldn't proceed. We fully support those organisations and individuals in their efforts and know they will provide wider depth and analysis of many of the issues than we are able to.

FRAG doesn't attempt to duplicate the content of those submissions, rather we wish to draw your attention to the individuals and the community which comprise Forbesdale and illustrate the effect the proposal will have on us.

The survival of this small, close knit and social community is under direct threat. Despite any justification of the project on the grounds of State or National interest, this community will not survive an open cut mine so close to our homes and we deserve the opportunity to either be able to continue our lives without disruption, or to be provided with the tools for escape.

The 33 properties which comprise the community of Forbesdale, as defined in this document, will be the most negatively affected of any in the Gloucester Valley as a result of Rocky Hill Coal Project. If given approval the Rocky Hill mine will have direct and profound impacts on the health and economic future of the Forbesdale community.

With the closest home being only 900 metres, and the Forbesdale community all within 2000 metres, from the proposed mine we are all well within the 5 kilometre health impact zone where the most damage to health will occur. As our submission demonstrates, local climactic conditions will have impacts on dust, noise and vibration, worsening the situation.

Apart from physical impacts on health, the Forbesdale community is already experiencing mental impacts such as anxiety, depression, insomnia, worry, anger and resentment. We are already placing an extra burden on the health system, before any approval is given!

There are no "compliance with best practices" or "reasonable and feasible measures" or "mitigating practices" which will enable Forbesdale residents to continue to live a healthy life, even if all dust, noise, blasting and other practices fall within "acceptable limits".

The economic impact is being experienced now, and it is brutal. The inability to sell our properties, even at lowered prices, has meant that we are all locked into this nightmare. No homeowner can afford to sell their home at a loss. The only purchasers in the area have been miners such as GRL, Yancoal and AGL and they are only purchasing the farmland which they want to dig up or put CSG wells on. Despite being so close to the proposed mine, GRL has not even bothered to meet with us.

Within the GRL EIS there has been considerable effort, as there rightly should be, to explore the impact on the terrestrial and aquatic ecologies that will be affected as a result of the Rocky Hill Coal Project. Ecotone Ecological Consultants and Cardno Ecology Lab between them contributed nearly 500 pages to the EIS and determined there would be little impact on these communities.

But we cannot over-emphasis that there has been absolutely no consideration in any part of the EIS to the human species living in Forbesdale.

It is in this context, supported by the following pages of our submission, that FRAG requests:
That the application by GRL for the Rocky Hill Coal project be REFUSED.

This request is not made lightly. We realise that the Government believes there is merit in resource extraction however we don't believe that ordinary Australians – hard-working, tax-paying, law-abiding citizens – should be collateral damage in the quest to export coal.

Forbesdale is a unique place, its topography and geography within the Gloucester Valley provides a visually stunning location. This very same topography and geology will be the cause of amplification of noise and the particulate migration which will occur as a result of mining operations in the valley.

With a median age of 65 years the Forbesdale population is ageing and a number are retired from paid employment. These residents tend to spend more time at home and some suffer medical conditions common to that age group. For many, Forbesdale represents a pleasant and peaceful existence, a caring community and a place to enjoy the benefits of their years of contribution to Australian society.

We provide you with evidence of our situation in this submission and we emphasise the close proximity of our homes to the proposed mine. We draw your attention to the recent ruling in relation to the Warkworth mine extension, and to recent reports which state that mining companies exaggerate the economic and employment benefits of their projects whilst downplaying effects on health of people living close by and on the environment. If, despite all this, it is considered that the Rocky Hill mine should be approved then there is a simple and cost-effective solution.

To stop the residents of Forbesdale becoming collateral damage, FRAG insists that the following condition be included in any mine approval.

1 a) That the area of Forbesdale, as defined by our submission, be placed in a Zone of Affectation or Acquisition Zone with the mine owner being required to purchase properties at the land owners request.

1 b) Such purchases to be at a value consistent with there being no mining activity at Forbesdale and be subject to a 30% buyer's premium [1]. This premium is to cover all relocation expenses and be in recognition of the emotional loss and forced disruption to residents.

1 c) This condition be effective immediately upon approval of the Rocky Hill coal project, regardless of the actual start date of the project.

These conditions are fair and reasonable and allow residents to move forward with their lives, rather than being in the state of limbo which we have already experienced for a number of years.

1 The 30% premium is to cover expenses such as but is not limited to:
- property valuation by a certified valuer.
- all legal costs incurred in the sale of the property.
- all legal costs incurred by the seller in the purchase of a new property.
- stamp duty payable upon the purchase of a new property.
- all costs incurred by the seller in the physical relocation from the old property to the new.

There has been debate amongst the members of FRAG as to whether we should consider the unthinkable – that the mine is approved and that we are condemned to live with it – and ask for further conditions to be placed on the proponents should that scenario eventuate.

Forbesdale residents are adamant that there really are only two options for them, both of which have already been outlined above. Most don't even want to contemplate any other scenario.

It is therefore with great reluctance that we are listing a number of conditions which we believe should be included in any Rocky Hill mine approval. We only list these as we don't believe we would be given further opportunity to have a say in regards to the mine application should the worst case scenario be realised.

Remember that the closest home is only 900 metres from the open cut mine and many of us are within 1,500 metres. Being in a rural area our background noise levels are very low and any change, even within allowed limits, will have significant impacts.

Should the unthinkable occur, we request that the following conditions be placed on the operations of the Rocky Hill mine:

1. Forbesdale residents to be offered the opportunity of an annual medical check in line with the industry benchmarks for employee/contractor health requirements. The medical check is to be conducted by a medical practitioner of the residents choosing with the cost being borne by GRL. The content of the medical check to be determined by consultation between the resident's medical practitioner and persons familiar with the procedural testing of mine employees. The content of the medical check would reflect the age, existing medical conditions and general health of the resident enabling a baseline to be established for ongoing monitoring. The results of the health checks are to be the property of the resident.

2. Independent annual testing of water quality in tanks used as potable water. Testing to be carried out by Council at the mines expense.

3. The proponents shall, at their expense, provide regular cleaning of water tanks (at least yearly) and supply water tank filters, or first flush diverters, for Forbesdale residents.

4. The proponents shall create a fund to compensate Forbesdale residents for the replacement of water tanks and guttering which do not reach their expected lifespan due to corrosive effects from particulate matter in the mine dust.

5. Forbesdale residents shall have one representative on the Rocky Hill CCC, that person nominated by FRAG.

6. A complaints line to be set up which is monitored by a third party. Complaints which are required to be lodged direct to mines can lead to friction between the proponents and residents, having a third party can diffuse this situation.

7. Residents within a 2km radius of the Rocky Hill mine are to be notified 24 hours in advance of any blasting. Such notice to be via mail or phone. It is not satisfactory that the onus must be on residents to keep themselves informed, at their own expense.

8. At the owners request and mines cost all properties be modified by way of:

- Ducted air conditioning
- HEPA air filtration
- Double glazing of windows

And natural barriers be provided by way of

- Tree planting up to 100 per property (type and location specified by owner, planting to be done by mine. Any failures within the first 5 years be replaced by the mine)

All of the above to be done with no agreement to be entered into preventing the property owner being in opposition to the mines activities, seeking compensation or lodging complaints about mine non-compliance.

9. Independent property audits to be carried out by licensed persons (at the mines expense) to establish baseline building condition should any claims arise due to blasting damage or corrosion due to coal dust.

10. Three air and noise monitoring and sampling sites to be established at Forbesdale with noise and PM2.5 monitors at mines expense. To be independently monitored by Council but monitoring paid for by the mine.

11. Noise and dust levels set are to be finite with no allowable "over limits"

Financial Penalties to be imposed for **ANY** breach of noise or dust levels recorded regardless of reason or reporting by community individuals. $10,000 per breach into a community fund administered by Council.

Persistent breaches require that operations cease until the cause is defined and repairs, modifications or changes made to operational procedures to ensure breach doesn't re-occur. Reoccurrence after modification or repair to carry $100,000 penalty and cessation of operations.

12. That the approval to mine be granted for 16 years (1 construction, 13 operation, 2 rehabilitation) as requested by GRL +10% equalling no more than 18 years. A time penalty of $10000 per day be paid into the community fund for

- Operational activity beyond 14 years (+10%)
- Rehabilitation activity beyond 18 years.

13. Approval be granted for the only for the extraction of the 16.9 million tonnes of product coal as specified by GRL in the EIS as being available with no increase allowable if new coal reserves are discovered.

14. Granting of approval requires relinquishment of the remaining portion of Exploration Licence to ensure no further expansion beyond the defined boundaries of this application.

15. Infrastructure elements affecting the Visual Amenity of Forbesdale (Coal Loader, Overland Conveyor, Visibility Barriers etc) are to be constructed as specified in the EIS without modification for any reason, and within the time frames specified (10% allowance). Failure to comply with construction details (eg the height of visibility barriers) carry penalties of $10000 per day into the community fund until rectified or completed.

The members of Forbesdale Resident Action Group sincerely hope that the Director General refuses the application for the Rocky Hill Coal Project.

If not, then the residents of Forbesdale deserve to be given the ability to relocate and escape the Rocky Hill nightmare by having the area placed in an Area of Affectation or Acquisition Zone.

All other scenarios are unthinkable and places each one of us in an utterly untenable position.

Forbesdale Resident Action Group

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1. Introduction

The Forbesdale Residents Action Group (FRAG) was formed in April 2012 by the residents of the Forbesdale area in response to Gloucester Resources Limited's application to the Director General of the NSW Department of Planning and Infrastructure for his requirements in regards to the proposed Rocky Hill Coal Project. This confirmed the resident's worst fears that, in all probability, an open cut mine would be operational within a few hundred metres of their homes.

It was decided by the group at this meeting that they would follow three courses of action:

- To try and prevent the approval of the Rocky Hill mine, or any other mine on the area covered by Exploration Licence 6523.

- To request the Director General to impose a condition of consent on the Rocky Hill Coal Project which requires the proponent to purchase properties within the FRAG membership area.

- To collect baseline data in the areas of health, environment and infrastructure which could be used in the future, should the mine be approved. This baseline data would provide proof of loss and would be used to take action when the inevitable disputes would arise with the mine owners, GRL or others, over violation of conditional levels, operational limits and future health issues affecting Forbesdale residents.

The purpose of this submission is to explain the compelling reasons why the Rocky Hill Coal Project should not be approved. And to explain why, if the project is approved, that there must be a condition of consent requiring the proponent to purchase Forbesdale properties.

Please note that for the purpose of this document the term "FORBESDALE" refers to that area encompassed by the FORBESDALE RESIDENTS ACTION GROUP rather than the geographical locality, unless stated otherwise.

It is important to note that Forbesdale is different to Gloucester in many ways, particularly in regard to demographics. Demographic and geographic assumptions and evidence about Gloucester in general cannot be translated to Forbesdale.

The proximity to the proposed Rocky Hill Coal Project, with all the properties within 2000 metres and the southern boundary shared with the Rail Load Out Facility, the topography providing an elevated position above the proposed operational area and a socio-economic structure vastly different to Gloucester and NSW put Forbesdale, and its residents, in a very unique and disadvantaged position.

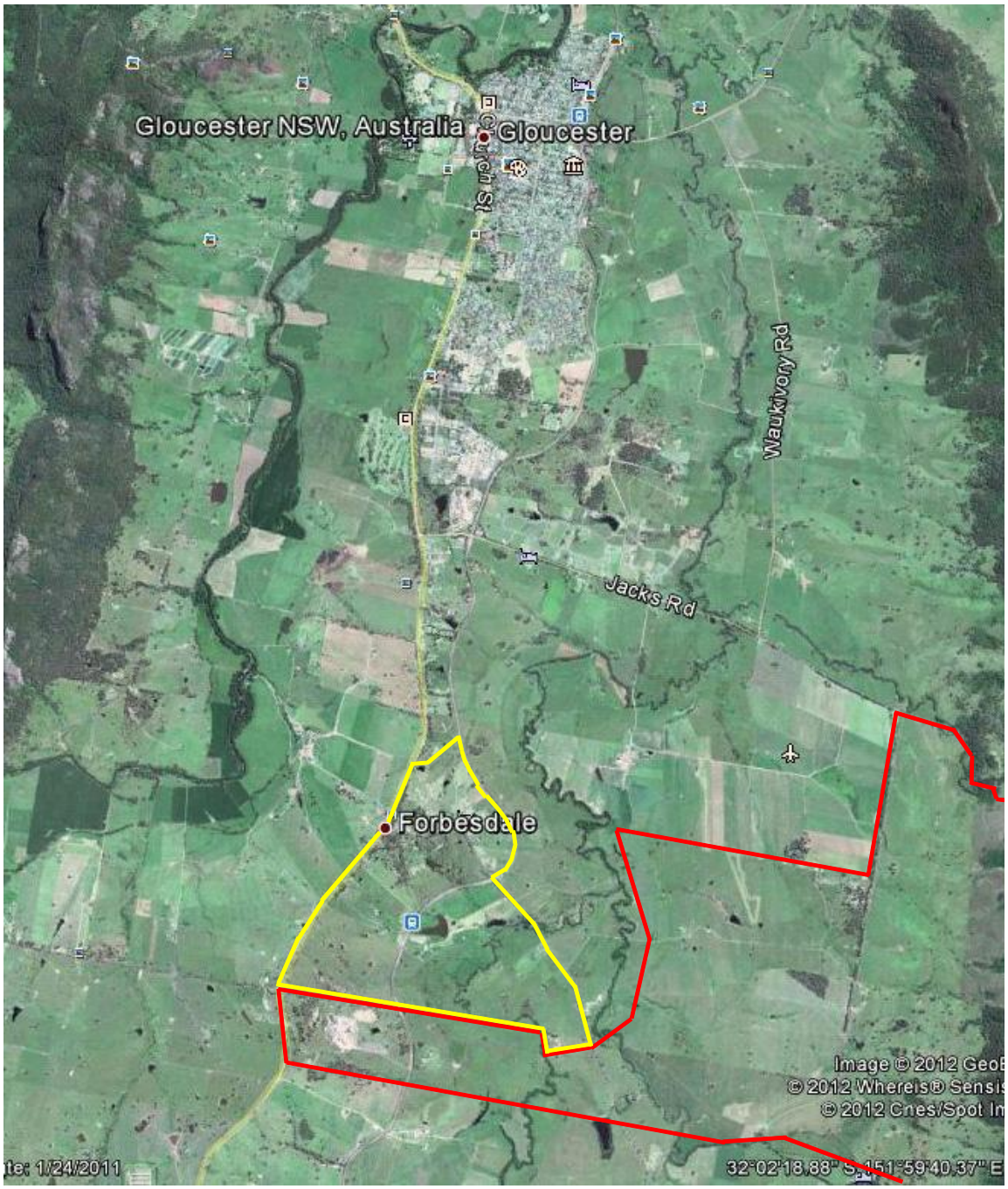
The concerns of the Forbesdale Residents fall broadly into four areas.

- The effect on the Socio-Economic future of the residents of the Forbesdale community.
- The effect of Dust, in particular PM_{10} and $PM_{2.5}$ particulate matter, on their future health and wellbeing.
- The effect of noise on their health through sleep deprivation.
- The total loss of visual amenity due to the replacement of the beautiful Gloucester Valley vista with the spectre of the open cut mine and attending infrastructure.

1.1 The Location and Topography of Forbesdale

The Forbesdale Residents Action Group is fully aware that many of the topics covered in this document have far more reaching effects than just the Forbesdale area, however, the location of the area and its topography in relation to the proposed Rocky Hill Coal Project puts Forbesdale in a unique position to be affected by the mine and its operation.

Figure 1.1 Location of Forbesdale in Relation to Gloucester and the Proposed Rocky Hill Coal Project Operational Area.



Forbesdale Area

Proposed Rocky Hill Coal Project

1.1.1 The Location of Forbesdale

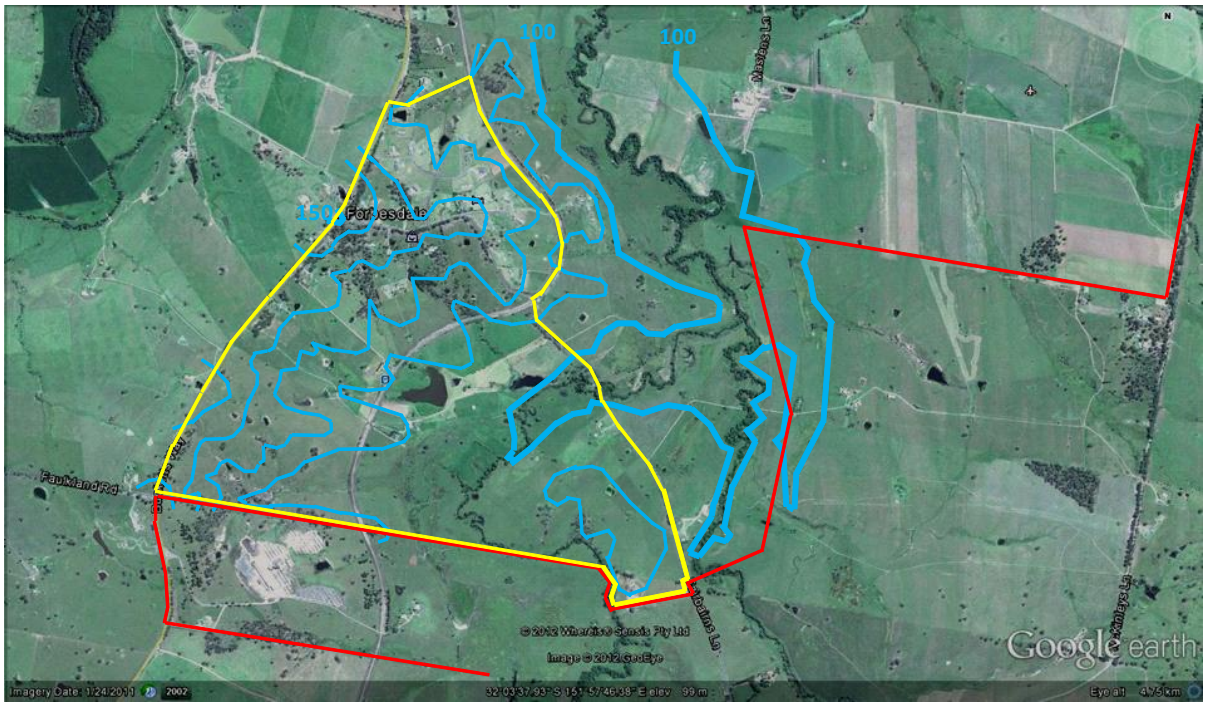
The Forbesdale area is situated some 3km south of the Cattle Sale yards, which broadly represents the southern residential area of Gloucester, and 5km from the main shopping street and Post Office.

It is bounded on the western side by the Bucketts Way, the main road access into the Gloucester Valley from the south. The southern boundary extends from the Bucketts Way to Fairbairns Road along the northern boundary of the proposed Rocky Hill Coal Mine operational area. Then Fairbairns Road from the northern boundary of the proposed Rocky Hill Coal Mine operational area to the intersection with the main northern railway line and then the railway line to the intersection with the northern boundary of the "Forbesdale Estate" forms the eastern boundary. The northern boundary of the "Forbesdale Estate" forms the northern boundary.

1.1.2 The Topography of Forbesdale

Forbesdale encompasses a spur of land that protrudes at its maximum 1800m from the north-south ridge line that separates the Avon and Gloucester River floodplains, to the Avon River. The ridge line is characterised by The Bucketts Way travelling along its length deviating slightly eastward at the northern end.

Figure 1.2 The Topography of Forbesdale.



Forbesdale Residents Action Group area
Contours at 10m spacing 100
Proposed Rocky Hill Coal Project operational area

Figure 1.2 represents a compilation of a Google Earth image of the area overlayed with contours obtained from CMA maps.

The ridge line varies in elevation from 143m AHD at the boundary with the Rail Load Out Facility to the south to 125m AHD at the northern boundary of "The Forbesdale Estate". The maximum elevation of 150m AHD occurs at the intersection of The Bucketts Way and Fairbairns Road. The Avon River's elevation around the spur lies between 100-101m AHD with the western boundary of the proposed Rocky Hill Project lying slightly to the east at an elevation between 101-105m AHD. The Rail Load Out Facility at the southern boundary of the Forbesdale Residents Action Group area sits atop a similar spur to the Forbesdale Spur creating an amphitheatre effect between the two.

The Eastern boundary of Forbesdale is the Northern Railway Line and its elevation lies between 110-114m AHD as it transits the boundary.

The significance of the topography will be evident later in the detailing of dust and noise issues that affect the FRAG area.

1.2 The Significant Issues Affecting Forbesdale

A summary of the issues is provided below with detailed analysis of the issues provided in the body of the documentation.

1.2.1. The Socio-Economic Impact on the Residents of Forbesdale

An understanding of Socio-Economic impact on the Forbesdale residents of the Rocky Hill Coal Project first requires a basic understanding of the premise that on a number of levels, Forbesdale cannot be compared with Gloucester.

The transferring of socio-economic parameters used for Gloucester to Forbesdale would be completely invalid. The aspect of proximity to the mine, the properties of Forbesdale and the population demography of the resident and non-resident owners are significantly different to Gloucester. As a result the socio-economic impact on Forbesdale will be significantly different.

Forbesdale is the closest residential area to the Rocky Hill Coal Project. The eastern boundary of Forbesdale and the western boundary of Gloucester Resources Limited properties are separated only by a railway line and a road. The southern boundary of Forbesdale is coincident with the Load Out Facility and Conveyor Corridor boundaries. The homes of Forbesdale all fall within 2000m of the mine.

The population is significantly older with a median age of 65 years compared to Gloucester's 46 years. Sixty percent of the population are over 55 years of age, they are married and for many, one or both of the couple, are retired. They own the place where they live.

The socio-economic impact on Forbesdale revolves around loss of their property value, loss of their health and loss of their lifestyle. Their age compounds the effects.

The advent of Gloucester Resources Limited and the subsequent intent to open The Rocky Hill Coal Project has seen property values in Forbesdale decline by up to 40%.

The estimated "No Mine" value of Forbesdale is calculated at $20,200,000.

The estimated current value is between $12,000,000 and $14,100,000.
The financial loss to Forbesdale residents is between $8,200,000 and $6,100,000.

This loss of value combined with no property sales, at any price in the area in the last four years, has given the community the sense of being "locked in" and unable to get away from the health issues and loss of lifestyle the Rocky Hill Coal Project will cause. This has caused deep concern and depression amongst the community with seemingly no way out other than to:

- walk away from their only asset and become homeless, or rent for the rest of their lives at a great financial sacrifice which will impact their health and wellbeing (and make them more dependent on the government)

or

- stay and accept the suffering caused by the loss of health, both physical and mental.

For most, the option of staying is not really an option. Their current state of health indicates that the burden of living next to an open cut coal mine will be a death sentence.

More information is contained in Section 2.1.

1.2.2 The Effect of Dust on the Residents of Forbesdale

The term dust, as perceived by the wider population, is an aesthetic annoyance removed with a vacuum cleaner or duster. It is however, as a by product of mining operations, a far more sinister element.

Dust refers to particulate matter, Totally Suspended Particles (TSP), with a diameter of 30µm (PM_{30}) or less containing sub groups of PM_{10} and $PM_{2.5}$ 10µm and 2.5µm respectively, far less than a fine grain of sand (90µm) or a human hair (70µm).

Whilst the coarser particulate matter is the cause of amenity issues the finer particulate matter, that below PM_{10}, has been cited in countless medical studies and departmental papers as being the cause of a wide range of medical impacts. These include asthma, cardiopulmonary disease, chronic obstructive pulmonary disease (COPD), hypertension, kidney disease, heart attack and stroke. The effect of this is most notable in the older and younger demographics. Just as with cigarette smoke there is no safe level of exposure to these particles.

The different sizes of particulate matter have different origins in the mining operation. The PM_{10} and over produced as a result of mechanical activity, the under PM_{10} produced by the combustion of fuel and secondary chemical reactions due to blasting. The size also determines the Atmospheric Lifetime, or the particles ability to stay suspended in the atmosphere, ranging from minutes to weeks and allowing for travel distance of hundreds of metres to thousands of kilometres.

The particles ability to travel away from the source is effected by several factors:

- The height of projection at the source:

  The height of projection can vary from a few metres to several hundred metres depending on the method of generation. The greater the height of projection the longer and more pronounced the exposure to the wind. This allows for a greater potential to travel away from the source.

- Physical barriers that may inhibit travel from the source:

  Artificial barriers and windbreaks have little or no effect on the travel of particulate matter. These barriers are for other purposes such as visibility, noise or dumping grounds for overburden and at best provide a temporary resting place until the particles are regenerated by another event.

  Natural barriers such as the areas topography have the effect of creating areas of deposition. Rising landform and natural vegetation reduce the ability of the atmosphere to continue to carry its particulate load leading to deposition

- Wind, both in its strength and direction from the source

  The major impact on the migratory ability of particulate matter is wind. The strength determines how much and how far it will travel, the direction determines where it will go to.

  Detailed wind records were kept for Forbesdale to determine the effect of the Forbesdale Spur on the direction and velocity of the wind in comparison to that at the Gloucester Resources Limited meteorological station on the valley floor.

Wind is never constant and as such long term averages do not give a true representation of the way the wind can vary in direction and force over short periods. Readings were taken at 9.00am and 3.00pm, in accordance with the Australian Standard, (a total of over 1800 readings) from 5 stations within a 400m radius on the Forbesdale Spur. These readings consistently indicated considerable variations in strength and direction of the wind at identical times around the spur.

Gust measurements were taken as these have the most profound effect on particulate migration and provided the best time snapshot of the area.

Considerable variation was found between the Forbesdale Spur averages for Spring and Summer and those from the Gloucester Resources Limited meteorological station located on the valley floor.

The combination of dry weather conditions, high temperatures and strong winds gives rise to the ideal conditions for the production of particulate matter and its ability to migrate. When the wind blows from the East to South quadrant this gives rise to the “Perfect Storm” for Forbesdale.

These conditions of no rain, temperatures in excess of 25 degrees and wind in excess of 3m/s (10.8kph) existed at 3.00pm on a total of 11 or 12.1%, of the 91 days in spring

(September, October and November) 2012. This figure increased dramatically to 29 or 32.2% of the 90 days of summer (December, January and February). Overall, 40 or 22.1% of the days during the six month period would be considered **"Perfect Storm Days"**

The end result of the effect on Forbesdale is dependent on the beginning. How much particulate matter will be produced by the Rocky Hill Coal Project? Direct comparison with the adjacent, Yancoal owned, Stratford Mining Operation is possible due to their proximity, similar topography, geology, size and method of operation. Figures are based on the Stratford Mines annual report, the recently submitted EIS by Yancoal seeking extensions to the Stratford Mine, the Stratford Mines listed output on the National Pollution Inventory and the Gloucester Resources Limited projections of output for the Rocky Hill Coal Project. They indicate that over 1,500,000kgs or 1,500 tonnes of TSP (PM_{30}) particles including over 820,000kgs or 820 tonnes of PM_{10} particles will be produced annually

The wind that would affect Forbesdale comes out of the East to South Quadrant. The Gloucester Resources wind rose would suggest that this occurs for approximately 21.6% of the time at greater than 3m/s. The wind roses of the Forbesdale Spur would suggest a higher proportion of 37.5% at the same velocity.

If a midpoint of 29.55% were to be used this would indicate 443,250kgs or 443.25 tonnes of TSP particles including 242,310kgs or 242.31 tonnes of PM_{10} particles would migrate through, pass over or be deposited at Forbesdale annually.

9,308,250kgs or 9308 tonnes of TSP – 5,088,510 or 5088 tonnes of PM_{10} particles will be produced by the Rocky Hill Coal Project over the life of the mine and make the short 900 metre journey to Forbesdale.

The effect on Forbesdale will be profound. The sheer volume of particulate matter, call it dust, soot, smoke, PM_{30}, PM_{10} or $PM_{2.5}$, described in technical terms or layman's language, will have a devastating effect on the residents will be staggering. During the life of the mine over 4000 tonnes of coarse particulate matter, highly likely due to its atmospheric lifespan, will be deposited on every surface of Forbesdale not only destroying the aesthetics and amenity of the area but also of greater concern is the 5000 tonnes of fine particulates, known to cause and exacerbate a wide variety of diseases. This will be breathed in daily by the Forbesdale community.

Details section 3.1

1.2.3 The Effect of Noise on the Residents of Forbesdale

"The adverse effects of noise on communities are well documented in literature. These vary from the direct effects (including noise induced hearing loss, speech interference, sleep disturbance and annoyance), to indirect or secondary effects, such as long term effects on physical and mental health as a result of long term annoyance and prolonged disturbance of sleep. The World Health Organization defines health as a state of complete physical, mental and social wellbeing, not just the absence of disease (WHO 1947). Community reaction to noise has been noted as a likely indirect cause of adverse health effects (Job 1996)"[1]

[1] *The NSW Industrial Noise Policy 1.1 Overview of the policy*
There will be adverse effects on the community of Forbesdale.

Forbesdale's proximity to the proposed Rocky hill Coal Project, the topography of the area and its susceptibility to the meteorological influences of temperature inversion and wind, guarantee this will be the case.

The 31 residences of the 33 Forbesdale properties all lie within 2000m of the mine's operational area. Gloucester Resources Limited assume sin their application for the Director General's Requirements a background rating level of 30dB. This would give an intrusiveness criterion of $L_{Aeq\ 15mins}$ 35dB or a more than doubling of perceived loudness over 15 minutes and an applicable sleep disturbance screening criterion of $L_{Aeq\ 1min}$ 45dB or more than triple the perceived night-time loudness in 1 minute bursts.

The natural topography of Forbesdale sees 27 of the residences located between 125m AHD and 140m AHD. This elevation will minimise the suitability of the proposed western visibility barrier as an effective noise barrier as the top of the barrier, save for the ineffectually placed extension at the northern end, reaches a maximum of only 140m AHD. Forbesdale's elevation also serves to amplify the effects of temperature inversions and wind between the mine's noise sources and the residential receptors of Forbesdale.

Temperature inversions are a significant feature of the area with almost 60% of winter nights experiencing some degree of temperature inversion as against the 30% requirement of the NSW industrial Noise Policy. The topography of Forbesdale causes the temperature inversions in the Avon Valley to occur from April to September and to start early in the evening and last later in the morning due to the valley topography increasing their impact on the area and further emphasises the inadequacies of the western visibility barrier. Residents would be subject to the impacts of these inversions prior to the mine operations closure at 10.00pm and again after the 7.00am start. Those residents impacted by the rail load out facility would be affected all night due to the 24 hour operation. Depending on the intensity, wind and distance from the source this could impart as much as a 6.5dB increase in noise level.

Wind data from the Gloucester Resources Limited meteorological station indicates that 50% of all recordings were at or below 2.5m/s. The NSW Industrial Noise Policy states 30% of wind under 3m/s represents a significant feature of an area. Wind blows from the south east to south west quadrant for 39% of the year with peaks in autumn (45%) and winter (46%) and spring and summer at 30% and 31% respectively. The topography creates a "skewing" of the wind slightly more to the east. The combined effect of all of these factors would see Forbesdale wind affected for at least 68 days a year

The combined impact of extended temperature inversions and 68 days of significant winds will be amplified by the natural topography and close proximity to the mine. This will ensure that noise levels under those conditions will exceed the project-specific noise levels. This will be abetted by the inadequate design of the western visibility barrier increasing even further the noise impact on Forbesdale.

Details Section 4.1

1.2.4 The Loss of Visual Amenity by Residents of Forbesdale

Visual amenity: that which is pleasant, agreeable and perceived by sight.

The loss of visual amenity would imply that something has been taken or changed. To fully understand the loss or change it is essential to understand what exists currently. Forbesdale is located in one of the most aesthetically stunning valleys in Australia. The Bucketts Range to the west and the Mograni Range to the east frame the valley with spectacular escarpments. In particular The Bucketts whose beauty has been captured by thousands of artists and photographers over the years, notably Sir Arthur Streeton whose painting "The Gloucester Buckets" (1894) still hangs in the NSW Art Gallery today.

Every property in Forbesdale enjoys these views, some looking straight up the valley to the north or south, some with vistas to the east or west, some more spectacular than others but all Forbesdale residents share all these views as they drive in and out of the area or go about their daily lives. The visual amenity of Forbesdale is the sum of all of these. It is an unquantifiable entity that is simply there, forming the backdrop against which the residents of Forbesdale live their lives, often not consciously thought of but there none the less.

It is no more possible therefore to separate the loss of visual amenity amongst individual properties than it is to attribute the visual amenity to any. A loss to one is a loss to all and all of Forbesdale is affected.

Eighteen (55%) of the thirty three properties will have an unimpeded view of the mine site or rail loading facility. In total 28 (85%) properties will have an unimpeded view of more than 25% of the mine site or rail loading facility.

The mine overburden dumps, inappropriately named visibility barriers, will do nothing to obviate the loss of visual amenity. With a height of up to 53m and a length of 1.5km the grey wall of the western visibility barrier is as much the problem as any solution that it may purport to offer. Ineffectual tree planting will also do nothing except offer a replacement for the thousands of trees to be removed during the mine development.

The impact of the loss of visual amenity on the residents of Forbesdale is significant. The visual appeal for many was their reason for choosing Forbesdale as a place to purchase property. Its topography affords views that are unique in the area and the loss of that visual amenity is tantamount to theft of part of what they purchased and, as with any theft, it is as much the feeling of violation as it is any monetary value that affects individuals.

Details Section 5.1

1.3 Summary

Forbesdale and its residents stand to bear the brunt of the impact of the Rocky Hill Coal Project on the Gloucester Valley and the township of Gloucester.

Situated in an elevated position between the ridgeline separating the Gloucester and Avon Rivers and the site of the proposed mining operation, it provides a natural amphitheatre from which to best view the mine and its attending operations.

The original Greek Amphitheatre was designed to allow all to receive the greatest exposure to the scene being played out in front of them, to be able to hear clearly the actors and to feel drawn into the unfolding events all for the cost of a few coins for a few hours of pleasure.

The natural Forbesdale amphitheatre unfortunately has the same impact. Most properties have an unimpeded view of the mine extraction area or rail loading facility, many of both., All have at least a partial view of some part of the mine. The amphitheatre shape and the climatic conditions serve to concentrate and amplify the effects of noise and capture the particulate output of the mine. The cost will be far higher than a few coins and the performance far longer than a few hours. The Rocky Hill Coal Project has an intended life of 21 years, the rest of a lifetime for many of the residents most of whom are over 60 years of age. The cost to their mental and physical wellbeing will be huge, many with existing medical conditions that will not cope with the increase in fine particulate matter, all suffering from concerns over their future health and economic wellbeing. The economic cost of the loss of property value and the inability to sell and move creates worry and anxiety in their lives which is not needed in their retiring years.

There is no upside to the residents of Forbesdale. No benefit from increases to the national export of coal, no benefit from the increase in State Royalties, no benefit from the proposed Community Grants Scheme, no benefit from proposed job opportunities and definitely no benefit from the increase in profits sought by Gloucester Resources Limited. There is only an uncertain future of economic loss, poor health as a result of increased noise and exposure to fine particulate matter and the destruction of the visual beauty of an area that was the underlying reason that many moved to Forbesdale.

2. The Socio-Economics of Forbesdale

2.1. General

Forbesdale is different to Gloucester in many ways, particularly in regard to demographics. Demographic and geographic assumptions and evidence about Gloucester in general cannot be translated to Forbesdale.

The residents are older, mostly retired and more likely to own their homes. They are the closest by far to the proposed Rocky Hill Coal Project and as such will be subject to the highest concentrations of health threatening dust particles and sleep depriving noise levels. Their properties were, by and large, purchased with a view to lifestyle and retirement, for many a place to enjoy life before age necessitated a move to somewhere with a greater degree of assisted care.

2.2 The Properties of Forbesdale

Forbesdale is an area of rural lifestyle properties developed over the last thirty or so years and with the exception of two remaining agricultural properties form a cross over area from rural Gloucester to the residential streets of the Gloucester Township.

Thirty three properties ranging in size from 1 hectare to over 100 hectares make up the area with 20 properties being part of the "Forbesdale Estate".

The estate had been developed in two stages beginning in the late 90's by The Webb Brother's Superannuation Fund (Webb Brother's was a family owned Stock and Station agent that has since been sold but still trades under that name in Gloucester).

The chart below depicts the time period during which properties were purchased in relation to the development of Stratford Mine and the advent of the Rocky Hill Coal Project.

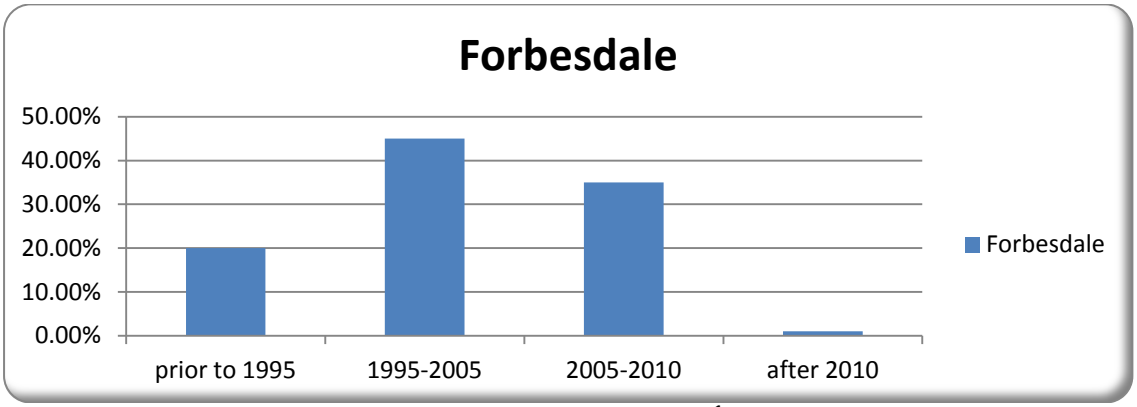


Chart 2.5 Purchase Periods of Forbesdale Properties [1]

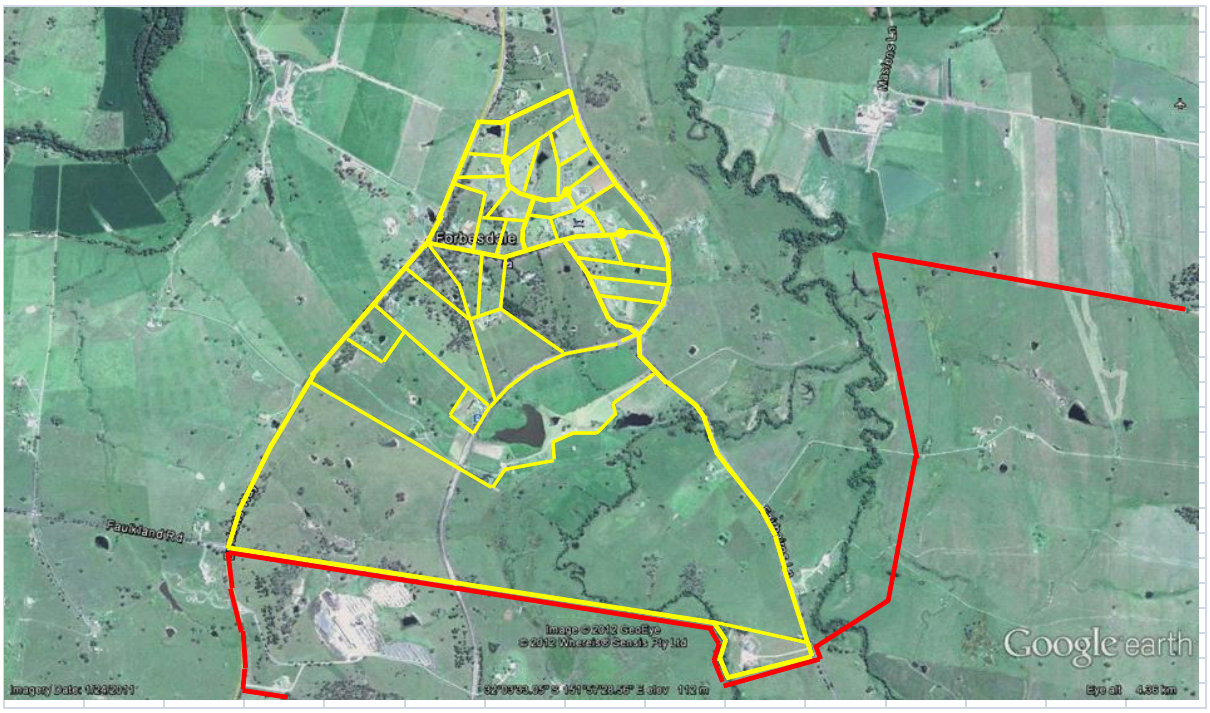
Prior to 1995: These properties were purchased prior to the Stratford Mine becoming operational

1995 - 2005: These properties were purchased prior to the announcement of GRL's intention to explore EL6523 for coal.

2005 - 2010: These properties were purchased prior to GRL's application for the Director General's requirements, these properties were all purchased at the beginning of this time period.

The properties purchased between 1995 and 2010 are almost all within the "Forbesdale Estate".

Figure 2.1 Forbesdale Property Boundaries



Forbesdale Boundary **Individual Property Boundaries**
Proposed Rocky Hill Coal Project Operational Area Boundary

The land immediately to the east of Forbesdale lying between the Railway-Fairbairns Road boundary and the proposed operational area is owned by Gloucester Resources Limited.

Table 2.1 Forbesdale Property Size and Usage

Number of Properties	Usage	Area (ha)
21	Residential / Lifestyle	1 – 2 ha
7	Residential / Lifestyle	2 – 5 ha
2	Residential / Lifestyle	5 – 10 ha
1	Residential / Lifestyle	10 – 20 ha
1	Agriculture	20 – 50 ha
1	Agriculture	50 – 150 ha

2.2.1 The Value of the Forbesdale Properties

The devaluation of their property asset by over **30%** in the last four years is of major concern to the property owners of Forbesdale.

2.2.1.1 Estimation of the current value of Forbesdale ignoring the impact of the Rocky Hill Project

It is impossible to obtain reasonable and accurate data on which to base the current value of properties in the area. Market appraisals by Gloucester Real Estate Agents have given some owners a guide to the worth of their property but this value is only proven when a purchaser is then prepared to pay it for the property. This has not happened in Forbesdale in the last four years. Several owners in Forbesdale have had the properties up for sale during that time and none have sold despite, in some instances, the price having been dropped significantly lower than the original market appraisal. Offers to purchase were almost non-existent and when made were so absurdly below the owners expectations as to be refused out of hand.

Gloucester Real Estate Agents are in agreement that it is impossible to sell properties south of Jacks Road.

The only property purchases in the surrounding area have been by Gloucester Resources Limited in relation to the Rocky Hill Coal Project and those appear to have been massively over inflated or undervalued depending on the desire of GRL to purchase in the early period and the desperation of the sellers in the latter. They also represented agricultural properties and as such would be of little assistance in determining property values for the bulk of Forbesdale.

In an attempt to obtain an estimation of property values in Forbesdale that ignore the possibility of a mine ever having been considered the following formula was used.

Current replacement building cost of house + current replacement cost of garage (if unattached) + current replacement cost of major outbuildings = **Total Replacement Building Cost**

Current land values of similar properties to the north of Gloucester in the Meadows Estate, Irrawang Estate and the Phasingale Estate were used for properties under 5ha. Property values between 5ha and 10ha were derived as an extension of the values of the smaller properties and the agricultural properties were valued by comparison with other similar properties away from the Forbesdale area. This gave T**he Current Land Value.**

Current Land Value + Total Replacement Building Cost = Current Property Value

Table 2.2 Estimated Current Land Value of Forbesdale

Number of Properties	Size	Estimated Value	Total Value
2	1 ha	$175,000 - $200,000	$350000 - $400,000
19	1-2 ha	$200,000 - $250,000	$3,800,000 - $4,750,000
7	2-5 ha	$225,000 - $275,000	$1,575,000 - $1,925,000
2	5-10 ha	$250,000 - $300,000	$500,000 - $600,000
1	10-20 ha	$300,000 - $350,000	$300,000 - $350,000
1	20-50 ha	$400,000 - $500,000	$400,000 - $500,000
1	50-150 ha	$700,000 - $900,000	$700,000 - $900,000
33			$7,625,000 - $9,425,000

Based on the figures shown in Table 2.2 the Current Land Value of Forbesdale would be $8,525,000.

Several Gloucester builders were asked what the current cost per m^2 was for homes typical of the Forbesdale area. Depending on the materials and type of construction their estimate was between $1000m^2 and $1200m^2. The size of the home made little difference to the square metre rate.

The replacement cost of an unattached garage depended on material and size. Garages constructed in the same design and materials as the house are costed on a m^2 figure 66% of the house construction cost. Garages made of metal cladding are costed at $10,000 per car space.

The replacement cost of outbuildings and sheds is based on small ($10m^2 – 35m^2$) $5,000, medium ($35m^2 – 50m^2$) $10,000, large ($50m^2 – 100m^2$) $20000 and very large (over $100m^2$) $30,000

Table 2.3 Estimated Rebuilding Cost of Forbesdale Houses

Number of Houses	House Size	Total m^2	Replacement cost @ $1100m^2
2	$100m^2$ - $150m^2$	235	$258,500
5	$150m^2$ - $200m^2$	861	$947,100
3	$200m^2$ - $250m^2$	700	$770,000
6	$250m^2$ - $300m^2$	1580	$1,738,000
3	$300m^2$ - $350m^2$	982	$1,080,200
5	$350m^2$ - $400m^2$	1884	$2,072,400
2	$400m^2$ - $450m^2$	825	$907,500
2	$450m^2$ - $500m^2$	944	$1,384,000
3	Over $500m^2$	1739	$1,912,900
31			$11,070,600

Table 2.4 Estimated Rebuilding Cost of Forbesdale Garages

Number of Garages	Style	Size	Replacement Cost @ $726m^2$ or $10000 / car space
3	To match house	188	$143,256
14	Metal Cladding	2 car	$280,000
1	Metal Cladding	3 car	$30,000
18			$453,256

Table 2.5 Estimated Rebuilding Cost of Forbesdale Outbuildings

Number of Outbuildings	Size	Replacement Cost
2	Small	$10,000
3	Medium	$30,000
5	Large	$100,000
1	Very large	$30,000
11		$170,000

A compilation of the previous tables gives an estimation of the valuation of Forbesdale based on there being no influence on that valuation from the proposed Rocky Hill Coal Project

Table 2.6 Estimated Value of Forbesdale

Component	Estimated Value
Land	$8,525,000
Houses	$11,070,600
Garages	$453,256
Outbuildings	$170,000
Total	**$20,218,856**

2.2.1.1.1 Comparison of Rebuilding Cost and Actual Cost of 5 Forbesdale Close

In July 2003 the Bowman family purchased the land at 5 Forbesdale Close. They moved to Gloucester in July 2004 and commenced building as “owner builders” later that year and moved in September 2005. The home was a kit home to lock up designed and supplied by New England Country Homes. All other required materials were purchased locally and local tradesmen completed the construction.

The home is of timber frame construction on brick piers with external brickwork to floor level. The walls are weatherboard and the roof Colorbond roofing iron. Internal floors are timber, carpet and tiles. The main home is $656.6m^2$ with a separate 3 car garage of $81m^2$. A small $10m^2$ shed, matching the house design, is the only other building added after the initial building.

Detailed records were kept and are shown below;

Initial land purchase Lot 10 (now No 5) Forbesdale Close Lot 10 DP 1067451 of 1.492ha	$195,000
Development Fees	$8690.92
Materials (Includes floor coverings air conditioning and light fittings)	$433975.28
Labour	$174141.27
Services	$7912.77
Equipment Hire	$1221.00
Additional 10m^2 Shed	$2500.00
Total	**$823441.24**

An adjustment for inflation using the Australian Bureau of Statistics for the years 2006 to 2011 inclusive of 3.5%, 2.3%, 4.4%, 1.8%, 2.8% and 3.4% would give an actual cost of in 2011$ of **$984,941.71**

Comparison with the estimation method used for Forbesdale

Estimated land value 1.492ha	$225,000
Estimated house cost 656.6m^2 x $1100	$722,260
Estimated separate garage cost matching house 81m^2 x $1100 x 66%	$58,806
Estimated outbuilding cost small shed	$5,000
Total	**$1,011,066**

Comparison between the estimated figure of $1,011,066 and the actual, inflation adjusted figure of $984,941, shows a variance of less than 3% and as such it would show the estimation method to be accurate.

It should be noted that the estimated values carry no components for property improvements other than garages and outbuildings. The value of swimming pools, driveways, fencing, landscaping and the like have not been included as they are unique to individual properties.

In the case of the example above the Bowman's have spent in excess of $50,000 on landscaping and internal fencing.

2.2.1.2 Current Forbesdale Values

The spectre of an open cut mine only 900m from homes in Forbesdale has had an enormous impact on the value of the properties in the area. Several property owners have obtained market appraisals from local Real Estate Agents and have been staggered by the results. Differences of 40% to what would be expected are not uncommon and yet those owners who attempted to sell their properties at these absurdly low levels were unable to attract purchasers.

2.2.1.2.1 Market Appraisal and Valuation Figures for 5 Forbesdale Close

In February 2010 a market appraisal was obtained from Webb Brothers Real Estate for the property. The likely sale price was given as between **$575,000 and $625,000**.

On 22 July 2010 a valuation on the property for the purpose of "evidence of value" was obtained from Country Coast Valuers of Cundletown NSW. The valuation of the property was **$600,000**

These two sources agree that the property value at that time was $600,000. It is highly unlikely to have changed from then to now as the basis of both of these valuations, the sale of similar properties in the area, has been zero.

This value varies from the estimated value ($1,011,066) by 40.65% and the actual cost ($984,941) by 39.08%.

Either way this represents a huge loss in the asset value of the property.

2.2.2 The Impact of the Rocky Hill Coal Project on the Forbesdale Properties

The impact of the Rocky Hill Coal Project on the properties of Forbesdale cannot be underestimated.

The bulk of the properties were purchased after 1995 at which time the Stratford Mine, at that point some 8km to the south, was already operational. All the Forbesdale properties were purchased on the assumption, not contradicted by either Real Estate Agents or Legal Counsel, that no mine would allowed closer to the area than the Stratford Mine. Some had discussions with representatives of Stratford Mine and were told that even though they held exploration leases over the area "It would be too difficult to obtain approval", subsequently the leases were relinquished.

Properties were purchased on the assumption that they, like properties everywhere, would be at the vagaries of market forces but over time would increase in value as all properties do.

The advent of Gloucester Resources Limited taking over the exploration licence and their initial aggressive buy up of properties adjoining Forbesdale has seen property values plummet.

The value of Forbesdale, estimated in section 2.2.1.1 as $20,218,856 has dropped by at least 30% or $6,056,568. If the example of 5 Forbesdale Close is used the figure rises to $8,051,542. These figures however represent a valuation only and not a "sold" price and with no purchase of property in Forbesdale in the last four years it is impossible to determine an actual value using accepted valuation procedures.

Estimated Real Value $20,218,856. Estimated Actual Value $12,077,314 to $14,162,288.

This represents a huge financial burden on the people of Forbesdale through no fault of their own but entirely the responsibility of Gloucester Resources Limited and the Rocky Hill Coal Project.

2.3 The People of Forbesdale

In April 2012, following the initial meeting that agreed to establish FRAG, a survey was conducted of resident and non-resident owners to determine the course of action that would best meet the desires of the group as a whole. The question was asked:

"If approval is granted for the mine to go ahead which of the following best describes what you would like to happen?"

Several options were offered with nearly 80% of respondents desiring to have their properties purchased by Gloucester Resources Limited. Additional comments made indicated that the purchase price to be paid should reflect the amount the properties would be worth if no mine were to ever be approved and that all associated cost of the purchase and removal to new location be paid by GRL.

In May 2012 a census was conducted of resident and non-resident owners to determine the social and economic structure of Forbesdale [1]. The census was patterned on the Australian Bureau of Statistics census of 2011.

[1] *The census was completed by FRAG members only and as such does not reflect every property individually in Forbesdale. With 70% of property owners, covering 80% of the area it does however provide sufficient accuracy for the comments made.*

The purpose was to determine:

- The age, sex and marital status of the Forbesdale population
- The level and type of employment in the Forbesdale population
- The household structure of the homes in Forbesdale
- The details of properties within Forbesdale

These where appropriate were compared to the ABS 2011 census figures for the Gloucester LGA to determine the similarity or dissimilarity of the Forbesdale population to that of the Gloucester population.

The following is a summary of the results:

The age of the Forbesdale population is significantly higher than that of Gloucester. The oldest resident is 88 years of age and the youngest 4 years of age giving a median age of 65 years compared to the Gloucester median of 46 years.

The age grouping is heavily weighted by the over 55's representing 60% compared to Gloucester's 38.6%.

It is commonly accepted, after years of medical research, that age plays a major role in susceptibility to cardiopulmonary disease, chronic obstructive pulmonary disease (COPD) and other lung disease, hypertension, kidney disease, heart attack and stroke, and asthma.

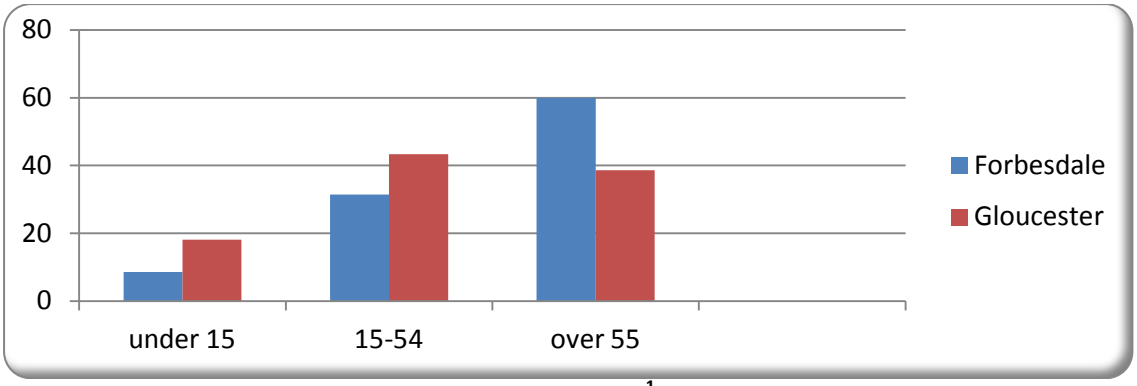


Chart 2.2 Forbesdale Population by Age Group [1]

The age of the Forbesdale residents reflects itself in the marriage statistics. There are only 2 Forbesdale residents over 15 and under 25 years of age causing an increased disparity between married and never married.

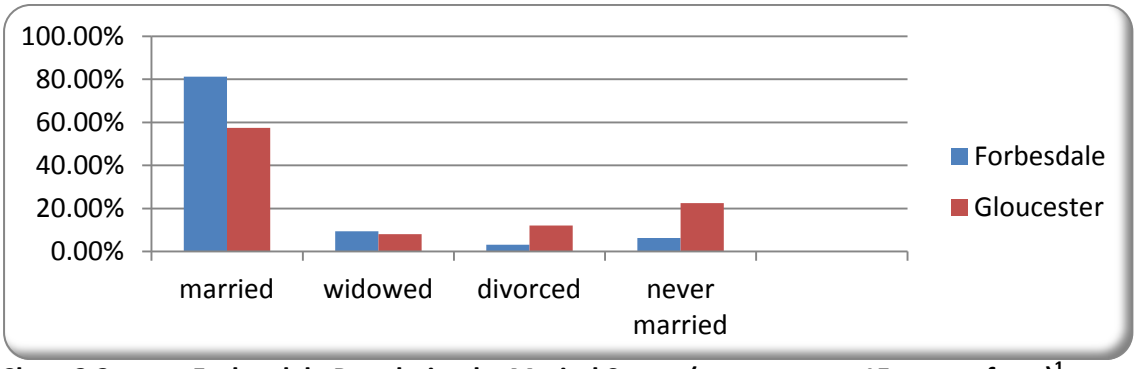


Chart 2.3 Forbesdale Population by Marital Status (persons over 15 years of age)[1]

The comparison between Forbesdale and Gloucester appears fairly balanced but because of the age grouping shown in chart 2.1 the "not employed" figure represents those retired from work because of age rather than the many other reasons that are represented in the Gloucester figure.

Of those residents that were employed 25% were employed part time and 75% fulltime with 30% being self-employed.

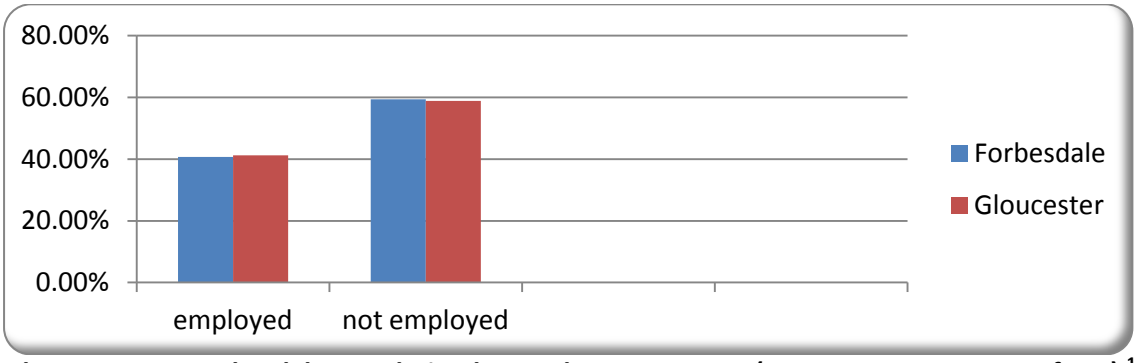


Chart 2.4 Forbesdale Population by Employment Status (persons over 15 years of age) [1]

The level of property ownership in Forbesdale is 97% [2] compared to 72% in Gloucester.
[2] *Adjustment has been made for the one property known to be rented within Forbesdale.*

There are two properties that are vacant land and two properties that are occupied on a part time basis only. The non- resident owners represent 12% of the properties in Forbesdale.

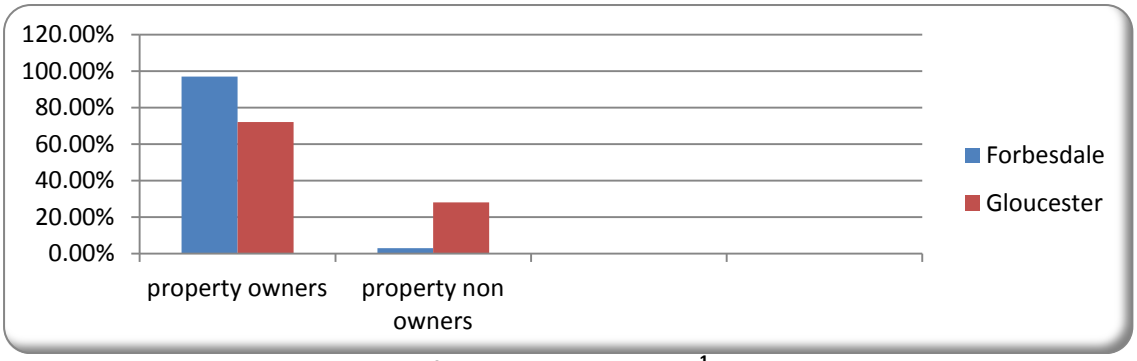


Chart 2.5 Forbesdale Levels of Property Ownership [1]

2.3.1 The Forbesdale Population in Relation to Gloucester Population

The majority of Forbesdale owners were not born in Gloucester as were the majority of the population of the Gloucester LGA. They made a decision to own property and live in Forbesdale as a lifestyle choice.

This choice was made for most at a time when most of the residents were retired or approaching retirement from the workforce. Their property would represent a “last stop” before moving on, as would probably be required at some point, to other accommodation due to limited physical or mental capability.

For others the lifestyle involved establishing and running their own agricultural based business on their property, establishing businesses or working within the town and for some simply where they had always lived and enjoyed the lifestyle of a rural town.

The population of Forbesdale is significantly older than Gloucester. The median age of 65 is over 30% higher than that of Gloucester and over 40% higher than that of Australia. It is what most would consider “retirement age” the point at which work ends and one enjoys the remainder of life.

The population of Forbesdale own the properties in which they live. Most are married with families that have grown and left home, others are still raising their children at home.

In short the socio-demographic of Forbesdale is very different to that of Gloucester.

2.4 The Socio-Economic Impact of the Rocky Hill Coal Project on Forbesdale

The socio-economic impact is the outcome of the advantageous and detrimental aspects of a situation on those people affected by it.

At a State or National level arguments can be made, rightly or wrongly, that the Rocky Hill Coal Project provides Royalties and Taxes and although there would be the despoiling of the Gloucester area and increased health risk to the local population there would be an overall benefit to the State and National Economy.

At a Gloucester local level arguments can be made, again rightly or wrongly, that there would be an increase in employment opportunity, money through a community based scheme and a bright financial future for the town and although this would come at the cost of increased asthma cases in the young, devastation of the town's amenity, loss of a hard fought for tourist industry and the encroachment of the mine in stage 1 to within 5km of the main street, that this would be good for the local area.

At a Forbesdale level there is no argument. There are no benefits. There is only loss.

Loss of health
Loss of property value
Loss of lifestyle

All of the Forbesdale residents share the same two concerns regarding the proposed impact of the Rocky Hill Coal Project, the increased health risks they will face living so close to the mine and the financial impact on their property value.

The Socio- Economic impact is reflected in the following, deeply concerning issue for resident and non-resident owners:

If the Rocky Hill Coal Project is approved there will be increased health problems due to dust, in particular PM^{10} and $PM^{2.5}$ particulate matter. There will be health problems due to the noise of extraction and processing of coal for most of the day. There will be health problems due to the noise of transporting and loading of coal 24 hours a day. There will be the visual spectre of a 1.5km long 45m high grey stone overburden dump supposedly protecting the community's health and visual amenity. Coal stockpiles, conveyors, load bins and trains at the load out facility all destroying the visual amenity of the area. The lifestyle once moved here for will be gone, our health will be gone and we will be locked into remaining because the loss of our property value means we simply cannot afford to move even if we could get a buyer.

The population of Forbesdale is aged well above the Gloucester and National median levels. This puts them at a far greater risk to health issues than the wider community. Their age affords them no time to change the course of their lives and absorb a "financial hit" and move on. They are being forced into a position that will cost them and their families dearly.

They will, however, not bear this cost alone. Loss of the financial capacity to look after one's self will mean a requirement for government assistance; increased health issues will mean a need for increased government health support; all of this at no cost at all to Gloucester Resources Limited and The Rocky Hill Coal Project ,but to the State and National purse.

3. Dust and its effect on Forbesdale

3.1 General

"Particulate matter is a term used to define solid or liquid particles that may be suspended in the atmosphere. Particulate matter is a generic term that is commonly used interchangeably with other terms such as smoke, soot, haze and dust."*
**NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining.*

Unlike the definition above people in general would perceive a considerable difference between Dust, Soot and Smoke. Dust, you sweep up with a brush, soot you wash down being careful not disturb it should it blow away and settle elsewhere and smoke drifts by on the wind, producing stains that are only removable by industrial solvents. This is a reasonable perception as it correlates accurately with the types of particulate matter:

- **TSP** (Dust): Total suspended particles, up to 30µm in diameter, used to determine the potential for particulate matter to affect amenity.

- **PM_{10}** (Soot): Suspended particles up to 10µm in diameter, particles between PM_{10} and $PM_{2.5}$ are often referred to as coarse particulate matter, used to determine the potential for particulate matter to affect health.

- **$PM_{2.5}$** (Smoke): Suspended particles up to 2.5µm, referred to as fine particulate matter, used to determine the potential for particulate matter to affect health.

As a comparison to the above the average thickness of a human hair is 70µm and the diameter of a grain of fine beach sand is 90µm.

All three are produced differently, all three act differently in the atmosphere and all three will be produced on a daily basis by the Rocky Hill Coal Project.

3.2 Health Impacts of Particulate Matter

The fact that particulate matter effects health is indisputable.

In 2012 the Health and Sustainability unit of the Boden Institute for Obesity, Nutrition and Exercise at the University of Sydney prepared a paper titled

"Health and Social Harms of Coal Mining in Local Communities"

The paper represents a pragmatic review of international peer reviewed health literature and reports from relevant government and non-government organisations undertaken to identify background information and evidence that reflects what is known about the community health and social harms associated with coal mining activity.

The relevant question asked was

"What specific diseases or other health problems are associated with coal mining in local communities?"

A summary of key findings shows

Adults in coal mining communities have been found to have:

- Higher rates of mortality from lung cancer, chronic heart, respiratory and kidney disease
- Higher rates of cardiopulmonary disease, chronic obstructive pulmonary disease (COPD) and other lung disease, hypertension, kidney disease, heart attack and stroke and asthma.
- Increased probability of hospitalisation for COPD and for hypertension
- Poorer self-rated health and reduced quality of life.

Children and infants in coal mining communities have been found to have:

- Increased respiratory symptoms including wheeze, cough and absence from school respiratory symptoms although not all studies reported this effect.
- High blood levels of heavy metals such as lead and cadmium.
- Higher incidence of neural tube defects, a high prevalence of any birth defect, and a greater chance of being low birth weight.

These findings are supported by every NSW Government Departments published literature on health and coal mining including "**Mine Dust and You**" a factsheet published by the NSW Department of health developed in conjunction with the NSW Minerals Council, the representative advocate for the mining industry.

The finer the particulate matter, the longer and more frequent the exposure, the greater the health risk and the greater the proportion of the population that would be susceptible to that risk.

In healthy adults occasional TSP particulate matter, 30µm in size, would represent no more than an inconvenience of blowing one's nose as the body's defences against dust worked against the particulate invasion. The same exposure for an elderly person suffering from a chronic lung complaint could be far worse requiring medical intervention.

Coarse PM_{10} particulate matter will cause adverse responses from those suffering from respiratory complaints such as asthma, bronchitis and emphysema.

Fine particulate matter, less than PM_{10} has no safe level. Similar in size to cigarette smoke particles, it is capable of causing increased rates of many diseases in otherwise healthy people and higher rates of mortality and morbidity in those with pre-existing respiratory and pulmonary conditions.

Regardless of whether coarse or fine increased levels of particulate matter will effect even the most healthy in the community. The effect on the elderly, particularly those with existing medical conditions, could be devastating.

3.3 Origin, Atmospheric Lifetime and Travel Distances for Particulate Matter

There is no question that the Rocky Hill Coal Project will produce all of the three types of particulate matter. Different sections of the mine operations however will produce a dominance of one type of particulate over another. If all the particulate matter produced was then to stay within the confines of the mine area there would be no issue, they are however transported far beyond the boundaries. The distance and direction they travel is dependent on their size and the direction of the wind that carries them.

3.3.1 Origins of Coarse and Fine Particulate Matter

The coarse particulate matter produced, size PM_{10} or larger, is generally mechanically generated. Any operation that involves the disturbance of the ground will produce this type of particulate matter. The mechanical processes of blasting, haulage, crushing, earth works, transporting and loading are typical producers of particulate matter greater than Pm_{10} during a mine's operation.

The fine particulate matter produced, size less than $PM_{10,}$ is generally generated by the combustion of fuel by vehicle engines and secondary chemical reactions from blasting explosions as well as by continued mechanical action on larger particles.

3.3.2 Atmospheric Lifetime and Distance Travelled

The table below has been extracted from the "NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining. Section 2.1 Definitions of Particulate Matter. Table 1"

Table 3.1 Atmospheric Lifetime and Potential Travel Distance for Particles of Various Size categories

Particle size	Description	Atmospheric Lifetime	Travel Distance
TSP	Total of all particle suspended in the atmosphere	Minutes to Hours	Typically deposits within the proximate area downwind of the point of emissions
PM_{10}	A subset of TSP, including all particles smaller than 10µm in diameter	Days	Up to 100 kilometres or more
$PM_{2.5}$	A subset of the PM_{10} and TSP categories, including all particles smaller than 2.5µm in diameter	Days to Weeks	Hundreds to Thousands of Kilometres

As can be seen from the above table Forbesdale residences, at the most 2000m from the mine, site are well within the range of being affected by all sizes of particulate matter.

3.4 Factors Affecting Particulate Matter Migration and Deposition

Other than the physical dimension of the particulate matter there are three main factors that affect the ability of the matter to travel from its point of origin:

- The height into the air that the particulate matter is transmitted at the point of origin. Simply the higher it goes up the longer it takes to come down.
- The effect of any physical barriers that the particulate matter would pass over or through.
- The effect of wind as a carrier of particulate matter determining both the potential travel distance and the direction of travel.

3.4.1 The Effect of Height at the Source on Particulate Migration

The particulate matter generated at the Rocky Hill Coal Project will have a source elevation of between zero and several hundred metres depending on its origin.

Particulate matter previously generated by other events, but having been deposited within the mine area, has a source elevation of zero metres and is easily and commonly introduced into the atmosphere. This may occur due to a secondary event as simple as walking across an area with deposited particulate matter present or as complicated as a second blasting event. Most commonly however it regenerates into the atmosphere completely without any assistance from mining operations by the passing of the wind.

With regard to the sizes of particulate matter being referred to, at the largest PM_{30} less than half the thickness of a human hair, it would not take a great deal of wind to make it regenerate and rise into the atmosphere. The Gloucester Resources Meteorological Station, located approximately at the position of the proposed CHPP, indicates that 2% of the time conditions are calm. So for 98% of every day, week and year wind will be regenerating particulate matter into the atmosphere.

Blasting events generate particulate matter from several tonnes to the TSP particulate matter that concerns health. These events project the TSP particles, both coarse PM_{30} – PM_{10} caused by the mechanical action of the blast and fine $>PM_{10}$ caused by chemical reaction, hundreds of metres into the air where again the wind determines the distance and direction of potential deposition.

The mines machinery, the major producers of the $>PM_{10}$ particulate matter, projects the matter into the atmosphere, with force, from elevated, vertically orientated exhaust outlets designed to allow atmospheric dispersion of the by-products of combustion. This projects the $>PM_{10}$ particulate matter dozens of metres into the atmosphere where again the wind takes effect.

Regardless of the source elevation at some point the TSP particulate matter will be projected into the atmosphere to be at the mercy of the strength and direction of the wind, both well beyond the ability of Gloucester Resources Limited to control.

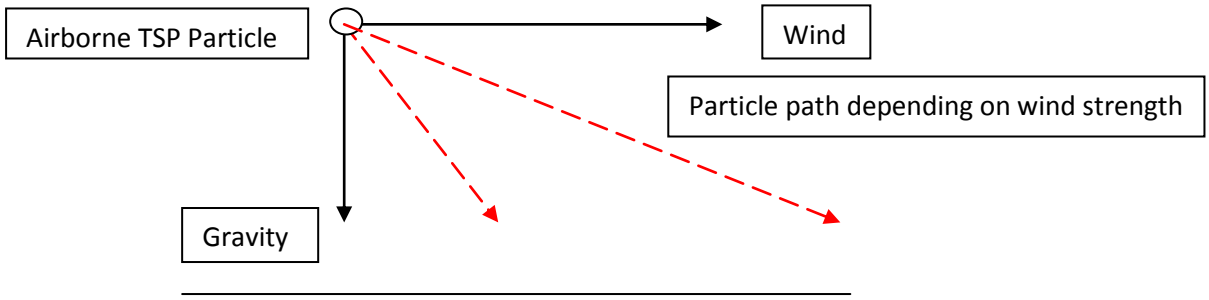
3.4.2 The Effect of Physical Barriers on Particulate Migration

*"Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it"**

*Sir Isaac Newton, Newton's first law of physics, "The Law of Inertia"

Two external forces operate on the particulate matter once it is in the atmosphere, gravity wanting to pull the particle down to a point of rest on the surface and the wind wanting to transport it far and wide. Gravity eventually always wins.

Figure 3.1 Unimpeded Particulate Pathways



If we ignore the effects of gravity and wind agreeing that regardless of how heavy a particle the wind can move it and no matter how light a particle it would eventually come to rest on the ground then the only variation to the distance travelled will be a physical barrier in the path of travel.

Physical barriers, with regards to particulate matter generated by the Rocky Hill Coal Project, will be one of two types:

- Solid Barriers that block the path of travel of the particulate matter.
  - The Walls of the mine pit
  - The Visibility Barriers, buildings and coal stockpiles
  - Stands of "Windbreak Planted Trees"
  - The Natural Topography

- Non Solid Barriers that "filter" the path of travel allowing some transmission through.
  - Trees in their natural growth habit

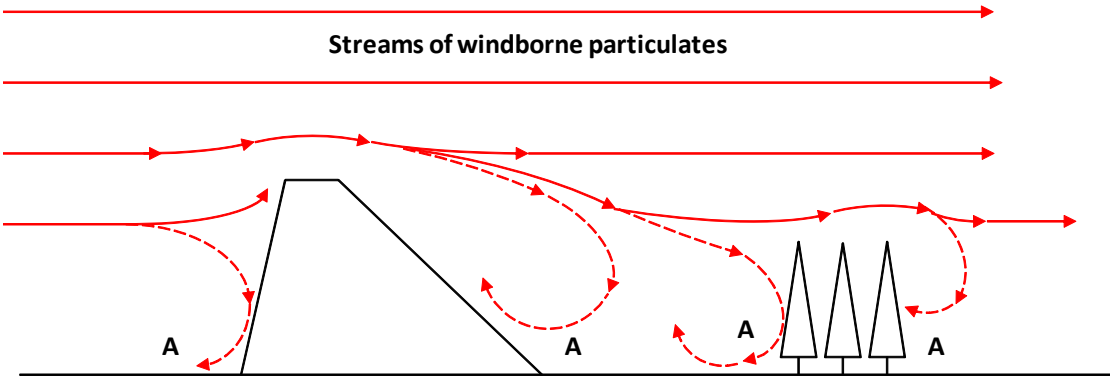
Solid barriers change the direction of the particulate matter causing it to lose some or all of its wind energy. Depending on barrier shape and the strength of the wind this will cause a shortening of the travel distance of the particulate matter.

The walls of the pit will cause a funnel effect with those particles travelling vertically unaffected while those travelling horizontally losing their energy and dropping to the pit floor. With all the movement in the pit however these are quickly regenerated to go through the cycle again.

Onsite buildings and stockpiles also cause deposition of particles. This again occurs in areas of regeneration and the particles will continue to cycle through the process.

Visibility Barriers and “Windbreak Planted trees create areas of particulate deposition on both the windward and leeward sides. Particulate matter above the battier of trees is carried unimpeded by the wind. The deposited particulate matter then may be picked up again by the wind. This is particularly the case of deposits of particulate matter on the outfacing slope of the visibility barrier as the barrier itself directs the wind flow across the outfacing slope not only picking up recently deposited matter but also having a scouring effect on the barrier which creates more TSP particulate matter.

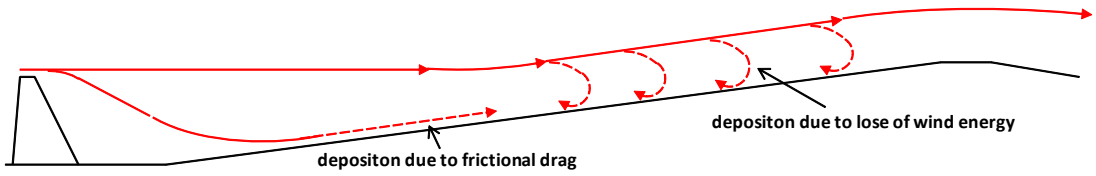
Figure 3.2 Particulate pathways over solid barriers



A areas of deposition of particulates

The natural topography also has the same effect as the visibility barrier but on a far larger scale.

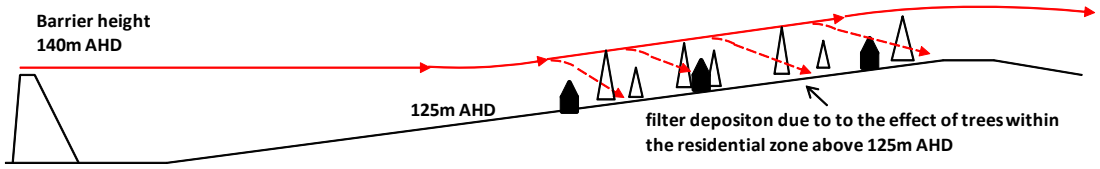
Figure 3.3 Particulate Pathways over the Forbesdale Topography



Particles will be deposited due to the frictional effect of the ground and the loss of wind energy caused by the upward sloping terrain

Non solid barriers, primarily individual trees or trees in a natural growth pattern rather than a windbreak formation, provide a filtering effect on the particulate matter passing through them. In the case of Forbesdale with its elevated position above the mine site and the rail load out facility there is no effect from this type of barrier filtration until the particulate matter reaches the level of residences at 125m AHD.

Figure 3.4 Particulate Filtration Over Forbesdale



As the windborne particulate matter passes through the “tree filters” some remains deposited on leaves and branches while others pass through and around the trees. This however causes a loss of wind energy in turn causing deposition in the areas between trees. Similarly the uneven nature of the tree canopy causes a disruption to the airflow again causing deposition in and around the trees due to a loss of wind energy.

The effect of the various barriers on Forbesdale is twofold and vastly different.

The visibility and windbreak type barriers create a solid barrier to the passage of the particulate matter causing it to be deposited either side of the barrier due to loss of energy. Only matter travelling at a height up to or slightly higher than the barrier is affected. The remaining particulates pass by unheeded. The deposited material is then able to be regenerated by the wind and in particular that deposited on the leeward side begin its journey again away from the source area.

These barriers due to their design and location will have little or no effect on Forbesdale with the exception of the very negative impact of construction and ongoing mechanical activity on the leeward face of the western visibility barrier which will provide a major source for TSP particulates of all sizes.

The natural topography and tree patterns of the Forbesdale spur however provide the perfect conditions for the deposition, concentration and confinement of particulate matter.

The tree patterns of Forbesdale spur provide a natural filter, trapping particulates and causing deposition in and around homes in the residential zone above 125m AHD. The windborne particulate matter arriving in Forbesdale has been unaffected by the solid barriers at the source losing elevation due to the effect of gravity only.

The natural topography of Forbesdale provides the perfect example of the impact of changing the vertical direction of a particle. At the beginning of this section Figure 3.1 was used to illustrate simply the effect of wind and gravity on a particle. The wind moved the particle horizontally, gravity vertically downward and the resultant angled pathway is determined by the strength of the wind. As the wind blows up the inclined slope it not only expends energy moving the particle horizontally but also vertically upward against the force of gravity. This increased energy expenditure causes more rapid deposition than would otherwise be the case.

The effect of the manmade barriers will provide little in the way of impedance to windborne particulate matter. It will either pass over or be temporarily deposited and then regenerated by the wind. The natural topography and tree patterns will promote deposition on the Forbesdale spur and retard regeneration due to the increased wind energy required.

3.4.3 The effect of Wind on Particulate Migration

Wind is the most influential factor in particulate migration.

There are two key elements of wind, direction and strength and these combined determine the path which the particulate matter will take and the distance it will travel along that path. Both of these are entirely out of the hands of Gloucester Resources Limited to control, the best that they can hope for is to manage activities around these elements but regardless of their best efforts they will produce large amounts of particulate matter and the wind will blow and distribute it to areas far and wide including, and in particular Forbesdale.

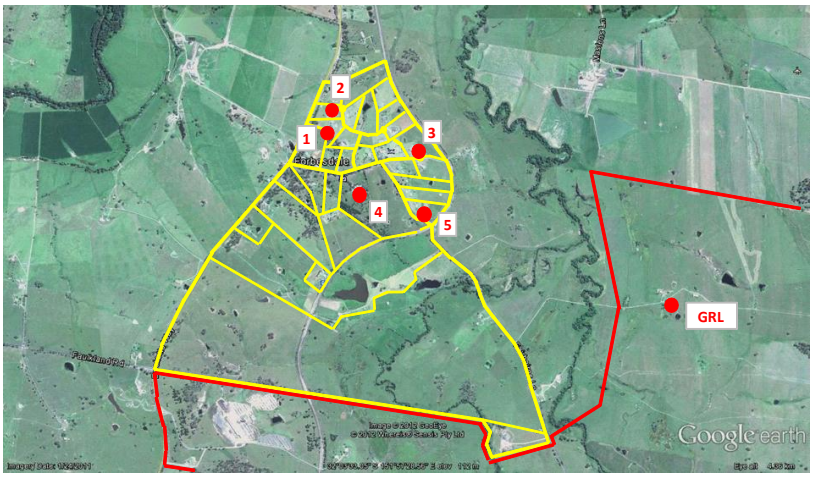
Unlike the effects of noise where wind with a velocity over 3m/s is deemed to assist in the masking of noise, it is precisely those winds that create and amplify the effects associated with dust.

3.4.3.1 Forbesdale Winds

In their EIS, section 4.1.3.6 Wind, Gloucester Resources Limited comment in regards to differences in wind readings from their meteorological station and the meteorological station located at Stratford Mine: “reflect the influence of the north-south orientated topography has upon wind directions throughout the Stroud - Gloucester Valley”. If there is a measurable difference between two meteorological stations located only 7km apart and both situated centrally on the valley floor then it would be highly likely that the wind direction and speed would differ markedly from the valley floor up and around the Forbesdale spur.

In August 2012 5 meteorological stations were established on the Forbesdale spur to provide data on wind direction and velocity and compare this with the data from the GRL meteorological station. All the meteorological stations are identical being a Model XC0348 Touch Screen, Wireless, Solar Powered unit distributed by Electus Distribution, Sydney. All have been correctly calibrated and installed as per the manufacturer’s instructions and are located sufficiently clear of buildings and structures as to give accurate wind readings.

Figure 3.5 Forbesdale Meteorological Station Locations



FRAG. meteorological Stations GRL meteorological Station

1 GRL

Station 1: No 5 Forbesdale Close
Station 2: No 7 Forbesdale Close
Station 3: No 6 Forbesdale Close
Station 4: No 32 Fairbairns Road
Station 5: No 85 Fairbairns Road

Data has been collected from these five stations, tabulated and is represented by the wind roses shown in **Appendix B.**

Summaries of the 3.00pm readings are represented by the wind roses shown below. By way of comparison the Gloucester Resources Limited meteorological station wind roses for the corresponding periods are also shown (2010-2011 extracted from their application for the Director General's requirements).

The Forbesdale data represents the 3.00pm "Gust" reading at each of the weather stations. The GRL wind roses represent the "Average" readings. The use of different reading standards has a significant impact on the analysis of the data and its suitability for use in determining its effect. The use of average data masks the impact on both dust and noise figures, this is covered in detail in section 3.4.3.2

Analysis of the wind roses in Appendix B shows considerable variations in direction and strength of recorded winds between the five Forbesdale recording stations indicating that the wind swirls around the Forbesdale spur. Conclusions can be drawn from this and are outlined below.

SPRING – September : October : November

9.00am Winds tended to be light and variable in direction but generally with a dominance from the north-west through to the north-east.

3.00pm Winds are far stronger than 9.00am. There was a north-western dominance in September changing to an east through to south-west dominance in October and November.

SUMMER – December : January : February

9.00am Winds light with dominant winds equally from the north and south with only occasion easterly and westerly impacts.

3.00pm Winds strong and heavily dominated from the east through to the south.

The conclusions outlined above vary substantially from those made by GRL in their EIS. They conclude that:

In spring there is no domination of wind direction. **(at Forbesdale there is a distinct east to south west dominance.)**

In summer there is a north east and south domination of wind direction.
(at Forbesdale there is an east to south dominance. Winds from the north east of any significance only occurred at station 2 and constituted less than 12% of readings.)

Figure 3.6 Forbesdale Wind Roses – Spring

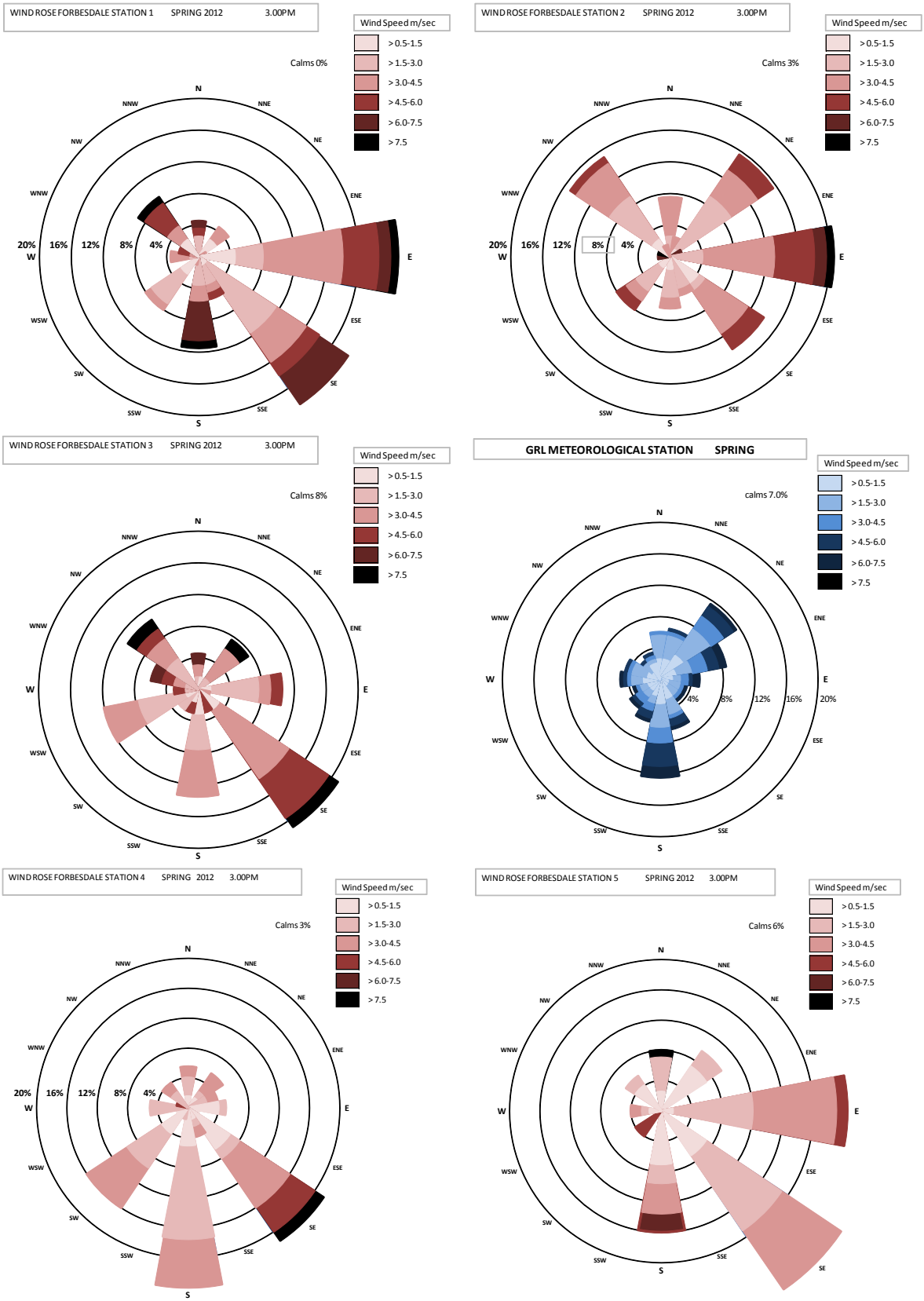
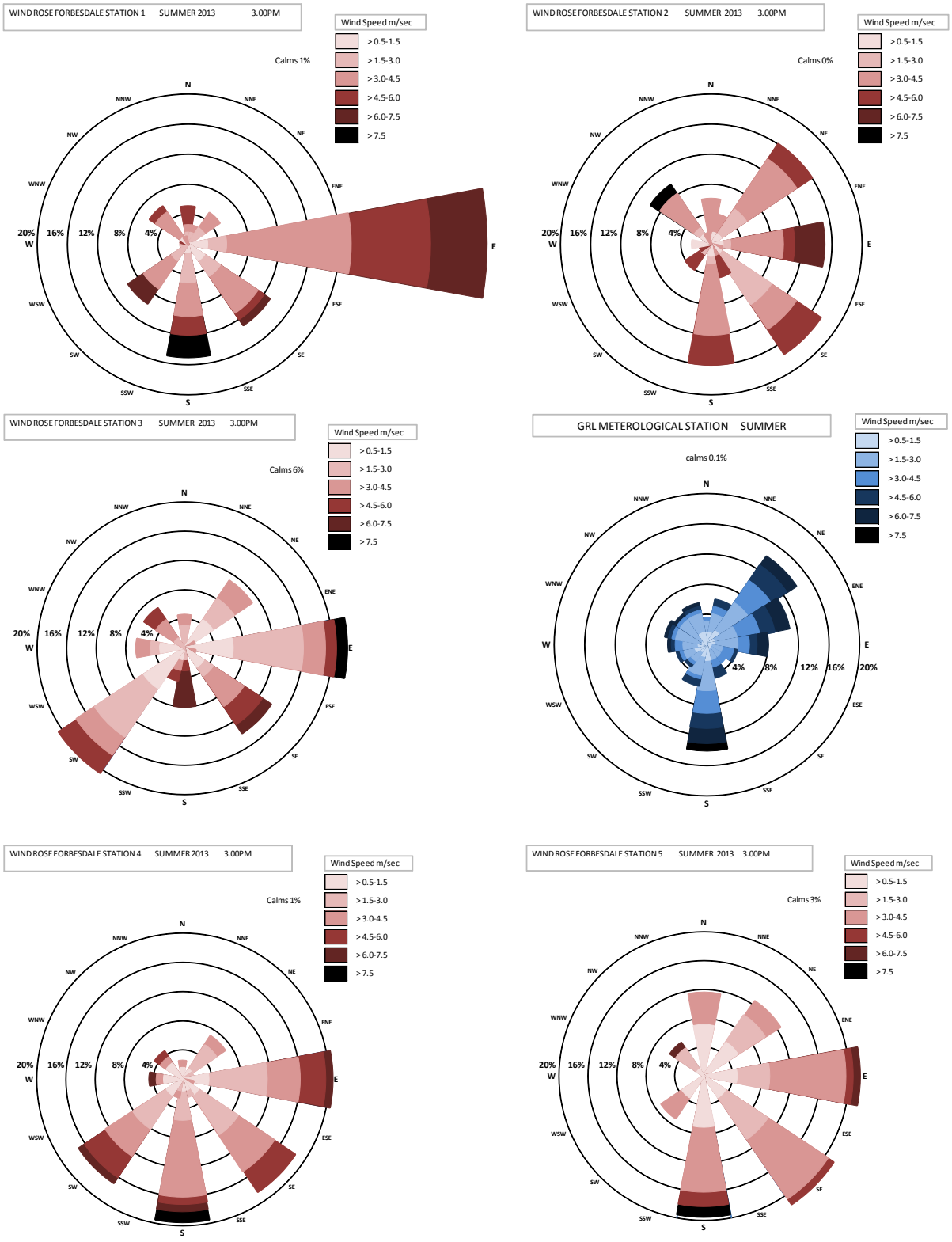


Figure 3.7 Forbesdale Wind Roses – Summer



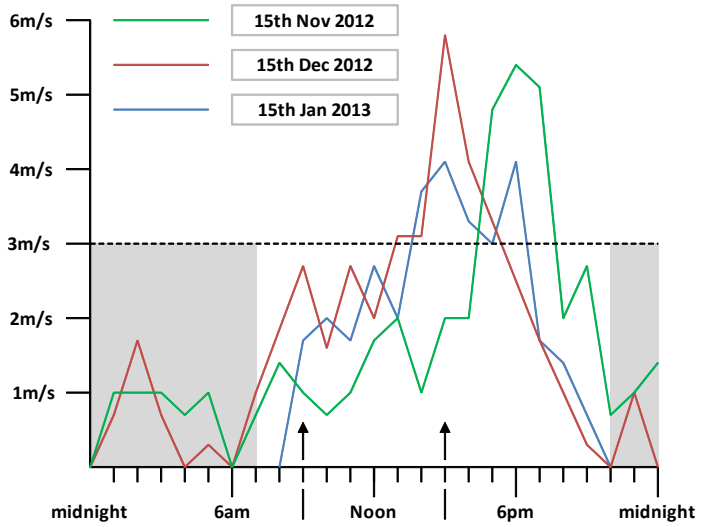
3.4.3.2 Forbesdale Wind Monitoring vs GRL Wind Monitoring

The purpose of obtaining wind data by GRL is to be able to use that data in the presentation of arguments with regards to its impact on noise and dust migration. Wind velocity of 3m/s is a key element in both. However in the case of noise this represents the maximum point of concern but with dust migration represents the minimum.

GRL rather than using the available data to amplify the points of concern, the lowest wind readings in the case of noise and those above 3m/s in the case of dust, have continuously sought to "average" readings to the point where they claim that for the 93.9%-93% of the time that the wind blew between July 2010 and June 2012 it did so at between 2.3m/s and 2.6m/s.

This figure is both deceptive and misleading creating an artificial figure that reduces both the noise and dust impacts.

Figure 3.8



The diagram above shows the 24 hour readings for Forbesdale Station 1 taken on the 15th day of November and December 2012 and 15th day of January 2013. The grey area represents the period 10pm to 7am when the mine theoretically is nonoperational. (This does not include coal loading operations which may occur 24hrs per day.)

Clearly a significant amount of the time (26.7% of the time) the wind is above 3m/s affecting dust migration and similarly (73.3% of the time) the wind is below 3m/s affecting noise transmission.

This building up of wind velocity from after sunrise, peaking in the mid to late afternoon and dropping in the evening after sunset is typical of the valley in the region of the Rocky Hill Mine.

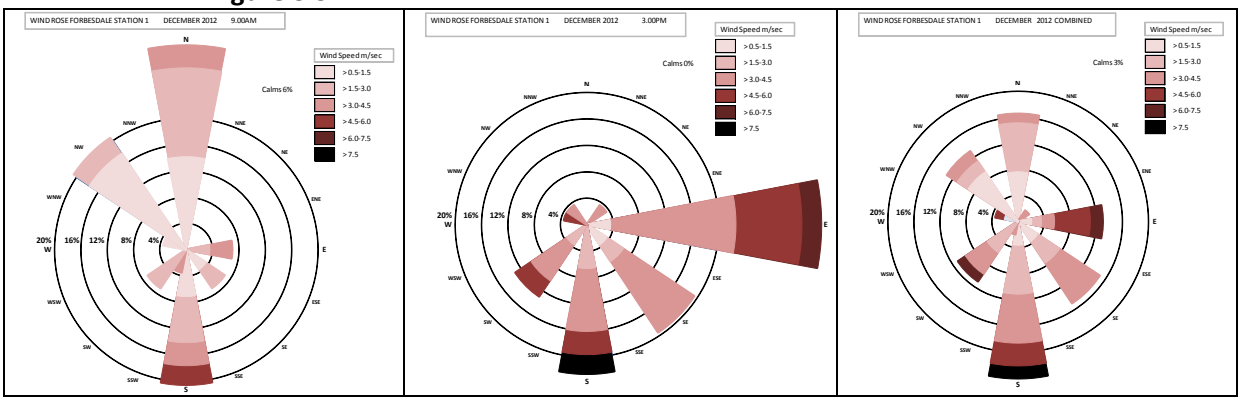
To ignore this by using "average" is deceptive in the extreme masking the true relationships between wind, dust and noise.

The significant north-north-easterly to east-north-easterly component of the GRL wind roses that is absent from the Forbesdale wind roses is also explained by the lack of desire to amplify the concerns but hide them in data manipulation.

The direction of the wind is of particular significance in the area of dust migration and to a far lesser extent in the area of noise transmission. Therefore by incorporating a greater number of low wind velocity readings the wind rose, rather than looking at the high velocity readings that affect dust, the directional components are altered. This has been done by GRL by incorporating the low velocity 9.00am readings with the higher velocity 3.00pm readings.

It is assumed that in accordance with Australian meteorological practice that GRL used 9.00am and 3.00pm readings as did FRAG. The monthly wind roses posted on the GRL Rocky Hill website indicate 60 readings a month have been used as compared to the 30 on the FRAG wind roses for 9.00am and 3.00pm.

Figure 3.9



9.00am **3.00pm** **combined**

Figure 3.9 shows the effect on the dominant wind direction as depicted by the wind rose when the 9.00am and 3.00pm roses for Station 1 December 2012 are combined. What was a 35% dominance on the 3.00pm rose becomes a 13% fifth most dominant direction on the combined rose.

Again this is both deceptive and misleading creating an artificial figure that reduces both the noise and dust impacts.

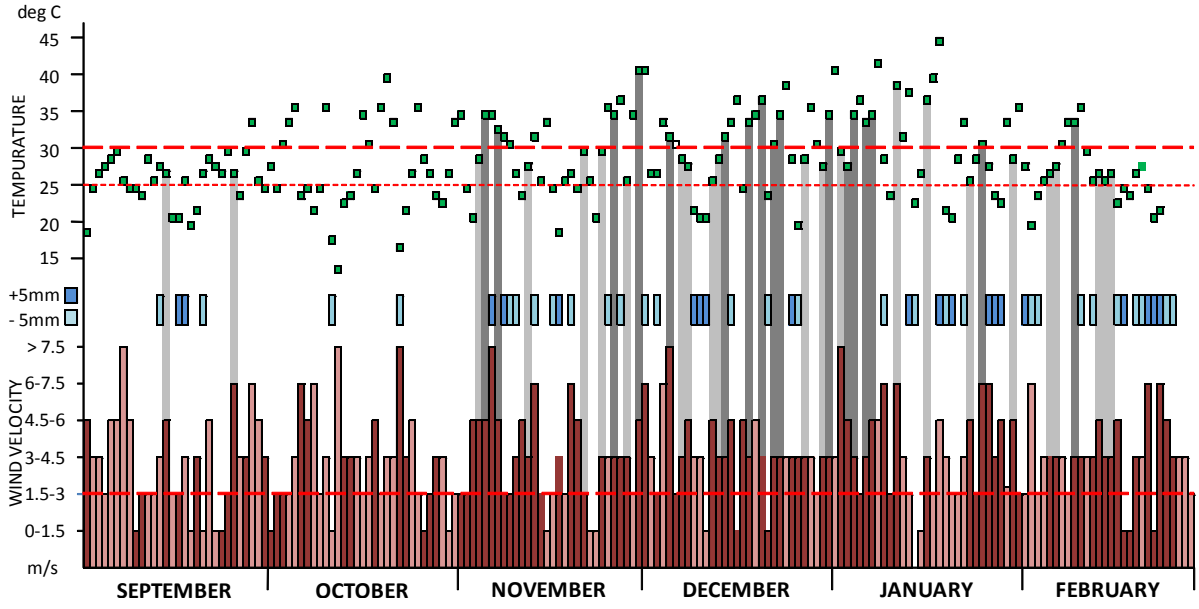
3.4.3.3 Forbesdale Winds – The Perfect Storm

The effect of the wind can be amplified or reduced by the impact of two other meteorological factors, rainfall and temperature. Obviously there is no dust migration in a rainstorm but conversely long periods of dry weather and high temperatures lead to a drying out of the ground making the generation of particulate matter easier by removing the bonding effect of the moisture on the individual particles.

The combination of no rainfall, high temperatures and strong winds coming from the source to the receptor would represent the “Perfect Storm” for particulate movement.

The graph below is representative of the occurrence of such “Perfect Storms” based on meteorological data from Forbesdale station 1.

Figure 3.8 Perfect Storm Conditions – Forbesdale Station 1



Wind from source to receptor, the E to S quarter

Wind from other quarters

Rainfall reading of less than 5mm

Rainfall reading greater than 5mm

Temperature 3.00pm

Easterly to Southerly quarter wind above 3m/s, no rainfall, temperature over 30 deg

Easterly to Southerly quarter wind above 3m/s, no rainfall, temperature over 25 deg

On the bare ground of an open cut mine with temperatures in excess of 25 degrees the effect of less than 5mm of rainfall the previous day would be insignificant in its ability to retard particulate matter being lifted into the atmosphere by +3m/s wind. The table below outlines the number of “Perfect Storm” days of over 25 degrees and 30 degrees.

Table 3.2 Perfect storm Days

Month	Total Days		% of Total		% of Total	Total Days	% of Total
September	30	0	0%	2	6.7%	2	6.7%
October	31	0	0%	0	0%	0	0%
November	30	4	13.3%	5	16.7%	9	30%
SPRING	**91**	**4**	**4.4%**	**7**	**7.7%**	**11**	**12.1%**
December	31	7	22.3%	6	19.35%	13	41.9%
January	31	5	16.1%	5	16.1%	10	32.3%
February	28	1	3.6%	5	17.9%	6	21.4%
SUMMER	**90**	**13**	**14.4%**	**16**	**17.6%**	**29**	**32.2%**
TOTAL	**181**	**17**	**9.4%**	**23**	**12.7%**	**40**	**22.1%**

3.5 How Much "Dust" Will There Be?

How much dust will be produced annually as a result of the Rocky Hill Coal Project? The answer can be found by looking a few kilometres south at the Yancoal owned Stratford Mining Operation. This is a similar size mine operating in the same valley, extracting the same grades of coal, producing the same type of overburden, processing in the same manner and loading the same size trains.

The Annual Report for the Stratford mine states in the year ending June 2011 they produced 2.94 million tonnes of ROM coal. Of this 1.19 million tonnes 40.5% was extracted at Stratford and the remaining 1.75 million tonnes, or 59.5%, was extracted at Duralie and was shipped to Stratford for processing and loading for transport to Newcastle.

In Yancoal's recently lodged EIS seeking changes to their Stratford Operation the following figures are quoted. In year 2 of the proposed project the quantity of Totally Suspended Particles (PM_{30} and smaller) would be 1,476,612kgs. There are listed some 40 different sources of which 7 refer to both Stratford and Duralie extracted coal.

- Dozer on product stockpiles - 131,302kg
- Loading ROM coal from stockpile to hopper - 109,486kg
- Crushing - 6,480kg
- Four other categories of a few hundred kilograms each

These figures total approximately 250,000kgs. The Duralie portion of the ROM coal is 59.5% as per the Annual Report so 148750 kgs are attributable to the Duralie extracted coal.

The Stratford operation therefore produces approximately 1,327,862kgs of TSP from the production of 1.19 million tonnes of ROM coal. This represents 89.9% of the total TSP produced.

The National Pollution Inventory lists the Stratford Mining operation as producing 760,000kgs of PM_{10} particulates. If we assume the same ratios will exist the Stratford portion of PM_{10} particulates as part of its 1,327,862kgs of TSP would be 684,000kgs of PM_{10} or smaller particulates. Fifty one and a half percent of the total TSP.

The Rocky Hill Coal Project, according to Gloucester Resources Limited intend to produce up to 23 million tonnes of ROM coal over the 14 year life of the operation, an average of 1.643 million tonnes annually. This equates to 1.38 times that of the Stratford Mining Operation.

This will total 1,832,450kgs of TSP including 943,920kgs, 944 tonnes, of PM_{10} or smaller particulates annually.

3.6 The Effect of Dust on Forbesdale

Data from the Gloucester Resources Limited Meteorological Station and displayed as a wind rose in their application to the Director General for his requirements would indicate that the wind blows from the East to South Quadrant for 34.5% of the year 62.5% of that with a velocity over 3m/s.

Comparison between the recorded wind data from the five Forbesdale weather stations would indicate a far greater proportion of easterly and south easterly rather than north easterly and southerly winds. The velocities are also generally higher indicating the variation between the Forbesdale "gust" readings and the probable "average" Gloucester Resources Limited readings.

The wind direction variation is a result of the topography. The shape of the Forbesdale spur, in combination with the funnelling effect of the Waukivory Valley, directs wind from the south in a more south easterly direction over the spur and those from the north have an increased easterly component. The "gusting" effect, as discussed previously, is that which has the greatest impact on particulate movement and is therefore the more significant reading.

The GRL wind roses for Autumn and Winter indicate a dominance of southerly winds. Time constraints have meant that there are no Forbesdale readings for this period but the probability is high that they would also show a strong south to south east dominance but with an increased wind speed reading to the GRL readings.

It would be reasonable to estimate that the contribution of wind from the East to South Quadrant, based on the Forbesdale readings, would be more in order of 50% annually with 75% having a speed of 3m/s or greater.

This quadrant blows directly from the extraction areas, the processing facility and/or the rail loading facility directly at the residences of Forbesdale no more than 2 kilometres away.

The combination of particulate volume, wind direction and velocity would see the following amounts of particulate movement from the Rocky Hill Coal Project in the direction of Forbesdale.

	TSP	**PM_{10}**
GRL E-SE Quadrant over 3m/s (62.5% of 34.5% = 21.6%)	395,809kgs	203,886kgs
FORBESDALE E-SE Quadrant over 3m/s (75% of 50% = 37.5%)	687,169kgs	353,970kgs

Will all this particulate matter reach Forbesdale? No, but with the furthest residence only 2000m away giving a travel time of 11.1 minutes at 3m/s there would be little loss due to the atmospheric lifetime of the particles (see table 3.1). The ineffectual barriers and windbreaks would also produce some loss much of which would be regenerated at a later date. (see section 3.4.2).

Regardless of the figures used, somewhere in the order of 400 tonnes of TSP including 250 tonnes of PM_{10} particulate matter will travel from the Rocky Hill Coal Project to be deposited on all types of surfaces and more importantly breathed in by residents of Forbesdale. The larger PM_{30} particulate matter may well affect the amenity of the area but the effect of the PM_{10} and under matter is of vital concern in particular with regards to the demographic of the Forbesdale community. (See section 2.3)

Further detail on quantities and health costs can be found in Section 2.3 of Part 3 of this submission

4. Noise and its effect on Forbesdale

4.1 General

There will be an increase in the noise level at Forbesdale to due to the Rocky Hill Coal Project.

The newly determined Project-Specific noises level, according to Gloucester Resources Limited, will be acceptable as it falls within the guidelines of the NSW Industrial Noise policy. Evidence from every other open cut mine operating in NSW will show that their project-specific level has often been exceeded and there is no reason at all to assume that the Rocky Hill Coal Project will be any different.

Forbesdale, by virtue of its proximity to the mine and the general topography of the area, will bear the brunt of this exceeding of project-specific noise levels.

Within the framework of the NSW Industrial Noise Policy section 5 deals with Meteorological Conditions and their impact on noise. Section 5.2 covers the impact of temperature inversions and section 5.3 the impact of wind in relation to their effect on the transmission of noise. Forbesdale is prone to both of these impacts.

4.2 Proximity

All the properties of Forbesdale fall within a 2000m radius of the operational area of the Rocky Hill Coal Project.

The closer proximity of Forbesdale than any other part of Gloucester to the operational area of the Rocky Hill Coal Project means that Forbesdale will be the area most greatly impacted by:

- The daily operational output of the mine in relation to noise caused by blasting, extraction, processing and transportation both to the load out facility and the loading of trains at the facility.

- The exceeding of approved project-specific noise levels through operational errors or adverse meteorological conditions.

4.3 Topography

The natural topography of Forbesdale will minimise or in some cases nullify the effect of the physical barriers proposed to mitigate the noise emissions from the Rocky Hill Coal Project.

The natural topography of Forbesdale as described in Section 1.1.2 and shown in figure 1.2 has lent itself to the establishment of homes, in the main, close to the ridgelines to take advantage of the views up and down the valley and to benefit from breezes that occur as a result of upward air movement from the valley floor in the warmer months. Twenty seven of the thirty three residences in Forbesdale are between 125m and 145m AHD and this elevation increases the susceptibility to noise under both normal operational and adverse meteorological conditions.

This result of this elevated position of the residences is to minimise the effectiveness of the barriers situated on the valley floor. The western visibility barrier has a height of 140m AHD for 1600m of its

2200m length with a topping piece extending the height at the northern end to 155m AHD. This extension will only shield the northern end of Forbesdale from site offices and operational activity at the northern end of the pit. The CHPP and stockpiles are located behind the 140m AHD section with a height almost equalling that of the barrier.

The coal load out facility is situated at an elevation of 130m AHD with the load bins extending to over 155m AHD. There is no possibility of effective barriers between the facility and residences as there is a steep gully immediately to the north of the stockpile area and insufficient land between the stockpiles and track or track and boundary to allow the construction of any type of effective barrier.

4.4 Temperature Inversion

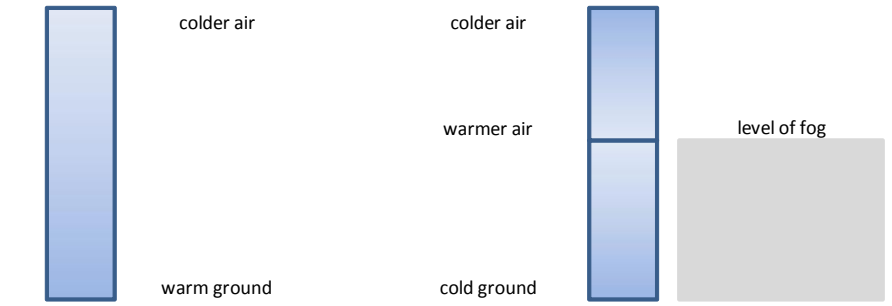
The NSW Industrial Noise Policy states "an occurrence of temperature inversion of 30% of the total night-time periods during June, July and August has been selected as representing a significant noise impact. "

The policy outlines in detail the process to be undertaken to determine the frequency and strength of temperature inversions. These require a degree of sophistication and cost beyond the means of the residents of Forbesdale however, they are not applying for a licence to operate the Rocky Hill Coal Project. Gloucester Resources Limited is, and as such it is their responsibility to provide the scientific detail to support their application. A far simpler method, all be it not as scientific has been used to show evidence and strength of temperature inversions in the Avon River Valley and their effect on Forbesdale.

4.4.1 General

Temperature inversion occurs when the normal situation of the ground being warmer than the air is reversed and a layer of warmer air sits above cooler ground. This event is often seen as fog with a distinct level top representing the extent of the inversion.

Figure 4.1



Normal Conditions

Temperature inversion Conditions And Resulting Fog

Temperature inversions are a common feature of the Avon Valley. They occur all year but predominately from April through until October.

Under normal conditions sound waves emanating from a source bend upwards due to the "drag" effect of the cooler air, during temperature inversion conditions the situation is reversed with the sound waves bending downwards giving the effect of sound seeming to travel farther and being able to be heard over intervening barriers. This is often noticed by campers on one side of a lake who during the daytime cannot hear their fellow campers on

the other side but as night falls the cooling of the lake water bends the sound from the other side allowing them to hear their quiet, around the campfire, conversation.

4.4.2 Measurement Methodology

Considering that the presence of fog is a good indicator of a temperature inversion and the height of that fog indicates the extent of the inversion these parameters were used to assess the number of days that inversion occurs and the likely impact of those inversions on Forbesdale.

A fog diary was kept by the residents of numbers 5 and 7 Forbesdale Close, recording the days and the level to which fog occurred. Observations were made at 6.00am, 7.00am and 8.00am using observable signposts as to the fogs level.

Figure 4.2

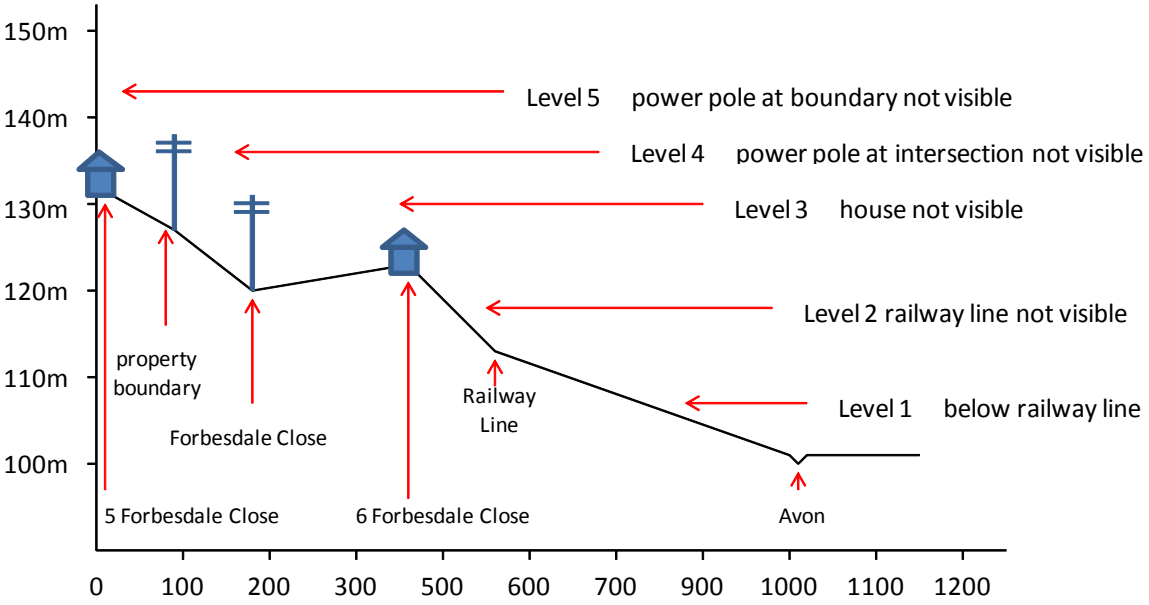


Figure 4.3 A typical Level 2 fog at 6.00am from 5Forbesdale Close.

4.4.3 Occurrence and Intensity of Temperature Inversions

The results of the Forbesdale fog diary are tabulated below showing the number of days each fog level shown in figure 4.1 were recorded.

Table 4.1 6.00am Observations

	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	rain
June	6	0	1	0	5	1	1	4	2	4	1	5
July	6	0	5	0	3	1	3	1	2	5	0	5
August	5	0	15	0	3	1	0	2	1	1	0	3
Total	17	0	21	0	11	3	4	7	5	10	1	13

Table 4.2 7.00am Observations

	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	rain
June	6	0	9	0	5	2	2	3	1	2	1	3
July	6	0	5	0	4	1	2	3	2	2	0	6
August	15	0	6	0	1	4	1	1	1	1	0	3
Total	27	0	14	0	10	7	5	7	4	5	1	12

Table 4.3 8.00am Observations

	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	rain
June	7	0	3	2	4	2	1	2	1	4	1	3
July	14	5	3	0	3	0	1	2	0	2	1	0
August	16	9	1	0	1	2	0	0	0	1	0	1
Total	37	14	7	2	8	4	2	4	1	7	2	4

Using fog as an indicator of temperature inversion would indicate the following:

That during the period of June, July and August 2012 there existed the following number of temperature inversions.

Table 4.4 Percentage of Days with Temperature Inversions

		6.00am		7.00am		8.00am	
	days	**Fog**	**%**	**Fog**	**%**	**Fog**	**%**
June	30	19	63.3%	21	70.0%	20	66.7%
July	31	20	64.5%	19	61.3%	17	54.8%
August	31	21	67.7%	13	41.9%	14	45.2%
Total	92	60	65.2%	53	57.6%	51	55.4%

These levels are far in excess of the 30% that would have a significant impact as stated in the NSW industrial Noise Policy.

Considering the topography of Forbesdale, with the majority of houses situated above 125m AHD, and the western visibility barrier with an elevation of 140m AHD it is those temperature inversions at or above the 2.5 level that pose the greatest concern. The inversion layer is at a point where the downward deflection of sound waves will allow noise from a source behind the western visibility to be heard clearly by residents.

Table 4.5 Percentage of Days with Level 2.5 or above Temperature Inversions

		6.00am		7.00am		8.00am	
	days	Fog	%	Fog	%	Fog	%
June	30	13	43.3%	13	43.3%	11	36.7%
July	31	12	38.7%	10	32.2%	6	19.4%
August	31	5	16.1%	6	19.4%	3	9.7%
Total	92	30	32.6%	29	31.5%	20	21.7%

If only those temperature inversions days at or above the 2.5 level are too be considered the 6.00am and 7.00am readings are still in excess of the NSW Industrial Noise Policy's guideline figure of 30% for significant impact to occur.

4.4.4 The Impact on Forbesdale

The proximity of Forbesdale residences to the mine and the natural topography of the area serve to emphasise the effect of the downward deflection of soundwaves caused by the temperature inversions that occur at a 2.5 Level or higher on more than 30% of days.

To better explain the impact on Forbesdale cross sections from:

- Section A. The intersection of Fairbairns Road and The Bucketts Way to the proposed CHPP.
- Section B. The intersection of Fairbairns Road and The Bucketts Way and the proposed Coal Load Out Facility at the old Boral Timber Mill site.

These two sections are diagrammatic only in the representation of the sound wave curvature but are representative of the proximity and topography of residences in relation to the operational areas of the mine.

Figure 4.4 Cross Sections A and B

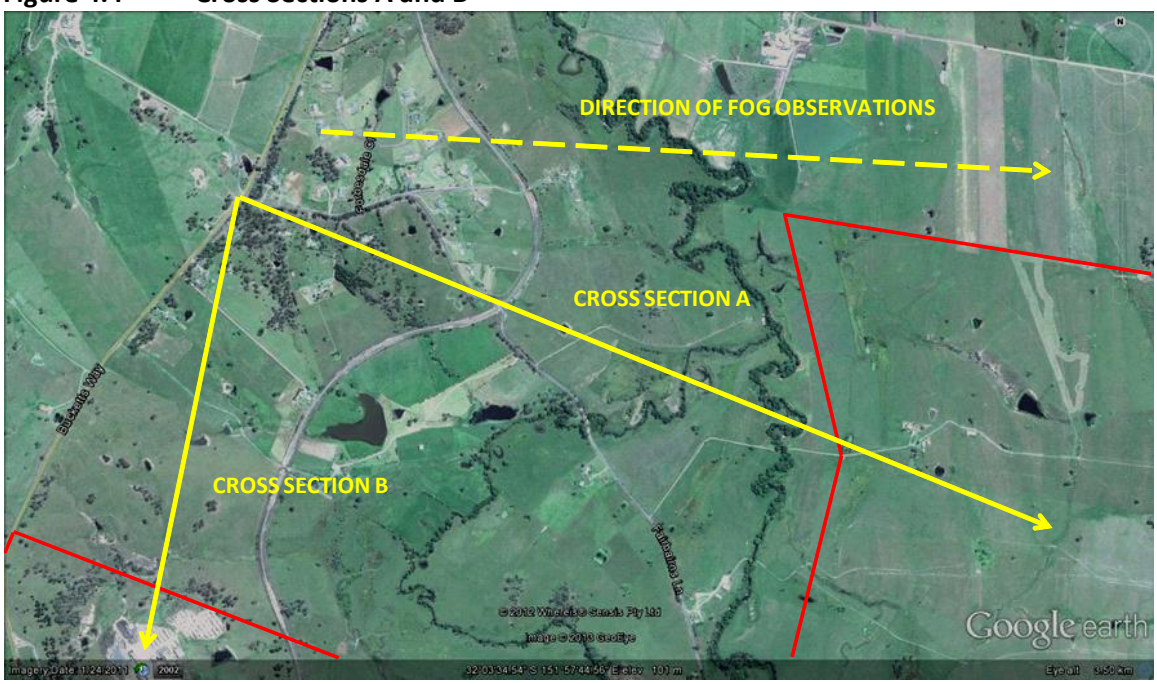
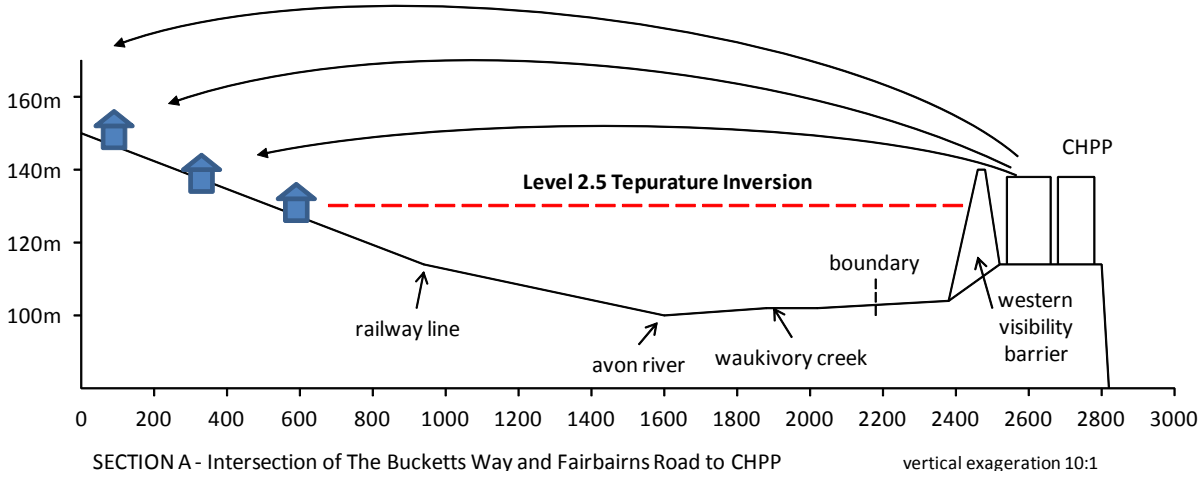
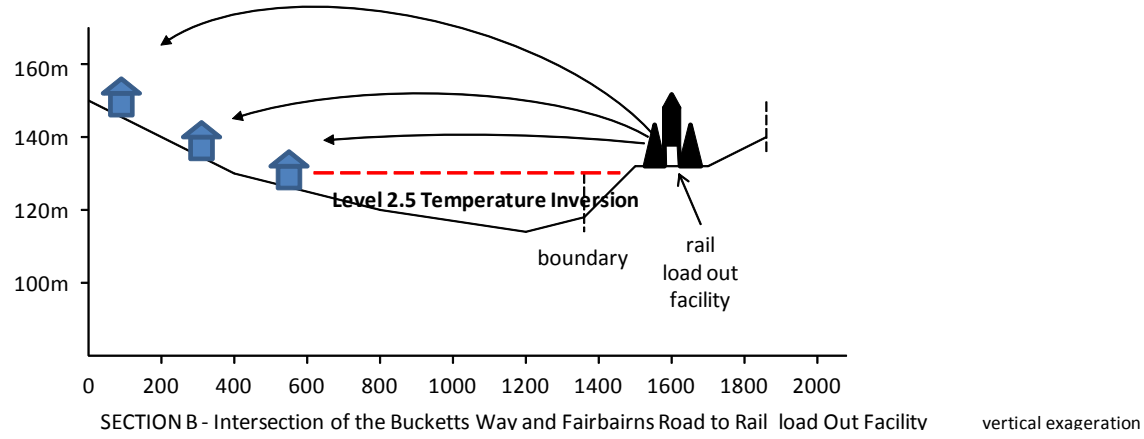


Figure 4.5 Sections A and B showing Level 2.5 Temperature Inversion





The NSW industrial Noise Policy in Appendix D "Estimating Noise Increase Due To Inversions" sets out in Table D1 estimations of the increase in noise level given various inversion conditions and the distance from the noise source. As previously stated there has been no scientific study of the Forbesdale temperature inversions but rather a series of observations to give an indication of occurrence and strength of the temperature inversions. The parameters used in adopting the Table D1 calculations however would apply to Forbesdale and therefore the use of the table gives a good guide to the expected noise increases.

The relevant section of the table is reproduced below to show the impacts on Section A and Section B

Distance (m)	Increase in Noise Level, dB			
	3°C/100m	3°C/100m and 2m/s wind	8°C/100m	8°C/100m and 2m/s wind
1000	1.5[B]	5.0[B]	5.0[B]	6.5[B]
1500	1.5[B]	4.5[B]	5.0[B]	6.5[B]
2000	1.5[A+B]	4.5[A+B]	5.0[A+B]	6.5[A+B]
2500	1.5[A]	4.5[A]	4.5[A]	6.5[A]
3000	1.5[A]	4.5[A]	4.5[A]	6.0[A]

Residences in Forbesdale can expect an increase of between 1.5dB and 6.5dB depending on their distance from the source, the intensity of the inversion and wind.

To understand the impact of this increase on Forbesdale the following points were considered.

- A difference of 3dB corresponds to doubling the power of a noise source. Two noise sources generating a sound pressure level of 40dB each at 1m from a receiver will have a resultant combined pressure of 43dB. An increase of 3dB would be noticeable by the community and therefore represents a significant increase
- An increase of 3-5dB from a sound pressure level of 90db that is 93-95dB will be perceived significantly differently to a 3-5dB increase from a sound pressure level of 35dB
- The noise levels at the Forbesdale residences will essentially be driven by low frequency noise. Using The Fletcher-Munson equal loudness contours[1] an increase in 5dB at 80Hz would be perceived as a doubling the noise levels going from the 20 loudness to the 30 loudness curve. A result that would indicate that a 5dB increase would be noticeable to most members of a community.

[1] *Fletcher-Munson equal loudness contours are a measure of sound pressure level over the frequency spectrum for which a listener perceives a constant loudness when presented with pure steady tones. It is understood that the noise, perceived by residents, from the Rocky Hill Mine would not be a pure tone but as it will be dominated by particular frequencies the use of the contours remains valid.*

The resulting impact on Forbesdale is that a doubling of the perceived noise level occurs, causing sleep deprivation and interruption to the residents. This will be further exacerbated be the extension of the daily Temperature Inversion time frame due to the topography of the Avon Valley and the suppression of high frequency noise by the formation of the fog that offers the indication that a temperature inversion in fact exists.

4.4.5 Exacerbating Factors affecting Temperature Inversion Impacts

4.4.5.1 The Topography of the Avon River Valley

The impact of temperature inversions as seen previously are governed by the intensity of the inversion and the distance of the receiver from the source. The NSW Industrial Noise Policy requires that readings for the determination of the significance of temperature inversions be taken from June to August and consider the period from 10.00pm to 7.00am.

The Avon River Valley where the proposed Rocky Hill Coal Project is to be located has an extended period both annually and daily, during which temperature inversions would have a significant effect. It is quite common for temperature inversions to occur, as is evidenced by the fog levels outlined in 4.4.2, as early as April and continue through to October at an occurrence rate that would still see them considered significant. The figures for September 2012 are shown below still well above the required 30% even at 8.00am

Table 4.6 September 2012 Temperature Inversion Frequency

		6.00am		7.00am		8.00am	
	days	**Fog**	**%**	**Fog**	**%**	**Fog**	**%**
September	30	18	60.0%	16	53.0%	12	40.0%

Temperature Inversions begin to form early and stay late due to the early sunset and late sunrise in the Avon River Valley. The topographical features of the Bucketts Range to the west and the Mograni Range to the east ensures the sun sets in the valley before 4.00pm in mid-winter with a corresponding significant temperature drop. Sunrise at the same time is after 7.00am leaving the valley without sunlight for over 15 hours.

4.4.5.2 The Dampening of High Frequency Noise

The effect of at level 2.5 or above fog (see 4.4.2) is to dampen high frequency noise being transmitted from the mine. Whilst there is no increase in the volume of the low frequency noise that appears to be the case due to the elimination of the higher frequencies of noise. This in turn, due to the considerations outlined in 4.4.4, increases the perception of loudness.

4.5 Wind

The NSW Industrial Noise Policy states "Wind effects need to be assessed when wind is a feature of the area. Wind is considered to be a feature where source to receiver wind speeds (at 10m height) of 3m/s or below occur for more than 30% of the time or more in any assessment period"

In their application for the Director General's Requirements for the Rocky Hill Coal Project Gloucester Resources Limited provided climatic information in section 3.4. Part of that information was by way of wind roses, both seasonal and annual, an assessment of those wind roses concluded that the average recorded wind speed was 2.5m/s and calm conditions prevailed for 2% of the year. This would indicate that the wind effects would need to be assessed as stated in the NSW Industrial Noise Policy as the wind was at or below 2.5m/s for at least 50% of the time far in excess of the policies requirements.

There is no indication in the Gloucester Resources Limited documentation as to the height of the wind readings. As with temperature inversions it is the responsibility of Gloucester Resources Limited to provide accurate scientific data in support of their application, it would be a valid assumption however that as the recorded wind speed was so far in excess of the policies requirements that wind effects should be assessed and considered.

4.5.1 General

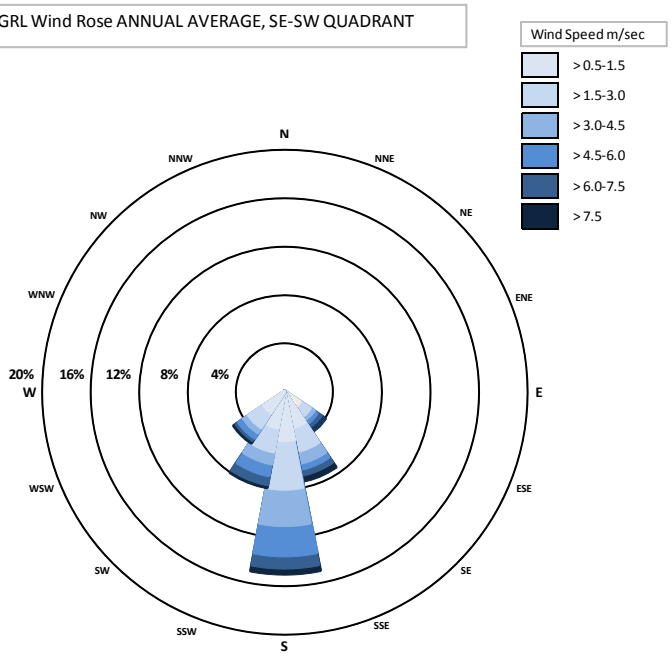
"A default wind speed of 3m/s at 10m height is proposed for assessing noise impacts caused by gradient winds. This wind speed can noticeably increase noise received down-wind of a noise source, but may not increase ambient noise levels to a point where they mask noise from a source and make it unnoticeable"[1]

[1] *Extract from section 5.3.2 "What wind speed should be used when assessing noise impacts?" of the NSW Industrial Noise Policy.*

4.5.2 Wind Direction

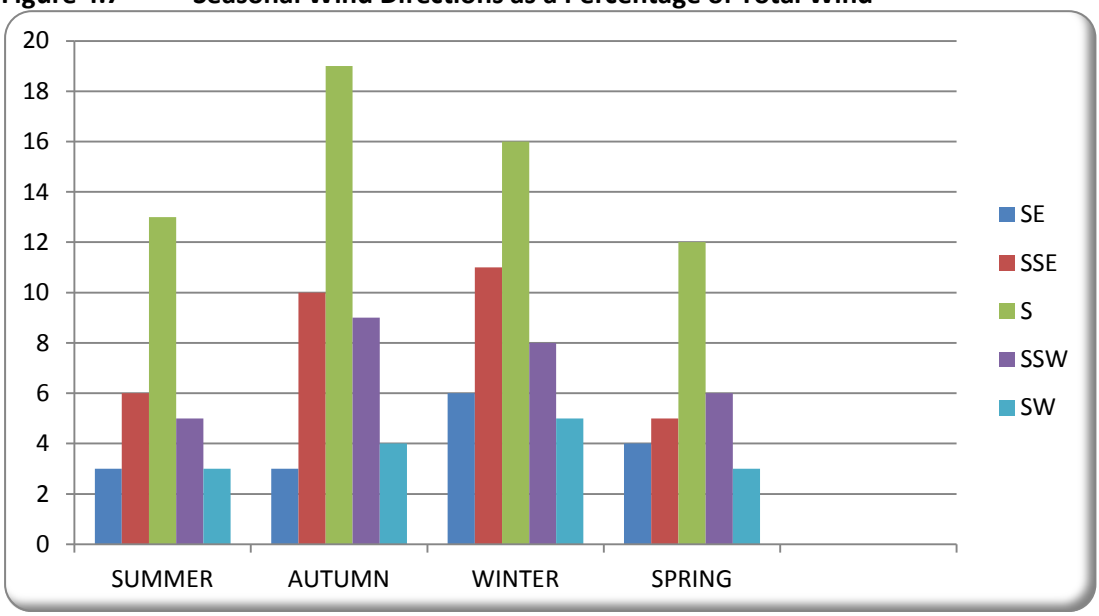
The annual wind rose generated from recordings obtained at the Gloucester Resources Limited Meteorological Station on the floor of the Avon River Valley and within the proposed mine operational area indicates dominance of wind from the South East to the South West. Wind blows from this quadrant for 39% of the year as shown on the relevant section of the wind rose shown below.

Figure 4.6 GRL Wind Rose, Annual Average, SE-SW Quadrant



A seasonal assessment of the percentage of the time wind blows from the South East – South West quadrant is shown on the chart below.

Figure 4.7 Seasonal Wind Directions as a Percentage of Total Wind

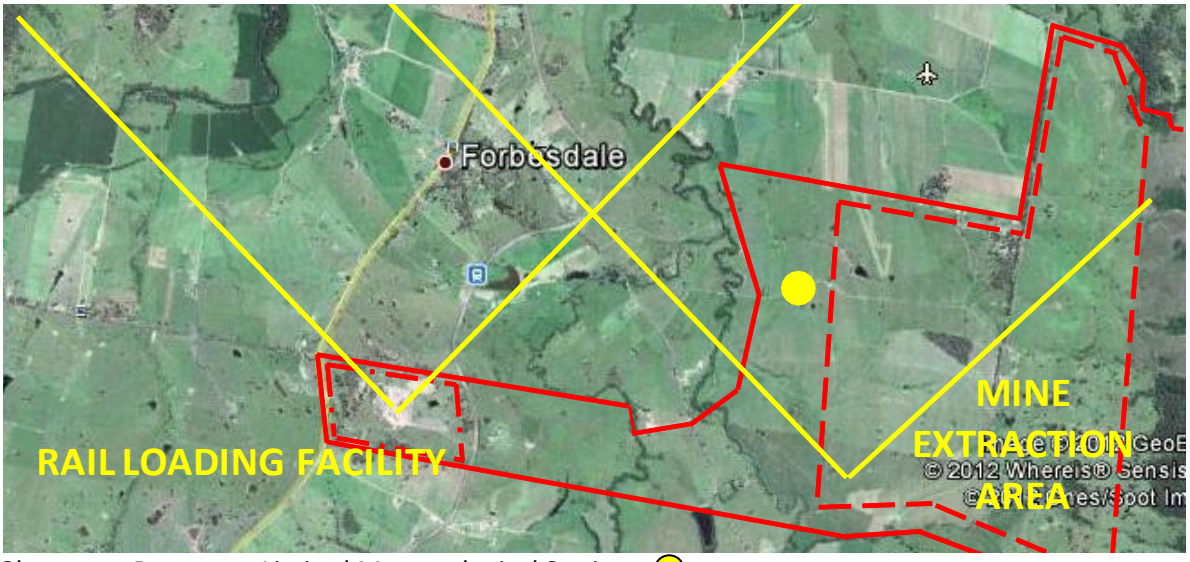


The wind from the South East – South West quadrant is particularly dominant in the autumn (45%) and winter (46%) with spring and summer both in the region of 30%.

4.5.3 Wind Direction and Frequency in Relation to Forbesdale

The effect on Forbesdale of wind from the South East – South West quadrant is shown on the map below.

Figure 4.8 South East-South West Quadrant Affected Areas



Gloucester Resources Limited Meteorological Station

According to the Gloucester Resources Limited figures of the 365 days in 2010 357 had wind readings recorded with 2% being calm. On those days when wind was registered it blew at 2.5m/s on 50% of days or 179 days. Table 4.7 below outlines the number of days relative to the season.

Table 4.7 Wind at or under 2.5m/s affecting Forbesdale by Season

	Days in Season	% of days with SE – SW quarter wind	Total affected days	Total affected days wind at or under 2.5m/s
Summer	88	31%	27	13
Autumn	90	45%	41	20
Winter	90	46%	41	21
Spring	89	30%	27	14
Total	357	39%	136	68

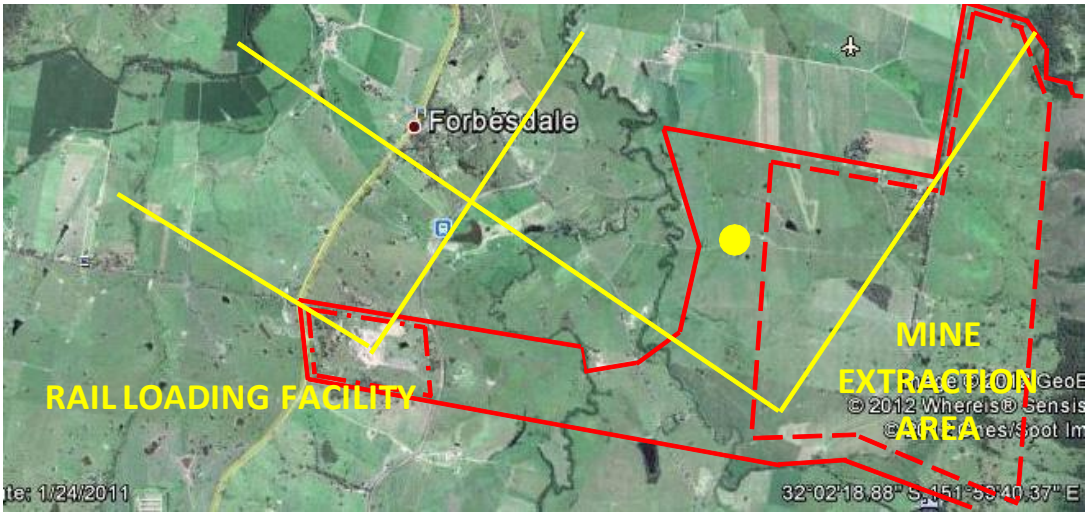
On 68 days of the year wind, under the definition of the NSW Industrial Noise Policy, will have a significant effect on the residents of Forbesdale. This effect will be most pronounced during the autumn and winter seasons coinciding with the impact of temperature inversions which also create a significant impact at this time of year.

4.5.4 Forbesdale Wind Readings vs. GRL Wind Readings

In September 2012 five weather stations were established at Forbesdale for the purpose of gauging wind directions and velocities at various points around the spur of land that forms the dominant topographical feature of the area. The purpose of this was not to dispute the readings from the Gloucester Resources Limited meteorological station but rather to provide information on conditions at the receiver rather than the source. (Details of the locations and the readings can be found in section 3 on Dust and its effect on Forbesdale.)

Of note however is that all 5 stations on the spur show a far greater influence of wind from the south-east and a lessening of wind from the west-south than does the Gloucester Resources Limited meteorological station located on the floor of the valley. This would have the effect of "skewing" the wind affected from a south west-south east quadrant to a more easterly orientated quadrant. This effect is shown in figure 4.8

Figure 4.9 South South West to East South East Quadrant Affected Areas

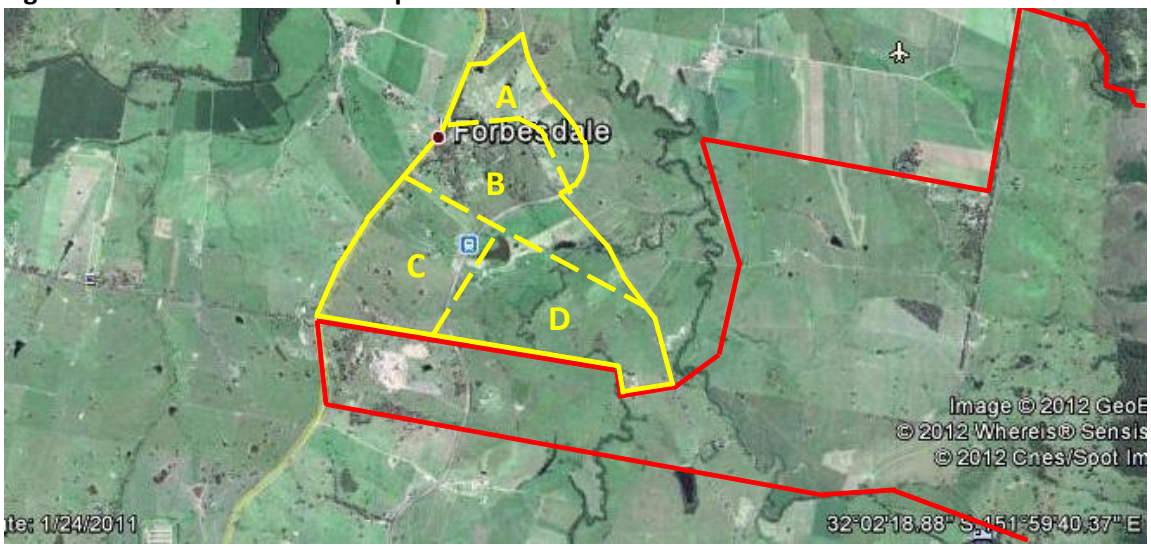


4.5.5 The Impact on Forbesdale

The combination of the topography of Forbesdale and there being two primary noise sources from the mining operation would see there being four receptor areas in Forbesdale two with different characteristics and one a combination of both the fourth affected when wind conditions lie outside those discussed here. The factors impacting on each varies so it is necessary to look at each individually.

Whilst the occurrences, directions and wind intensities described previously are dominant in Forbesdale it by no means suggests that wind from other directions or at other intensities will not affect the area. There is also a third noise source in the overland conveyor that is not discussed which will never the less have an impact

Figure 4.10 Forbesdale Receptor Areas



4.5.5.1 Receptor Area A

This area lies broadly to the north and east of Fairbairns Road excluding those homes fronting Fairbairns Road and encompasses primarily stage 2 of the Forbesdale Estate (Total 13 properties, 11 residences).

Residents in this area will be primarily be affected by noise from the operational area of the mine. They are most influenced by wind from the South Easterly quarter. Wind monitoring from the Forbesdale weather stations in this area would indicate that the wind curls around the spur giving it a more easterly direction than the south easterly at the source.

For at least 68 days of the year wind will have a significant effect on noise during the operational hours of the mine.

4.5.5.2 Receptor Area B

This area lies to the south and west of Fairbairns Road including those homes fronting Fairbairns Road (Total 17 properties*, 15 residences). It encompasses the Fairbairns Road ridge and extends to include the valley floor.

Residents in this area will be affected by noise from both sources. Noise from the operational area of the mine will have the greatest impact when it is the most easterly and from the rail load out facility when the most south westerly.

For at least 68 days a year wind will have a significant effect on noise levels during the operational hours of the mine and 24 hours a day on noise from the rail load out facility.

4.5.5.3 Receptor Area C

This area lies immediately to the north of the rail load out facility and extends easterly to the north coast rail line. The Bucketts Way ridge forms the western boundary (Total 4 properties*, 2 residences).

Residents in this area will be primarily affected by noise from the rail load out facility. They are most influenced by wind from the southerly quarter.

For at least 68 days a year wind will have a significant effect 24 hours a day on noise levels from the rail load out facility.

4.5.5.4 Receptor Area D

This area is primarily the valley floor immediately north of the conveyor corridor boundary (Total 3 properties*, 3 residences)

Residents in this area will be affected the most of any area by influences not previously covered. They will be impacted by mine operational noise when the wind blows from the east but from the overland conveyor when from the south. This will be of significant impact as in some cases they are only a couple of hundred metres from the source.

For at least 68 days a year wind will have a significant effect 24 hours a day on noise levels from the overland conveyor.

**Some properties fall within more than one receptor area.*

4.6 Low Frequency Noise and Infrasound

Infrasound is the term used to describe sound with a frequency below 20Hz generally considered to be the threshold of audible noise. The influence of infrasound is often masked by higher frequency sounds.

Low frequency noise and infrasound are typically produced by machinery both rotational (eg gas turbine engines) and reciprocating such as diesel engines, pumps and compressors all of which will be employed at the Rocky Hill Mine.

Attenuation (reduction) of infrasound over distance through air is far less than for higher frequencies meaning that whilst the audible sound from the mine may have fallen away or be masked by wind noise the infrasound will remain largely undiminished.

4.6.1 Health Impacts of Low Frequency Noise and Infrasound

Infrasound is a recognised cause of cardiovascular disorders[1]. It can also be responsible for loss of balance, confusion, loss of concentration and mental acuity, learning difficulties, headaches, nausea, sleep deprivation, stress and depression[2]. The age of the Forbesdale population would leave it particularly susceptible to many of the disorders mentioned.

[1] "Adverse Health Effects of Noise" World Health Organisation
[2] "A Review of Published Research On Low Frequency Noise and Its Effects" Leventhall. G 2003

4.7 The effect of noise on Forbesdale

There will be an increase in the noise levels at Forbesdale and under the provisions of the NSW Industrial Noise Policy, limits will be set outlining the volume, duration and times these increases above the current ambient levels can occur. These limits will be exceeded, whether by accident or design, as they have been at every open cut mine.

Forbesdale, by virtue of its location, will bear the brunt of the allowable increases and be the most impacted by the exceeding of the limitations.

The topography combined with the climatic effects of temperature inversions and wind provides a perfect stage upon which the "exceeding of limitations" can occur. The effect of barriers will be minimal and operational modifications only fit the operations within the limits, not provide for the exceeding of them.

The World Health Organization defines health as a state of complete physical, mental and social wellbeing, not just the absence of disease (WHO 1947). The increase in both the ambient noise levels due to the setting of "project specific limitations" and the exceeding of those limitations will impact on the physical, mental and social wellbeing of the Forbesdale residents.

5 The Loss of Visual Amenity and its effect on Forbesdale

In the Director General's Environmental Assessment Requirements he recognises the importance of visual amenity and asks under the section Key Issues / Visual for the "potential visual impacts of the project on private landholders in the surrounding area". He also asks for "a detailed description of the measures that would be implemented to minimise the visual impacts of the project".

The answer to these requests was outlined in the Gloucester Resources Limited application to the Director General. In section 5.6 Visibility they state "there is minor exposure of the site to private views" and that they will create a pleasing final landform to the east from the overburden they produce. They will build visibility barriers from the overburden and they will undertake tree planting so they will soften the view of this overburden that they have produced.

The reality is that every residence and property in Forbesdale has at least some view of the operational area and the visibility barriers.

The final landform will be to the east not because it is more distant but because it is the only land they have available.

The visibility barriers are no more than overburden dumps located as close as possible and as high as possible, given engineering constraints and the need to avoid the floodplain, to their respective adjacent pit to minimise the transport distance of the overburden. These will be vegetated at some point with some grass and scrub that is supposed to replicate what was removed.
The trees are being planted primarily in areas softening the impact on GRL, AGL and Yancoal owned properties. Those that could possibly have any impact will need to grow to over 40m in height and in the last two years have yet to attain a height of 1m with most still less than 0.5m

The Gloucester Resources Limited indicated response to visual amenity is more about suiting their mining operation than concern over "potential visual impacts of the project on private landholders in the surrounding area" as requested by the director General.

5.1 General

Vi-su-al attained or maintained by sight **Ame-ni-ty** the quality of being pleasant or agreeable[1]

[1] *Definitions from Webster's Dictionary*

Visual amenity then, by the definition, concerns what can be seen and is it pleasant or agreeable, the following sections address these two concerns.

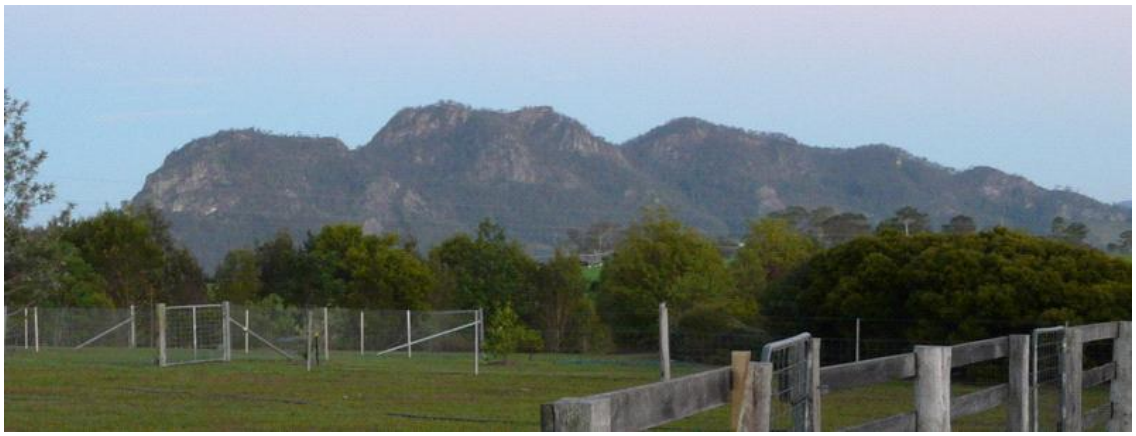
5.2 The Existing Visual Outlook of Forbesdale

To full understand the loss of visual amenity will suffer it is necessary to understand the existing visual amenity of Forbesdale. The visual amenity of an area is not simply the view in one direction but rather the total visual impact of an area. If it represents the area in which one lives the visual amenity sits in the background as you go about your daily routine stopping every once in a while and saying "look at that sunrise" or "look at the way the cloud is hugging the Bucketts", at least the residents of Forbesdale do.

The photographs below represent the existing visual amenity of Forbesdale

Figure 5.1 Existing Visual Amenity Photographs.

A The Bucketts from the rear of 5 Forbesdale Close in the early morning. 26/01/2013



B The Avon River Valley and the Mograni Range Looking North in the afternoon from 19 Grantham Road. 29/01/2013

C Sunrise over the Mograni Range from 77 Fairbairns Road. 1/02/2013

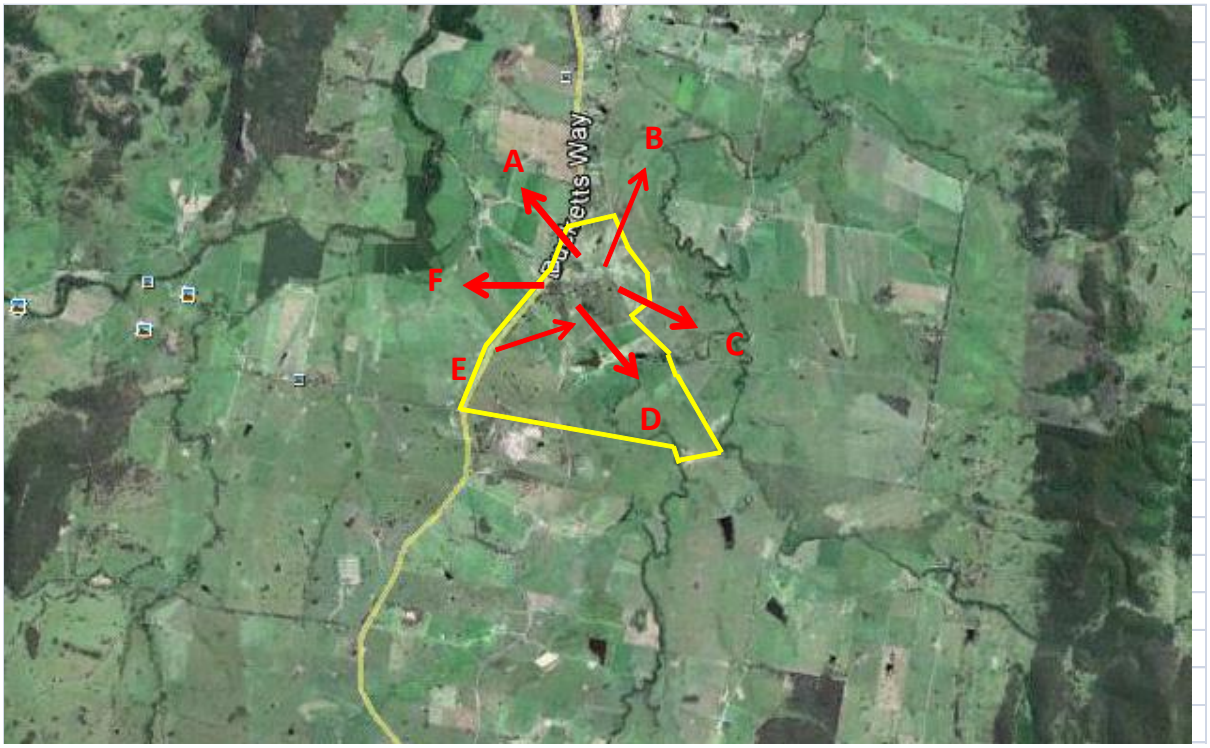
D The Avon River Valley and Mograni Range looking south in the afternoon from 30 Fairbairns Road. 29/01/2013

E The Mograni Range from Bucketts Way. 29/01/2013

F The Gloucester River Valley from the intersection of The Bucketts Way and Fairbairns Road early morning. 31/01/2013

The map over page indicates the directions in which the existing visual amenity photographs were taken.

Figure 5.2 Visual Amenity Photographs: Indication of Photographic Directions



The photographs give a snapshot of the visual amenity of Forbesdale. The views in every direction, from every property are stunning. They change hourly, daily and seasonally with changes in the angle and intensity of the sunlight and the meteorological conditions.

The visual landscape ranges from patchwork green farmlands on the valley floors to the spectacular cliffs of the Bucketts. It extends 360 degrees around Forbesdale giving true meaning to the expression visual amenity.

5.3 The Loss of Visual amenity

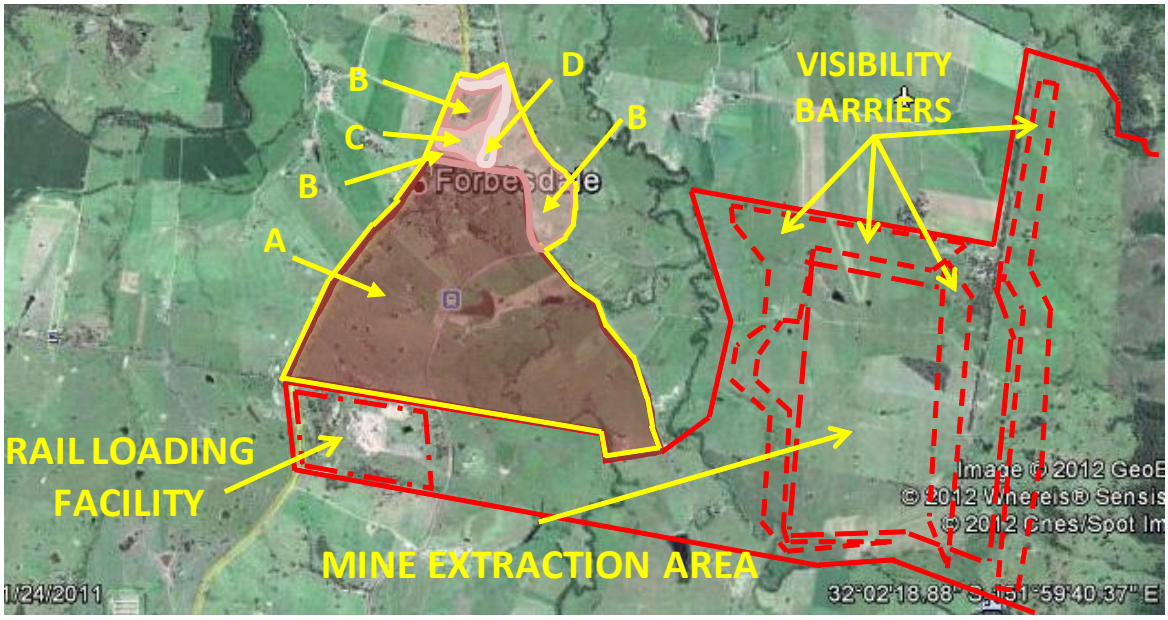
There is no half measure when it comes to visual amenity. There is no half pleasant or half agreeable. The visual amenity of an area is agreeable and pleasant or it is not, it exists or it does not exist.

Individually, every property in Forbesdale will be affected by this loss of visual amenity as every property will have a view of some part of the operational part of the mine, of infrastructure or the overburden dumps inappropriately named Visibility Barriers.

5.3.1 What Parts of Forbesdale Will Be Affected

The map below shows what will be seen of the Rocky Hill Coal Project Operational Area from Forbesdale properties.

Figure 5.3 Forbesdale Views of the Rocky Hill Coal Project Operational Areas



Area A View of the Rail Loading Facility, Extraction Area and All Visibility Barriers

Area B View of the Extraction Area and all Visibility Barriers

Area C View of the Visibility Barriers

Area D No view of the operational area*

**Area D represents a deep gully and contains no residences*

The visual amenity of an area is not defined by the visual amenity of individual properties. All the residents share the views and visual amenity of Forbesdale as they drive to work, visit neighbours and go about their daily business. Gloucester Resources Limited, in their application for the Director General's Requirements, manage to ignore this point entirely indicating there is only "minor exposure of the site to private views" with no consideration of the area as a whole.

5.3.2 The Degree to which Forbesdale will be affected

In relation to the extent by which Forbesdale will be impacted Gloucester Resources Limited have written in their application,

"The most significant concentration of private views is in the Grantham Road / Fairbairns Road area of the Forbesdale rural-residential area from which a limited number of residents will have unimpeded views towards exposed areas of the site. It is the views from this area that have influenced the location and design of the three visibility barriers within the mine area."

The limited number is 10 properties, or 30.3% of the Forbesdale properties, that have an unimpeded 100% view of the site. 7 of these are from elevated positions. A further 8 homes, or an additional 26.7% of Forbesdale properties, have an unimpeded view of between 25% and 80% of the site bringing the total to 57%, hardly a percentage that can be considered a limited number.

They also ignore the 15 properties, or 45.5% of Forbesdale properties, 12 from elevated positions, that have an unimpeded view of the rail loading facility.

Of the properties mentioned above 7 have the dubious honour of having an unimpeded view of 100% of both the mine site and the rail loading facility.

In total 28 properties, or 84.8%, have an unimpeded view, most from an elevated position, of at least 25% of the mine site or rail loading facility, 4 properties, or 12.2% have views through the trees of both and only 1 property, or 3%, has less than 25% view of the mine site.

These figures are for individual properties, the number of residents that will, on any given day, have an uninterrupted view of some part of the Rocky Hill Coal Project will be 100%.

5.3.3 Visibility Barriers and Tree Planting as Protectors of Visual Amenity

Gloucester Resources Limited has as the cornerstone of the protection of the visual amenity of Forbesdale the construction of three visibility barriers and the planting of trees to soften the impact of those barriers.

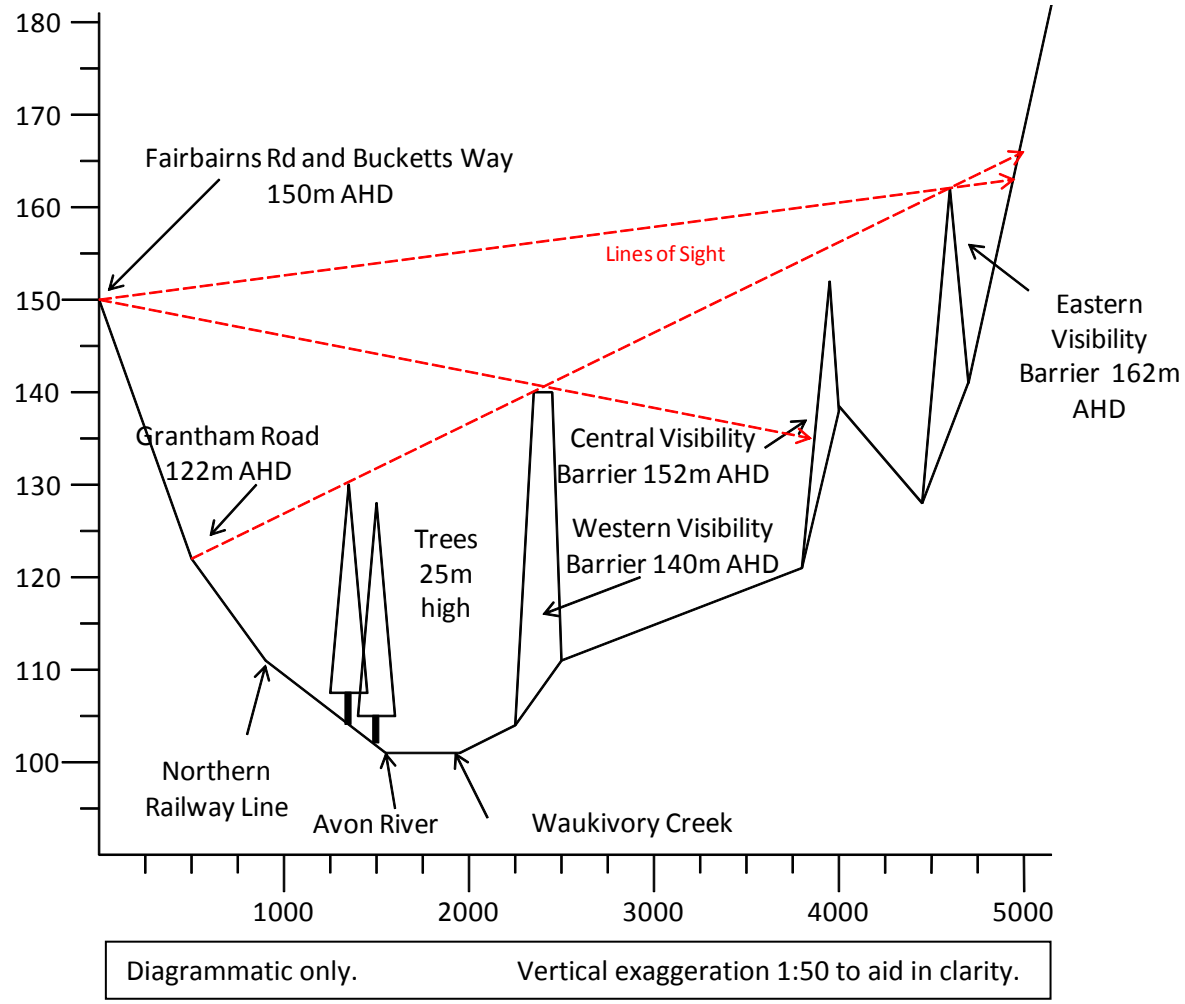
Figure 5.4 represents the lines of sight from the Fairbairns Road-Bucketts Way intersection (150m AHD) and from the lower end of Grantham Road (122m AHD).

The elevated position of Forbesdale above the mine site on the floor of the valley has the effect visually of “stacking” the visibility barriers one behind the other. As the ground level rises on the eastern side of the valley the apparent height of the barriers compounds behind the first.

This height difference between the western and eastern barriers is 22m. The apparent height however is reduced by the horizontal distance between the two and the distance from the observer. In this case, assuming a 10km horizon, 2000m to the western barrier and 2000m between them this would reduce the 22m actual height difference to an apparent height difference of 13m giving an apparent height of the western barrier of nearly 50m off the valley floor.

The trees shown are representative of 25m trees planted at a level slightly higher than the Avon River. These trees do not actually exist between Forbesdale and the barriers as shown on this cross section but have been included to give an indication of their height in relation to the barriers if they were to be planted.

Figure 5.4 Lines of Sight from Forbesdale in relation to the Visibility Barriers



5.3.3.1 Visibility Barriers – The Solution or the Problem

There appear to be two assumptions that form the basis of the use of visibility barriers to maintain visual amenity.

- They are installed for the purpose of maintaining visual amenity that would otherwise be destroyed by the view of the operational aspects of the mine. As the name suggests they are a barrier against visual impacts.

- That they in themselves provide a far more aesthetic option to looking at the mines operational aspects.

Both of these assumptions are manifestly incorrect.

Ask yourself this question. If the Rocky Hill Coal Project was an industry that operated exactly where it is proposed but did not produce huge amounts of excavated material as a by-product of its operation would large, earth visibility barriers be constructed? Answer No.

The major purpose of the visibility barriers is to provide the most cost effective solution to the placement of overburden material that is why they are located immediately adjacent to each of the pits. They are as large as is possible, given engineering and landform constraints, all designed to minimise the cost of doing something with the overburden. In the case of the Rocky Hill Coal Project the design criteria of the barriers represents an extremely expensive construction option and considering the barriers real purpose one that may not be financially viable. It makes sense to spend as little as possible on the barriers construction as there is no profit to be gained only expense. One would be fully entitled to be sceptical that the barrier as indicated in the design may never be built and a far cheaper option be built.

Several engineering issues also exist with the design of the barriers. *For detailed information see the submission titled Engineering Deficiencies, Anomalies and Concerns with the Rocky Hill Coal Project by Gloucester Residents in Partnership.*

The second assumption could be considered true except for the fact that the barriers that are described never eventuate. Covered with topsoil, vegetated with grasses shrubs and trees to simulate the surrounding area etc. etc. all sound very good but the barriers can take years to produce and the expense as discussed previously restricts the time and effort put into any rehabilitation.

Figure 5.5 below shows the barriers at the Yancoal owned Stratford Mine adjacent to the proposed Rocky Hill Coal Project. The barriers are several years old, no grass, no shrubs, no trees and no reason to assume the barriers at the Rocky Hill Coal Project would look any different.

Figure 5.5 Stratford Mine visibility barriers

The distance of the barriers from the photographer in Figure 5.5 is between 3km and 3.5km the same as the maximum distance from any Forbesdale properties and the eastern visibility barrier. The western visibility barrier will only be 1km from the Forbesdale properties.

The impact of the western visibility barrier at 1km distance will be far more dramatic as can be seen in the artist impression “with and without” photographs in figure 5.6 and figure 5.7 taken of the Rocky Hill Coal Project site from Grantham Road.

Figure 5.6 The Rocky Hill Coal Project site as it is today

Figure 5.7 The Rocky Hill Coal Project, Western Visibility Barrier

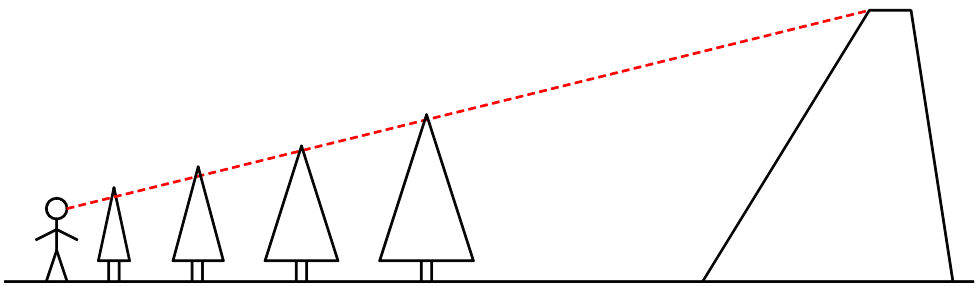
The visibility barriers could not, under any circumstance, be considered aesthetically pleasant or agreeable by anyone.

This has been acknowledged by Gloucester Resources Limited as they intend to plant thousands of trees all in an attempt to "soften the impact" of the visibility barriers.

5.3.3.2 Tree Planting

The concept of planting trees to soften the effect or to eliminate entirely the view of the visibility barriers is a good idea in theory. It presupposes the idea that the situation shown in figure 5.8 exists

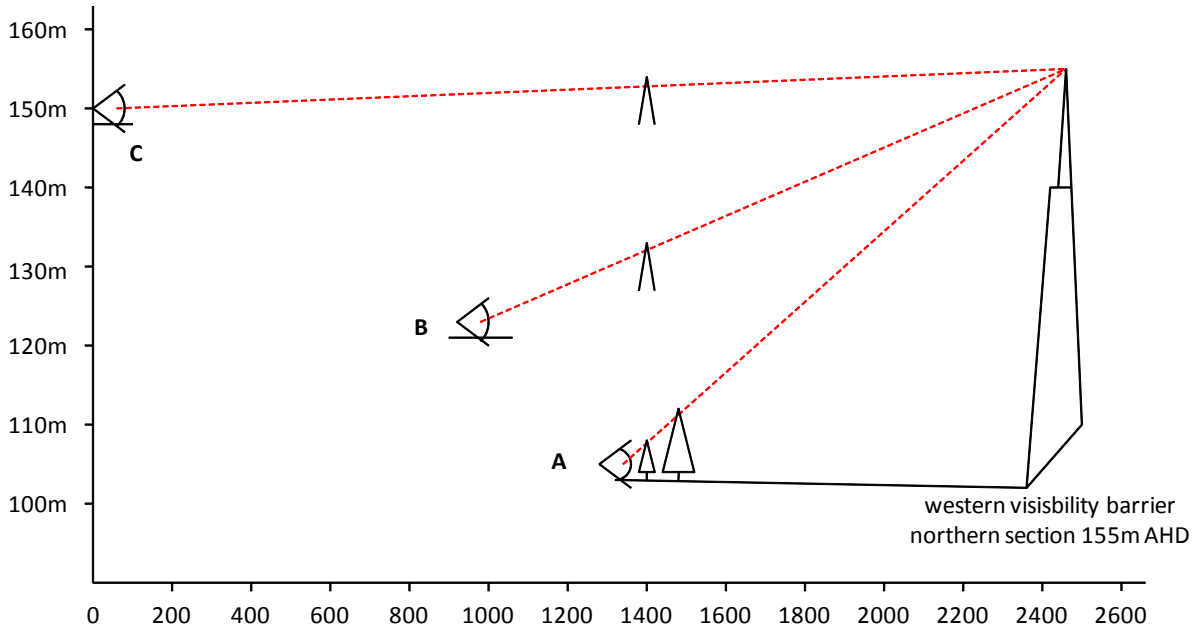
Figure 5.8 Perfect Tree Planting



Trees are planted close to the subject and as far away from the object as possible. The farther away from the subject the trees are the taller they need to be too have the same effect.

The reality in Forbesdale is very different as figure 5.9 shows.

Figure 5.9 Tree Planting the Forbesdale reality



A 176 Fairbairns Road. 103m AHD. Distance to trees 100m. Distance to barrier 1000m
B 85 Fairbairns Road. 120m AHD. Distance to trees 450m. Distance to barrier 1300m
C 5 Fairbairns Road. 148m AHD. Distance to trees 1400m. Distance to Barrier 2400m

176 Fairbairns Road is the least elevated and closest to the Fairbairns Road tree plantings property in Forbesdale. As such it will gain the maximum benefit with the residence only 100m from the trees and the trees needing to attain a height of 5-8m to be effective.

85 Fairbairns Road is the lowest of the elevated Forbesdale properties and the closest to any potential tree planting some 450m away. To be effective these trees would need to attain a height of 30m.

5 Fairbairns Road is the most elevated Forbesdale property and the furthest from any potential tree planting some 1400m away. To be effective these trees would need to attain a height of 54m.

Tree planting to date that would impact on Forbesdale has taken place along Fairbairns Road. Much of it "softening the impact" on GRL, AGL and Yancoal owned properties, and at the rail loading facility's Bucketts Way frontage. The only section having any impact on Forbesdale properties is that from the Fairbairns Road railway crossing to 260 Fairbairns Road with an effect on 3 properties.

5.3.4 The Rail loading Facility and Conveyor Corridor

The rail loading facility and the conveyor bringing the processed coal to the facility must both be considered visually appealing to the people of Forbesdale as there is no attempt to hide this operational infrastructure behind any kind of barrier. Visibility barriers of the type at the mine site are not possible because there is no adjacent overburden to be dumped. Therefore building a visibility barrier becomes too costly and the topography of the northern, Forbesdale facing, side of the rail loading facility will not allow for tree planting.

The reality is that the 15 properties that currently enjoy an unimpeded view of the rail loading facility will continue to do so.

5.4 The Effect of the Loss of Visual Amenity on Forbesdale

The property owners of Forbesdale in making their decision to purchase their property did so with the visual amenity of the Gloucester region and in particular Forbesdale as a major factor in the decision making process. The loss of the visual amenity of the area is tantamount to theft of part of the makeup of every owner's property. That theft in tangible terms is represented by an unrecoverable drop in property value and an increase in difficulty of finding purchasers, as a major component of the property's appeal has gone.

This "loss of place" also has a strong emotional impact on the residents of Forbesdale. This has no easily calculated tangible value but is of no less importance and for the residents represents a key element in the social cost of the mines development.

Appendix A
Letters to the Director General from residents of Forbesdale

The Director General
The Department of Planning and Infrastructure
23-33 Bridge Street
SYDNEY,NSW,2000

25th November 2012

Dear Sir,

I am writing to you to express our disgust that in this day and age mining of such a carbon polluting mineral is still tolerated, let alone destroying prime farming land.

My wife and I had chosen this area to retire because of the unspoilt landscape and clean air. We purchased the land in 2006 thinking this was the place to retire to and having no knowledge of any mining, we were bitterly dissappointed to find out what was going to happen to the area.

Unfortunately should the mine go ahead we will have to sell as my wife is an Asthma sufferer and the airbourne pollution would be very detremental for everyones health.

Should the mine proceed, ideally we would like to be compensated and bought out for purchase price and any increase from that period.

Yours Sincerely

Helen Bell

Frank and Helen Bell
152 New Line Road
Cherrybrook 2126

Rod and Robin BESIER
'Avonview'
7 Forbesdale Close
FORBESDALE N.S.W. 2422

Phone/Fax: (02) 6558 9883
Email: r.besier@bigpond.com

Welcome to Gloucester at the foothills of the Barringtons

31 January 2013

The Director General
The Department of Planning and Infrastructure
23-33 Bridge St.
SYDNEY, NSW 2000

Dear Sir

SSD 5156 - ROCKY HILL COAL PROJECT – FORBESDALE

In June 2004 we purchased our rural residential property in preparation for our retirement. We moved from Sydney in 2006 to build our beautiful home in Forbesdale. We wanted a quieter lifestyle and chose Gloucester because of the beauty of its mountain ranges, the vista of the open spaces and were 'sold' by the two dairy farms which we overlook on our eastern and western boundaries.

Sydney was three hours travelling time, where our adult children live. We did our homework; a rail link, good medical facilities including a large country hospital, an ambulance service with three ambulances. There were clubs to join and many activities to choose, from leisurely bushwalking to sport such mountain bike riding and canoeing. Settling into retirement was wonderful. The community were friendly and willing to accept the new 'tree changers'. They made us feel that we had made the right decision to live in a little part of Paradise.

In the late 1990's Gloucester Shire Council developed a 20-year plan and released parcels of rural residential land for housing development, to attract people with new and diversified businesses, retirees and young families looking to bring up their children in an open, healthy and safe environment. The plan was surpassed in five years!

We are in our mid-60's and are aware that should this Project be approved, our health will be compromised. Our health is suffering now, as every day we wake up, our first thoughts are about the mine proposal. We did not choose to live near a coal mine. We did not choose to spend much of our time over the past four years going to meetings, writing to politicians about the loss to Gloucester of its agricultural base, its diversity, its tourism and its wonderful community, which a mine will eventually change, leaving the community all poorer financially and their health will be compromised, which has been proven.

To make matters worse, in a couple of years' time, we will be surrounded by up to 110 coal seam gas wells, over the two beautiful dairy farms, which is part of our wonderful visual amenity; all this will be lost. We do not wish to stay in Gloucester should the mine be approved. We are distressed that we cannot choose to leave – who will buy a home 1km from the Rocky Hill coal mine?

Should you approve this project, part of the Conditions of Consent should be the mining company buy us out for a good price, pre mining, at today's market. Also, the Department of Planning & Infrastructure should now define the distance for considering compulsory acquisition, which should be at least, 3kms from the mine pits.

Yours faithfully

Rod Besier

Robin Besier

The Director General,
The NSW Department of Planning and Infrastructure.
23-33 Bridge St.
SYDNEY NSW 2000

Dear Sir,

This is not a letter that I should have to write, this is not an explanation that I should have to give and this is definitely not a request that I should have to make. I am doing so because the lack of leadership by political parties and the lack of morality of the mining industry demand it.

Over the next few months your department will assess the merits of a proposal to establish an open cut mine, The Rocky Hill Coal Project, directly in front of our home.

I'm sure that the Department will ensure that no koala will be affected, no platypus endangered and no aboriginal heritage despoiled, as indeed it should. It will ensure that "best practice" is followed and "fair and reasonable" methods are employed to limit emissions and it will ensure the economic viability of the project to guarantee the royalty return to the people of NSW, who at the end of the day, it is there to serve.

Will the Department also ensure that the health and economic wellbeing of my family be likewise protected?

If a decision is made that the Rocky Hill Coal Project be allowed to proceed then I request that you make it conditional that our property and other properties within a two kilometre radius of the operational boundary be deemed an "affected zone" and at my request the mine's developer be required to purchase my property at the "Highest and Best" valuation of the current market price and that adequate recompense be made to cover legal and moving expenses.

My family's desire is that there would be no need for this to be necessary. That a decision would be made in line with community expectation that the Rocky Hill Coal Project is too close to both the residences of Forbesdale and the township of Gloucester for it to proceed. If however, this is not the case, we will be left with no decision but to move.

Our family consists of myself, my wife and my mother. She is 89 years old, suffers from a heart condition, has had part of one lung removed due to cancer and suffers from the early stages of dementia. She will not survive the dust laden environment the mine will produce, she won't understand why she will have to move from her home and she certainly won't understand the economic impact of such a move. She will, never the less, have to move, regardless of our ability to sell our home or what price we may receive for it. The last valuation we received in 2010 valued the property at 40% less than its construction cost.

We moved to the area nine years ago and into the home we built 8 years ago. The stunning views from our property of the Avon Valley, The Bucketts and The Mograni Range were a primary motivator in our original purchase. It seems a tragedy that the loss of this amenity due to the Rocky Hill Coal Project will be the reason that we leave. The sun will still rise over Rocky Hill and still come in through our bedroom window but it will illuminate each day not the green, patchwork floor of the Avon River Valley but the grey and black spectre of the Rocky Hill Mine.

This is not a letter that I should have to write but do so in the hope that you, by your decision, will provide the moral compass that Gloucester Resources Limited lacks and ensure my family's continued health and financial wellbeing.

Michael Bowman

On behalf of myself, my wife Carolyn Bowman and my mother Hilde Bowman

5 Forbesdale Close
Gloucester, NSW 2422

Colin & Beryl Franklin
14 Forbesdale Close
Forbesdale NSW 2422

27 January 2013

The Director-General
Department of Planning & Infrastructure
23/33 Bridge Street
SYDNEY NSW 2000

Dear Sir

Re: Rocky Hill Mine Project

My wife and I are writing to you to strongly oppose any consideration you may have towards approving the Rocky Hill open cut coal mine. There are a number of reasons for our stance on this matter.

1. Asthma
We moved to the Gloucester area to help combat this problem.

2. Proximity
Our property will be in the zone of affectation, that is to say, one (1) kilometre from mine workings.

3. Dust/Noise
This will be a major problem because of the height of the unsuitable material which will be stockpiled at various locations within the mine area.

4. Environment
The amount of overburden extracted will be of significant proportions, such that the Avon River, which forms part of the Upper Manning catchment, could be severely impacted upon with silt and sludge. The slope ratio would have to be in the vicinity of 1:2 otherwise the high volume of material being removed will be in the Avon River. A slope of this magnitude will allow rills to form and deleterious material to become airborne. Vegetation normally used to help control the dust and runoff will be unsustainable. Any airborne dust particles will become a serious health issue.

To reiterate our position, we are totally opposed to the mine. Our position is supported by the community at large at a recently held public meeting. 100% of residents rejected the Rocky Hill open cut coal mine.

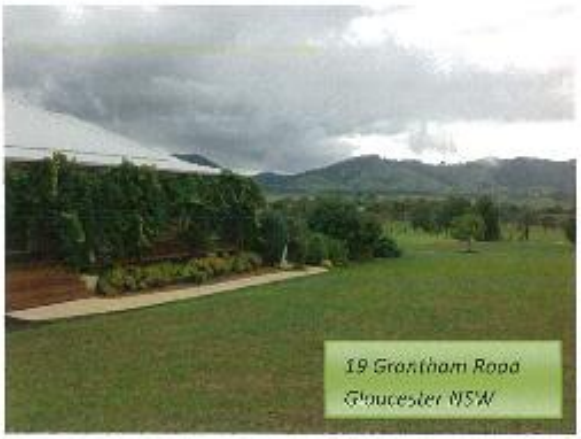
If this mine is given approval we will be seeking a buyout and/or compensation. We fail to see why our lifestyle and property should be destroyed to satisfy greedy mine owners.

Yours faithfully,

Colin and Beryl Franklin

The Director General
The Department of Planning and
Infrastructure
23-33 Bridge Street
SYDNEY, NSW 2000

23 January, 2013



Dear Sir,

We are writing to you to let you know who we are, and the situation we have found ourselves in. My wife and I are in our late 40's and have two teenage boys. We bought our block of land at 19 Grantham Road, Forbesdale in 2003 and subsequently built our family home on it and moved in on 21 August 2005. We had moved to Gloucester in 2001 for work and lived in town for the first 3 years. We had previously come off the land and wanted a few acres to bring our boys up on and big enough to run a couple of cows. We searched for a block of land out of town, though close enough that we did not have to travel far to go to work, as we both work in Gloucester. The block we chose had everything we were looking for, electricity, town water, no chance of being built out below us. (we have a railway line there, and below it, a floodplain), but the main thing that got us in, was the magic views and outlook that we have at this moment. That is, without the view of the proposed Rocky Hill Coal Mine, which, will be approximately 900 metres from where we live, and will be in full view from our lounge/living room.

At this moment, we are totally confused about where we are headed and what we are going to do if the proposed mine does, or does not go ahead. Apart from the stress of not knowing what is going to happen, it also puts our life in limbo, as we could not sell for a decent price as no one will do anything until something is made certain. It also stops us from finishing off around our pool and putting on a rear deck that we have had the timber drying in our garage for the last year. This is because we do not know whether to spend any more money on our family home or just leave it as is, as we feel that any further improvements could be just money down the drain. The immediate problem that we face is that we need to finish off around our pool. We don't know whether to finish it to a standard that we would like it to look in case we end up being stuck here, which will cost us a lot of money, or we just do it good enough to get the job done.

The other major concern for us, is our, and more importantly, our children's health. At present, we have a black substance on our roof that could possibly be coal dust from the Stratford mine that is roughly 5kms to our south. If that is the case, how much dust are we going to be breathing in once the Rocky Hill mine starts.

As it is, we feel that because of our situation, the mining company should have to buy us out for the right price ASAP so that we can get on with our life and rid it of the stress that we are currently going through.

Yours Sincerely

Chris Reynolds & Patrice Reynolds

"The Director General"
The Department of Planning and Infrastructure
23-33 Bridge St
SYDNEY, NSW, 2000

18th November 2012

Dear Sir,

I'm writing this letter regarding the proposal of the "COAL MINES". If this goes ahead we will be "DEVASTATED"

We have a beautiful little country retreat, located in Forbesdale on 10 acres. My wife & I are retirees and purchased our block of land 20yrs ago, knowing that when I did retire my wife and I & our family would have a beautiful little country retreat to come up to, as we live in Sydney. Over the time we have built a lovely little cottage, and I have a beautiful garden with lots of fruit trees. I have had so much enjoyment making my little country retreat "My Dream".

My wife & I and our family frequently come up here and have so much fun. It's such a lovely place. My grand-daughter loves coming here, as she sees the beautiful "Country Side"- Farm animals, Fauna and wildlife as she wouldn't get to see in Sydney.

My wife & I both have major health issues. I have had "prostate cancer" & other issues ongoing and my wife has "Breast Cancer", Lung issues & other health concerns. Gloucester is the only little place we look forward to coming up to, to get away from drs appt, because of our health. "It's Our Retreat"

If the mines were to go ahead this would be a major concern for us, as the traffic would increase dust & pollution in the air and the beautiful Country atmosphere would change "Forever".

It would be devastating for us to have to sell "Our dream country retreat" but we would have no choice as we would not be able to keep coming up here because of our health conditions and what the mines & pollution would cause & do to us & our health. We are very concerned.

If we were to sell, we would expect to get "FULL MARKET VALUE OF OUR BEAUTIFUL PROPERTY", before the mines proposal was first established.

Forbesdale is a lovely little country community. It's so peaceful & has such a loving atmosphere. Residents have lived here all their lives and this would devastate them.

My Concerns is that "Forbesdale" will be destroyed the community spirit will die & health issues will arise.

Please consider this request as you to, will retire one day and you may want you "dream Country Retreat", just like we did, as my wife & I have worked hard all our lives. Please don't destroy our "DREAMS".

I really appreciate your time.

Kindest Regards

Diane Shore
4310 Bucketts Way
FORBESDALE, NSW, 2422
diane.c.shore@gmail.com PH: 02 9743 2119 MOB: 0407 207 014

Graham Shore
10 Wiggins Place
CONCORD, NSW, 2137

The Director General
The Department of Planning and Infrastructure
23-33 Bridge Street
SYDNEY NSW 2000

26th November 2012

Dear Sir,

We are writing to you today to voice our opposition to the Rocky Hill Coal Project at Gloucester.

We fell in love with the Avon River Valley and in view of having an alternative lifestyle we purchased this amazing block of land in 2001. Even though we are only part time residents we have developed lifelong friendships and enjoy a lifestyle that is second to none. As owner builders and as finances permitted we built our home, not realising that we would come to love Gloucester and all that it offers.

The sense of fulfilment and pride in what we have achieved can only be equalled by the quiet tranquillity we enjoy as we sit on our veranda or in our lounge room and enjoy a 180 degree view of the valley.

We have reached an age where we are able to retire and thought that our home in Fairbairns Road Forbesdale would be the ideal place.

If the Rocky Hill Coal Project goes ahead any plans to retire at Gloucester will be detrimental to our future, our health and therefore our quality of life. If the Rocky Hill Coal Project goes ahead we not only have our right to choose where we live in our retirement but we also have the security of our financial future taken from us. We, like all Australians, are encouraged to work for our own future and plan so we are independent in our retirement. What right do GRL have to take this from us?

If approval for the Rocky Hill Coal Project is given we think GRL should purchase our home. Living within 900 meters of an open cut coal mine will not offer a quality lifestyle with total wellbeing and therefore, sadly, there is no future for us in Gloucester. John has been dusted with asbestos and his disease is progressing. We cannot possibly move to an environment where the air quality is in anyway compromised.

When making the decision regarding the Rocky Hill Coal Project can you please take into consideration the impact this is having and will continue to have on us.

We appreciate you taking the time to listen to us, thank you.

Yours Sincerely,

John and Lorraine Findlay
75 Fairbairns Road
FORBESDALE NSW 2422

The Director General
The Department of Planning and Infrastructure
23-33 Bridge Street
SYDNEY NSW 2000

30 January 2013

Dear Sir

We are writing in regards to GRL's Rocky Hill Mine application. We are residents of 85 Fairbairns Road and are approximately 850 metres from the proposed coal mine with the loader facility being located behind us. I have owned our property for 15 years with my husband and two young children. When we first purchased it, and did our searches, there were no mining leases in the valley.

Over the last six years since GRL'S mining leases have been in place this has rendered our property unsellable and devalued it, as a recent bank valuation showed, and has caused us a large amount of stress and anxiety.

We feel it's time that financial certainty of our most important asset, our home, is returned to us by not approving GRL's mine. If this mine is approved we will be severely impacted, as will a number of residents, by dust, noise, and our 280 degree rural views will be destroyed.

To date we feel that we've been totally abandoned by the State Government and its Departments.

Should this mine be approved, we feel that it should be a condition of GRL that we are compulsorily bought out and that adequate compensation is paid to us.

As we've been dealing with uncertainty for the last 6 years, GRL and the State Government need to ensure that the above conditions are enacted within 2 years if GRL's approval is successful. It's not fair that we're sitting in front of a proposed coal mine for another 6 years with our property still unsellable and our anxiety and stress continuing.

Yours sincerely

Susanna Jackson
85 Fairbairns Road
Forbesdale NSW 2422

Michael and Karen O'Brien
5 Fairbairns Road
FORBESDALE NSW 2422

The Director General
Department of Planning & Infrastructure

THE ROCKY HILL OPEN CUT COAL MINE- FORBESDALE NSW

Dear Sir/Madam,

Our family (Mum, Dad and two boys) moved to Forbesdale (Gloucester) NSW in January 1989. We wanted to raise our family in a rural area, as our son Shane is a chronic asthmatic, and we were hoping home grown food and good country air would help in the management of his condition. Gloucester was a lovely town, ticked all of the boxes for us i.e. Schools (pre, infants, primary and high), good sporting facilities, a comprehensive commercial and cultural area, employment, great medical centre and local hospital. All this! Plus some of the best views and countryside in NSW.

We purchased our property on Fairbairns Road, which has spectacular views to the Buckets Mountains, Mograni hills and the Avon valley. Michael gained employment at our local Dairy Farmer's factory. Shane had excellent medical care. The boys enrolled at school, they thrived, and played lots of sport, we had a third son James, and life was good!

In 2002 the Gloucester Dairy farmers factory closed, Michael was unemployed, we started a business called Hillview Herb Farm. We supply local restaurants and the Newcastle rural markets with fresh culinary herbs. Visitors tour our garden and have morning teas etc. Our business has grown, we work hard and have established a good a name in both the produce and tourist industries; we have tour groups visiting our farm from all over Australia.

Gloucester Resources Ltd purchased numerous properties on our road. When questioned for what purpose, we were informed that GRL was an agricultural company and wanted to secure and protect Australian agricultural land. We are very annoyed that this is not the case, GRL have applied to develop the Rocky Hill open cut coal mine.

This mine will be less than a kilometre away from Forbesdale, our home! We cannot understand how a government could allow an open cut coal mine so close to a rural residential area. Also shouldn't the government be protecting our food producing land and our water resources? Tourism is a major industry in Gloucester. The expansion of mining in the Gloucester district will damage our tourism image. Tourism has long term financial benefits to our area and to the State government. We as a family are very concerned about the many problems associated with an open cut coal mine, so close to where we live and operate our business. Our health and the health of our son is our major concern, we could lose our business when the tourism and food production industries are affected. We ask that the State government reject the development of the Rocky Hill mine. We also request that if for some reason the development is approved, that at least the residents in Forbesdale be included in a zone of affectation.

We are hoping that your Government considers the effect this decision has on all members of our community.

Yours faithfully
Michael and Karen O'Brien

H.J. and P.F. Cox
45 Fairbairns Road
Gloucester 2422
30th January 2013-

The Director General
The Department Planning and Infrastructure
23-33 Bridge Street
Sydney 2000

Dear Sir,

It is with much concern that I write this letter regarding the proposed Coal operations in the Gloucester Avon River Basin.
We built our house on Fairbairns Road in 2000 to achieve a quite and clean atmosphere for our ageing life.
My wife has suffered from Asthma most of her life and with the proposed mine located two and half kilometres away I can see adverse conditions and suffering ahead.
I urge the directors and Principals to consider the problems we will receive if the proposed mine goes ahead.

Regards,
H.J. & P.F.Cox

8 Forbesdale Close
Gloucester. 2422

16.12.12.

The Director General
Dept. Planning & Infrastructure
23-33 Bridge St
Sydney NSW 2000

Dear Sir

I write to deplore the prospect of an open cut mine 900 mtrs from my home. At 75, I had anticipated a long and peaceful retirement in this scenic valley. Every penny I had is invested in my home where I have lived for the past 6 yrs. In fact, there are 9 homes in the close under 10 yrs old. It's a travesty to contemplate their future.

With the possibility of mines going ahead, nobody wants to buy our homes & the inheritance we thought to leave our children, now turns into a millstone. Can you wonder at our despair.

On a health issue, I am asthmatic, under the care of specialist Dr Peter Coote and a regimen of Bronchosphy every 18 mths - 2 yrs. The Gloucester climate has been excellent for my condition. With the advent of mines, this will inevitably change.

Forbesdale should never have been opened to residential status. Please consider the health, both mental & physical, of the residents here and refuse the mines permission to destroy our valley for not only will you destroy our valley, but our lives, an important food bowl & a first class tourist area.

Hopefully

(MRS) H.M. Evans
H.M. EVANS

THE DIRECTOR GENERAL

DEPT OF PLANNING AND INFASTRUCTURE

23-33 BRIDGE STREET

SYDNEY NSW 2000

Re - Rocky Hill Coal Mine Proposal

Dear Sir

My wife and I aged 67 and 71 decide to move to Forbesdale to retire in a beautiful quiet valley near Gloucester and we have lived here for five years. Not long after moving and building a new house we were given the devastating news that a open cut coal mine was proposed within 200 metres of our home and enclosing all of the land around Gloucester. What a disaster for the community with the thought of coal dust, noise day and night and health issues.

We would have to move and we would require adequate compensation for our home, moving costs, legal costs and the stress that goes with this.

Please do not allow this mine to proceed in this place, it is far too close to our homes and town.

Yours sincerely

GRAHAM MORRIS

10 FORBESDALE CLOSE

FORBESDALE NSW 2422

The Director General
The Department of Planning and Infrastructure
23-33 Bridge St.
SYDNEY, NSW, 2000

23rd November 2012

Dear Sir,

After having lived in Sydney for most of our "working" years, we found beautiful Gloucester in 2007, purchased a piece of land and had our house built.

This was Heaven!

Unfortunately my husband passed away – quite suddenly – in 2009 and I now live alone – at the age of 75 – on our property.

Only recently – 6 months ago – one of my kidneys was removed due to cancer.

IF the mine goes ahead and comes as close as planned I really would hope that GRL would do the right thing and purchase my property to enable me to buy somewhere else.

I do realize that economy and growth in today's climate cannot stand still, but I would respectfully ask you to consider the above.

Yours Sincerely,

Johanna Heyink
4 Forbesdale Close
FORBESDALE, NSW, 2422

The Director General
The Department of Planning and Infrastructure
23-33 Bridge Street
Sydney N.S.W. 2000.

29-1-13

Dear Sir

I am writing concerned about the "Rocky Hill Coal mine" at Forbesdale if approved what impact it will have on our property What concerns us is it will only be 950 metres away We overlook the mine on the eastern side. On the western side is to be the coal loader. which is roughly 1.2 Kilometres away which we overlook. Our main concerns are Dust, Noise, lights and Vibrations also Coal Dust from 6.AM to 10pm 6 days a week at the mine also 7 days a week for the coal loader. When we bought the property there was to be no coal mines within 5 Klms that is Stratford.

my wife and I think if mining is approved and because of our closeness and overlooking both mine and loading.
The mines have imposed on us and devalued our property We would like the mines to purchase our property if the mine is approved.
I suffer from Asthma, Sinus and Hayfever which dust does not agree with.
Also I have been ~~diagoned~~ diagnosed with Melonoma Cancer.

Yours Sincerely

Robert and Ronda West
77 Fairbairns Road
Forbesdale NSW. 2422.

Susan Mills
76 Toepfers Road
Wyee NSW 2259

31st March 2013

Dear Sir/Madam

Before you disregard this letter as yet another letter of complaint against the open cut coal mine proposal in Gloucester, I would like you to take a moment to reflect not on the financial gain but **on what will be lost.**

In case you are unaware Gloucester is an area of green hills, farm land, national parks and pristine water ways, it is within easy travelling distance from Sydney, Newcastle and Taree and many people come for weekends and holidays to enjoy its peace, tranquillity, fresh air and outdoor pursuits. I feel an open cut mine with its scar on the landscape (no matter what they say they will do to try and hide it, therefore admitting that it is unsightly) and the billowing of coal dust into the air and rivers is going to greatly distract from the enjoyment of these holiday maker, future generations of Australians and certainly from the health and enjoyment of the residents of Gloucester, who have without doubt moved there for its natural beauty and clean healthy environment.

My land which is 900 metres from the proposed mining site, was brought with my retirement in mind, some where I could have a modest house and enjoy the country side with my animals and at times my god children. I have spent the last few years working in an oncology unit with the risk of breathing in harmful chemicals in the hope of curing or extending the lives of people with cancer. I am now fifty five years old and in my retirement I would like to relax and breathe fresh air, not coal dust.

As an asthmatic, if the open cut mine goes ahead my dreams of building on my land and moving to Gloucester will be ended.

Is the carbon tax just for revenue raising and putting on a façade for the rest of the world, or is the government really concerned about carbon emission? If so, stop selling off part of Australia to overseas companies to mine for coal one of the world major pollutants.

I feel that if the open cut coal mine should go ahead so close to my land, the company should buy the land off me for its current value, enabling me to purchase land in a less polluted area.

Yours sincerely

S. N. Mills

The Director General
The Department of Planning and Infrastructure.
23-33 Bridge St.
SYDNEY, NSW, 2000

13th March, 2013

Dear Sir,

We are writing this letter as a long time residents of the Forbesdale area- over 34 years. During this time we have raised four children in an environment we have always felt to be of benefit for all our family. No visual, noise or air pollution has always been an expected consequence of living in a small country town.

My husband and I moved to this area after purchasing the Dental Practice in town. A few years later we were very happy to purchase 33 acres in Forbesdale as a place to build our family home and also have the opportunity to subdivide at a later stage as part of our 'superannuation'.

GRL now has the potential to totally change our lifestyle, health and the environment of our beautiful town, Gloucester- always a popular tourist destination.

Our property already has nowhere near the value it once had- even with just the threat of a mine so close by. Our ' peaceful haven' could be turned into a property less than a kilometre away from a coal mine with all the pollution and associated problems that we have always been so careful to avoid.

As much as we always wanted our home to be just that for the rest of our days, we cannot even entertain the thought of living here with a coal mine so close. GRL would need to buy our property plus compensate us for any loss of value on our property due to the mine.

Yours Sincerely,

Paul Hedditch, S. Hedditch

Paul and Suzanne Hedditch
32 Fairbairns Rd,
Gkloucester. 2422

6 Forbesdale Close
Forbesdale NSW 2422

The Director General
NSW Department of Planning and Infrastructure
23-33 Bridge St
Sydney 2000

Proposed Rocky Hill Mine (EL 6523) - Gloucester Valley

This letter is one of many that you will receive about the impact of mining (and to some extent CSG) in the Gloucester area.

We are sure that you will not receive many letters in support of these extractive industries. Most supporting letters will probably talk about the increase of jobs in the area, the past loss of the timber industry and/or the dairy industry. As evidenced by many small mining towns throughout Australia, the promise of “jobs for our children, jobs for our town” is often mouthed by politicians and extractive industry bosses alike.

In January 2013 the website MiningAustralia.com.au quoted the general manager of the Stratford/Yancoal coalmine, Mike Smith, as saying that 58% of his existing workforce resides within the Gloucester and Great Lakes Local Government Areas.

This means that 42% of his employees travel from much further afield, presumably as DIDOs (drive in/drive out), putting their lives, as well as those of other road users, at great risk due to the excessive work hours 'enjoyed’ by many mine workers. Even those who commute from the nearby Great Lakes area have a drive of an hour or more each way.

It can be readily concluded from Mr. Smith's comments that he has not been able to attract any more potentially employable people from the Gloucester local government area for his current mine.

Whilst these projects may create jobs in the Gloucester area, this doesn't mean these jobs will be filled by current Gloucester residents. They are likely to attract more out-of-town DIDO workers who won't be spending much of their paypackets in Gloucester; they will spend their money in their distant home towns.

However, the letters that you receive pleading for the Rocky Hill mine not to go ahead will tell many a sad story. They will tell of lost enjoyment; lost investments, in terms of a legacy for their children; loss of a planned investment for retirement; loss of friends who have already given up and moved on. Those letters are real stories about real people. One letter that you may receive will be from an elderly couple, whose home will look straight onto coal conveyors and coal-loading facilities. They will probably not tell you of their earlier lives, one as a child under the Nazi jackboots between 1938 and 1945, and the other as a young man fighting the iron fist of the Russians when they invaded Hungary in 1956. Australia has been kind to them until now, yet again they expect to soon experience the jackboots of overseas profit-makers.

These letters are to be read by you, as employees of the NSW government, against a backdrop of big money and big profits, some of which will flow to the NSW government. But much of which will flow to overseas-owned corporations, private and government. Take a look at Google maps of the NSW area of Singleton and see for yourself the obscenity of open-cut mining. That is what the Gloucester Valley will face should Rocky Hill be approved. That is what the Gloucester Valley will endure forever once the mining stops in 20 or so

year's time. The effect of cumulative mining in the valley will leave a permanent scar in and on the valley.

As we sit in Forbesdale writing this letter today, we are distracted by a number of acrobatic aircraft as their dare-devil pilots soar vertically high into the sky above the adjacent Gloucester aerodrome, only to death-stall and roll over into a deadly plummet towards earth. Should Rocky Hill – well, we call it Rocky Hell – get approval, Gloucester's aerodrome will disappear under the proposed Rocky Hell Stage 2, as will the adjacent 500 head dairy milking herd currently owned by the 3rd generation Maslen family.

Loss of Gloucester's aerodrome will also mean the end of its role as an emergency airfield for bushfire-fighting; it was used for 3 full weeks late in 2012 for RFS and NPWS use in several local S.44 fire emergencies. It is often used for aircraft familiarisation by the RFS and NPWS.

"Visual Amenity" is a term that describes a measure of the visual quality of a site or area experienced by residents, workers or visitors. It is the collective impact of the visual components which make a site or an area pleasant to be in.

Visual Amenity, to us as residents of Gloucester, is the very enjoyment of watching dare-devil pilots at the Gloucester aerodrome, as well as experiencing the sheer screams of pleasure as first-time tandem parachutists descend to the aerodrome from their first-ever parachute jump. Visual Amenity is hearing the sound of lawn-mowers in the sky as near-invisible motorised hang-gliders appear from the east over the Mograni foothills. Visual Amenity is also the pleasure of watching our local eagles soaring along the silent gliders during their meetings at the aerodrome.

Visual Amenity is watching the afternoon line up of the Maslen's 500 milkers as they patiently wait to enter the fully automated dairy. Another Amenity, this time of the nasal variety, is the smell of those 500 milkers as an easterly wind carries their signature smell to our house. It is obviously not the best smell, but Gloucester is rural, it is farming. It must never become industrialised with mines and csg.

To you city-centric folk in Sydney, you would not know of Gloucester's annual fundraiser to help keep the Newcastle-based Westpac rescue helicopter service in the air. The next ambulance that you will probably have to call will be at your door in minutes. In most cases, the same usually applies in Gloucester. The huge difference is that Gloucester hospital is not a well-resourced hospital able to deal with all types of emergencies. The next 'big' hospitals are at Taree (50k; 1 hour) via Bucketts Way East or Newcastle (120k; 1.5 hrs) via Bucketts Way South. Often, the Westpac helicopter is summoned for an emergency, life-saving flight. How will Gloucester's future Westpac fundraisers be held once the aerodrome is swallowed by Rocky Hell Stage 2?

The item below was in a 2012 edition of the Gloucester Advocate newspaper.

"*A fundraiser by the Gloucester Westpac Rescue Helicopter Support Group, as part of the Gloucester Aero Club fly-in on the weekend, raised more than $5000 for the Helicopter Rescue Service. There were about 20 Gloucester businesses and organisations as well as personal donations of time and money for the weekend and all have been thanked personally from the Rescue Service*".

Sure, you might think that the Rocky Hell mine might kick in a few grand to the helicopter fund to make up what will certainly be lost should their mine go ahead. After all, it would be in their interest to do so, so you may think. But what about Gloucester's residents, its local businesses and the Aero Club and its members. Surely they will suffer a loss of doing, of

helping. Of giving. After all, that's what small communities do best. They band together to get things their city cousins so often take for granted.

As you read this letter, and those of many others, read them with a full understanding and appreciation of every word in every letter. Read between the lines, and accept that letters may not perhaps be as strong as they should be. The people who wrote them are stressed more than you can ever realise. And they are probably presuming that you are "doing the right thing."

Do not presume; do not be 'guided' by your colleagues or supervisors, nor your head of department, and certainly not by your Minister. Many of the letters you will read are by people who are retired and who moved to Gloucester to escape the city. They have invested their all in Gloucester, and in financial terms, we have no alternative strategy should Rocky Hell go ahead. Should the mine be approved, there needs to be a condition in the approval process that the mine owners buy us and other affected residents out, so that we can resume our lives that are currently on hold.

We have no lifeboat, we have no nest egg. We have a property that will in all certainty be worth far, far less than what we spent on it. We invested our life savings in our 5 acre block of land and built a house, erected a shed and put a lot of time and physical effort in landscaping. It took us about 4 years of pre-retirement planning to finally decide on Gloucester as a place to retire to. Why should an American tycoon and a handful of associates be allowed to dictate our lives from afar.

You are reading this and other letters in relation to the Rocky Hill mine. You should be aware that this is for Stage 1 only; Stage 2 is waiting in the wings as "Forbesdale Stage 2 – Exploration Program – EL 6523." (February 2011). As sure as night follows day, Stages 3, 4, etc. will probably appear quite soon after Stage 2 is approved, and they will sooner rather than later be right on Gloucester's doorstep. Perhaps with a mine boundary ony half a kilometre from the Gloucester CBD, its primary schools, hospital, child care centres, and nursing homes. And I haven't raised the health issues of 2.5 ppm and 10 ppm with you.

Read carefully, consider wisely and decide conscionably. There must be enough existing or proposed mines in NSW that are not on the doorstep of a country town. The Gloucester valley already has its share of coal mines; far more than Sydney. We want no more.

Spend a weekend in Gloucester and check out the closeness of the proposed mine to Forbesdale, where we live. Follow the easterly part of the GRL Rocky Hell exploration lease as it spreads north, just east of the Gloucester CBD and immediately south of the railway station.

We, and many others, are utterly and completely in your hands.

Denise and Bruce Gilbert
Forbesdale, NSW

27 September 2013

3 Forbesdale Close
Gloucester NSW 2422

The Director General
The Department of Planning and Infrastructure
23 – 33 Bridge Street
Sydney NSW 2000

Dear Sir

Re: Development Application SSD 5156 – Rocky Hill Coal Project – Forbesdale

I am writing to you today to voice my opposition to the proposed Rocky Hill Coal Mine.

It is my fervent hope that this mine will be stopped or, if the unthinkable occurs and it is approved, that the Department will order GRL to include the Forbesdale Estate in the "area of affectation" and purchase my property and those of my neighbours so that we can move on and resume our lives in an area that is not within 2km (and in many cases closer) of an open cut coal mine with all its attendant health, noise (both obvious and low frequency), light disturbance and visual amenity horrors.

If the human face of this situation is not paramount in your consideration of whether or not this mine should be approved, it should be. I recently heard an interview with Political Strategist Mark Textor who claimed that "politicians seek to understand the person not the issue…"
That certainly does not sound like the successive State Government's that have ridden roughshod over our rights as home/landowners.

Let me tell you my story.

After having visited friends in the Gloucester area during our holidays for almost 8 years, there came a day when my children and I said to ourselves "Let's move here!" as we loved everything about the place and had done enough research over the years about the accessibility to the city and the coast, the vibrant community, wonderful High School and my employment prospects to know we could make it work. When most 12 year old girls are still playing with dolls, my daughter was trawling the internet looking at Real Estate sites. She found the house we ultimately bought in early 2009.

My husband passed away in 1996 after a long and devastating illness (melanoma) when our son James was 4 years, and our daughter Caitlin 11 months old. The children and I moved from the Gold Coast hinterland to live with my parents in South Turramurra on Sydney's North Shore in 1998. After caring for both parents until their deaths in 2000 and 2007 we were left grieving and devastated having lost our three most loved family members and our entire support system. We were left emotionally and financially compromised and were forced to sell our home in Sydney.

Gloucester became the light in our future. We bought a house that we could afford and one in which we could realize our dream of a quiet life in a rural town with the kind of lifestyle that many people envied.
Despite the sadness of having lost my husband (soulmate and best friend and the irreplaceable father of my children) and both parents (both adored and a huge part of our lives) I had a renewed optimism that moving to the country (a lifelong dream) was absolutely the right thing to do despite

some concerns from well meaning friends and relatives in the city. I was able to find full time work, I had a house that I loved on just under 4 acres that would support a horse and chickens and a veggie patch. The proximity to town, views that most people only see in postcards and fresh air and peace and quiet sealed the deal. Not to mention exquisite neighbours who would all eventually become friends.

Sadly for me, I have been unable to plant any trees or gardens or that veggie patch on my block as I feel mentally crippled by the knowledge that any money, time or effort spent will ever be rewarded. By the end of 2009 my dream was quickly turning into a nightmare with the exploration licences in the area having been given the go ahead by the State Government. Fast forward four years and countless worried, sleepless nights, and here we are living the nightmare that is now GRL's Rocky Hill.

A huge rally in town attended by myself and over 900 people in early 2009 told us that there was vehement opposition to the mine. The fight has been waged ever since and this has taken a huge toll. Along with many others, I have for the first time in my life, experienced anxiety and depression so crippling at times that I have had to accept the prescription of anti-depressant drugs and psychological counselling. I still see a counsellor once a month.

Since the beginning of time, the Worimi and Biripi tribes had custodianship of this fertile and abundant valley. In the 1840's early European settlers founded a significant agriculture area and this valley was developed and proved its farming worth. Farmers in this area are running productive viable operations. Politicians need to ask themselves – where does my food come from?

As an island, we need to feed ourselves, and so we should with all the resources available to us. Freight from countries far away is mindless as is the theory that we are a global economy and need to share and apportion resources with our neighbours. This may to some extent be true of small European countries where freight costs and distances are much smaller – but Australia is a long way from the rest of the commercial world and I believe we have a responsibility to feed ourselves and to export food to other less lucky countries rather importing it which is what will ultimately happen if we turn our beautiful farmland into coal mines and gas fields.

With less than 6% arable land available, it astounds and dismays me that governments don't take this issue more seriously. This is a big country with many more appropriate places to mine – it is beyond me how anyone could take for granted the beauty of this valley, its town and rivers and farmland, its tourism value – Barrington Tops is a world heritage site for goodness sake!

People who drop into our business in town constantly remark what a beautiful area we live in, and it used to be with pride that we agreed. In the last few years I feel sorrow when I hear these remarks as I fear the knowledge of what a coal mine will do to this town will send tourists packing and many locals to the wall.

Gloucester is a unique and well preserved town with profitable, vibrant businesses employing many, many people. Towns like this in NSW and around Australia should be valued for what they represent - a link to our diverse and productive past and a reminder of the history and origins of our farming roots and should remain a vital hub for food production, tourism opportunities and a haven for the flora and fauna of our pristine rivers and forests. Natural resources (not mineral resources) found in this agriculturally viable land should be protected.
Especially its people and the special community spirit and values they share.

I am one of those people.

To conclude, this is how I see my position:
My property is my only financial asset.
I have all my eggs in one basket.
I have minimal superannuation (my house was to represent that).
My property is virtually worthless.
I have debts that will take me the rest of my working life to repay.
My children are looking down the barrel of zero financial legacy from me.
I have no choices for my future.

I hope that in your decision regarding the future of this coalmine and our town you can tell me that I am wrong and that I do have a future.

As I sit here this morning witnessing the peace - listening to the birdsong wake the valley, watching the mist rise and fall and rise again, observing our horse peacefully grazing and the colours of the sunrise, I am reminded of the reasons we chose this place to live.

For us this is paradise.

Rocky Hill will mean paradise lost.

Thank you for listening.

Sincerely yours,

Kathy Wardrop

e: k.wardrop@bigpond.com

m: 0413 133 429

Appendix B
Wind Rose Data from Forbesdale and GRL weather stations

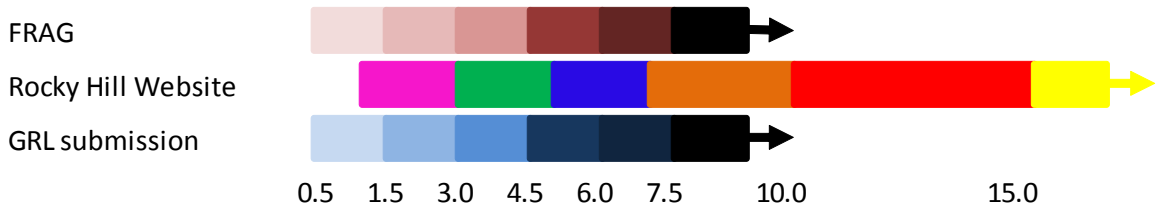
B.1 Wind Rose Design

The style and scale used on the FRAG wind roses is based on that used in the Gloucester Resources Limited application to the Director General for his requirements and in their subsequent EIS. The colours used in the FRAG wind roses were changed for the purpose of easily identifying the FRAG from the GRL roses.

The wind roses depicted on the GRL Rocky Hill Project website for some reason are presented in a different style, scale and colour than those in their other presentations.

In an attempt to make comparison easier the Rocky Hill Project wind roses have been redone by FRAG in the same style and scale as the FRAG and GRL submission wind roses but the original colouring and scale segmentation has been retained. (This may have led to minor changes due to interpretation of scale but essentially they are identical.)

The scales below represent the colour and scale segmentations used in this submission.



B.2 Wind Rose Data

The Forbesdale wind roses are compiled using the "Gust" wind readings taken at 9.00am and 3.00pm daily during the period from the 1st September 2012 to the 28th February 2013.

These are then presented to show the variance between stations on a monthly basis in figures B1 – B6.

Data for the Rocky Hill Project website roses comes from the GRL meteorological station and are assumed to be 9.00am and 3.00pm readings. They are stated as "Average" readings (no explanation of what average constitutes is included).

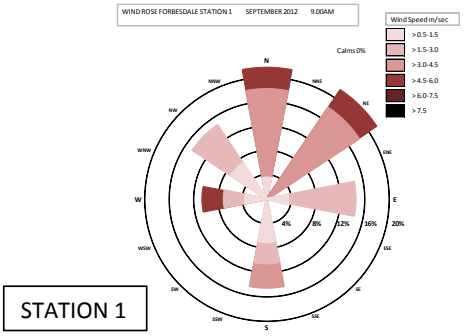
B.3 Comparisons between Forbesdale and GRL Roses

Monthly 3.00pm Forbesdale wind roses are shown with the corresponding Rocky Hill Project website roses to allow comparison. The obvious differences in appearance are due to the use of averages and multiple readings in the Rocky Hill Project roses rather than maximum and time specific readings as used in the Forbesdale roses.

This has the effect of meaning out the velocities rather than focusing on the maximums and changing the direction dominance from being aligned with the wind at the reading times to a meaningless daily average.

Figure B.1

9.00am Wind Roses for September



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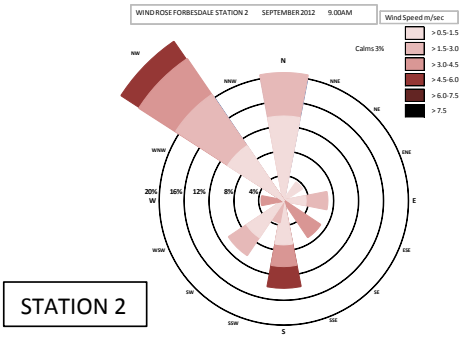

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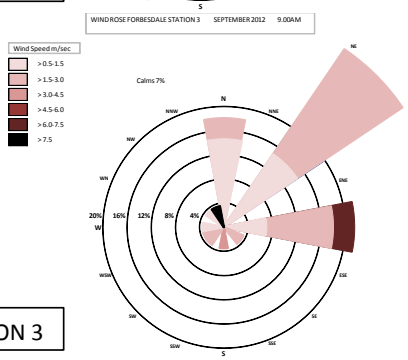

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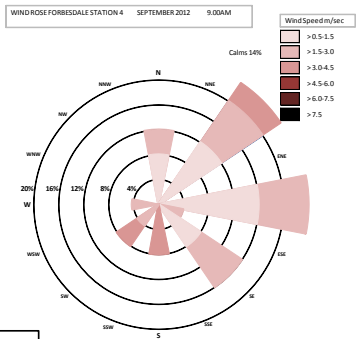

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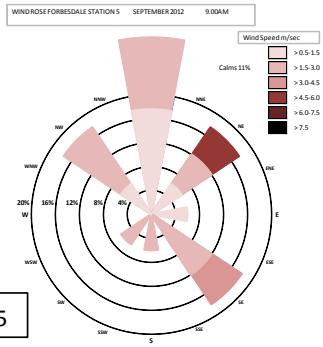
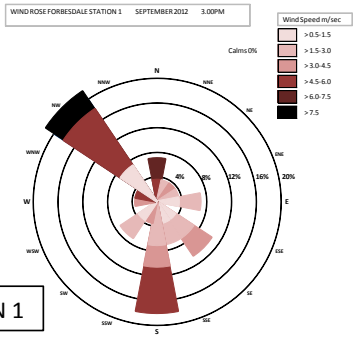


STATION 5

3.00pm Wind Roses for September



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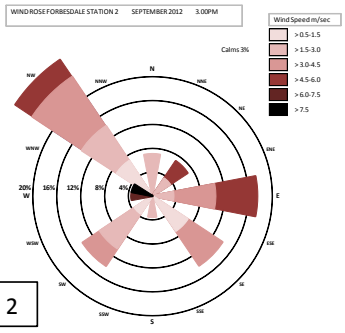

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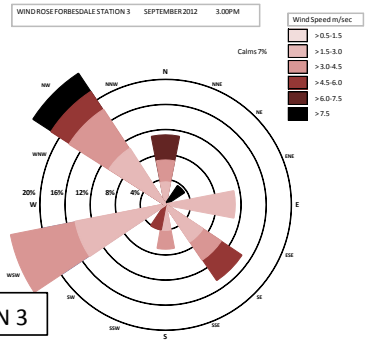

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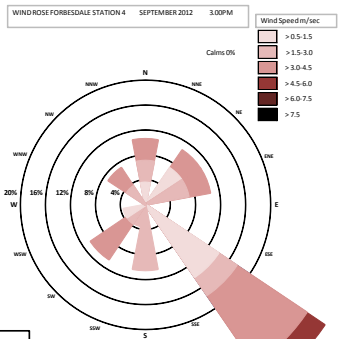

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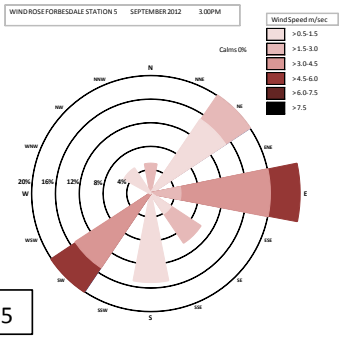
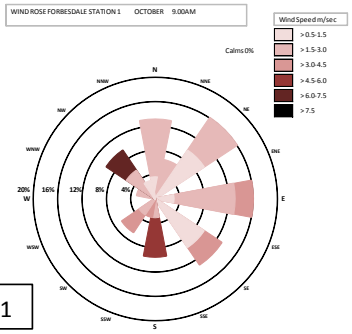


STATION 5

Figure B.2

9.00am Wind Roses for October



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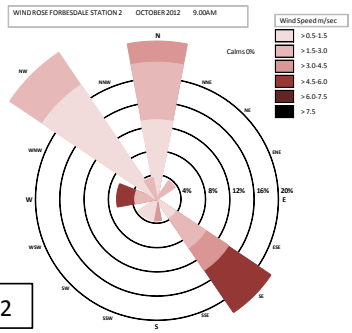

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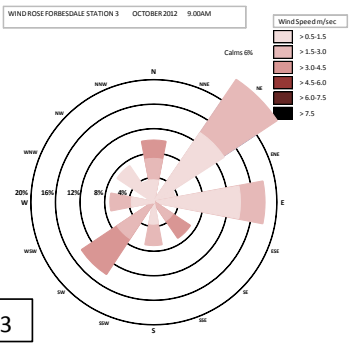

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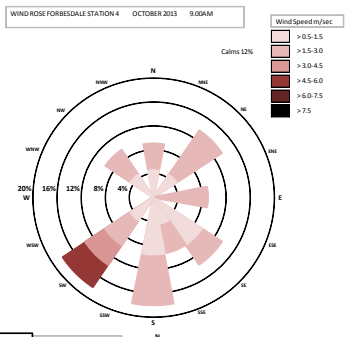

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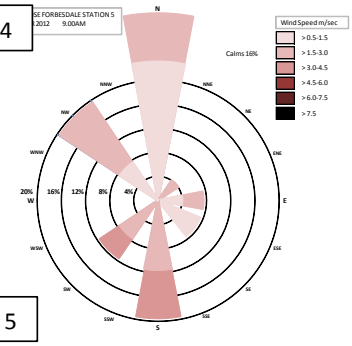
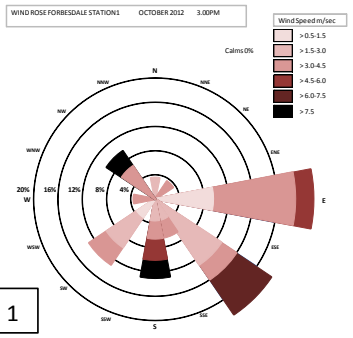
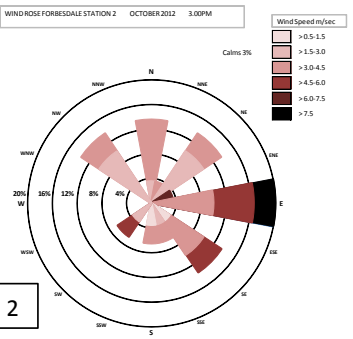


STATION 5

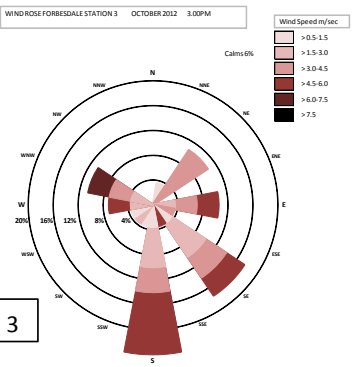
3.00pm Wind Roses for October



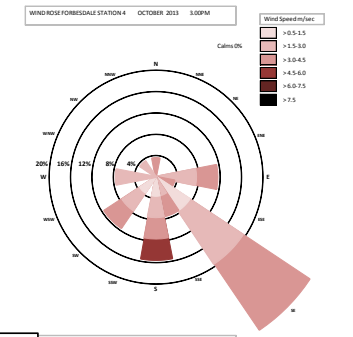
STATION 1



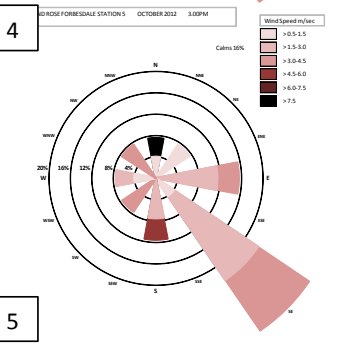
STATION 2



STATION 3



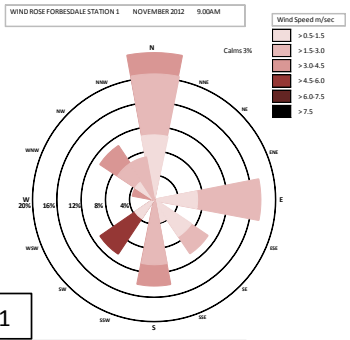
STATION 4



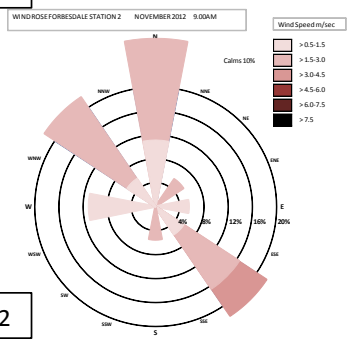
STATION 5

Figure B.3

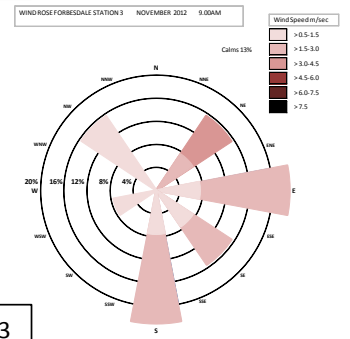
9.00am Wind Roses for November



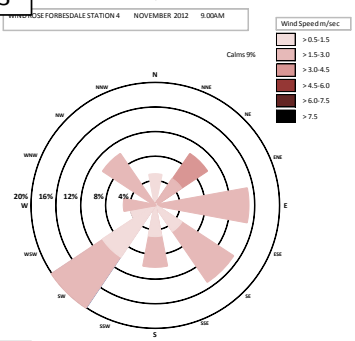
STATION 1



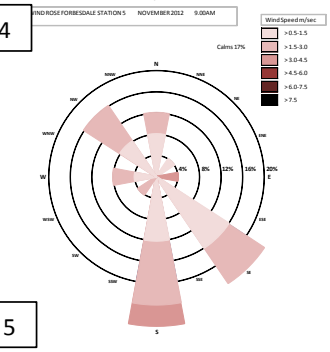
STATION 2



STATION 3

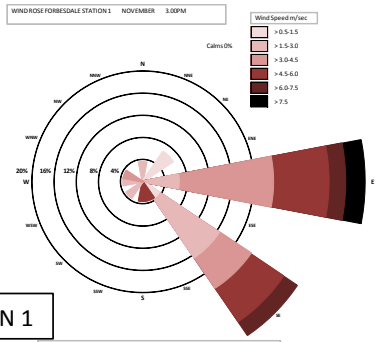


STATION 4

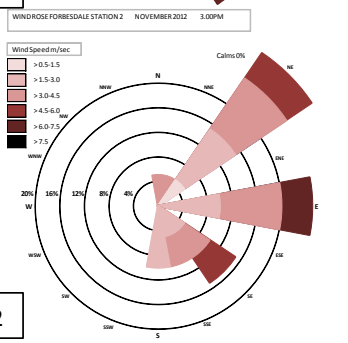


STATION 5

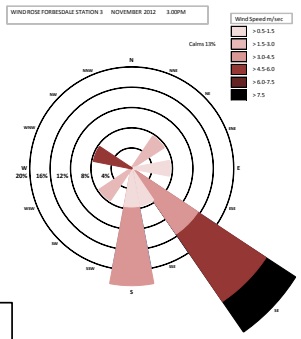
3.00pm Wind Roses for November



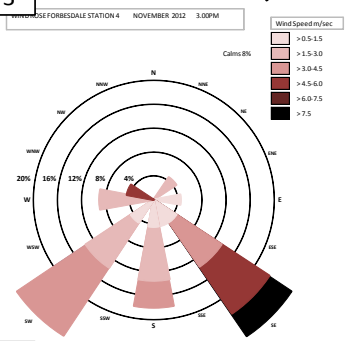
STATION 1



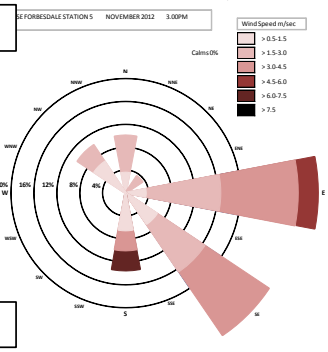
STATION 2



STATION 3



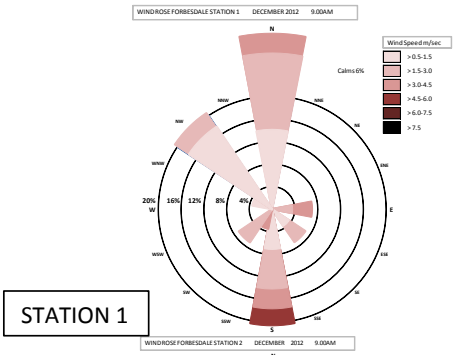
STATION 4



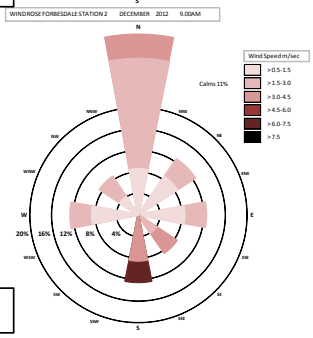
STATION 5

Figure B.4

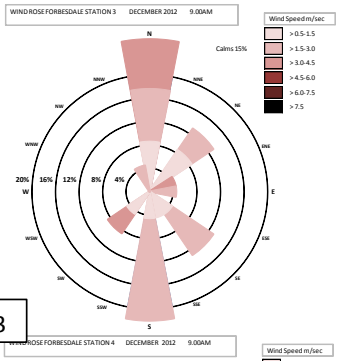
9.00am Wind Roses for December



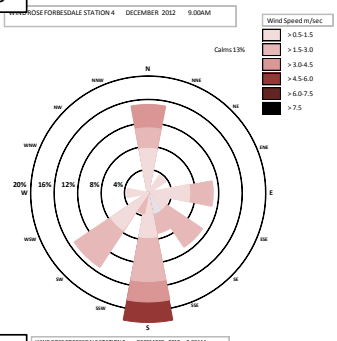
STATION 1



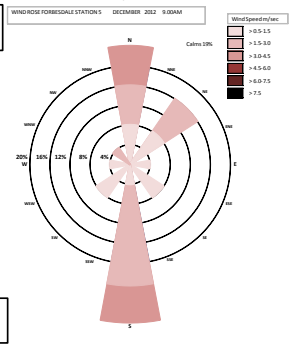
STATION 2



STATION 3

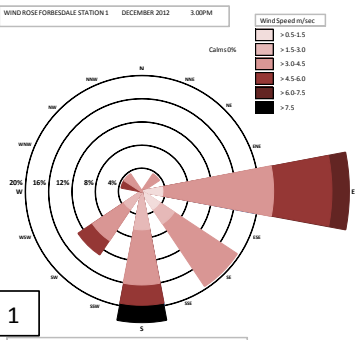


STATION 4

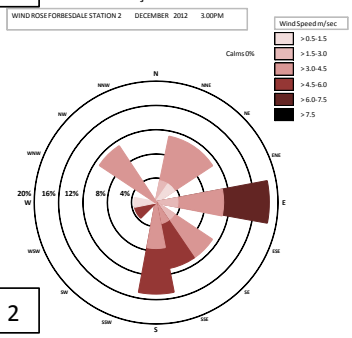


STATION 5

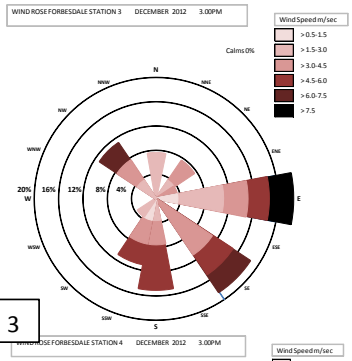
3.00pm Wind Roses for December



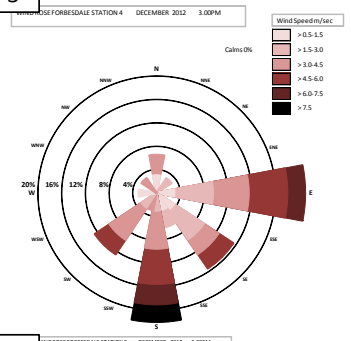
STATION 1



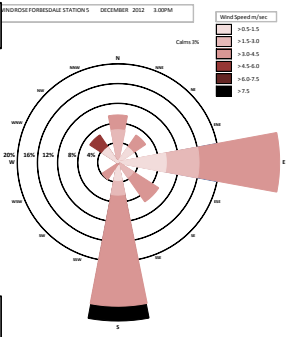
STATION 2



STATION 3



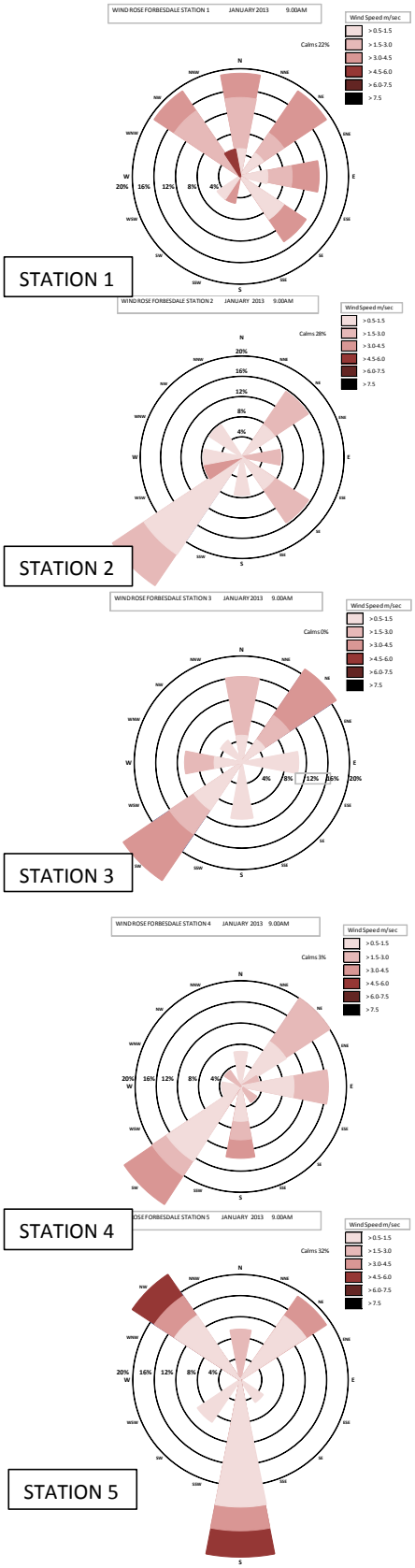
STATION 4



STATION 5

Figure B.5

9.00am Wind Roses for January



3.00pm Wind Roses for January

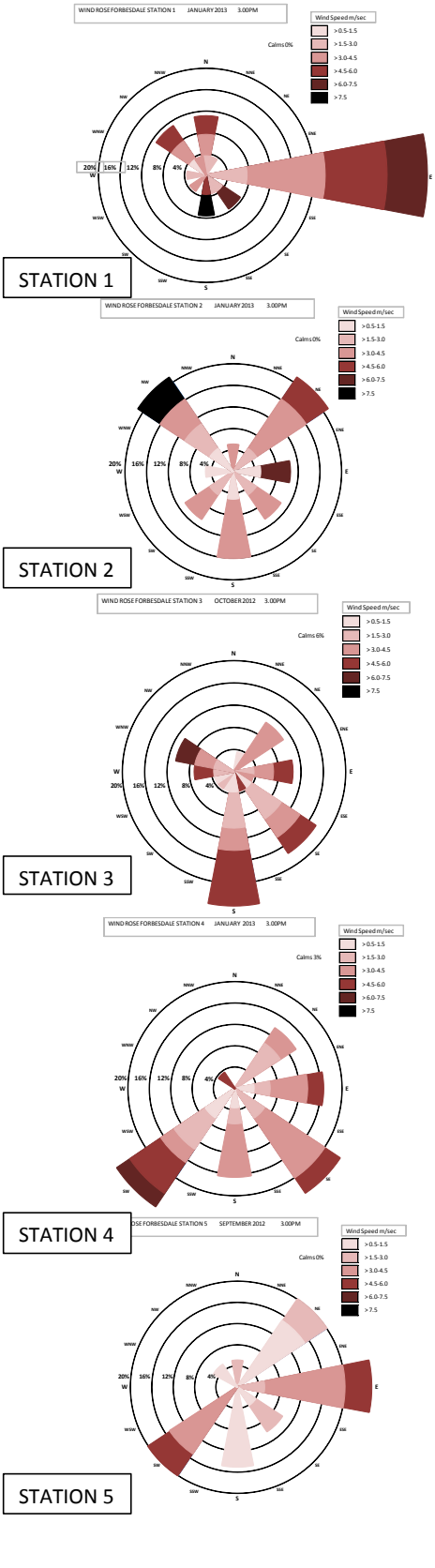
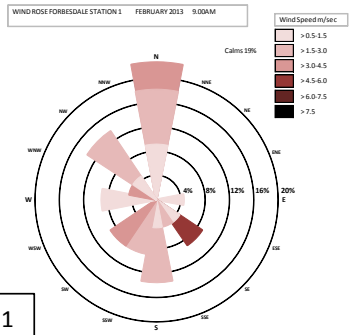
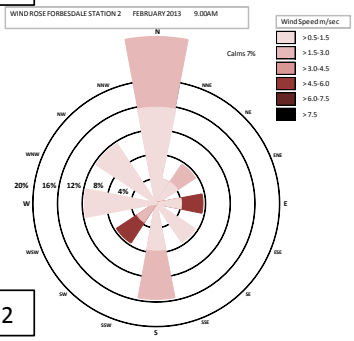


Figure B.6

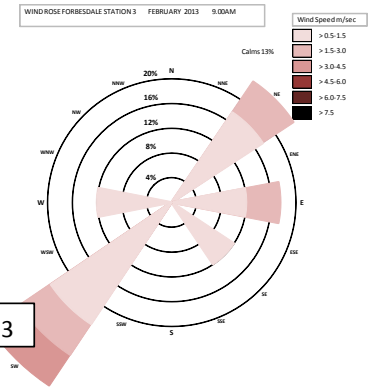
9.00am Wind Roses for February



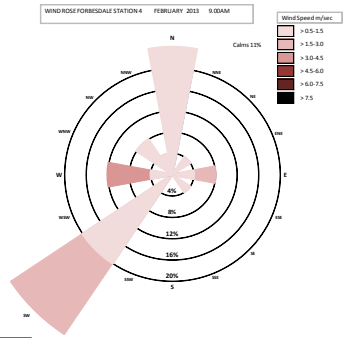
STATION 1



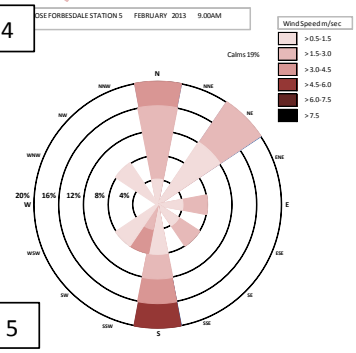
STATION 2



STATION 3

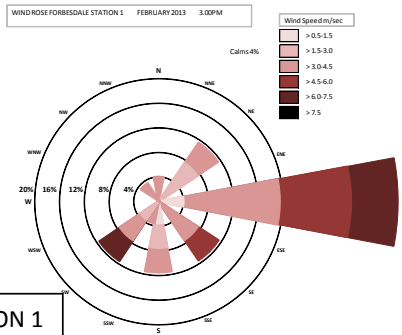


STATION 4

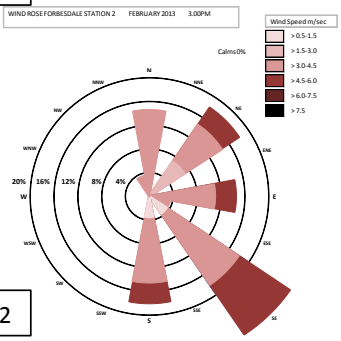


STATION 5

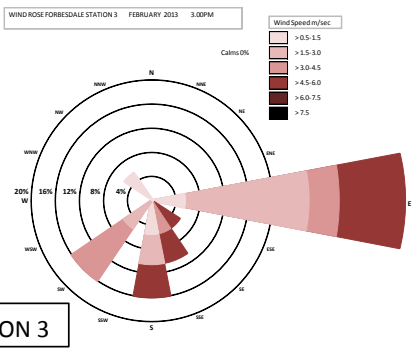
3.00pm Wind Roses for February



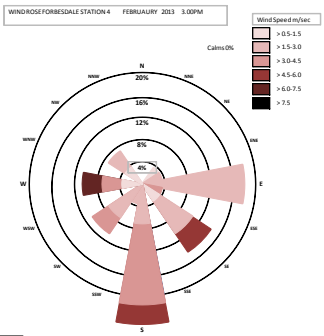
STATION 1



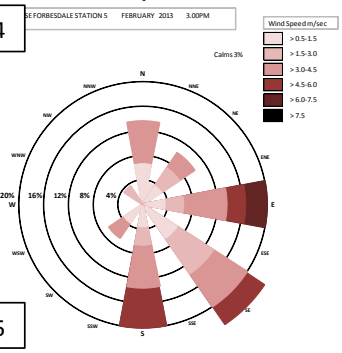
STATION 2



STATION 3



STATION 4



STATION 5

Figure B.7

Wind Rose Comparison September 2012 Forbesdale and GRL

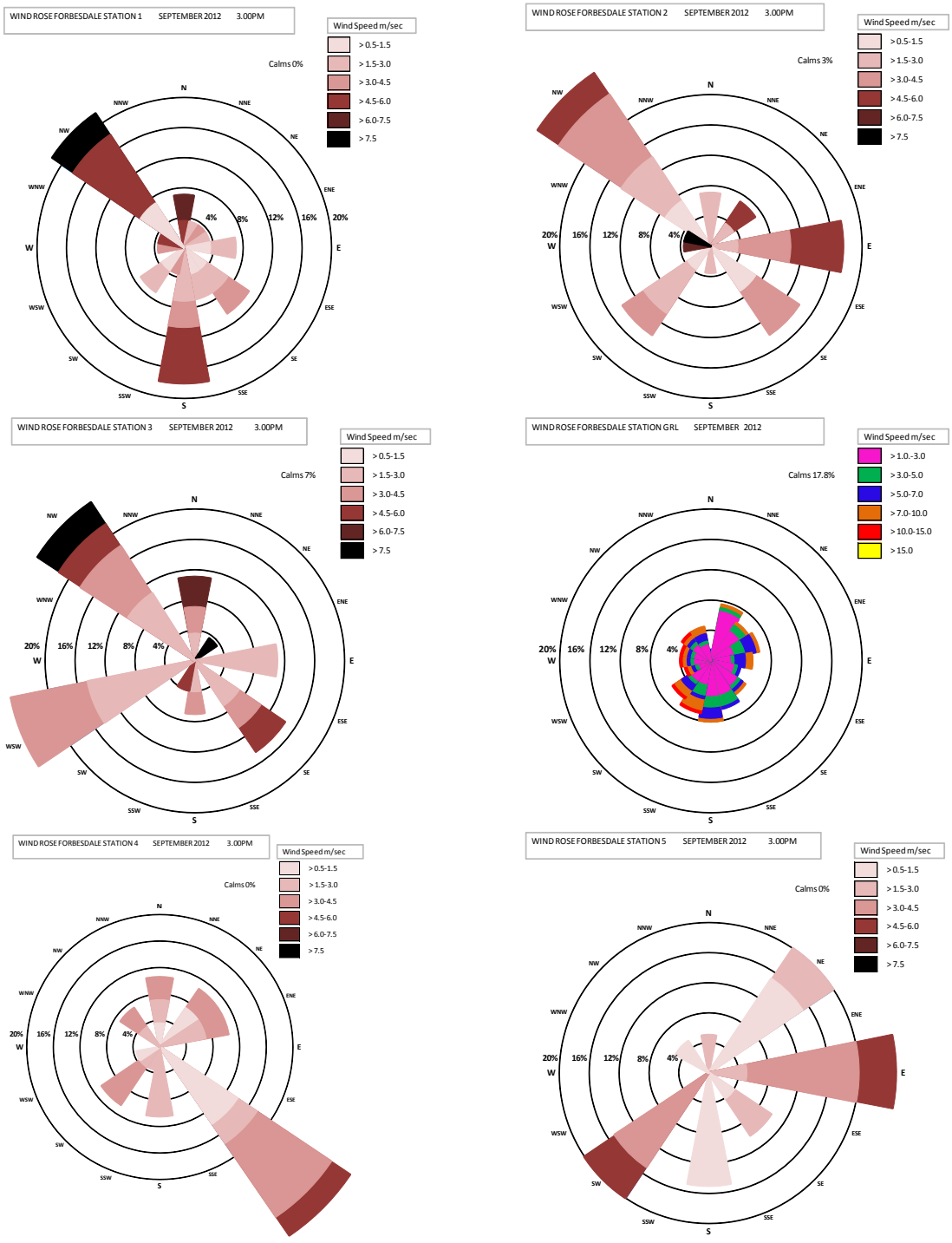


Figure B.8

Wind Rose Comparison October 2012 Forbesdale and GRL

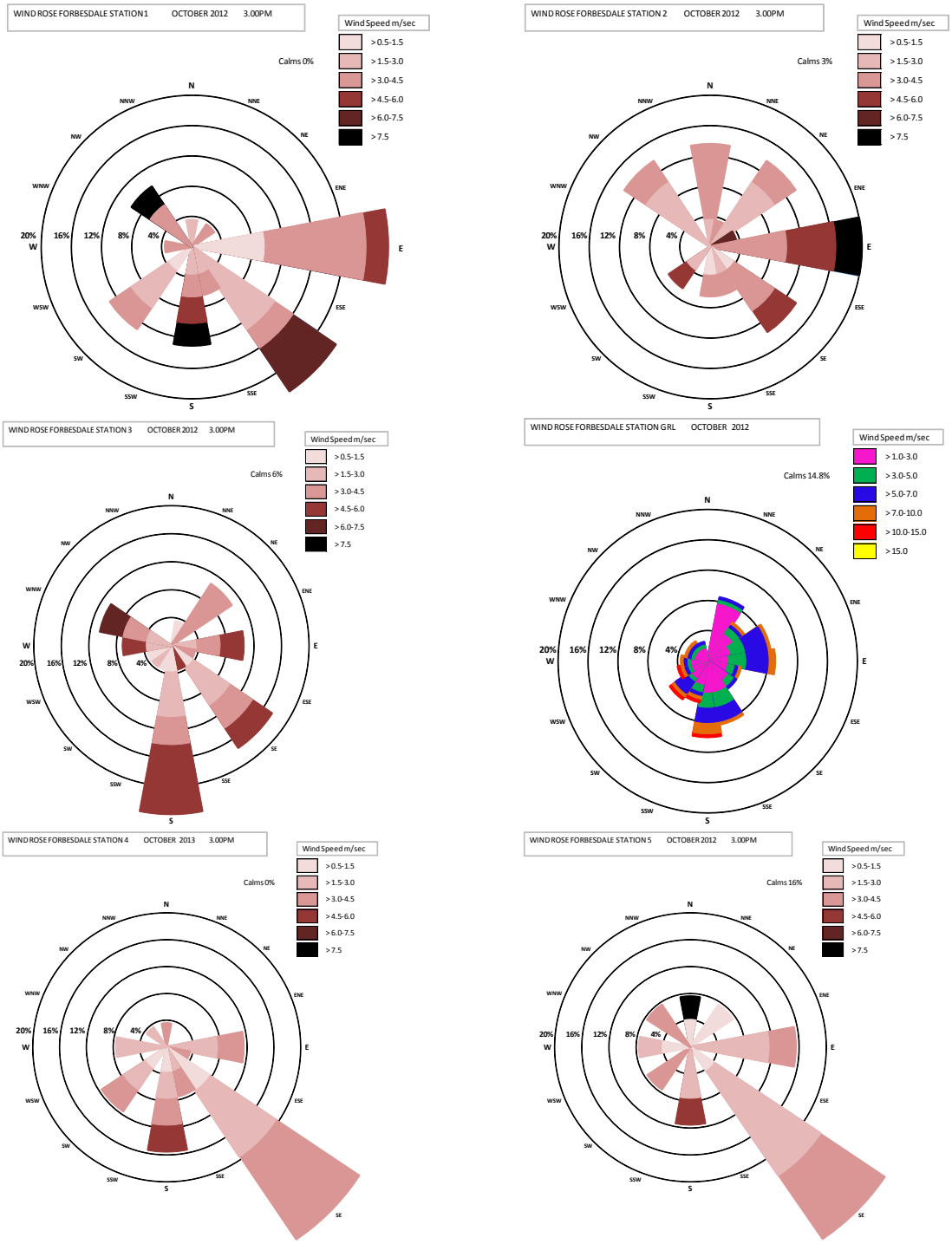


Figure B.9

Wind Rose Comparison November 2012 Forbesdale and GRL

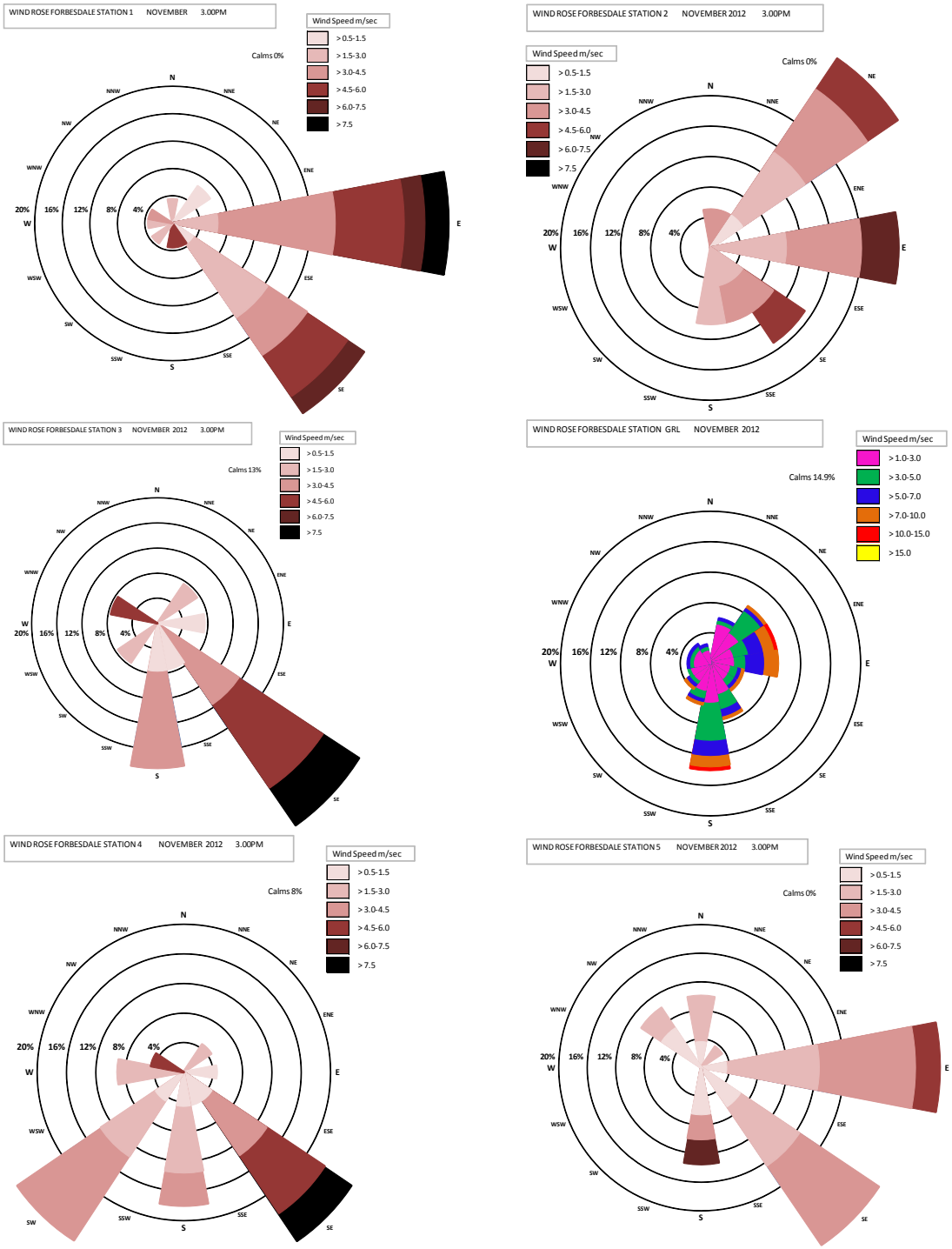


Figure B.10

Wind Rose Comparison December 2012 Forbesdale and GRL

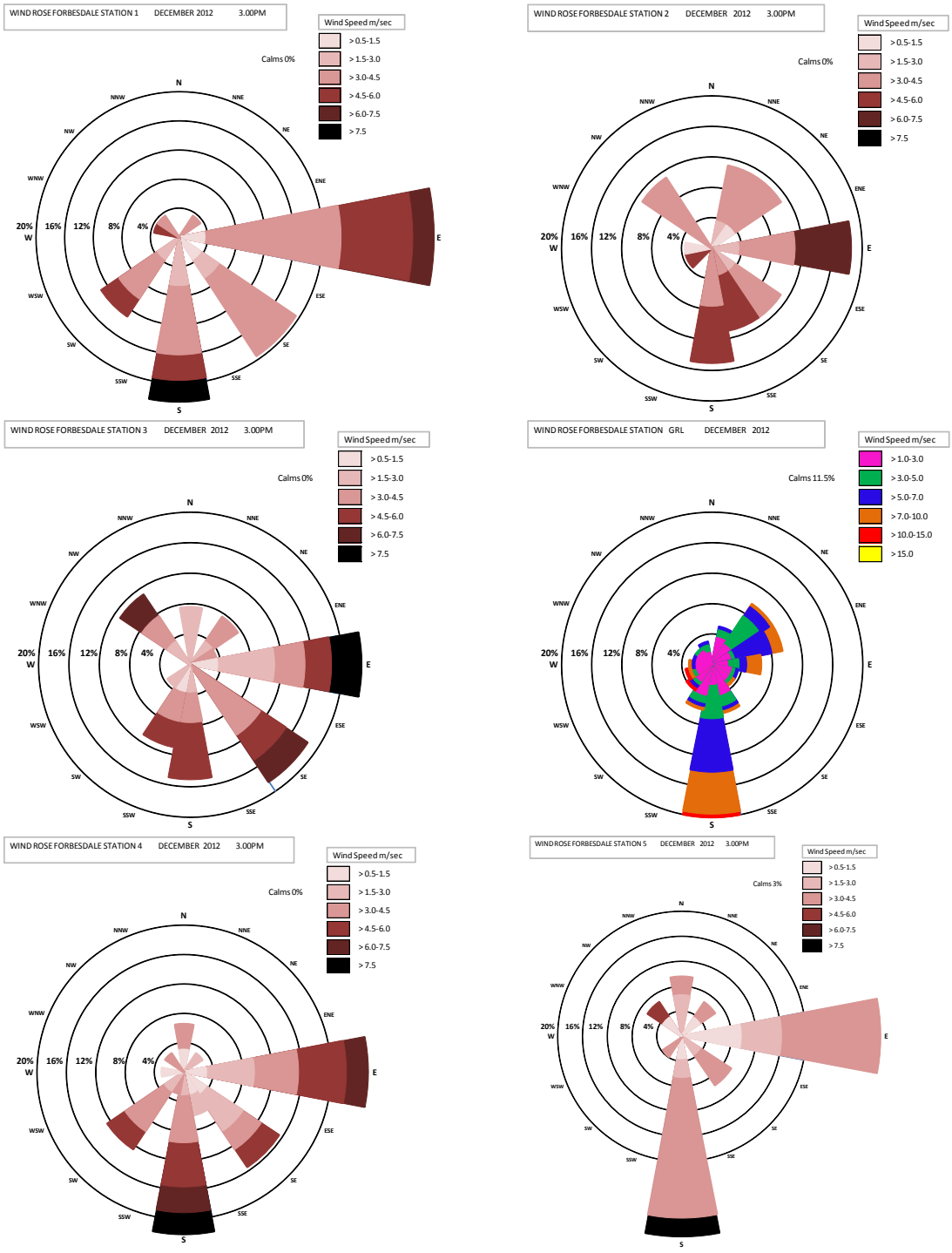


Figure B.11

Wind Rose Comparison January 2013 Forbesdale and GRL

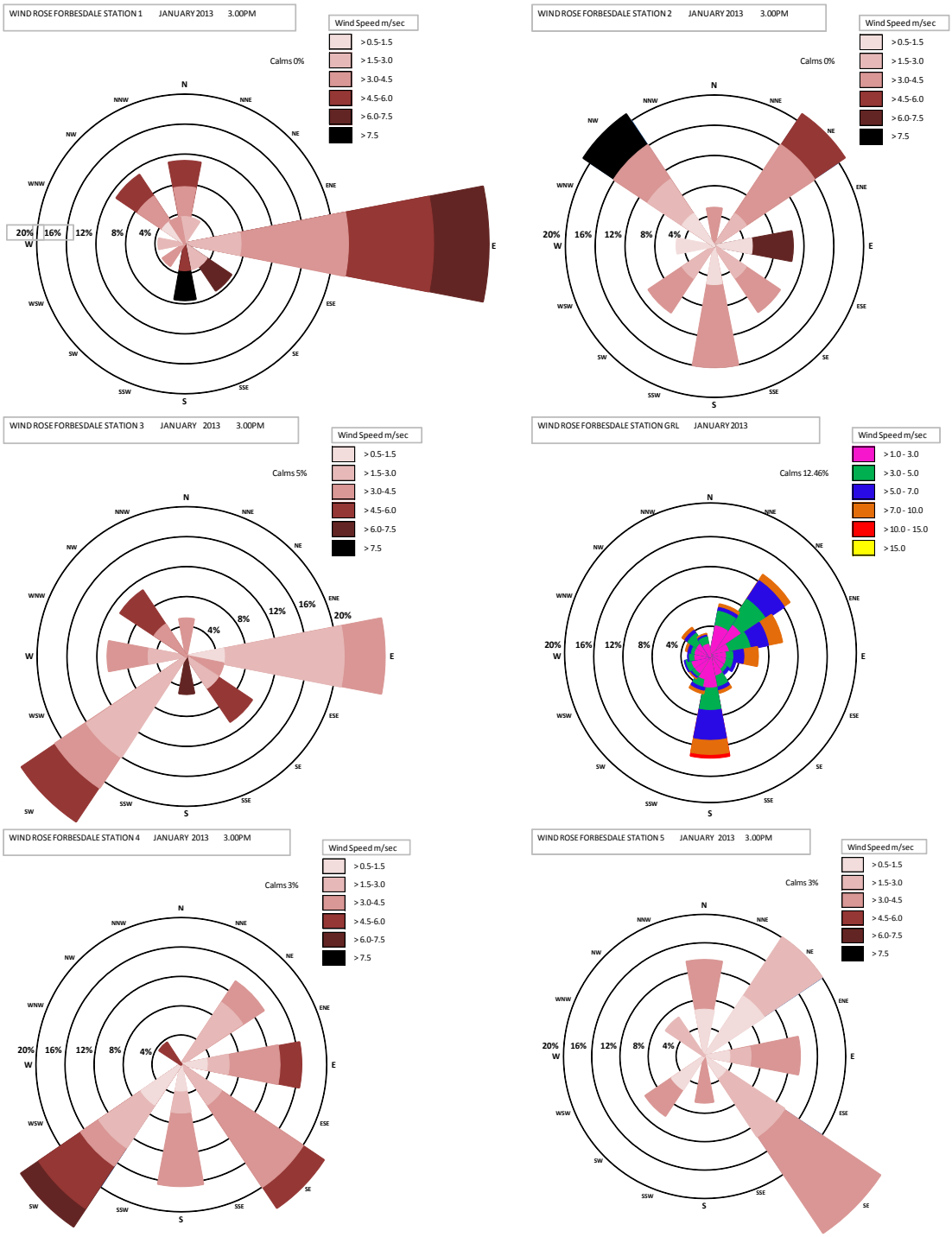


Figure B.12

Wind Rose Comparison February 2013 Forbesdale and GRL