Subject to the implementation of the measures outlined above, and as articulated in the recommended conditions of approval, the Department is satisfied that the project could be undertaken consistent with the requirements of established rail noise policy in New South Wales, and in a manner that would not pose a significant adverse impact on the acoustic amenity of Portland residential receivers.

5.2 Air Quality Impacts

Issues

An air quality assessment was undertaken to determine whether the project may result in any adverse impacts on local air quality. The Proponent identified three main potential sources of emissions that could result in adverse air impacts:

- earthmoving work that would be undertaken as part of the construction phase;
- operational transfer of coal from the trains to the Mount Piper Power Station site; and
- operational locomotive movements associated with the delivery of coal to the unloader.

Construction Phase Impacts

Regarding earthmoving work, the Proponent stated that particulate matter and dust would be key pollutants. The Proponent had identified that some 600,000 m^3 of fill material would be required to construct the rail line foundations. This material would be transported to the site where conventional earthmoving equipment would then be used to distribute the material.

Dispersion modelling was undertaken to determine the level of impact that would likely result from these activities at the nearest residences. Specific consideration was given to the generation of dust; fine particles (PM_{10}); and large particles (TSP). The assessment predicted that dust and particulate levels would meet the relevant air quality criteria at all sensitive receivers. Results for the most affected residences are detailed in Table 6 below.

Table 6 – Dust and Particulate Impacts Associated with Construction Works

Pollutant	Increment at most affected receiver	Background	Cumulative (Most Affected + Background)	Air Quality Criteria
Monthly Dust Deposition ($gm^{-2}month^{-1}$)	1.2	2	3.2	4
PM_{10} (24 hour average) (μgm^{-3})	11	27	38	50
PM_{10} (annual average) (μgm^{-3})	5	14	19	30
TSP (annual average) (μgm^{-3})	20	54	74	90

Operational Phase Impacts

Air impacts associated with the transfer of coal from the coal trains to the Mount Piper coal storage area was assessed in a similar manner to the dust impacts associated with construction activities. The assessment undertook dispersion modelling of monthly dust deposition; fine particles (PM_{10}); and total particles (TSP), specifically resulting from the coal hopper. The effect of the coal hopper operation on air quality levels was modelled because it was identified by the Proponent as the most significant source of pollutant emissions in the coal transfer process. It was asserted that other elements of the transfer process, such as the conveyor, would be fully enclosed and therefore would not be a source or emissions. The assessment found that dust and particulate levels are all predicted to meet the relevant air quality criteria at the nearest residences. Results at the most affected residences are contained in Table 7.

Table 7 – Dust and Particulate Impacts Associated with Operational Coal Transfers

Pollutant	Increment at most affected receiver	Background	Cumulative (most affected + background)	Air Quality Criteria
Monthly Dust Deposition ($gm^{-2}month^{-1}$)	0.1	2	2.1	4
PM_{10} (24 hour average) (μgm^{-3})	9	27	36	50
PM_{10} (annual average) (μgm^{-3})	0.6	14	14.6	30
TSP (annual average) (μgm^{-3})	1	54	55	90

Air emission impacts due to locomotives were assessed indirectly and comparatively by the Proponent. The Proponent sought to establish the relative level of impact that would result from locomotive emissions when compared to the total emissions resulting from the power stations and in turn what effect power station emissions are having on local air quality. The assessment identified the likely number of locomotives associated with each train; projected train numbers; train speeds; and known emission rates associated with rail operations; and then used this information to predict the annual air emissions that would result from locomotive operations associated with the project. These levels were then compared to the contribution of the two nearby power stations, which were in turn compared against local air quality and the relevant air quality criteria. Key contaminants assessed included carbon monoxide, oxides of nitrogen, particulates (PM_{10}), sulfur dioxide, and volatile organic compounds (VOCs). Two scenarios were selected so as to demonstrate the likely impact of initial use (whereby 2 million tonnes of coal would be transported by rail each year) and future use (whereby up to 8 million tonnes of coal would be transported by rail each year). The results of this assessment are detailed in Table 8 and Table 9 below.

Table 8 – Pollutant Contributions of Locomotive Operations

Pollutant	Locomotive Operations 2 Million Tonne Scenario	Locomotive Operations 8 Million Tonne Scenario	Combined Power Stations
Carbon Monoxide (tpa)	0.263	0.92	1540
Oxides of Nitrogen (tpa)	2.071	7.248	40000
PM_{10} (tpa)	0.049	0.17	1171
Sulfur Dioxide (tpa)	0.091	0.318	66000
Total VOCs (tpa)	0.089	0.312	190

Table 9 – Existing Local Air Quality Levels

Pollutant	Blackmans Flat	Wallerawang	Air Quality Criteria
NO_2 (max 1 hour average) (μgm^{-3})	79	59	246
NO_2 (annual average) (μgm^{-3})	10	10	60
SO_2 (max 1 hour average) (μgm^{-3})	353	424	570
SO_2 (max 24 hour average) (μgm^{-3})	70	47	350
SO_2 (annual average) (μgm^{-3})	13	7	60
Pollutant	**Modelled Wallerawang Area (Maximum Concentration Contribution due to Power Stations)**		**Air Quality Criteria**
TSP (annual average) (μgm^{-3})	0.0482		90
PM_{10} (max 24 hour) (μgm^{-3})	0.4490		50
PM_{10} (annual average) (μgm^{-3})	0.0145		30

Note: The Proponent stated that modelled data for the Wallerawang area was used by the Proponent for the purposes of particulate evaluation because there was no available particulate monitoring data available for the area. All other pollutant levels for Blackmans Flat and Wallerawang are monitored values.

The assessment concluded that locomotive emissions are not predicted to have a significant impact on local air quality. When compared to the combined contribution of the Mount Piper and Wallerawang powers stations as shown in Table 8 predicted pollutant contributions due to locomotive operations are minimal. Further, local air quality, which includes emissions from both power stations, has been shown to comply with the existing air quality criteria as shown in Table 9. On this basis, the Proponent concludes that the emissions associated with locomotive operations are minimal and not anticipated to adversely affect local air quality.

Consideration

The Department is satisfied with the level of air quality assessment undertaken by the Proponent. The Proponent has identified the sources/ activities that would most likely have the greatest level of impact on existing air quality and given detailed consideration to their likely effect on local air quality. The main emissions generating activities were identified to be the earthworks associated with construction; coal unloading operations; and locomotive engine operation. The Department concurs with this assessment, highlighting that other sources such as fugitive

emissions from either the diesel farm or conveyor, are unlikely to be significant contributors to air quality levels because emissions from these sources are typically negligible and can be effectively mitigated through appropriate design.

Predictive air dispersion modelling was undertaken for both the earthworks and coal unloading sources. For earthmoving activities the assessment concluded that adverse air impacts would be unlikely provided that mitigation measures such as water sprays, re-vegetation of finished areas and cloth fencing are employed throughout the construction phase. The Department agrees with this conclusion, highlighting the results of the predictive dispersion modelling which predict dust/ particulate levels to comply with the relevant air quality criteria refer Table 6). However, the Department notes that the predicted increments due to earthmoving activities would nevertheless increase existing background dust levels notably and in the case of monthly dust deposition, up to a 60% increase. As such, the Department considers it prudent that the Proponent undertake dust monitoring during construction to ensure that the predicted level of performance is achieved, and importantly, to ensure that local air amenity is protected during the six month period of intensive earthmoving activities.

For this reason, the Department, on advice from the DECC, has recommended conditions which would require the Proponent to undertake a comprehensive dust monitoring program which would commence prior to construction. This information would be regularly reviewed by the Proponent, the Department and the DECC throughout the construction phase, and would be used to modify and improve dust/ particulate mitigation measures committed to by the Proponent in the unlikely event that it is necessary. This program would form part of a broader suite of recommended conditions which specifically target the mitigation of dust and particulate generation.

In relation to air quality impacts associated with coal unloading sources, the assessment concluded that unloading activities would not result in an exceedance of the relevant air quality criteria and, when combined with the proposed dust mitigation measures, would be unlikely to result in any adverse air quality impacts. The Department concurs with this assessment, noting that the maximum predicted levels for dust, particles (TSP) and particulates (PM_{10}) are all well within the relevant air quality criteria when considered cumulatively with existing background levels (refer Table 7). In fact, the individual increment due to coal unloading in most cases is less than 6% of the existing background level. The one exception to this is for particulates (daily averaged) where the predicted increment of $9\mu gm^{-3}$ would effectively result in a 33 % increase to the existing background air quality level of $27\mu gm^{-3}$. However, it should be noted that even in this instance, the cumulative impact of $36\mu gm^{-3}$ would still comfortably comply with the air criteria for daily average particulates of $50\mu gm^{-3}$.

The Department further notes that the Proponent's assessment was highly conservative because it assumed 24-hour unloading operations; did not include proposed dust mitigation measures such as the dust suppression system; and used a low dust moisture content. In light of this, the Department is of the opinion that actual dust impacts associated with the operation of the rail unloader would be considerably lower than that predicted.

Nevertheless, the Department has recommended conditions that would require the inclusion of the operational phase into the dust monitoring program to ensure that the predicted air performance levels are achieved and that adverse air impacts are minimised. Again, real data obtained as part of this program would be used by the Proponent and the DECC to ensure that the dust/particulate control measures employed at the unloading facility are effective and protect local amenity.

The comparative air impact study of locomotive air emissions concluded that adverse impacts due to locomotive operation were unlikely given their predicted negligible contribution to local pollutant loads. The Department and the DECC support this assertion. In reaching this conclusion, the Department notes that emissions due to locomotive operations are predicted to be several orders of magnitude less than that currently emitted by the neighbouring power stations combined, even in the maximum coal haulage scenario (refer Table 8). Further, ambient air monitoring has demonstrated that power station emissions are not resulting in exceedances of established ambient air quality criteria (refer Table 9). In light of this it can be concluded that adverse air quality impacts associated with locomotive operation would be minimal.

It is the opinion of the Department then, that provided the Proponent's mitigation measures are implemented and the recommended Instrument of Approval is adopted, the project is anticipated to meet all relevant air quality criteria.

5.3 Hydrological Impacts

Issue

A flood study and an assessment of water quality was undertaken to determine whether the project would have any adverse impacts on flood behaviour or water quality of Pipers Flat Creek. Pipers Flat Creek is a tributary of Coxs River and part of the Sydney Water Catchment.

The flood study examined whether the proposal would cause flood water levels to change or result in a change to the existing flood water displacement patterns. This study concluded that while flood waters would be anticipated to rise on site and flood waters would be displaced, these effects would be limited to the site with no changes in flooding behaviour anticipated on adjacent properties or infrastructure. In noting the increase in floodwaters on site, the Proponent highlighted that the design of the rail loop would be able to adequately manage a one in one hundred year flood event.

Peak flood velocity was also examined as part of the flood study to determine whether the proposed embankment structure would change water flow rates and in turn result in the scouring of creek banks. In particular, the construction of a significant rail embankment across Thompsons Creek, Irondale Creek and Pipers Flat Creek has the potential to restrict the flow of water, including head accumulation behind crossing structures, with a consequent increase in the velocity of water passing through the crossing structures. Water flows with elevated velocity can lead to scouring of embankments.

Under a 1 in 100 ARI flood scenario, the Proponent's modelling indicates that peak flood velocities through the Thomsons Creek, Irondale Creek and Pipers Flat Creek crossings would be 4.9 ms^{-1}, 3.7 ms^{-1} and 3.3 ms^{-1} respectively. At these levels, the Proponent suggests that scouring may be an issue, but argues that the potential for scouring can be avoided or minimised through careful detailed design of the project. Under a Probable Maximum Precipitation Flood Design (PMPFD) scenario, flood velocities are expected to increase significantly, to 7ms^{-1} (Pipers Flat Creek), 9ms^{-1} (Irondale Creek) and 10 ms^{-1} (Thomsons Creek).

Consideration

The Department is generally satisfied that the Proponent has undertaken an appropriate level of assessment, utilising acceptable methodologies, in relation to the potential hydrological impacts of the project.

It is recognised that given the scale of the project, its location in an area susceptible to flooding, and the engineering constraints of constructing a rail embankment, that the project is likely to affect flooding characteristics and levels. In absolute terms, the Department considers that the project is likely to result in a significant increase in flooding levels. However, and as highlighted by the Proponent, increase flooding levels are not considered significant in relative terms when compared to the scale of the proposed rail embankment. Further, the Proponent has demonstrated that changes in flooding levels will be restricted to within the Proponent's land and would not affect surrounding landowners. On this point, too, the Department highlights that the most significant changes in flooding levels would occur within the area demarcated by the proposed rail loop. This portion of land, should the project proceed, would in effect be sterilised or severely restricted in future development potential due to its bounded location within the rail loop itself. The loss of this small parcel of land to future development is not considered significant, and as noted above, is part of the Proponent's land holdings (and its loss has presumably been taken into account by Proponent in designing the project). As such, increases in flood levels would not impact on existing or proposed developments in the area, and would not adversely impact on the potential for development of land in future (noting that such development potential has already been reduced by the location of the project itself). The Department is therefore satisfied that the project would not adversely affect flood levels surrounding the project, and that flooding increases on the site are acceptable.

The consequence of increased flooding levels behind constructed rail embankments is an increase in flood water velocities through culverts and watercourse, and the potential for scouring to occur under those circumstances. With respect to the assessment undertaken by the Proponent, the Department considers it appropriate to focus

on the outcomes of modelling for the 1 in 100 year ARI event, rather than a full PMPFD scenario. The PMPFD is considered to represent an unreasonable (and unlikely) modelling scenario under which significant scouring of watercourses would be experienced, irrespective of whether the project proceeds or not. The total volumes of water and natural flow velocities (in the absence of the project) would be of such a magnitude as to be an unreasonable impost on any development to design around. In contrast, the Department considers the 1 in 100 year ARI to be a more appropriate standard against which to assess the reasonable and potential flooding scenarios that would occur at the site.

In this context, the Proponent has estimated that flood velocities between 3.3 ms^{-1} and 4.9 ms^{-1} at the three principal watercourse crossings associated with the project. These velocities lie above the desirable level of 2 ms^{-1} at which bank stability becomes an issue and scouring is possible. The Proponent has argued that flooding velocities presented in the Environmental Assessment are based on initial design and are intended to inform the detailed design process. The Proponent has also argued that it can and will design the project to reduce these flood velocities and to avoid scour through downstream culvert structures. Further, it has also committed that the project would be designed to ensure that there is no significant increase in flood afflux beyond the boundary of the site.

The Department considers this to be an acceptable outcome. There are reasonable options available to the Proponent to design the project in such a manner as to reduce flooding velocities to achieve these outcomes. Through detailed design, for example, options existing the for the Proponent to reduce the head accumulation behind rail embankments and culverts, to increase cross-sectional flow areas around watercourse crossings to reduce velocities, and to install measures to disrupt or re-direct flood water flows to dissipate the energy of flood water flows, thereby reducing the potential for scour. To ensure that the final detailed design of the project achieves these outcomes in practice, the Department has recommended a condition of approval that specifies that the project is to be designed so as not generate significant increases in flood afflux on neighbouring properties or scour through downstream culvert structures. These outcomes would be demonstrated to the satisfaction of the Department of Water and Energy through detailed designs prior to the commencement of construction of the project.

5.4 Visual Amenity Impacts

Issues

The Proponent conducted a visual amenity impact assessment to ascertain the visual impact of the proposed facility from numerous viewing points within the local area. This included a photomontage assessment which utilised visual modelling techniques to simulate the visual impact of the constructed facility from key viewing points. Consideration was given to the degree of visual modification that would occur as a result of the proposal; the visual sensitivity of the surrounding areas and land uses; and the ability of the existing landscape to absorb the visual impact of the proposed facility.

The visual amenity impact assessment concluded that the level of visual modification would be high and that the existing landscape would not be able to adequately absorb the visual impact. The assessment stated that several areas of high sensitivity existed, namely the receiver referred to as "Premier Farms" and users of the Pipers Flat Road. At these locations, visual impact would likely be high. Further, other residences located to the south of Pipers Flat Road are predicted to be affected, although to a lesser extent due to screening afforded by favourable topography and existing vegetation. The Proponent asserted that a number of mitigation measures such as the use of on-site vegetation screening, revegetation works and the use of building colour schemes that are sympathetic to the existing landscape would be employed to prevent significant visual impacts. On the basis of implementing these measures, the Proponent concluded that residual visual amenity impacts would be low.

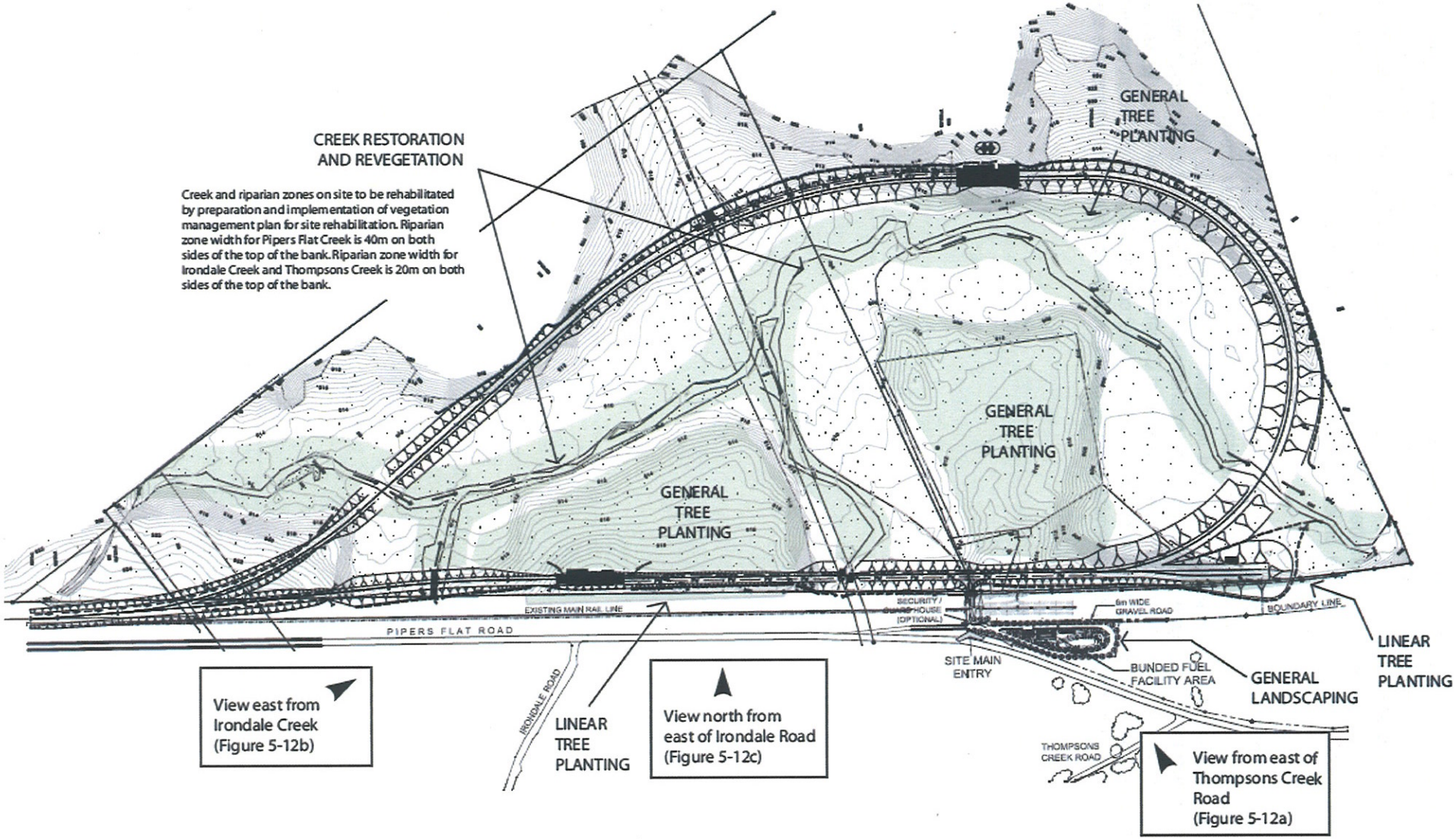
Consideration

The Department is satisfied with the level of visual amenity impact assessment undertaken by the Proponent. The main concern identified during public exhibition regarding visual amenity impacts was that the facility conflicted with the rural visual character of the existing area. It was asserted in submissions that the scale and industrial appearance of the proposed facility would significantly reduce the visual amenity currently afforded by the escarpment, flood plane and creeks at the site.

The Department acknowledges these concerns however it does not believe that visual amenity impacts are so great such that they outweigh the broader public benefit that the project would provide to the State through continued electricity generation at the Mount Piper plant. Realistically, of the approximately 30 residential properties that lie within three kilometres of the site, only 10 of these properties would potentially experience visual impacts as a result of the project, with the remainder already screened by existing vegetation or topography.

Impacts on potentially affected residential properties and users of Pipers Flat Road would be significantly reduced through the use of proposed building façade treatments which would blend project structures into the landscape, while proposed on-site revegetation works and vegetation screening would further reduce impacts (Figure 2). These works would be implemented as part of an extensive Landscape Management Plan which the Proponent has committed to implement as part of its Statement of Commitments. Implementing the plan would not only serve to mitigate visual amenity impacts, but would also deliver considerable ecological improvements through the rehabilitation of the site and its otherwise degraded creeks and riparian zones which traverse the site.

Figure 2 – Proposed Revegetation and Screening Works (Reproduced from the Proponent's Environmental Assessment)



The mitigation measures proposed are supported by the Department and, if implemented, the Department believes would reduce visual amenity impacts to acceptable levels. The Department has therefore reflected these measures in the recommended conditions of approval to ensure that they are undertaken. Further, the Department has strengthened the Landscape Management Plan proposed by the Proponent by requiring that it be further developed in consultation with the Council, the Department of Environment and Climate Change, Department of Primary Industries, Sydney Catchment Authority and the Department of Water and Energy to ensure that the plan delivers the predicted visual amenity and ecological benefits.

While these measures would notably reduce visual amenity impacts on site for local residents and users of Pipers Flat Road in particular, it is accepted that some residual impacts may exist at individual residences. To this end, the Department has recommended conditions of approval which would require the Proponent, if requested by an affected residential landowner, to install and maintain visual screening measures at the residence. As part of this requirement, any such measures would be funded by the Proponent.

The Department believes that provided the measures proposed by the Proponent and recommended in the conditions of approval are undertaken, visual amenity impacts can be effectively mitigated to low levels. Whilst it is acknowledged that the scale and industrial appearance of the facility would contrast with the existing rural landscape, impacts are not so great such that they outweigh the broader public benefit that the project would provide to New South Wales as a whole.

CONCLUSIONS AND RECOMMENDATIONS

The Department has assessed the Environmental Assessment, Statement of Commitments, submissions on the proposal and Submissions Report, and is satisfied that the impacts of the proposal can be mitigated and/ or managed to ensure an acceptable level of environmental performance. The Department recommends approval of the project accordingly.