

4.17 VISUAL

4.17.1 Visual Amenity

Predicted Impacts

This section responds to the submissions from stakeholders regarding the potential visual impacts associated with the Project and the measures to be implemented to mitigate or manage such impacts.

Submission reference: RA7, RA16, SIG1, SIG10, SIG12, P18, P66, P83, P84, P88 and P101

Summary response: The visual impacts associated with the Project are predicted to affect viewing locations to the north, south, east and west of the Project Boundary; however, such impacts vary in significance and in duration over the life of the Project. Impacts have been mitigated to an extent through the mine plan design. Residual impacts will be managed by means of a Visual and Lighting Management Plan and additional offsite measures, where deemed necessary. By Year 30, the final landform will be integrated with the existing landscape and the overall visual impact on surrounding receivers will be negligible.

As described in the Section 7.17 of the EIS and the Visual Impact Assessment (Appendix J of the EIS), the visual impacts associated with the Project are predicted to affect viewing locations to the north, south, east and west of the Project Boundary (dependant on residence orientation and other siting factors); however, such impacts vary in significance and in duration over the life of the Project.

The Northern Sector, while potentially having high levels of visual exposure, is only anticipated to have views for relatively short periods of time during the initial construction of the Eastern Mining Area and its northern OEA. Visual effects and therefore impacts will be quickly reduced from high to moderate by Year 5 and low once the OEA is rehabilitated. These impacts will further be reduced to very low as rehabilitation planting matures. By Year 30, the final landform will be integrated with the existing landscape. As a result of existing vegetation screening and distance from the Project Boundary, the village of Curlewis at over 12 km distance will not have views to the Project and therefore will not be visually impacted.

The Eastern Sector will view the workings of the Eastern Mining Area (from Year 2 to Year 17) and Southern Mining Area (from Year 17 to Year 24) for substantial periods of time with pre-rehabilitated OEAs visible to elevated residences. In particular this will include some residences in the village of Breeza, along the Kamilaroi Highway and local roads adjacent to the Project Boundary. High and moderate visual impacts will be reduced to moderate and low following completion and rehabilitation of the Eastern Mining Area (in Year 17) and Southern Mining Areas (in Year 24). These impacts will further be reduced to very low as rehabilitation planting matures. By Year 30, the final landform will be integrated with the existing landscape. Some residences situated on the eastern face of the Breeza Hill are shielded from the Project Boundary by the hill itself and will not be subjected to any views of the Project.

The Southern Sector is visually affected by the workings in the Eastern Mining Area (from Year 2 to Year 17) and Southern Mining Area (from Year 17 to Year 24) with the active faces of the OEAs facing that direction for substantial periods of time, particularly at rural residences and along local roads in close proximity to the Project Boundary.

High and moderate visual impacts will be reduced to moderate and low following completion and rehabilitation of the Eastern Mining Area (in Year 17) and Southern Mining Areas (in Year 24). These impacts will further be reduced to very low as rehabilitation planting matures. By Year 30, the final landform will be integrated with the existing landscape. Both the Caroonna and the Walhallow villages are shielded from views in all years to the Project and therefore will not be impacted by the Project.

The Western Sector is visually affected by the Western Mining Area (from Year 24 to Year 30); in particular, rural residences and local roads within close proximity to the Project Boundary. Visibility in the sector is reduced by hills within Breeza State Forest immediately south of the Western Mining Area and other existing topography. High and moderate visual impacts will be reduced to moderate and low following completion and rehabilitation of the Western Mining Areas. These impacts will further be reduced to very low as rehabilitation plantings mature. By Year 30, the final landform will be integrated with the existing landscape.

Mitigation and Management

As described in the Section 7.17.5 of the EIS and the Visual Impact Assessment, numerous mitigation measures have been incorporated into the design to mitigate the visual impact of the Project on sensitive viewing locations, including:

- Timely construction and implementation of progressive OEA rehabilitation during mining operations to reduce dust and other visual effect levels;
- Placement of the Mine Infrastructure Area between existing topographic features to assist in screening it from the external view; and
- Retention of iconic high points and topography in the local landscape setting (such as Mt Watermark).

Shenhua Watermark has committed to the development of a Visual and Lighting Management Plan. The plan will include provisions for additional onsite mitigation and management measures to reduce visual impacts further, including:

- Creating landscape plans to establish visual and ecological landscape patterns that attempt to emulate existing forest, woodland and grassland;
- Shaping the tops of the OEAs to achieve a more natural fit with surrounding landscape rather than an extensive “flat top” development;
- Constructing infrastructure in forest tones (i.e. green, grey or cream) to blend in with the surrounding natural environment, as far as practical such that it does not affect safety standards;
- Using hoods on lights or direct lights away from sensitive receivers;
- Fitting mobile equipment to prevent light being directed above the horizontal, where possible; and
- Conducting activities in compliance with AS4282 (INT) 1997 – *Control of Obtrusive Effects of Outdoor Lighting* (or latest version).

Where deemed necessary through consultation within relevant stakeholders, offsite mitigation and management measures will be implemented, including:

- Where requested by the owner of a primary residence which has a moderate to high visual impact from the Project (as identified in the Visual Impact Assessment), Shenhua Watermark will provide landscaping treatments or vegetation screens in a reasonable time frame to reduce the visual impacts. Other than in exceptional circumstances, this is not expected to be required for primary residences located more than 7.5 km from mining operations;
- Developing and implementing a landscape plan for relevant sections of the Kamilaroi Highway in long term impact areas; and
- Establishing tree screens along relevant sections of Clift Road, The Dip Road and Nea Siding Road.

4.17.2 Tourism Values

This section responds to the submissions from stakeholders regarding the potential impact of the Project on tourism values, in particular scenic and landscape amenity.

Submission reference: RA16 and SIG12

Summary response: The visual impacts associated with the Project are predicted to affect select viewing locations associated with local tourism and recreational areas; however, such impacts vary in significance and in duration over the life of the Project. Impacts will be managed by means of a Visual and Lighting Management Plan, which provides for an onsite and offsite tree planting strategy. Upon establishment of the tree screens and successful rehabilitation of the final landform, the Project will be integrated into the existing landscape and the overall visual impact on surrounding tourism values will be negligible.

A key component of the Visual Impact Assessment was identifying local tourism and recreational areas which may be affected by the Project.

Tourism and recreation areas generally have a higher visual sensitivity than other land use areas including industrial, agricultural or transport corridors as they use the scenic amenity values of the surrounding landscape over extended viewing periods.

Lake Keepit is a predominant tourism destination within the Gunnedah LGA. The Kamilaroi Highway provides a key transport corridor to Gunnedah and thus, also carries tourism traffic. There are also a number of potential tourist drives within the region; notable among these is the Tambar Springs Diprotodont Country Drive and Poets Drive. The Porcupine Lookout complements Gunnedah's tourist attractions.

Within the Liverpool Plains Shire, key tourism attractions are associated with the Who'd A Thought It Lookout and Heritage Museum at Quirindi, along with the Australian Railway Monument at Werris Creek.

The importance of tourism values, in particular scenic and landscape amenity were key considerations throughout the Project design phase and EIS. This has been reflected in the concessions and commitments that have been made by Shenhua Watermark as part of the design of the mine plan for the Project, as described above in **Section 4.17.1**.

As described in the Visual Impact Assessment, Porcupine Lookout is a sensitive viewing location; however, it is greater than 20 km from the Project Boundary. As such, any visual impacts will be low and will be short-term in nature until Year 5 of the Project as the Northern OEA is constructed and rehabilitated.

The portion of the Kamilaroi Highway that is between 2.5 km and 7.5 km of the Project Boundary will have a high to moderate visual sensitivity, respectively. Visual effects will be created primarily by views to the Eastern Mining Area and to a lesser extent the Southern Mining Area. During the initial years of operations, the Eastern Mining Area will create high visual effects until shaping is complete along the northern and eastern faces of the OEA by Year 5 and 15, respectively. High visual effects on some sections of the Highway will also be experienced from the Southern Mining Area, when some views of overburden are available over the adjoining tree canopies.

Beyond this, all other key tourism and recreational sites are beyond the Primary Visual Catchment of the Project (i.e. over 20 km) and will therefore, not experience any visual impacts.

Onsite and offsite tree screening and progressive rehabilitation will be integral components of the Project in mitigating any residual visual impacts. As committed to in the EIS, a tree planting strategy will be developed as part of the Visual and Lighting Management Plan and implemented along selected sections of the Kamilaroi Highway. The Visual and Lighting Management Plan will include strategies for tree screening to reduce visual impacts. These initiatives will improve the existing scenic and landscape setting and subsequently tourism values during the life of the Project.

Upon establishment of the tree screens and successful rehabilitation of the final landform, the Project will be integrated into the existing landscape and the overall visual impact on surrounding tourism values will be negligible.

4.17.3 Lighting

This section responds to the submissions from stakeholders regarding the potential visual impacts associated with direct and indirect (diffuse) night lighting.

Submission reference: RA1, RA7, SIG1, SIG10, SIG13, P2, P4, P16, P18, P65 and P88

Summary response: Vehicles and equipment within and outside of the open cut mining areas will contribute to direct lighting effects at select viewing locations to the north, south, east and west of the Project Boundary. The Project's operations will also create a glow (diffuse lighting), which may be apparent from time to time. Impacts will be managed by means of a Visual and Lighting Management Plan, which will be prepared in line with best practice measures, which will be implemented where reasonable and feasible. Accordingly, lighting will not significantly impact surrounding receivers.

The visual effect of lighting surrounding the Project Boundary will vary. It will be influenced by the locality of operations on site, the relative elevation at which the viewing location is situated and the presence of any barriers within or outside of the Project Boundary such as topographic features and / or vegetation.

There are two types of lighting effects that could be experienced from the Project. The first effect is where the light source is directly visible and will be experienced if there is a direct line of sight between a viewing location and the light source.

The second effect relates to the general night-glow (diffuse light) that results from light of sufficient strength being reflected into the atmosphere. This type of effect will create a strong local focal point and the effect will vary with distance and atmospheric conditions such as fog, low cloud and / or dust particles which all refract light. The anticipated impacts of each are discussed further below.

Direct Light Effects

Direct light effects are generally restricted to vehicles and equipment within and outside of the open cut mining areas, as other operational light sources such as within the Mine Infrastructure Area would largely be hooded.

Generally, vehicle lighting will be visible from various mining areas at different times in the Project life. Northern areas would be affected by the Eastern Mining Area operations until the northern OEA is completed. Lighting from the Eastern Mining Area will be visible from eastern areas and limited southern areas for more extended periods. However, road alignment screening by the OEA and below ground level operations will limit this. The main area affected by direct light effects would be some houses at Breeza, with other areas anticipated to be too distant.

Direct lighting from the Southern Mining Area could affect residences on Clift Road and Rossmar Road. Impacts from lighting from the Western Mining Area will mainly be towards the west, with some spillage to the north from the top of OEAs. Such effects should not extend past Nea Siding Road except for truck movements on the top of the OEA, as it is constructed. Other roads are at ground level and/or below ground level and are screened by adjoining topography.

Direct lighting from the Mine Infrastructure Area has the potential to project into a small section of the Northern and Southern Sectors as there is no topography or vegetation to screen such lighting along Watermark Gully.

The village of Curlewis is protected by topography and vegetation and will not experience night light effects. Similarly the village of Breeza (approximately 3 km away) is protected for the greater part although more elevated areas will be potentially exposed to operations associated with the construction of the OEA in the Eastern Mining Area. Rural residences will for the greater part be protected by topography or vegetation, to the west, north, east and south-west. The potential exceptions are residences to the south-east. However residences that are within 6 km are within woodland that would assist in mitigating any effect over this distance.

Indirect (Diffuse) Lighting

Lighting for the Project will collectively create a glow of light that will be seen in the ambient dark night. This glow will represent the indirect lighting effects of all the lights including machinery as well as lights around work areas and infrastructure elements. This could create a localised effect, especially on foggy nights. Generally, the glow associated with diffuse lighting will not create a significant visual effect; however, it may be apparent from time to time.

Mitigation and Management

As described above in **Section 4.17.1**, Shenhua Watermark has committed to the development of a Visual and Lighting Management Plan, including the following measures to reduce lighting impacts:

- Using hoods on lights in Mine Infrastructure Area or ensuring lights are directed away from sensitive receivers;
- Fitting mobile equipment to prevent light being directed above the horizontal, where possible; and
- Conducting activities in compliance with AS4282 (INT) 1997 – *Control of Obtrusive Effects of Outdoor Lighting* (or latest version).

4.17.4 Siding Spring Observatory

This section responds to the stakeholder submission regarding the potential visual impacts associated with the Project on the Siding Spring Observatory and the mitigation measures to be implemented.

Submission reference: RA1

Summary response: Indirect (diffuse) lighting from the Project when considered cumulatively with other sources may contribute additional light to background sky levels upon which the Siding Spring Observatory relies upon. As such, Shenhua Watermark has committed to consulting with AAO and the Australian National University during the preparation of the Visual and Lighting Management Plan and implementing best practice lighting measures, where reasonable and feasible, to reduce potential impacts at this receiver.

The AAO recognise the importance of coal mining for energy production in Australia; however, express concern about the potential threat posed by mining to the observing conditions at the Siding Spring Observatory, mostly in the form of light and dust pollution.

The AAO notes that they are enthusiastic to work with Shenhua Watermark to minimise any detrimental impact from the Project on the Siding Spring Observatory. In this regard, the AAO requested in its submission that Shenhua Watermark meet the following conditions:

1. *“Familiarisation of the above parties (i.e. Shenhua Watermark) with the risks and threats of mining activity to astronomical and astrophysical research, including dust and light pollution and possibly seismic disturbance;*
2. *Recognition of the potential of the Watermark Coal Project to generate these risks and threats for Siding Spring Observatory, located near Coonabarabran in the Warrumbungle Shire;*
3. *Agreement to engage in formal consultation with the Australian National University and the Australian Astronomical Observatory regarding a mitigation program for the minimisation of these impacts;*
4. *Implementation at the Watermark mine site of an approved mitigation program;*

5. *Ongoing engagement with the ANU and AAO to monitor the efficacy of remedial measures, assess the impacts of any expansion of mining activity and explore the potential of new technologies to limit the detrimental effects of light and dust pollution;*
6. *Adoption of effective light and dust minimisation measures at the Watermark mine, including Shenhua Watermark Coal Pty Limited providing suitable equipment for the monitoring of light and dust levels at both the mine site and at Siding Spring; and*
7. *Observance of the proposed new State Environmental Planning Policy (SEPP) especially governing lighting developments and conditions of consent for mines within 200 km of Siding Spring."*

In response to the above, Shenhua Watermark offers the following comments to each submission point above:

- Conditions 1 and 2 – As noted above in **Section 4.17.3**, indirect light generated by the Project, including machinery in the active mining areas and Mine Infrastructure Areas will collectively create an indirect glow that will be seen in the ambient night sky, in particular during increased cloud cover, and could create a localised effect. Generally the glow associated with diffuse lighting will not create a significant effect.

As such, Shenhua Watermark has committed to consulting with AAO and the Australian National University during the preparation of the Visual and Lighting Management Plan as outlined in Statement of Commitment 51 in the EIS.

Responses to issues associated with dust pollution and seismic disturbance are provided in **Sections 4.7.8** and **4.9.1** of this RTS, respectively.

- Conditions 3 and 4 – As outlined in Statement of Commitment 51 in the EIS, Shenhua Watermark will consult with the Australian National University and the Australian Astronomical Observatory during the preparation of its Visual and Lighting Management Plan. As such, Shenhua Watermark supports the AAO's request to engage in formal consultation during preparation of the Visual and Lighting Management Plan.
- Condition 5 – Shenhua Watermark supports the request for ongoing engagement with the AAO to monitor the efficacy of remedial measures and explore the potential of new technologies to limit the detrimental effects of light and dust pollution, where such measures are reasonable and feasible. This will be documented in the Visual and Lighting Management Plan to be developed in consultation with the AAO.
- Condition 6 – Shenhua Watermark supports the AAO's request for the adoption of effective light and dust minimisation measures, if reasonable and feasible to utilise. This is discussed further below.
- Condition 7 – Shenhua Watermark will comply with all applicable legislative requirements, including any applicable State Environmental Planning Policy.

Full Cut-Off Lighting Fixtures

In its submission, the AAO recommends the use of full cut-off lighting fixtures by Shenhua Watermark, so that shielded downward illumination is exclusively used. The AAO also recommends the use of low colour-temperature lamps, since the blue component of white light (which is minimised in these lamps) has a greater tendency to scatter over long distances.

Shenhua Watermark will investigate whether it is reasonable and feasible to use full cut-off lighting fixtures and low colour-temperature lamps, with such consideration to take account of safety requirements. This will be reflected in the Visual and Lighting Management Plan (as relevant) to be developed in consultation with the AAO.

Good Lighting Design

In its submission, the AAO recommends that good lighting design is implemented for the Project so that the intensity of illumination is limited to only that needed in any given situation.

As noted in the EIS, Shenhua Watermark will conduct its mining activities in compliance with AS4282 (INT) 1997 – *Control of Obtrusive Effects of Outdoor Lighting* (or latest version) and will implement good lighting design.

In this regard, Shenhua Watermark will implement policies to ensure its workforce understands the importance of good lighting practice, potential visual impacts of the Project and practical strategies to reduce light spill.

Consulting Lighting Engineers

In its detailed submission, the AAO notes that utilising the services of Lighting Analysis and Design as consulting lighting engineers has worked well with other lighting developments to promote the installation of state-of-the-art environmentally-friendly lighting.

Accordingly, Shenhua Watermark will liaise with Lighting Analysis and Design, or other suitably qualified consultant, during the preparation of the Visual and Lighting Management Plan, in consultation with the AAO.

4.17.5 Interactions with Dust

This section responds to the stakeholder submission regarding the potential visual impacts associated with dust generation.

Submission reference: RA1

Summary response: The predicted particulate matter contribution from the Project at the Siding Spring Observatory is considered to be undiscernible from existing ambient concentrations. However, at the working face of the mine, dust generation may enhance light scattering associated with dust in the ambient air, from time to time. To minimise dust within the vicinity of the Project, Shenhua Watermark has committed to implementing a suite of measures in accordance with an approved Air Quality Management Plan and other applicable regulatory requirements.

The AAO highlights in its submission the potential threat of airborne dust on the Siding Spring Observatory. The AAO acknowledges that it is unlikely that dust ingress at the telescopes will be a major issue (since quite high levels of natural wind-borne dust are experienced from time to time at Siding Spring), however indicates that there may be a requirement to enhance the dust-filtering equipment at the Siding Spring Observatory and other telescopes in order to avoid any occurrence of problems.

The AAO requested that Shenhua Watermark might contribute financially to the purchase of suitable dust monitoring equipment for installation at the Siding Spring Observatory. **Section 4.7.8** of this RTS provides a detailed response to this issue.

The results presented in the Air Quality and Greenhouse Gas Impact Assessment show that the predicted annual average concentrations of PM₁₀ and PM_{2.5} due to the Project are 1 µg/m³ or lower within 5 km of the Project Boundary. Since the concentrations from the Project decreases with distance, the contribution at the Siding Spring Observatory would hardly be discernible from existing ambient concentrations. As such, Shenhua Watermark considers there should be no requirement to enhance the dust-filtering equipment at the Anglo Australian Telescope of the Siding Spring Observatory as a consequence of the Project.

The AAO also highlights in its submission that a more significant risk is that associated with rising dust around the working face of the mine being illuminated by the mine's lighting equipment, effectively increasing the light-flux from the mine.

As detailed in **Section 4.7.13** of this RTS, a suite of best practice measures have been adopted, including implementation of operational controls and a real-time meteorological and predictive dust management and monitoring system. Such measures will be facilitated by an approved Air Quality Management Plan and in accordance with the Project's EPL. This will allow air quality impacts to be managed within relevant criteria in the area local to the Project, and will by default through its operation protect the air quality at locations further away, such as the Siding Spring Observatory.