Centennial Coal

Construction Environmental Management Plan

Angus Place Colliery

Ventilation Facility

June 2013

Contents

APPENDICES

1 INTRODUCTION

The purpose of this *Construction Environmental Management Plan* (CEMP) is to provide guidelines for the identification, protection and management of environmental aspects during the construction of the Angus Place Colliery's Ventilation Facility Project (the Project). It provides all employees and contractors of Angus Place Colliery (Angus Place) with a clear description and understanding of responsibilities and requirements regarding construction activities.

The CEMP also addresses the requirements of:

- The conditions of the second modification to Angus Place's Project Approval (PA 06_0021 Mod 2), approved on 22 April 2013 by the NSW Planning Assessment Commission
- The final Statement of Commitments submitted to the Department of Planning and Infrastructure on 17 December 2012.

The background to the Project, the statutory framework, the existing site description, the Project description and the environmental issues identified and assessed in the *Environmental Assessment* (RPS (2012)) are included in **Appendix 1**. Information presented in **Appendix 1** has been used for the development of environmental management procedures presented in Section 2 of the CEMP.

2 ENVIRONMENTAL MANAGEMENT

2.1 VEGETATION CLEARING CONSIDERATIONS ALONG ACCESS TRACKS AND COMPOUND SITES

This plan does not authorise or manage the disturbance of *Persoonia hindii*. Disturbance of *Persoonia hindii* can only be undertaken in full accordance with an approved *Persoonia hindii Management and Research Program*. No disturbance of *Persoonia hindii* can be undertaken in conjunction with construction operations, except under an approved *Persoonia hindii Management and Research Program*. Field training in recognising and avoiding *Persoonia hindii* will be provided to all equipment operators prior to commencing construction activities in any area where *Persoonia hindii* may occur. Appendix 1 contains photos and a description of *Persoonia hindii*.

The following protocols and considerations will be implemented with regard to the clearing of vegetation:

- Pre-clearing survey of individual trees which require removal will be undertaken, and will be directed towards detecting any fauna present. All trees to be felled will be marked.
- Investigation of trees will be conducted on the day that they are to be felled, to detect any individual animals present at the time. Where arboreal species are detected in a tree, that tree and a 10 metre buffer around it, will be left uncleared, and the animal left to vacate the tree of its own accord. Generally, this will occur overnight.
- Inspection of tree-hollows prior to and during clearing will be undertaken to ensure removal and relocation of animals can occur. The following protocols will be adopted:
    - A qualified ecologist will supervise the removal of the hollow-bearing trees to ensure the protection of native fauna;
    - Any identified fauna within the hollows will be managed as described below.
    - A controlled felling technique such as soft-felling will be utilised for hollow-bearing trees requiring felling to minimise potential impacts upon any fauna inside (described below); and
    - Felled habitat trees will be left for two days to allow fauna inside to escape unless the absence of fauna can be confirmed at an earlier time.
- Fauna identified within tree-hollows will be released immediately into adjacent bushland. In the event that an animal is found injured, the local Wildlife Information Rescue and Education Services (WIRES) organisation will be contacted immediately for assistance on phone number 1300 094 737.
- A qualified ecologist will be present to supervise vegetation clearing, including hollow-bearing trees, to ensure only trees marked for clearing are cleared and fauna is handled appropriately.
- The felled hollow-bearing trees will be retained for retained on site to provide fauna habitat and for use in rehabilitation.

- All approved construction corridors and compounds will be clearly demarcated to ensure all works remain within the nominated areas. This will ensure that any areas beyond those approved are not damaged.
- Realignment of the powerline corridor onto Sunnyside Ridge Road will be undertaken, wherever possible, to reduce the impact on surrounding bushland.
- During clearing the removal of vegetation will be limited to above ground parts as much as possible, this will enable any vegetation that is able to re-sprout once works are completed to do so and will also assist with stabilisation of topsoil to minimise erosion/soil loss.
- Cleared vegetation will be windrowed, wherever possible, between the construction site and the surrounding vegetation. This windrowing will act as erosion and siltation control as well as a short-term refuge to any animals fleeing from removed vegetation.
- The removal of topsoil will be kept to a minimum and only occur where necessary. Ensuring topsoil is left undisturbed as much as possible will greatly increase the likelihood of natural regeneration and the speed that it occurs.
- The Hanging Swamp to the west of the Ventilation Facility will be protected by a buffer of at least 50 m within which no works and no disturbance to native vegetation will occur and the boundaries of the buffer zone will be physically marked and monitoring by an Angus Place Environmental Representative or qualified ecologist during construction.
- The two areas of significant ecological value to the north of the Ventilation Facility area (S4) identified in the Flora and Fauna Assessment (RPS (2012a)) will be protected by the establishment of a buffer of at least 50 m within which no works will occur and the boundaries of the buffer zone will be physically marked. Monitoring of this buffer area by a qualified ecologist prior to and during construction will occur.
- Appropriate measures will be employed to ensure that machinery working within the construction area does not bring materials (soils etc.) onto construction sites that may infect onsite vegetation with *Phytophthora cinnamomi* or Myrtle Rust fungus.
- Induction and refresher training regarding the buffer zones will be provided to all personnel engaged at the relevant sites.

- Ongoing weed monitoring will be implemented and potential weed infestations appropriately managed to ensure surrounding communities including the endangered ecological communities the Newnes Plateau Hanging Swamps and Newnes Plateau Shrub Swamps are protected from invasive species.

2.2 POWERLINE TRENCHING ALONG ACCESS TRACKS

A progressive trencher will be used to construct the powerline trench. This method results in soil being placed directly adjacent to the trench. The trenched soil will be stockpiled separately as topsoil and subsoil. The advantage of this process is that disturbance is kept to a minimum.

The mixing of topsoil and subsoil in the trenched material will be avoided. The ecological value of the topsoil and the likelihood of success of natural regeneration of seedbank contained within the removed topsoil will be dependent upon this occurring.

2.3 SEDIMENT AND EROSION CONTROL

Sediment and erosion control measures and management techniques are to occur in accordance with the *Sediment and Erosion Control Plan* (refer **Appendix 2**).

Additional and specific measures to reduce runoff from the Ventilation Facility site (S4) are as follows (GHD (2012)).

- The Ventilation Facility will be graded to enable surface runoff to drain toward the southeast corner so that surface water is directed away from the hanging swamp located to the west of the site. The runoff water will pass into a sedimentation pond to retain sediment loads on site (refer **Figure 1**).
- The Ventilation Facility site will be constructed as a sloping pad through the undertaking of balanced cut to fill earthworks. The works will include the formation of a pad that is graded downward from the north western corner toward the sedimentation pond at the south east corner. This grading will direct surface runoff away from the Wolgan River.
- Surface runoff water from the sedimentation pond in the drilling (blind boring) processes will be reused on site.
- As much surface runoff as practical will be diverted around any uncovered stockpiles of granular materials stored at the Ventilation Facility during the construction period to minimise the potential for erosion and transport of those materials to the sedimentation pond.

- Measures to mitigate runoff volume to the hanging swamp comprising a diversion drain, stabilising disturbed areas and sediment basins will be implemented as indicated below:
    - Providing a diversion drain around the upslope siteof the site compound area to reduce the potential for surface runoff from upslope areas to pass through the site compound. Thus reducing the magnitude of flow that needs consideration within the site compound and also restricting the potential for soil erosion.
    - Stabilising disturbed areas as soon as practical after disturbance using standard design guidelines from Landcom (2004) and DECC (2008) to provide design information on appropriate methods for soil stabilisation within the site.

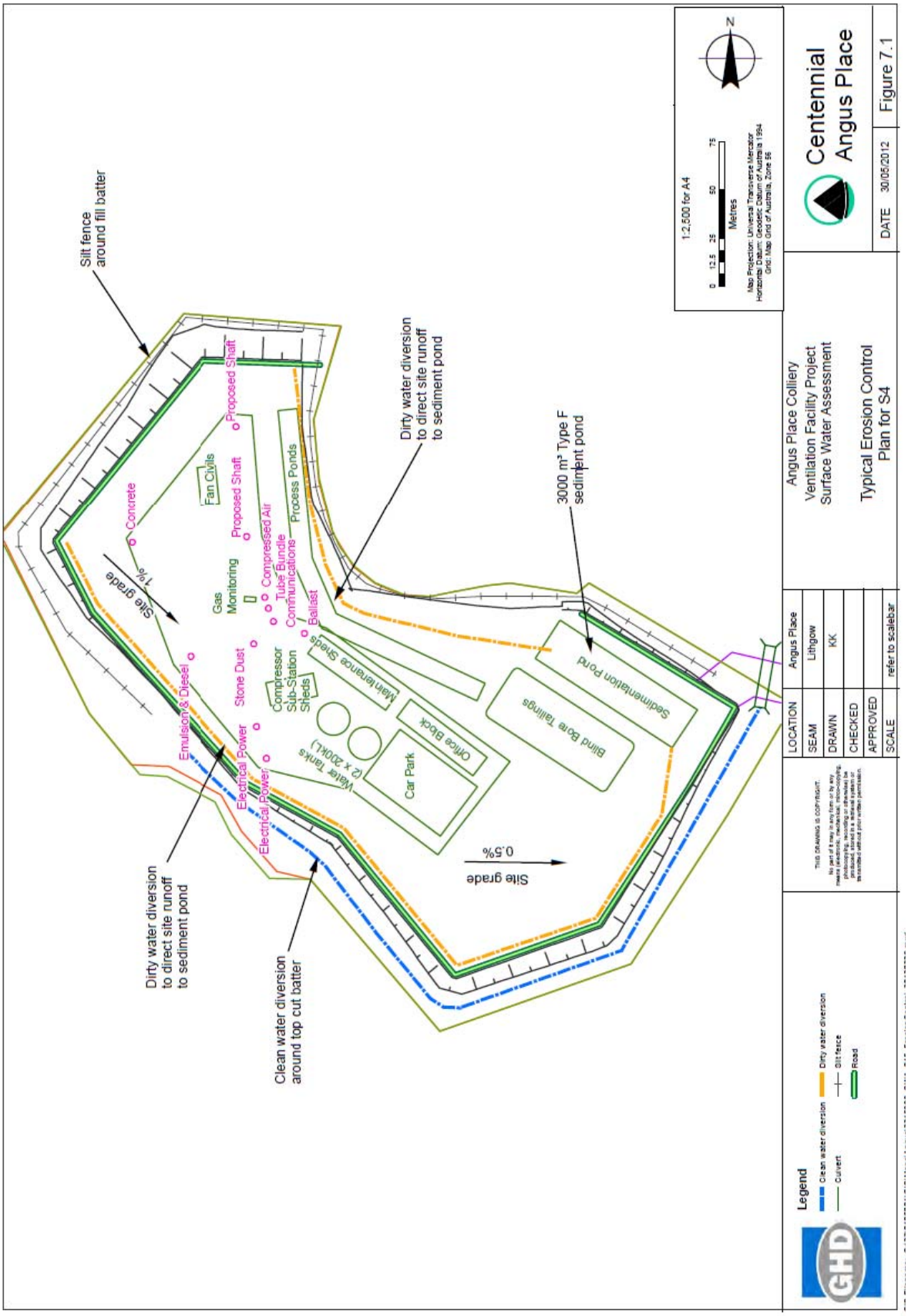

Figure 1: Ventilation Facility Site Erosion Control Plan for Ventilation Facility Site

Installing appropriate construction period erosion control measures, including a downslope sediment basin(s) of appropriate size. The design guidelines from Landcom (2004) and DECC (2008) will be used to source information on construction erosion control plans and for the design appropriately-sized sediment basin. Mitigation measures for other construction areas will be as follows.

- For the substation site, clean surface runoff from the site will be diverted around the site through the use of clean water diversions and level spreaders to prevent flow concentration and erosion.
- The new access tracks to all sites will be designed to minimise the concentration of surface flows.
- The existing surface water monitoring of the Wolgan River catchment will be continued as currently implemented by Angus Place.
- Once construction period controls are implemented to mitigate water quality impacts, the measures will be inspected weekly and especially after daily rainfalls of 25 mm or more over a 24-hour period, and works undertaken to maintain the implemented measures as soon as practical after the need for maintenance is identified.

The following site specific erosion control measures will be implemented on the powerline corridors.

- The backfilled trench will be thoroughly compacted to avoid settlement/subsidence of the fill material and inadvertent channelization of water. The top 150 mm of fill may subsequently be scarified or roughen (if required) to assist topsoil adhesion and vegetation establishment.
- Topsoil and forest litter will be respread over the trench area. Logs and windrowed timber will be randomly scattered over the topsoiled areas. Care will be taken to ensure that any large logs are placed parallel to the contour to avoid the concentration of overland flows.
- As the powerline corridor follows a ridge along its entire length the running surface of the access track will be constructed with a crown so that runoff water sheds to both sides of the track.
- Mitre drains will be constructed periodically along the upgraded access tracks to direct runoff away from the track and will be done so to reduce the likelihood of concentrated water flowing over the rehabilitation.

2.4 TOPSOIL STOCKPILING

Stripping and stockpiling of topsoils followed by re-spreading for revegetation is regarded as best practice rehabilitation in the mining industry. The use of topsoil in this regard has three main advantages: as a source of seeds (seed bank), soil microbial organisms, and as a physical covering for dispersive subsoils. Biologically, the value of stockpiled topsoil is largely determined by the length of time that soil will be stockpiled and the physical shape of the stockpile.

Topsoil will be used as a seed source, however, the extent to which this is undertaken depends on the quality and composition of the vegetation previously established and the target community to be re-established. That is, native vegetation can provide an excellent seed source if that is the revegetation target, whereas exotic pasture species will not aid in the re-establishment of native ecosystems.

The majority of soil micro and macro flora and fauna reside in topsoil. The organisms residing here are instrumental in nutrient cycling, soil structure and plant survival. A key component of the soil microbial community is the *endomycorrhizae*. These are obligate symbiotic fungi (they must infect plant roots to survive) that form associations with the majority of all plant species. They are slow to re-colonise a disturbed area taking tens of decades to disperse, and are severely disrupted by stripping and stockpiling; their spores degrade within six months of stockpiling. Stockpiling of topsoil needs to be considered in light of two conflicting requirements, minimisation of impact footprint and preservation of biological aspects of topsoil. **Table 2** provides requirements for topsoil stockpiling.

Stockpiles will be constructed during the land preparation stage to minimise surface area to volume ratios. That is, they will be constructed as high and as steep as possible. This reduces the total disturbance footprint and restricts the surface area for weeds to become established. However, stockpiles can become anaerobic within six months, leading to death of beneficial microbes and the degradation of seeds and spores, therefore the anticipated duration the soil will be stockpiled will determine how it will need to be treated before it can be used for rehabilitation purposes.

To maximise the preservation of the biological aspects of topsoil, however, stockpiles will be constructed as low and spread out as much as possible, preferably <2 m in height. This does increase the footprint and provides greater surface area for weed colonisation. Seeding with target vegetation species as soon as possible on the stockpile itself will reduce weed infestation and erosion. The roots will assist in maintaining a viable microbial community and the plants will provide organic matter after re-spreading. Depending on the length of time stockpiling occurs, some species may even set seed

thereby replacing the original seed bank which can deteriorate and become unviable over time. Stockpiled topsoils are to be treated for any noxious weed infestations prior to being respread over the site.

Excavated topsoil and subsoil will be stockpiled away from drainage lines, with installation of sediment control fencing where deemed appropriate. Soils excavated from the trenches will be stockpiled in the vicinity of the trenches (refer Section 2.2) and those from the boreholes within the Ventilation Facility site (refer **Figure 1**) will be stockpiled temporarily in the vicinity of the boreholes, for subsequent use in rehabilitation.

Table 2: Topsoil stockpile requirements

Soil Type	Time Since Stripping	Action
Topsoil	Duration <6 months	Normal erosion controls Shape to reduce disturbance of surrounding area
	Duration >6 months	Normal erosion controls Shape to reduce biological impact of stockpiling
Subsoil	Duration not as critical	Normal erosion controls Seed with native grass species to reduce weed infestations Replace in reverse order of removal

2.5 PROGRESSIVE SITE REHABILITATION

The full rehabilitation of all Project sites, following the decommissioning of the infrastructure, will be undertaken in accordance with the *Ventilation Facility Project Rehabilitation Management Plan* to be prepared for the Project, as required under Schedule 3 Condition 39 of Project Approval 06_0021 Mod 2. That Plan, to be prepared in consultation with the Department of Planning and Infrastructure, the Office of Environment and Heritage (OEH), and Forests NSW, will be submitted to the Executive Director Mineral Resources (Division of Resources and Energy, NSW Trade and Investment) for approval prior to 1 August 2013.

Following the construction phase, partial rehabilitation would be undertaken for construction areas as discussed below.

2.5.1 Compound Site Rehabilitation

Site Preparation

Site preparation will include dozer trimming of the area to facilitate appropriate drainage of surface runoff. Rehabilitation will be undertaken to ensure the final landform is

commensurate with the surrounding topography and will be free-draining. Topsoil will be respread across the site and contour ripped to ameliorate the effects of compaction from heavy machinery. Ripping will not occur too deeply below the depth of the re-spread topsoil (<200 mm). Mixing and de-compaction of underlying subsoils can increase erodability.

Brush matting will be utilised to spread the harvested stems, seed pods and seeds en-masse over the targeted area. This method requires the source site to be in reasonable proximity and the harvested plant material must have seeds at the correct phase of development to be viable.

Habitat re-instatement for the return of fauna will include the following where possible:

- Hollow bearing trees that were removed will be replaced, or equivalent nesting structures, such as nest boxes will be erected. Hollow bearing trees will also be retained and used as ground habitat.
- Woody debris will be reinstated randomly over the sites being rehabilitated. This will be sourced from material stockpiled from clearing or imported from other sources or sites if not available.
- Woody material not used for habitat re-instatement will, if possible, be chipped, and placed on the ground after seeding to decompose and add to the organic content as well as aid in erosion control.
- Rocks that were removed prior to construction will be replaced in approximate size and location. These will form an important habitat feature for many of reptiles that inhabit these sites. Any large rocky material that was brought onto the construction site will be used for this purpose within the site, given that it does not interfere with revegetation/rehabilitation outcomes, rather than removed from the site.

Revegetation

Revegetation of the compound sites requires consideration of a range of factors which can influence the establishment success of the target vegetation. Revegetation generally requires site preparation and direct seeding, and may also involve other methodologies such as brush matting, and planting with tubestock. All seed and tubestock that will be utilised for revegetation at the compound sites will be of a local provenance and sourced locally to ensure they are acclimatised to the climatic conditions that occur at the sites.

Site preparation will involve the following steps.

- Assess the site and identify potential weeds, erosion issues and other important site specific information. Identify potential resources that can be used for the rehabilitation process (i.e. native vegetation and topsoil availability).
- Treat weeds with herbicide and remove these if viable seed is present.
- Identify the dominant target species from site surveys and further species known to occur within the locality. These data will be collated and used to create a site specific table from which groundcover and shrub species (if present) can be selected.
- Reshape and spread topsoil across the re-profiled sites.
- Contour-rip the topsoil to ameliorate the effects of compaction from heavy machinery. Ripping will not occur below the depth of the re-spread topsoil given mixing and de-compaction of underlying dispersive subsoils can increase dispersion.
- Plant the prepared surface with the tubestock and seed bank.

Weed Treatment

Any listed noxious weeds infestations identified will be treated. This will include any that are deemed to be deleterious to the revegetation effort, or are likely to spread during the course of the rehabilitation work. Herbicides should be used with due consideration to environmental knock-on effects. Any weeds that germinate from the seed bank in the topsoil stockpile will also be treated to prevent outbreaks that pose an ongoing liability.

Rehabilitation Success Criteria

The success criteria for the rehabilitation areas are documented in the *Ventilation Facilities Rehabilitation Management Plan* required under Schedule 3, Condition 39 of Project Approval 06_0021. The success criteria are performance objectives or standards against which rehabilitation success in achieving a sustainable system for the proposed post-mine land use is demonstrated. Satisfaction and maintenance of the success criteria (as indicated by monitoring results) will demonstrate that the rehabilitated landscape is ready to be relinquished from the mine's financial assurance and could be handed back to stakeholders in a productive and sustainable condition.

2.5.2 Infrastructure Corridor and Access Track Rehabilitation

The installation of the powerline infrastructure (corridor (ESAs 1 – 4, refer **Figure A1.2** in **Appendix 1**) along the Sunnyside Ridge Road will result in the removal of vegetation

along a total 4.4 km corridor. The additional access track (ESA 5, refer **Figure A1.2** in **Appendix 1**) will result in the removal of vegetation along a 369 m corridor from Sunnyside Ridge Road to the Ventilation Facility site (S4, **Figure 1**).

The powerline corridors along Sunnyside Ridge Road and the access track to S4 site are both narrow and linear with minimal disturbance proposed to occur during clearing and trenching. The corridors will be progressively rehabilitated and it is anticipated that backfilling and reinstatement of these service corridors will be completed within a three week period from opening the trench.

Being a narrow linear feature the distance for propagules to disperse and recolonise the within the corridors from surrounding vegetation will be minimal. In addition, as the vegetation and topsoil will only be stockpiled for a short period of time, seeds and the soil flora and fauna are unlikely to have degraded to a significant degree during that time. With the implementation of mitigation measures discussed in Section 6.5.1, where practical, during clearing and trenching a minimal amount of active rehabilitation will be required along the infrastructure corridors.

The access track to the Ventilation Facility will be a semi-permanent feature in the landscape until the Ventilation Facility is no longer required. This access track (along with the compound sites) will be fully rehabilitated to an end land use of open forest.

2.5.3 Indicators of Successful Revegetation

Completion criteria will be dependent upon monitoring demonstrating that rehabilitation trajectories are trending towards baseline values. This will be established by increasing vegetation coverage, ongoing survival of planted species and sustainability by successful completion of life cycles by plant species that can be expected to produce seedlings within the monitoring timescale.

2.5.1 Monitoring

Initially, monthly visual inspections of the Ventilation Facility and supporting infrastructure sites will be undertaken immediately following rehabilitation. Visual monitoring will allow for any problems with the rehabilitation that may occur to be rectified as quickly as possible.

Once the rehabilitation can confidently be considered to be progressing and stable then an annual monitoring program will be commenced. This will be undertaken to determine whether or not vegetation is approaching the form and composition of what previously occurred at the site and/or the immediate surrounding areas.

The following specific monitoring will be undertaken.

- Initial visual monitoring will include ensuring that erosion and sediment controls are functioning effectively as per the *Erosion and Sediment Control Plan* (**Appendix 2**). The goals for erosion and sediment control are that no excessive erosion and sediment deposition is occurring and that any control measures are implemented as soon as required. Photographic records will be sufficient and will be taken from a fixed monitoring point on every inspection or when any change or impact has occurred.
- Visual inspections will also monitor for the emergence of seedlings and re-sprouting of vegetation and that once this has occurred that vegetation cover is stable, final monitoring will demonstrate improved coverage and species composition approaching that of pre-disturbance levels.
- Evidence of sustainability will be provided by recording the production of seeds and recruitment of seedlings leading to increasing coverage, especially of fast life cycle grasses and shrubs.
- Evidence of nutrient cycling (especially of nitrogen) by leguminous species will be determined by the presence of root nodules on appropriate species. Hand excavation of roots and photographs should be included in any reports. Decomposer fungal colonisation of woody material also indicates the establishment of important nutrient cycling processes, but may only be visible on older woody debris or during rainy season.
- Returning the site to the equivalent of native remnant vegetation requires the measurement of survival of planted species and increased growth. Some shrub species will have flowered and may have seed set within a 3 year monitoring period. Evidence of such indicates improving rehabilitation trajectory. Recruitment of seedlings from seed bank or from sources outside the disturbance area will also be recorded and indicates sustainable rehabilitation.
- A targeted area in close proximity to the Ventilation Facility site and located within an undisturbed section of an equivalent rehabilitation target vegetation type will be used as a reference site in the monitoring program. The structure, composition, condition of the vegetation, and rates of erosion within the reference site will be those that the rehabilitation will be assessed against.

2.6 NOISE EMISSIONS

2.6.1 Compound Sites

The following mitigation measures will be implemented to manage the minimal potential noise impacts identified in RPS (2012) and described in Section 11.2 (**Appendix 1**):

- 'Quiet work' practices will be observed at all times:
    - Workers at the site will undergo induction training and regular refresher training (i.e. toolbox talks) to use equipment in ways that minimise noise.
    - Mobile plant will be operated in a quiet, efficient manner.
    - Plant and equipment will be well maintained including:
        - Regular inspections and maintenance of equipment to ensure it is in good working order.
        - Equipment will not be operated until it is maintained or repaired.
    - For equipment with enclosures it will be ensured that doors and seals are well maintained and kept closed when not in use.
- Noise monitoring on site and within the community will be continued in accordance with the Angus Place Noise Monitoring Program.
- Onsite noise mitigation measures and plant operating procedures will be refined when appropriate.
- Clear signage at the site including relevant contact numbers for community enquiries will be provided.
- Community issues of concern will be addressed promptly in accordance with Section 4.4.

2.6.2 Corridors and Access Track

- Clear hazard warning signage along Sunnyside Ridge Road will be present whilst trenching of the powerline is being undertaken. Any access restriction issues will be adaptively managed in consultation with Forests NSW.
- Signage will provide clear contact information should members of the community wish to contact Angus Place.
- Excavation equipment and cable laying equipment will be maintained to ensure the equipment is in good working order.

- Noise monitoring regarding the Sunnyside Ridge Road construction activities will occur in accordance with the Angus Place Noise Monitoring Program.

2.6.3 Traffic Noise and Vibration Issues

- Only light vehicles are to access the Newnes State Forest and construction sites via State Mine Gully Road.
- All other vehicles required for the construction phase are to access the Newnes State Forest and construction sites via the Old Bells Line of Road.

2.7 VISUAL AMENITY

2.7.1 Residential Receptors

Any issues of concern from the residential receptors and local community will be managed through consultation and appropriate action. Angus Place advertises its community contact and enquiries line (02 6354 8700) through its website to enable the community to contact Angus Place regarding any matters of concern, including visual amenity impacts.

Angus Place engages with its Community Consultative Committee regarding any matter of concern to the local community.

2.7.2 Recreational Receptors

Mitigation measures to minimise impacts on the visual amenity in the vicinity of the construction works are as follows.

- Where feasible, buildings and structures will be coloured to blend into the surroundings.
- The height of all buildings will be kept to a minimum.
- The drill rig and other equipment will be removed from the construction site soon after completion of construction activities.
- Cleared areas that are no longer required will be revegetated with suitable native vegetation in accordance with the rehabilitation strategy (refer Section 2.5).
- Areas no longer required for the Project will be rehabilitated soon after decommissioning of infrastructure. Endemic native species will be used in the revegetation activities.
- Night lighting during construction will be restricted to the minimum required for

operational and safety requirements and directed away from sensitive receptors where practicable.

2.8 ABORIGINAL CULTURAL HERITAGE

No Aboriginal sites were identified within the Project Application Area and therefore there are not anticipated to be any impacts. Standard measures noted below will be applied in the event that any new (i.e. currently unknown) sites are identified or suspected at any stage of the proposed works. These measures are consistent with the OEH protocols.

- All relevant Angus Place and contractor staff will be made aware of their statutory obligations for heritage under NSW *National Park and Wildlife Act 1974* and the NSW *Heritage Act 1977*. This will occur through the induction training.
- If during the proposed works any Aboriginal sites are identified in the construction area, then all works in the area will cease, the area cordoned off and contact made with OEH Enviroline 131 555, a suitably qualified archaeologist and the relevant Aboriginal stakeholders, so that it can be adequately assessed and managed.
- In the unlikely event that skeletal remains are identified:
    - Work will cease immediately in the vicinity of the remains and the area will be cordoned off.
    - Angus Place will contact the local NSW Police.
    - Police will make an initial assessment of the remains are part of a crime scene or possible Aboriginal remains.
    - If remains are thought to be Aboriginal the local police will contact the OEH to determine if remains are Aboriginal or not.
    - An OEH Officer will determine if the remains are Aboriginal or not.
- If, during the course of development works, significant European cultural heritage material is uncovered, work will cease in that area immediately. The OEH Enviroline 131 555 will be contacted and works only recommence when an appropriate and approved management strategy has been instigated.

2.9 AIR QUALITY

- Measures such as dust suppression and limiting plant use for only when required will be implemented across the compound construction sites and access tracks. Monitoring will be continued, including on Sunnyside Ridge Road under the

existing Angus Place Air Quality Monitoring Program.

- Dust suppression using water carts during construction at the compound sites and access tracks/infrastructure corridors will occur on an as-needs basis. Visible dust will be assessed during the weekly inspections, and will be managed with water sprays if required.
- Vehicle speed limit restriction of 40 km/hr on all unsealed areas and access tracks will be observed to minimise fugitive dust generation.
- Any physical construction activities such as vegetation clearance, topsoils/subsoil stripping or powerline trenching will cease during periods of high winds and high temperatures.
- Topsoils and subsoils stockpiled in windrows will be replaced as soon as practicable; the time the trench is open will be limited to minimise the potential for soil erosion.
- Where the trench is required to be open for longer periods, suitable physical protection of windrows (sedimentation barriers or Hessian cover) will be afforded to limit the potential for dust generation caused by high winds.
- OEH's Dust Stop program aims to ensure that the most reasonable and practical particulate control options are implemented by each coal mine. The Dust Stop program is being implemented through pollution reduction programs (PRPs) as operating conditions under the EPL. A PRP was issued to Angus Place Colliery in December 2011 requiring that a Site Specific Particulate Matter Control Best Practice Assessment be prepared for the site This assessment will be reviewed in light of recommendations from the Project, and if required, the Angus Place Air Quality Monitoring Program will be updated. To ensure that emissions from the diesel generator are mitigated on the occasions when it is needed, it will be maintained in accordance with the manufacturer's maintenance requirements.
- For mitigation of odour in the vicinity of the Ventilation Facility the existing forest provides a vegetative buffer. Such a buffer will be maintained during the construction of the Ventilation Facility.
- Signage erected in the vicinity of the construction sites will provide clear contact information should members of the community wish to contact Angus Place for any air quality issues.
- Excavation equipment and cable laying equipment will be maintained to ensure

the equipment is in good working order.

- Only light vehicles are to access the Newnes State Forest and construction sites via State Mine Gully Road.
- All other vehicles required for the construction phase are to access the Newnes State Forest and construction sites via the Old Bells Line of Road.

2.10 TRAFFIC MANAGEMENT

Whilst the road network for the Project is considered appropriate and safe for the vehicle movements associated with the construction activities the following measures are proposed to improve road safety during construction:

- Angus Place, in consultation with the Forestry Corporation of NSW (NSW Forests) and Lithgow City Council, will prepare and implement a Construction Traffic Management Plan in accordance with the Traffic Impact Assessment for the Project and Statement of Commitment number 23 included in Appendix 6 of PA 06_0021 Mod 2. The Construction Traffic Management Plan will be discussed with Lithgow City Council and NSW Forests during week commencing 10 June 2013.
- All heavy vehicle construction traffic (GVM >5 tonnes) will be managed in accordance with the Construction Traffic Management Plan.
- Only light vehicles are to access the Newnes State Forest and construction sites via State Mine Gully Road.
- All other vehicles required for the construction phase are to access the Newnes State Forest and construction sites via the Old Bells Line of Road.
- All traffic will adhere to the sign-posted speed limits on the proposed road network and the access roads to construction sites.
- All drivers accessing the Project sites on Newnes Plateau will be briefed with regards to the Construction Environmental Management Plan and the Construction Traffic Management Plan.
- The Ventilation Facility Project Manager will monitor driver behaviour to ensure the controls and road rules are adhered to.
- Any changes associated with the Project regarding the condition of the unsealed road network within the Newnes State Forest will be managed in conjunction with NSW Forests and in accordance with *Forest Practices Code: Part 4 Forest Roads*

and Fire Trails.

- General maintenance procedures for the access routes between the sub-regional network and the construction sites will be undertaken during the construction and operation stages of the Project in accordance with the Traffic Impact Assessment for the Project (ARC (2012)).
- At all times the Roads and Traffic Authority's (RTA) *Traffic Control at Work Sites* guidelines must be adhered to with regards to the measures detailed above.
- Delivery loads will be scheduled so as not to result in multiple delivery vehicles reporting to the construction sites.
- Recreational and other user vehicles movements within the Newnes State Forest are catered for within the existing road network carriageway. There will be no restrictions to other users of the Newnes State Forest road network.
- Safety to other road users will be managed by the use of hazard warning signs and traffic management personnel where required.
    - Hazard warning signs will be deployed at appropriate locations between 10 July 2013 and 30 June 2016.
    - Wording will state: *This track will be used by substantial numbers of heavy vehicles and other construction traffic from 10 July 2013 to 30 June 2016*. *Higher than usual levels of traffic can be expected and all road users should take care.*
    - The location of the signs will vary depending on the stage of construction. A permanent sign will be installed at the intersection of Sunnyside Ridge Road and the Ventilation Facility Access Track.
    - The signs will also notify other road users of any temporary alternative arrangements in place.
    - The Project Manager will be responsible for ensuring that appropriate signage is deployed.
- All personnel parking associated with construction will occur within the approved boundaries of the construction sites.
- All delivery vehicle loading/unloading will be completed within the approved boundaries of the construction sites.
- No construction vehicles will be permitted to stand on the external public road

network.

2.11 PUBLIC SAFETY

Public safety mitigation measures that will be undertaken for the construction phase are as follows:

- Prior to the commencement of construction works at the compound sites, man-proof fencing of 2 m height and signage will be installed. **Figure 2** illustrates the proposed fencing for the Ventilation Facility site.

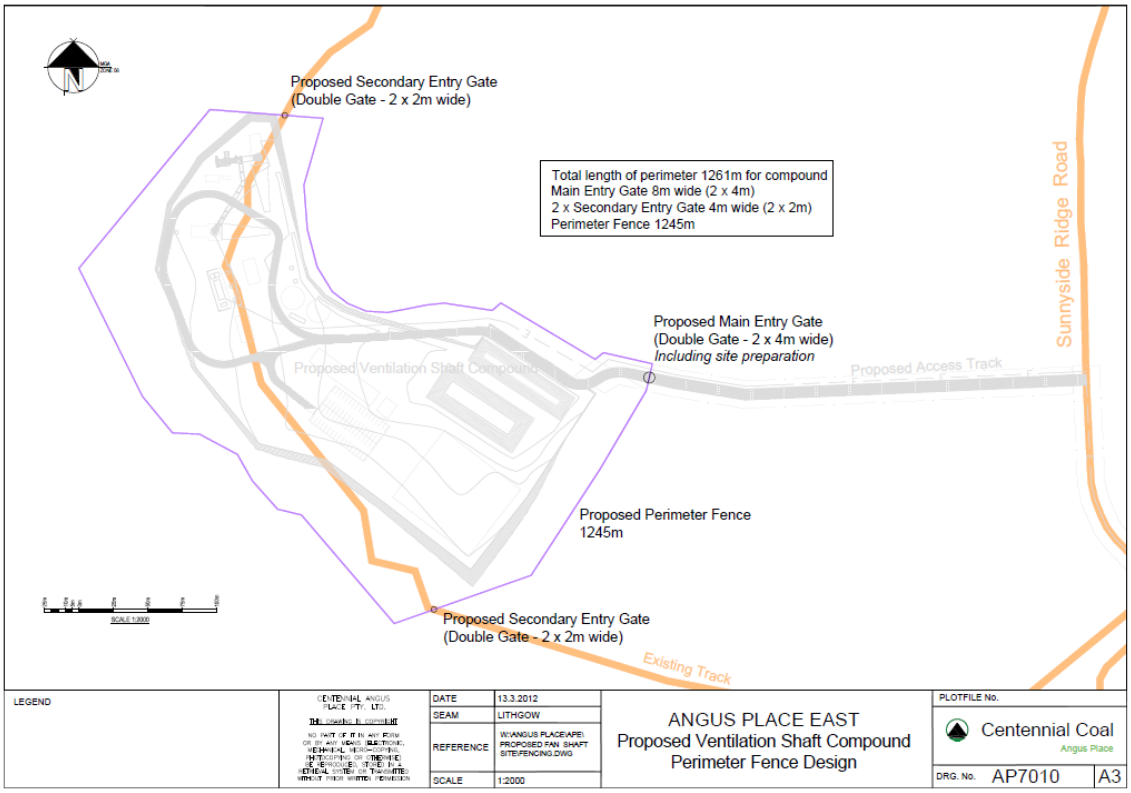

Figure 2: Ventilation Facility Site Perimeter Fence Design

- During construction signage will be installed to warn the public of the risks associated with unauthorised access, contact with high voltage powerlines and construction vehicle traffic.
- Prior to construction, existing relevant plans will be checked and 'Dial Before You Dig' searches will be undertaken to avoid interception with utilities, including underground pipes and cables.
- Plant will be appropriately maintained.
- Storage, handling and transportation of materials will be in accordance with

relevant Australian Standards and legislation.

- To protect sites against unauthorised access during construction and operation, there will be regular site based inspections and contractor inspections.

2.12 BUSHFIRE MANAGEMENT

The risk created through activities such as the use of earth moving machinery, welding and drilling equipment will be assessed, monitored and addressed through the implementation of protocols which mitigate the chance of ignition caused by sparks or other ignitions sources (molten metal). If this risk prevails on Total Fire Ban Days all works will be suspended until cessation of the ban.

2.12.1 Ventilation Facility Site (S4 area)

- Operational procedures and evacuation planning will be prepared prior to the commencement of construction in order to address emergency access/egress.
- Angus Place will give contractors toolbox talks on the operational procedures and evacuation planning prior to commencement of construction activities.
- The site will not be manned during Total Fire Ban days and catastrophic fire weather days.
- All 'hot work' within the site will be assessed and monitored to determine the risk of ignition of surrounding unmanaged vegetation.
- In order to reduce the risk of flame contact on the structures i.e. office block, maintenance sheds and compressors, the minimum setback to unmanaged vegetation from these structures will be maintained at >40 m.
- In order to minimise the ignition of the structures by burning embers the structures will be constructed to Bushfire Attack Level (BAL) 40 in accordance with A.S. 3959 – 2009.
- The whole of the site will be managed as an Inner Protection Area) as defined by *Specifications for Asset Protection Zones* (NSW Rural Fire Service).
- A 'back-to-base' radio network will be installed in the Office Building within the S4 area, complete with either back-up power or solar power supply.
- All vehicles will be equipped with a two-way, back to base radio system.
- At least one building within the site will be constructed and equipped as a safe refuge, capable of protecting occupants against ember and smoke impact.

2.12.2 Substation Site (ESA 7 & 8)

- Operational procedures and evacuation planning will be prepared prior to the commencement of construction n order to address emergency access/egress.
- Angus Place will give contractors toolbox talks on the operational procedures and evacuation planning prior to commencement of construction activities.
- The substation equipment will be located within the north-eastern corner of the site, adjacent to Sunnyside Ridge Road as identified in the Bushfire Risk Assessment for the Project.
- The minimum separation between the equipment and the bushfire prone vegetation to the west of the perimeter track will be 50 m and 25 m to the north. A separation of 25 m will be to the east with the compound located in the north-eastern corner of the former plantation site as identified in the Bushfire Risk Assessment (ABPP (2012)).
- The *Pinus Radiata* will be removed and the area of the former plantation will be managed as an Asset Protection Zone.
- The equipment yard will be maintained free of vegetation and combustible materials.
- All 'hot work' within the site will be assessed and monitored to determine the risk of ignition of surrounding unmanaged vegetation.

2.12.3 Switchyard (ESA 6)

- A 50 m wide Asset Protection Zone will be provided to the south-western, western and north-western aspects of the switching equipment and a 25 m wide Asset Protection Zone provided to the remaining aspects.
- Operational procedures and evacuation planning will be prepared prior to the commencement of construction in order to address emergency access/egress.
- Angus Place will give contractors toolbox talks on the operational procedures and evacuation planning prior to commencement of construction activities.

2.12.4 Access Track (ESA 5)

- The minimum width of the proposed access road to the Ventilation Facility will be 4 m, within a cleared corridor of 6 m. The road formation will be all weather and have a carrying capacity of 28 tonnes GVM. Passing bays will be provided at

200 m intervals.

2.12.5 Powerline – Aerial Connection

- Bundled or insulated cable will be used.
- Quarterly inspections of the line/poles will also be undertaken by a qualified power line technician and the base of the poles shall be kept clear of tall vegetation.
- Clearance to the aerial connection to the underground cables will be undertaken and maintained in accordance with the electricity supply company's best practice standards. Trees located on the western side of the overhead line connection will be assessed and removed if the 'drop-zone' of the tree impacts the overhead line.

2.12.6 Water Supplies for Fire-fighting Operations

- The onsite water storage tanks will be equipped with 65 mm outlet to enable fire service tanker replenishment. The outlet/s will be fitted with a 65 mm Ball Valve and Stortz Coupling (a type of hose connection).
- A fire-fighting water supply will be installed within the Ventilation Facility site (S4), including a diesel powered pump-set supplying hydrants and hose reels to the buildings supplied from the water storage tanks. The pump-set will be remote start from the office and maintenance shed with back-up power provided to the pump from batteries charged by solar panels.
- Hose Reels will be strategically located in order to provide a wet-down of the buildings and the hydrants will be located on the periphery of the compound with two-way Millcock Valves (fire hydrant valve) complete with ball valves and Stortz Couplings.
- Lay-flat canvas hose, nozzles and spanners will be stored on the maintenance shed in sufficient quantities to enable at least 2 x 30 m hose line lengths to be used on three hydrant points at any one time.

2.12.7 Emergency Management Protocols/Training

- Protocols will be established prior to the commencement of construction in the form of operational policies for the safe occupation of the Ventilation Facility and access/egress during potential bushfire emergencies.
- These protocols will include training in emergency management/evacuation,

bushfire fighting, the use of structural and bushfire fighting equipment and clear guidelines on (emergency) attendance at the Ventilation Facility site during bushfire danger days (high to catastrophic).

- Management of Asset Protection Zones (Defendable Spaces) within the Ventilation Facility, the substation and switchyard compounds will comply with the following:
    - Maintain a clear area of low cut lawn, pavement or gravel adjacent to the asset;
    - Keep areas under shrubs and trees raked and clear of combustible fuels;
    - Trees and shrubs should be maintained in such a manner that tree canopies are separated by 2 m; and
    - Understorey vegetation is not continuous (retained as clumps).
- The maintenance of the vegetation within the Ventilation Facility, substation and switchyard compounds will be monitored to determine the risk posed by machinery undertaking this work. Operators must be trained in bushfire fighting and have appropriate 'first response' fire-fighting capabilities (knapsacks / fire extinguishers).

2.13 WASTE AND HAZARDOUS MATERIALS

Specific construction waste streams anticipated to be generated by the Project during construction are identified in **Table A1.6** (refer **Appendix 1**). Management measures that will be implemented are as follows.

- A dedicated tailings emplacement area will be provided within the Ventilation Facility site as shown in **Figure 1.** Rehabilitation of the tailings emplacement area will occur in accordance with DRE (2012).
- The tailings will be tested for contaminants as specified in NEPC (1999). If contaminated, the tailings will be removed from the site for treatment and disposal by a licensed waste contractor. If the tailings are not considered to be contaminated they will be used to rehabilitate the site.
- Angus Place will aim to balance areas of cut and fill. In the event of any surplus spoil this will be taken to the proposed tailings dam.
- Where possible, all quantities of waste or recyclable material will be quantified and recorded for benchmarking and continuous improvement purposes.

- Excess process water will be removed off site by a licensed waste contractor.
- Dirty water will be managed through water management controls in accordance with the existing *Angus Place Colliery Site Water Management Plan*. The proposed surface water management system will rely on separation of clean and dirty water and treatment of dirty water before discharge.
- There will be preventative measures to ensure controlled use of drilling fluids during construction, as follows:
    - Biodegradable drilling fluids will be used;
    - Minimal quantities of drilling fluids will be used;
    - Drilling fluids will be recycled as much as possible, and will be stored within temporary and lined process ponds in the vicinity of the borehole area.
- All chemicals including hydrocarbons, oils, drilling muds etc. will be stored within self-bunded storage pallets.
- Disposal of all chemicals will follow the appropriate guidelines for the disposal of such wastes.
- Toilet facilities will be provided and maintained by an appropriate/accredited service provider.

3 RESPONSIBILITIES AND ACCOUNTABILITIES

3.1 VENTILATION FACILITY PROJECT MANAGER

The Ventilation Facility Project Manager is responsible for overseeing the implementation of this CEMP, consulting with the relevant government and public stakeholders as required and providing the relevant information to stakeholders as necessary.

During construction, the Ventilation Facility Project Manager will be responsible for:

- the overall implementation of this CEMP
- maintaining accountability for the management of the construction sites and all Angus Place employees and contractors entering the sites for the purposes of construction
- the conveyance of the CEMP and it objectives to all contractors entering the construction sites

- maintaining accountability for the implementation, maintenance and monitoring of compliance with the CEMP
- advising project management on potential environmental issues
- maintenance of the complaints register, investigating complaints, and taking appropriate action to alleviate the impact of any complaints
- ensuring the Mine Manager is informed of all incidents and non-compliance and the corrective actions taken to mitigate any such incidents
- ensuring appropriately located caution signs are deployed around the Newnes State Forest road network.

3.2 ANGUS PLACE COLLIERY MINE MANAGER

The Angus Place Colliery Mine Manager will be responsible for:

- providing adequate resources to implement this CEMP
- the maintenance of resources to achieve the main objectives of the CEMP
- the ultimate responsibility and accountability for the environmental performance of the Project consistent with the existing Angus Place policies on health, safety, environment and community.

3.3 ENVIRONMENTAL OFFICER

The Environmental Officer will be responsible for:

- assisting the project manager with the overall implementation of this CEMP
- providing advice on environmental pollution issues
- investigating environmental incidents, exceedances, complaints and/or enquiries
- coordinating the required monitoring activities and undertaking additional monitoring as required
- coordinating training to employees and contractors regarding the requirements of this CEMP
- assist the project manager to undertake inspections on a regular basis to monitor the environmental performance of the construction phase
- coordinating all reporting (both internally and externally) in relation to this CEMP.

3.4 SITE CONSTRUCTION WORKERS AND EMPLOYEES

- All construction workers and Angus Place employees will be required to undertake training in the content of the CEMP during a site induction program.
- During construction all contractors and employees will be responsible for carrying out actions as directed to ensure compliance with this CEMP.

4 REPORTING AND COMPLAINTS

4.1 ANNUAL REVIEW

All internal and external reporting will be undertaken in accordance with the *Angus Place Colliery Environmental Management Strategy*, which includes reporting within the Annual Review (Schedule 5, Condition 3 of Project Approval PA 06_0021 Mod 2).

A summary of the environmental performance of the Ventilation Facility construction phase will be provided in the Annual Review each year that construction is occurring. The results of any monitoring undertaken for this CEMP will be compared against the impact assessment criteria in the *Ventilation Facility Project Environmental Assessment* (RPS 2012) and limits contained in the Project Approval PA 06_0021 Mod 2 to assess the effectiveness of the environmental management proposed in this CEMP.

4.2 EXCEEDANCE CRITERIA / ENVIRONMENTAL INCIDENT MANAGEMENT

The Environmental Protection Authority (EPA) will be notified of environmental incidents in accordance with the requirements of the Angus Place Colliery Environment Protection Licence 467. This requires Angus Place to contact the EPA's Pollution Line on 131 555 of any incidents causing or threatening material harm to the environment. The *Angus Place Colliery Environmental Management Strategy* will be consulted for any additional notification requirements such as internal incident reporting procedures and minor environmental impacts that are not threatening to cause material harm to the environment.

4.3 REPORTING TO THE COMMUNITY CONSULTATIVE COMMITTEE

A summary of environmental performance from all construction activities will be presented at the Community Consultative Committee meetings.

4.4 COMMUNITY INFORMATION AND NOTIFICATION STRATEGY

Angus Place has formulated a community information and notification strategy that will assist with the conveyance of Project-related information, encourage discussions and

dialogue with the community and provide a clear complaints management procedure for the duration of the construction period. Information on the current construction activities will be made available on Centennial Coal's website. This website will contain project-specific information including:

- all appropriate applications and approval documents
- contact names and telephone numbers of key project staff
- information on how to make a complaint including telephone, email and postal addresses
- planned work schedules.

4.5 COMPLAINTS

The Angus Place Colliery Community Complaints and Enquiries line (02 6354 8700) will be provided at Centennial Coal's website and will also displayed on a sign at the entrance to the Ventilation Facility access road and is available on the Centennial Coal website.

All complaints will be maintained in a register and reported internally to senior management and the Ventilation Facility Project Manager for appropriate action. Any complaints will be reported externally in the Annual Review.

5 CONTINGENCY PLANNING

- The *Ventilation Facility Project Environmental Assessment* (RPS 2012) provides a risk based analysis of environmental impacts resulting from the construction phase. Given the location of the site and potential external influences such as bushfire, climatic and emergency events it is possible that unpredicted events may occur.
- The Project Manager and Environmental Officer will be contacted in the event of unpredicted environmental impacts being identified to provide guidance on an appropriate course of action, including assessing whether the Angus Place Colliery incident procedure should be implemented.
- Impacts that have not been predicted will necessarily be dealt with on a case by case basis. After appropriate action has been implemented, the need for review of the CEMP, based on the unpredicted impact, will be assessed by the Project Manager.

6 INSPECTIONS, ACTIONS AND REVIEW

6.1 DAILY REVIEWS

The Project Manager will undertake daily reviews of the work site and will schedule any routine maintenance and/or augmentation of management practices or control measures.

6.2 WEEKLY INSPECTIONS AND SITE MEETINGS

The Project Manager will undertake formal weekly inspections of the construction sites and will also attend weekly Project meetings where specific environmental issues will be raised and/or discussed. If required, actions will then be assigned to the most appropriate responsible person.

The Project Manager will also schedule additional site inspections following periods of heavy and/or prolonged rainfall (i.e. >25 mm in 24 hours).

6.3 MONTHLY REVIEW OF THIS PLAN

The Project Manager will review the adequacy of this plan on a monthly basis. If required, the proposed management strategies and control measures will be modified to address evolving site conditions, latent conditions and/or changes to the proposed construction sequence.

Any changes to the Plan will then be communicated to the relevant site personnel via daily “toolbox talk” training and weekly project meetings.

6.4 NON-CONFORMANCE AND CORRECTIVE AND PREVENTATIVE ACTION

Angus Place will document in a report any case of non-conformance with the CEMP. The Project Manager will investigate any such non-conformance by a contractor and/or subcontractor with the relevant contractor / subcontractor on a case by case basis.

6.5 REVIEW OF THE CEMP

The Project Manager is the only person authorised to amend the CEMP for re-issue. The CEMP is a controlled document and will be reviewed on an as needs basis. If the CEMP is updated, Angus Place will issue an updated copy of the plan to all applicable stakeholders. Approval will be sought from the Department of Planning and Infrastructure on the amended CEMP.

7 REFERENCES

ABPP (2012), Angus Place Colliery Ventilation Facility Project, Bushfire Risk Assessment, Australian Bushfire Protection Planners, October 2012.

ARC (2012), Angus Place Colliery Ventilation Facility Project, Traffic Impact Assessment, Anton Reisch Consulting, October 2012.

DRE (2012), Guidelines to the Mining, Rehabilitation and Environmental Management Process. Division of Resources and Energy, April 2012.

GHD (2012), Ventilation Facility Project, Angus Place Colliery, Surface Water Assessment, GHD, October 2012.

NEPC (1999), National Environmental Protection (Assessment of Site Contamination) Measures 1999, Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater.

RPS (2012), *Environmental Assessment*, Angus Place Colliery, Ventilation Facility Project: Modification 2 of Project Approval 06_0021.

RPS (2012a), Flora and Fauna Assessment, Angus Place Colliery Ventilation Facility Project, October 2012.

APPENDIX 1: BACKGROUND TO THE PROJECT

8 SCOPE AND REGULATORY REQUIREMENTS

8.1 PROJECT APPROVAL

Schedule 3 Condition 38 of Project Approval 06_0021 Mod 2 requires the following to be addressed in the CEMP:

The proponent shall prepare and implement a Construction Environmental Management Plan to the satisfaction of the Director-General. This plan must

(a) Be prepared by a suitably qualified and experienced person/s;

(b) Be approved by the Director-General prior to the commencement of vegetation clearance ground disturbance activities caused by construction of the Mod – 2 ventilation facility and their supporting surface infrastructure and access tracks/roads; and

(c) Identify environmental impacts and potential impacts of these activities and describe measures to mitigate and manage these impacts, including impacts associated with:

- *Noise emissions;*
- *Visual amenity;*
- *Night lighting;*
- *Aboriginal cultural heritage;*
- *Air quality;*
- *Traffic management;*
- *Public safety;*
- *Bushfire management;*
- *Waste and hazardous materials management;*
- *Vegetation removal (including identification of tree hollows, provision for their salvage (where feasible), and provision for their relocation and/or replacement in adjacent woodland); and*
- *Erosion and sediment control.*

Table A1.1 lists the Condition 38 requirements that have been addressed in this CEMP and provides the reference section where the requirement has been addressed.

Table A1.1 – Condition 38 Requirements addressed in the CEMP and location in the document

Condition 38 Requirement	Reference Section
Noise emissions	2.6 and 11.2
Visual amenity	2.7 and 11.3
Night lighting	2.7.2 and 11.4
Aboriginal cultural heritage	2.8 and 11.5
Air quality	2.9 and 11.6
Traffic management	2.10 and 11.7
Public safety	2.11 and 11.8
Bushfire management	2.12 and 11.9
Waste and hazardous materials	2.13 and 11.10
Vegetation removal	2.1, 2.2 and 11.1
Erosion and sediment control	2.3, 11.11 and Appendix 2

8.2 EXISTING ENVIRONMENTAL MANAGEMENT AND MONITORING

The CEMP will be implemented in conjunction with the Angus Place's *Environmental Management Strategy* and the *Environmental Monitoring Program*. The *Environmental Management Strategy* provides an overall structure for environmental management at Angus Place including the strategic context, statutory requirements and roles and responsibilities of key personnel. The *Environmental Monitoring Program* consolidates all monitoring requirements developed in the individual management plans and monitoring programs. **Table A1.2** provides an outline of the relevant Management Plans in place for all existing activities at Angus Place.

The relevant plans are being revised to address the mitigation and management measures committed to in the *Environmental Assessment* (RPS (2012))..

Table A1.2 – Existing Environmental Management and Monitoring Plans

Plans and Programs	Outline
Environmental Management Strategy	Describes the overall approach to environmental management at Angus Place Colliery
Environmental Monitoring	As a high level document, the program provides a summary of

Plans and Programs	Outline
Program	the operational monitoring procedures and reporting functions required under the various management plans. By holistically assessing performance, the need for additional impact mitigation can be determined.
Flora and Fauna Management Plan	Aims to minimise impacts to flora and fauna by outlining strategies to manage vegetation clearing, weed control, access to environmentally sensitive areas and potential conflicts between flora and fauna and Aboriginal heritage.
Newnes Plateau Shrub Swamp Management Plan	Measures and manages potential impacts on the Newnes Plateau Shrub Swamps in the current mining area. The plan includes monitoring of the effects of subsidence in addition to other issues and outlines impact mitigation techniques.
Site Water Management Plan	Establishes management, baseline monitoring and impact mitigation techniques regarding surface water courses within the Colliery Holding Boundary. The plan additionally considers erosion and sediment control strategies.
Groundwater Management Plan	Aims to coordinate the sustainable management of groundwater affected by Angus Place Colliery's operations.
Noise Monitoring Program	Sets out procedures for monitoring, assessing and mitigating noise impacts from Angus Place Colliery with a view to maintaining acceptable levels in accordance with the Project Approval limits.
Air Quality Monitoring Program	Sets out procedures for monitoring, assessing and mitigating air quality impacts from Angus Place Colliery with a view to maintaining acceptable levels in accordance with the Project Approval limits.
Subsidence Management Plan	Summarises the subsidence predictions and expected impacts from underground mining and identifies how natural and built features will be managed.
Contractor Environmental Management Plan	Aims to ensure that all activities carried out on behalf of Angus Place Colliery comply with internal and external practices and guidelines for the impacts generated by the proposed activity.
Bushfire Management Procedure and Management of Bushfire Assets Procedure	Sets out the procedures for managing surface based assets in bushfire prone areas.

8.3 STATEMENT OF COMMITMENTS

The Statement of Commitments (SoC) for the Project (Appendix 6 of PA 06_0021 Mod 2) are listed in **Table A1.3**. This table also provides reference section in the CEMP where each SoC has been addressed.

Table A1.3 – Statement of Commitments addressed and location in the document

Statement of Commitment number	Requirement	Reference Section
5	A Construction Environmental Management Plan will be developed and implemented. This plan will include measures to minimise impacts to surface water systems, including sediment and erosion controls.	This document
8	The Construction Environmental Management Plan will include sediment and erosion controls.	2.3, 11.11 and Appendix 1
13	The Construction Environmental Management Plan will include measures such as dust suppression and limits to plant use.	2.9 and 11.6
19	The Construction Environmental Management Plan will include noise management and mitigation measures.	2.6 and 11.2
21	The Construction Environmental Management Plan will include measures to minimise the visual impacts of the construction phase of the Project.	2.7 and 11.3
22	The Construction Environmental Management Plan will include measures to minimise impacts to recreational users of the Newnes State Forest during construction. This will include installation of appropriate signage.	2.6, 2.7, 2.9, 2.10, 2.11 and 2.12
27	Cultural Heritage Management Arrangements as identified in Section 9.17.4 of the EA will be included in the Construction Environmental Management Plan.	2.8 and 11.5
32	The Construction Environmental Management Plan will take into consideration public safety, hazardous materials management and waste management activities.	2.11 and 2.13

9 CONSULTATION AND CORRESPONDENCE

Consultation with government authorities and public stakeholders regarding the Project was undertaken during the preparation of the *Environmental Assessment* (RPS 2012) and throughout the approval process, and included:

- Project Briefings

- Community Information Sessions
- Field Inspections
- Written correspondence.

A full account of consultation and correspondence activities undertaken appears in Section 6 of RPS (2012).

Angus Place will continue to consult with its relevant stakeholders in accordance with *Angus Place Colliery Stakeholder Engagement Plan*.

10 PROJECT BACKGROUND

10.1 PROJECT DESCRIPTION

The Project Application Area is shown in **Figure A1.1**, and falls within the Newnes State Forest. The Project components comprise the following:

- Construction and operation of a Ventilation Facility consisting of both upcast (exhaust) and downcast (intake) shafts, mine ventilation fan, an air compressor station, emulsion mixing and supply plant, various services boreholes, electrical substation, self-bunded diesel storage tank, back-up generator, internal roadways and hardstand area, spoil emplacement area, water management control ponds, fire controls (including Bushfire Asset Protection Zones), security fencing and amenity buildings
- Construction of a new access track from Sunnyside Ridge Road to the Ventilation Facility site (S4)
- Establishment of a 66 kV/11 kV electrical substation (including Bushfire Asset Protection Zone and security fencing) situated off Sunnyside Ridge Road.
- Construction and operation of a 66 kV metering switchyard facility (including an associated access track).
- Establishment of the 66 kV trenched electrical power supply from existing overhead powerline running adjacent to Blackfellows Hands Road to the 66 kV/11 kV substation following Sunnyside Ridge Road.
- Establishment of the 11 kV trenched electrical power supply from the substation to the proposed Ventilation Facility site along Sunnyside Ridge Road and the proposed new track to this site.

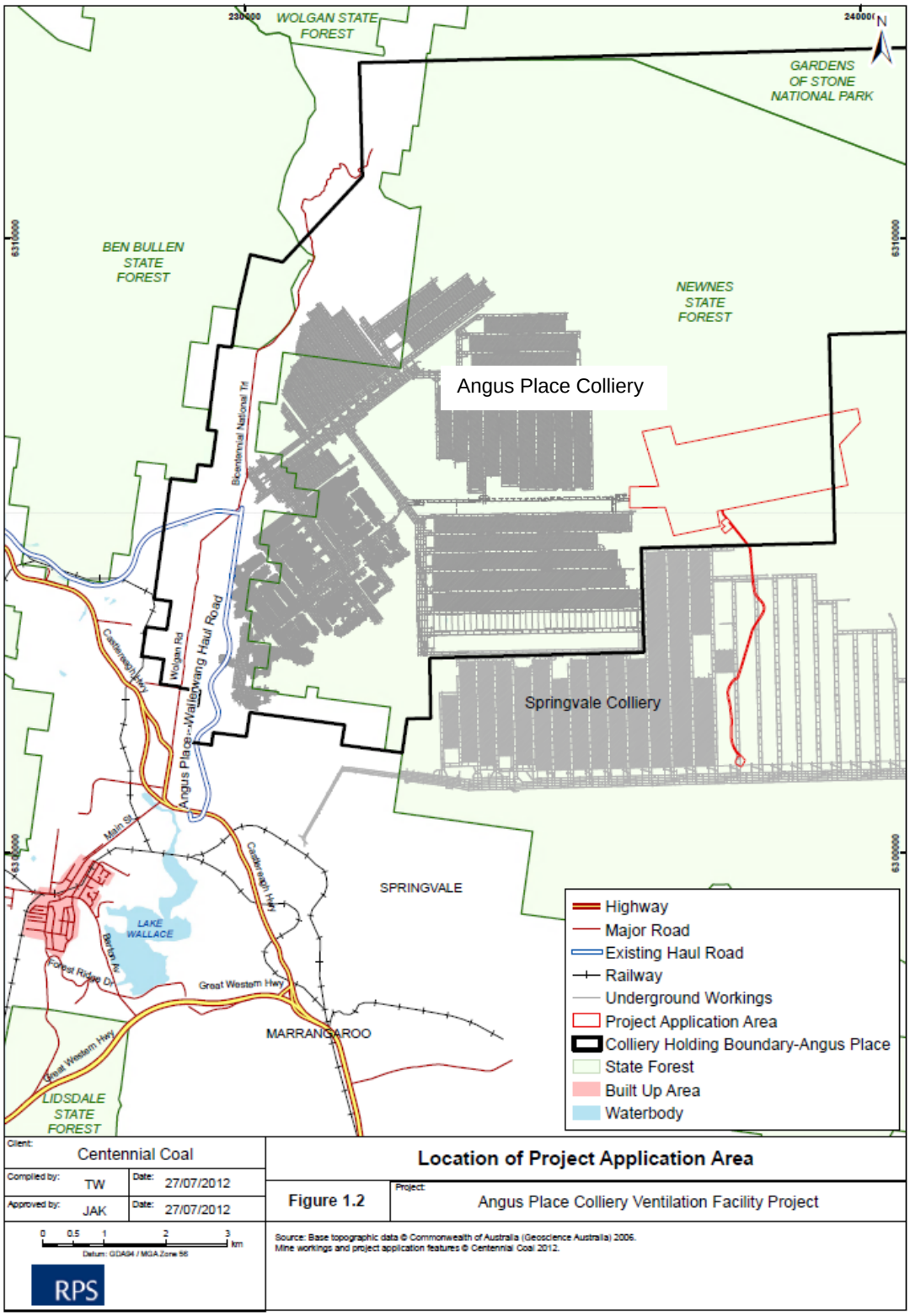

Figure A1.1: Project Application Area

10.2 PROJECT CONSTRUCTION SITES

Table A1.4 provides a detailed description of the Project components while **Figure A1.2** illustrates the location of the individual components within the Project Application Area. These project components are described in terms of Environmental Study Areas (ESA) noted in **Figure A1.2** and used for ecological surveys in the *Environmental Assessment* (RPS (2012). ESA10 noted in **Figure 1.2** will not be constructed.

Table A1.4 Description of Project Components

Component	Area Reference (refer Figure A1.2)	Description
66 kV trenched electric power supply from the existing power line to the proposed electrical substation (ESA7/8 in **Figure 2**).	ESAs 1, 2 and 3	Corridor of approximately 25 m width and 4.4 km length following Sunnyside Ridge Road. This is a larger area than would be required for the proposed trenched power line to allow for design flexibility. 10 m either side of the existing road of approximately 5 m is provided for although only one side of the road (10 m in width) would be required. *Persoonia hindii* stems are located along the length of this corridor (refer **Figure A1.3**).
11 kV trenched electrical power supply from the substation to the junction with the proposed new track to the Ventilation Facility site (ESA9/S4).	ESA4	Corridor of approximately 20 m width and 225 m length following Sunnyside Ridge Road. *Persoonia hindii* stems are located along the length of this corridor (refer **Figure A1.3**).
New access track from Sunnyside Ridge Road to the Ventilation Facility site.	ESA5	Corridor of approximately 20 m width and 369 m length.
66 kV metering switchyard facility to the south of the junction of Sunnyside Ridge Road and Blackfellows Hands Road.	ESA6	ESA6 has an area of 1.74 ha. This comprises an existing powerline at the junction of Blackfellows Hands Road and Sunnyside Ridge Road.
66 kV/11 kV electrical substation	ESA7 and 8	ESA7 has an area of 1 ha. ESA8 has area of 1.5 ha. Comprises existing pine plantation.
Ventilation Facility site	S4 and ESA9	ESA9 has an area of 30.7 ha and is a larger area than would be required. The Ventilation Facility itself, determined through the EA process, requires an area of 7.5 ha, being the S4 area shown in **Figure A1.2**.

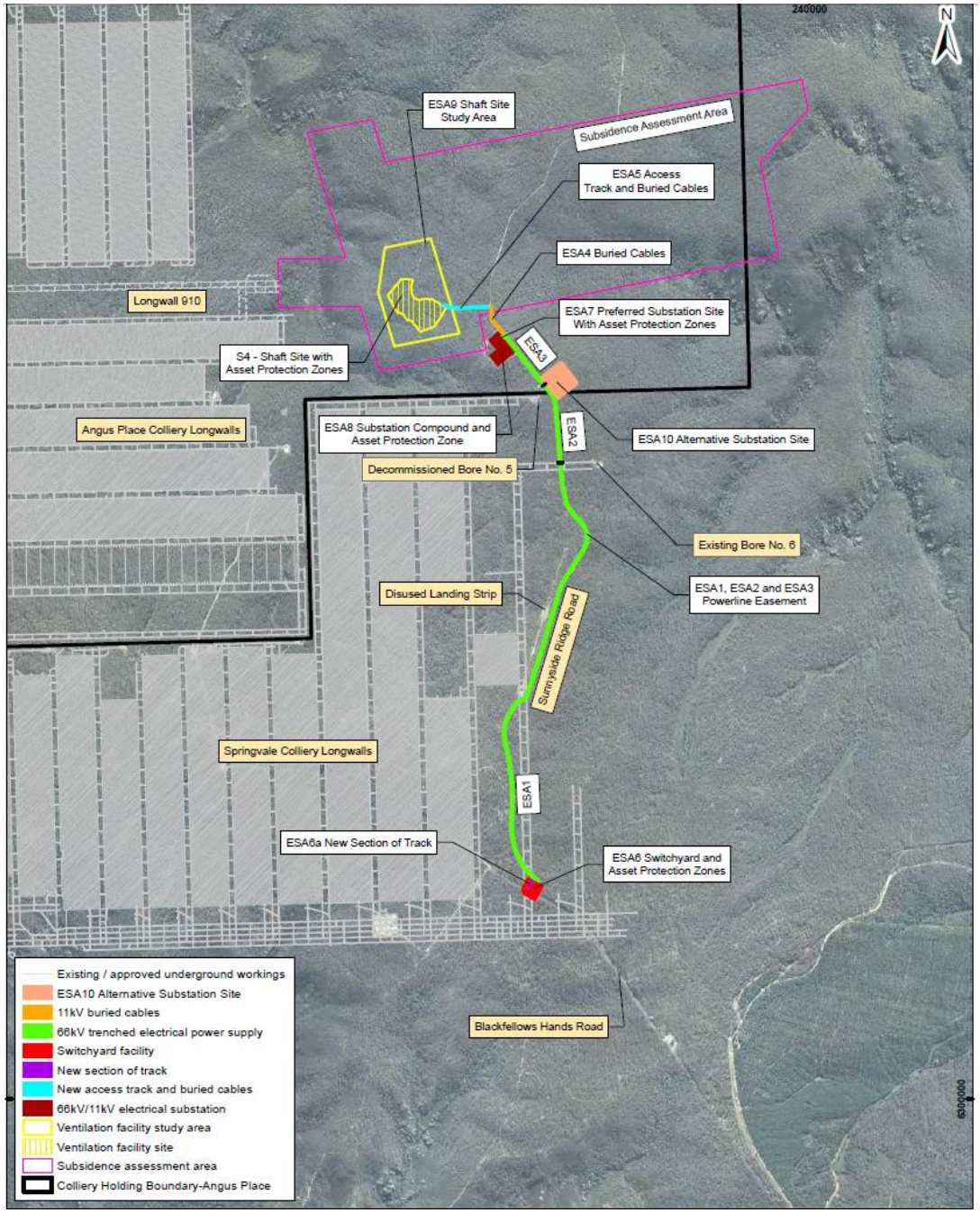

Figure A1.2: **Locations of Project Components**

10.3 CONSTRUCTION TIMING AND SEQUENCE

Construction is proposed to take place 24 hours a day, 7 days a week. Construction works are expected to take approximately two years and six months. Works are planned to commence in May 2013 and be completed by October 2015.

Construction activities will be undertaken in accordance with the following elements:

- Installation of erosion and sediment controls at the Ventilation Facility site (or compound) and access track leading to the site.

- Clearing of access track to the (ESA 5) to allow vehicular access to Ventilation Facility site. Clearing of Ventilation Facility site (S4) once access is gained.
- Installation of surface water management structures and security fencing around the Ventilation Facility site (S4 site).
- Commence sinking of 3.5 m ventilation shaft within S4 site.
- Clearing of pine plantation area (ESAs 7 & 8) for the establishment of the switchyard.
- Drilling and casing of Service Boreholes within S4 site.
- Ventilation Fan construction commencement within the completed 3.5 m shaft.
- Clearing of vegetation for supporting infrastructure sites 66 kV take off point and metering station. Upgrading of existing Springvale Shaft 3 access track. Progressive clearing and installation of the buried power cable, and rehabilitation along access corridor to Ventilation Facility site.
- Commission Ventilation Fan on 3.5 m ventilation shaft.
- Commence sinking of 4.5 m ventilation shaft within S4 site.
- Installation of mine services - surface to seam power cables, compressed air facilities etc within S4 site.
- Relocation of Ventilation Fan inlet ducting from the 3.5 m shaft to the 4.5 m shaft.
- Progressive rehabilitation of all construction areas not required for the operational phase.

The likely construction timeline of the works for the Ventilation Facility, as anticipated at this time, is set out in **Table A1.5**.

Table A1.5 – Construction Activities and Schedule

Construction Activity	Schedule
Land preparation	June 2013
Sinking of first shaft	August 2013 – August 2014
Fan construction	June 2014 - August 2014
Electrical Infrastructure	May 2014 - August 2014
Fan commissioning	September 2014
Sinking of second shaft	September 2014 - November 2015
Connect fan and restart	November 2015
Establish Mine services	September 2014 - November 2015
Rehabilitation of components not required for operations.	January 2016

10.4 EXISTING SITE

10.4.1 Site Location, Land Use and Ownership

The proposed construction area is wholly within the Newnes State Forest, which is used for both forestry and recreational activities. The Newnes State Forest is Crown Land managed by the Forestry Corporation of NSW.

10.4.2 Residential Receptors

There are no residential properties within or close to the construction area. The closest residential properties are six properties located to the west and northwest between 7.6 and 8.8 km from the construction area (refer **Figure A1.6**).

10.4.3 Soils and Topography

The soil landscape units that occur within the Project Application Area are:

- Newnes Plateau (covering approximately 45%);
- Wollengambe (covering approximately 25%);
- Medlow Bath (covering approximately 20%);
- Mount Sinai (covering approximately 8%); and
- Deans Creek Variant 1 (covering approximately 2%).

With regards to erosion and sediment control planning, all of these soils exhibit a sandy to sandy loam texture. Both erodibility and dispersibility is low. While these soils are relatively easy to detach in a concentrated flow situation, subsequent transportation and sedimentation is easily controlled due to the inherent predominance of large particle sizes. Low levels of clay indicate that the site runoff should also exhibit low levels of suspended solids and resultant turbidity.

Land within the Project Application Area comprises Land Capability Classes VI and VII (in accordance with the former Soil Conservation Service of NSW) and is used for forestry purposes only.

The north western section of the construction area comprises mildly undulating and relatively flat terrain to the east of the Wolgan River. The Wolgan River is incised with steep banks. The plateau area has ridge crests at an elevation of approximately 1100 m.

10.4.4 Climate

Average monthly rainfalls vary from a low of around 53 mm in July to a high of approximately 98.5 mm in January. Temperature data showed that the lowest average maximum monthly temperature is in July at approximately 12^{o}C and the highest is in January at approximately 28oC. Evaporation data shows that the lowest average monthly evaporation is in June and the highest in January. The average annual evaporation rate was approximately 1,350 mm compared to the annual average rainfall of approximately 819.7 mm, indicating an annual deficit of approximately 530.3 mm.

Temperature inversions can occur predominantly at night during the winter months. At Angus Place, temperature inversions are greater than 30% during the winter night time period.

10.4.5 Vegetation

The construction area and its surroundings, for a distance of greater than 2 km in any direction, contains native vegetation which is unbroken apart from occasional fire trails. Native vegetation is periodically selectively logged but there are no areas of clear-felling. Woodland areas are dominated by Eucalyptus species, which have been subject to selective timber harvesting activities for a sustained period of time.

Persoonia hindii, a plant species listed as Endangered under the *Threatened Species Conservation Act 1995* (TSC Act), is present within the construction area (refer

Figure A1.3). *Persoonia hindii* is an erect to spreading shrub 0.3 to 1 m tall (refer **Figure A1.4**) with slightly upwardly curving linear-oblong leaves usually concave on the upper surface. Distribution is limited to the Newnes Plateau in the Upper Blue Mountains where it occurs in dry forest habitats. The *Persoonia hindii* are known to colonise within and in the vicinity of disturbed areas (refer **Figure A1.5**).

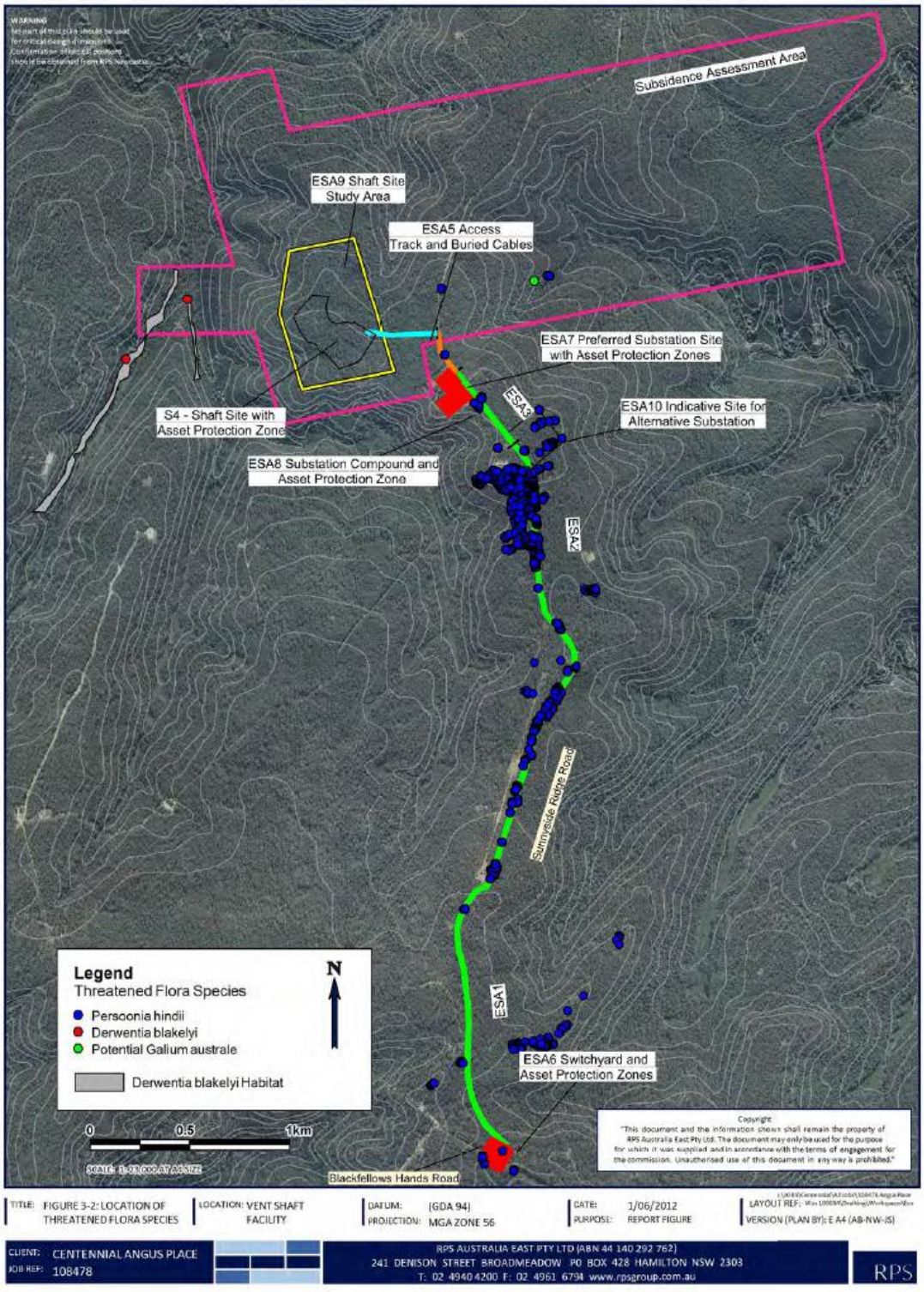

Figure A1.3: Locations of Threatened Flora Species

Figure A1.4: Example of *Persoonia hindii* plant and its fruit

Figure A1.5 *Persoonia hindii* re-colonising a road verge on Sunnyside Ridge Road on Newnes State Forest (Photo Source: RPS Australia Asia Pacific)

11 IDENTIFICATION OF POTENTIAL ENVIRONMENTAL IMPACTS OF APPROVED ACTIVITIES

11.1 VEGETATION REMOVAL

This section discusses the vegetation clearing to be associated with the Project. The information has been used for the development of management controls discussed in Sections 2.1 and 2.2.

The area of vegetation clearance associated with the proposed infrastructure would be approximately 17.3 ha comprising approximately 15 ha of native vegetation. None of the vegetation communities to be impacted upon mapped within the construction area correspond to any Endangered Ecological Communities as listed within the TSC Act or *Environment Protection and Biodiversity Conservation Act 1999*.

Whilst *Persoonia hindii* stems will be removed as part of the Project Construction, this plan does not authorise or manage the disturbance of *Persoonia hindii*. Disturbance of *Persoonia hindii* can only be undertaken in full accordance with an approved *Persoonia hindii Management and Research Program*.

11.2 NOISE EMISSIONS

This section discusses the potential noise impacts associated with the construction activities proposed in the Project. The information has been used for the development of noise management controls presented in Section 2.6.

During construction, there is potential for noise due to activities such as site preparation and clearance, boring of the ventilation shafts, construction of foundations, installation of the fan structure and ducting, connection to the shaft and commissioning within the Ventilation Facility. Construction activities would be undertaken 24 hours a day, 7 days a week and this has been subject to noise modelling. The need for undertaking construction outside standard hours, as identified in the Interim Construction Noise Guidelines, is outlined in Section 4.10 of the *Environmental Assessment* (RPS (2012)).

The *Interim Construction Noise Guidelines* identify management levels. For residences, the recommended standard hours are Monday to Friday 7am to 6pm and Saturday 8 am to 1 pm and no work on Sundays or public holidays. The management level for standard hours is the background level plus 10 dBA. Outside recommended hours the *Interim Construction Noise Guidelines* recommends a noise management level of background plus 5 dBA. The construction noise management

levels for the project have been established in accordance with the *Interim Construction Noise Guidelines* based on the existing operational noise criteria. The proposed construction plant and equipment noise levels were generated from a database of sound power levels.

For the recreational receivers, the management level specified in the Interim Construction Noise Guidelines is 60 dBA for a passive recreation area.

The nearest potentially affected residential receivers are located over 7 km from the construction area (refer **Figure A1.6**). The predicted construction noise levels at the six residential receptors are less than 20 dBA during the daytime, evening and night time and are therefore well below the project specific construction noise goals during daytime, evening and night time periods.

The predicted construction noise levels at the recreational receivers range from less than 20 to 29 dBA during the daytime, evening and night time and are therefore well below the construction noise goals as specified in the *Interim Construction Noise Guidelines* during the daytime, evening and night time periods.

Based on the predicted road traffic movements, Angus Place does not anticipate any additional road traffic noise impacts due to the construction of the project.

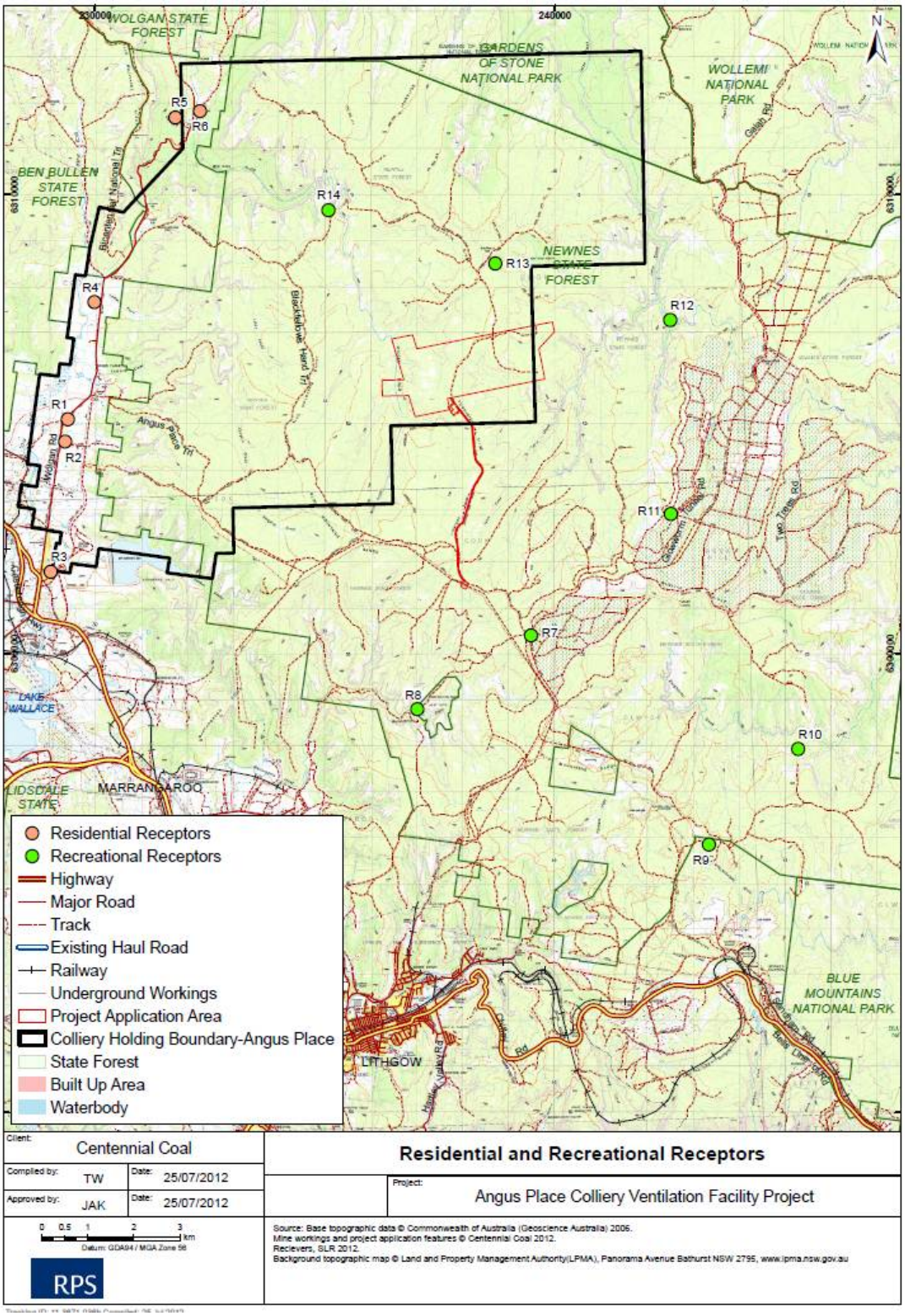

Figure A1.6: Residential and Recreational Receptors

11.3 VISUAL AMENITY

This section discusses the potential visual impacts associated with the construction activities proposed in the Project. The information has been used for the development of visual amenity management controls presented in Section 2.7.

Due to the elevations in the region and the mature vegetation the works are not likely to be seen from the residential receptors.

There are potential adverse impacts on views of those using the area for recreation. Construction works would be visible from within the immediate area, in particular Sunnyside Ridge Road and Blackfellows Hands Road and there would be a greater number of large vehicles using the road due to the construction works. The analysis undertaken as part of the environment impact assessment for the Project (RPS (2012)) shows that parts of the works would potentially be visible from the recreational receptors identified as R8 (Lost City), R9 (Bald Trig) and R11 (Carne Creek Shrub Swamp) in **Figure A1.6**. The analysis was undertaken without taking into account the presence of vegetation and therefore represents worst case scenario conditions.

11.4 NIGHT LIGHTING

Night lighting would be noticeable to recreational users in the vicinity of the construction sites, such as those driving along Sunnyside Ridge Road. This would be a temporary adverse effect at night time. It is not considered that the night lighting would be visible at the closest residential receptors.

11.5 ABORIGINAL CULTURAL HERITAGE

A desk top study and field survey was undertaken to assess the potential impact of the Project on the Aboriginal Cultural Heritage. The results of the assessment are presented in this section while management procedures are presented in Section 2.8.

A search was undertaken of the OEH Aboriginal Heritage Information Management System (AHIMS) on 21 July 2011 within a 5 km radius of the construction area. A total of 41 sites were identified within that search radius. The most common site types within the local landscape are shelters with deposit (51.2%), followed by artefact scatters (17.1%) and shelters with art (12.2%).

There are no sites recorded within the immediate vicinity of the construction area. The nearest recorded site to the construction area is a scarred tree site, located approximately 140 m to the west of Sunnyside Ridge Road.

It is considered highly unlikely that the construction phase will impact on Aboriginal Cultural Heritage.

11.6 AIR QUALITY

The results of the air quality assessment undertaken for the Project are described in this section. Management procedures for the minimisation of the identified potential impacts of the Project on air quality are presented in Section 2.9.

During construction, there are potential emissions of particulate matter including those from the use of construction equipment, activities and traffic. During operation, there are potential impacts from a back-up diesel generator (particulate matter, NO_2, SO_2, CO, VOCs) and from the ventilation shafts (particulate matter, CO, odour).

Nominated project criteria specifying pollutant concentration levels have been determined against which the predictions for the change to pollutant concentration levels associated with the Project are assessed.

For all pollutants assessed (particulates, NO_2, CO and VOCs) concentration and deposition levels at the nearest sensitive receptors are well below the nominated project criteria.

The level at which an odour is perceived to be a nuisance can range from 2 odour units (OU)/m^3 to 10 OU/m^3 depending on a combination of factors. Odour impacts from construction are predicted to be less than 0.7 OU at all sensitive receptor locations compared to a criterion of 5 OU. The criterion is formed by the number of residential receptors. The potential for nuisance impacts associated with odour is negligible as the nearest residential receptor is over 7 km away. Therefore the construction phase would have a negligible impact on air quality, including odour, at the residential receptors.

Consideration was also given to recreational receivers in the Newnes State Forest, specifically the Bungleboori picnic and camping area (R7), Birds Rock Lookout (R13) and Wolgan Falls (R14). Similarly to the residential receptors negligible impacts are predicted at these locations. Odour may be noticeable in the immediate vicinity of the Ventilation Facility and that forest vegetation would act as a buffer between the facility and those using Sunnyside Ridge Road near the site with receptors likely to be transient.

11.7 TRAFFIC MANAGEMENT

The results of the traffic impact assessment undertaken for the Project are described in this section. Management procedures for the minimisation of the identified potential impacts of the Project on the local road network are presented in Section 2.10.

Construction traffic is anticipated to generate an average of less than 20 daily vehicle trips over the construction period. The peak generation is anticipated to occur around the 13th to 14th month of construction for approximately one month. The peak generation would comprise approximately 42 daily trips (20 truck trips and 22 light vehicle trips). There would be no significant impact on either the sub-regional network providing access to the Newnes State Forest or on the access roads within the Newnes State Forest providing access to the construction area.

11.8 PUBLIC SAFETY

This section describes results of an assessment of the potential impacts of the Project on public safety. Mitigation measures that will minimise these impacts are described in Section 2.11.

The assessment undertaken has identified the unauthorised access to the construction sites potentially poses several public safety issues such as electrocution, contact with hazardous materials and injuries from construction equipment. There is additionally the potential for the interception of construction utilities with public vehicles on forest roads and tracks.

11.9 BUSHFIRE

This section describes results of an assessment of the potential bushfire hazards associated with the Project, while Section 2.12 provides management procedures to minimise bushfire hazards.

The assessment identified the construction of the Ventilation Facility and associated infrastructure may present a short term threat of ignition of adjoining unmanaged forest vegetation. This may result in a risk to forestry assets and the broader community.

11.10 WASTE AND HAZARDOUS MATERIALS

11.10.1 Waste

Table A1.6 identifies the wastes that are anticipated to be generated by the Project during the construction phase. Management measures that will be implemented to reduce waste generation and impact in the environment are described in Section 2.13.

Table 1.6 – Waste Streams and Quantity Estimates

Waste	Estimate of Quantity
Construction: Solid Waste	
Spoil from the construction of the ventilation shafts and boreholes.	Two shafts = total 7,150 m^3 Eight boreholes = total 1,809 m^3
Spoil from construction (other than the shafts and boreholes) from the construction of Ventilation Facility, site services and supporting surface infrastructure.	Surface works = 8,280 m^3
General waste from construction	There will be two 23 m^3 skips on site that will contain general waste and one 23 m^3 recyclable material bin. Therefore, up to 529 m^3 waste.
Construction: Liquid and Hazardous Waste	
Excess process water and dirty water	Process water and dirty water = 21,000 m^3
Fluids such as oil and chemicals associated with maintenance and use of construction equipment and plant.	Minor quantities in lined with standard maintenance schedules.
Sewage	Two portable toilets.

11.10.2 Hazardous Materials

A risk screening was undertaken to determine if the project falls under the SEPP 33 Hazardous and Offensive Development based on the anticipated potentially hazardous materials that would be used during the construction stages of the project. Material Safety Data Sheets (MSDS) regarding hazardous materials proposed to be used on site are available from the electronic Angus Place Colliery MSDS Register.

These materials are not classified as hazardous with regard to SEPP 33 and would be stored at construction sites, if required, in relatively small quantities.

11.11 EROSION AND SEDIMENT CONTROL

The construction of surface infrastructure will require the clearing of vegetation, possible stockpiling of the vegetation and earthworks to regrade the sites. Ancillary works will include traveling along tracks to the work sites and transportation of the prefabricated elements to the construction areas. Section 2.3 and **Appendix 2** provide Sediment and Erosion Controls for the construction phase of the Ventilation Facility.

Given Angus Place proposes to use blind boring for construction of the two shafts means the construction method has the potential for an increased risk of sedimentation as the waste reports to the surface. Implementation of the proposed earthworks to regrade the site to the south-east, coupled with erosion control measures around the construction area at the time of undertaking the construction works, will mitigate adverse effects downstream of the shaft area particularly to the Wolgan River. With the implementation of these mitigation measures it is not expected that there would be a significant effect to the Wolgan River.

Changing the shaft site runoff rates or volumes could potentially change the sensitive ecosystem structure, causing either erosion within the areas or sediment deposition within the areas as a direct result of the change in runoff rates. A change in the water quality resulting from sediment export off the shaft site would be most likely to result in sediment deposition within the sensitive ecological areas. Since the construction period is estimated to be approximately 2 years and 8 months it is unlikely that there would be a significant change in the long term soil moisture regime during the construction period.

Generally across the construction sites from an erosion and sediment control perspective, without the implementation of mitigation measures there could be:

- Formation of localised soil erosion in disturbed areas prior to stabilisation of those areas and the deposition of this sediment in designated ponds.
- Mobilisation of stored granular materials (if not covered to keep rain off) if they are placed in areas where surface flows can interfere with the stockpiles.

APPENDIX 2: SEDIMENT AND EROSION CONTROL PLAN

SEDIMENT AND EROSION CONTROL MEASURES AND MANAGEMENT PRACTICES

The following suite of control measures aim to manage erosion and sedimentation by initially minimising soil detachment and transportation, controlling runoff volume and velocity, and maximising sediment deposition and retention on site. These controls will be implemented in addition to those described in Section 2.3 of this document. The sediment and erosion controls described will apply to both the access track (ie. the infrastructure corridor) and the compound areas (or the infrastructure sites).

This detailed Sediment and Erosion Control Plan has been prepared in recognition of industry best practise principles for the region and the specific requirements of the following documents:

- Environmental Assessment, Ventilation Facility Project, Angus Place Colliery; RPS, October 2012
- Managing Urban Stormwater; Soils and Construction (The Blue Book) Volume 1; Landcom, Sydney, 2006
- Managing Urban Stormwater; Soils and Construction Volume 2A, Installation of Services; Department of Environment and Climate Change NSW, Sydney 2008
- Managing Urban Stormwater; Soils and Construction Volume 2C, Unsealed Roads; Department of Environment and Climate Change NSW, Sydney 2008
- Managing Urban Stormwater; Soils and Construction Volume 2E, Mines and Quarries; Department of Environment and Climate Change NSW, Sydney 2008
- Soil Landscapes of the Wallerawang 1:100,000 Sheet, King 1993; NSW Department of Land and Water Conservation, Sydney
- Surface Water Assessment, Ventilation Facility Project, Angus Place Colliery; GHD, October 2012

1. SITE MANAGEMENT PRACTICES – ALL AREAS

Best practice site management aims to schedule and conduct site activities so as to minimise both the extent and the duration of disturbance. Accordingly, the following site management practices will be adopted on this project:

- The maximum limits of clearing will be clearly marked out prior to clearing activities commencing.
- Ground disturbance will be avoided outside of the areas identified above, vehicle movements will be restricted to designated tracks, and existing clearings will be utilised as turnaround areas and laydown sites.
- Where site access permits, erosion and sediment control structures will be installed/constructed prior to commencement of site clearing/ground disturbing activities.
- In situations where some preliminary clearing is required to gain access to the site (i.e. the compound area), the required erosion and sediment control structures will be installed/constructed as a matter of priority.
- Disturbance along the infrastructure corridor will be confined to those areas involved in current construction activities. Where possible, forward clearing and trenching activities will be limited to a maximum of 200 m ahead of active pipe laying activities.
- The Bureau of Meteorology five day weather forecast will be used as a trigger to minimise forward clearing activities, expedite rehabilitation activities, and schedule additional erosion control measures along the corridor when inclement weather is predicted.
- Works will also be scheduled so that an absolute minimum quantity of trench (e.g. less than 50 m) is left open over any weekend.
- Timber and other vegetative material will be removed and stockpiled immediately adjacent to the works. Where practicable, this material will be windrowed on the downstream side of the works to act as a sediment barrier.
- Where possible, unless located *directly* over the trench alignment, tree stumps and roots will not generally be grubbed, in an effort to promote coppicing.
- There will be an excess of vegetative material cleared from the compound site. This material may be tub ground, stockpiled and allowed to compost in preparation for final site rehabilitation following decommissioning of the site.
- Topsoil and forest litter will be removed and stockpiled in a windrow adjacent to the timber windrow. In order to maintain topsoil viability, stockpiles will not exceed 1.5m in height and will not be compacted.

- Where site contours permit, the topsoil windrow may also be used as an upslope perimeter bank, to divert clean runon water around or away from disturbed areas.
- Rehabilitation of the infrastructure corridor will commence immediately following trench backfilling. Where practicable, there will not be more than 75 m of backfilled trench left un-rehabilitated as work progresses.
- All site earthworks activities (including refuelling and servicing of plant and equipment) will cease during periods of heavy and/or prolonged rainfall (i.e. >25 mm in 24 hours).

2. EROSION CONTROL MEASURES – INFRASTRUCTURE CORRIDOR

In addition to the site management strategies listed above, the following site specific erosion control measures will be implemented on the infrastructure corridor works:

- The backfilled trench will be thoroughly compacted to avoid settlement/subsidence of the fill material and inadvertent channelisation of water. The top 150 mm of fill may subsequently be scarified or roughened (if required) to assist topsoil adhesion and vegetation establishment.
- Topsoil and forest litter material will be respread over the trench area. Logs and windrowed timber will be “randomly” scattered over the topsoiled areas. However, care will be taken to ensure that any large logs etc. are always placed parallel to the contour to avoid concentration of overland flows.
- Mitre drains will be constructed periodically to direct runoff away from the track; refer **Figure A2.1.** Mitre drains will be located to utilise local surface topography and there will be a nominal spacing of 50 m between structures. The mitre drains will be constructed with a trapezoidal or parabolic profile, and the channel gradient will not exceed 1:10.

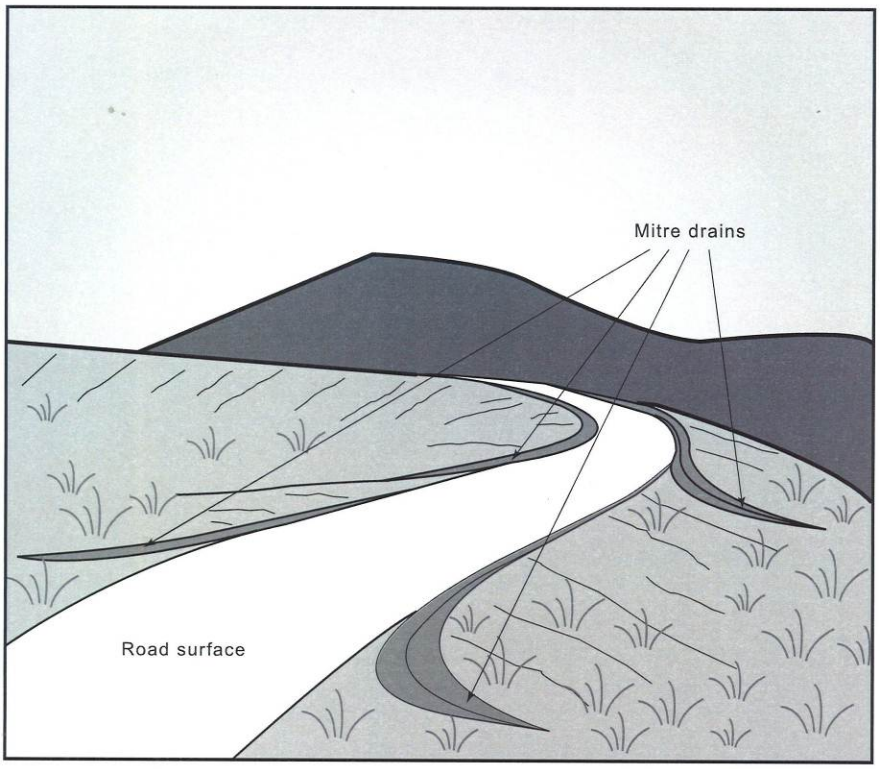

Figure A2.1: Typical layout of mitre drains on ridge top tracks (Source: Managing Urban Stormwater; Soils and Construction – Volume 2C Unsealed Roads)

- For any steep sections of track where the slope increases to >5%, cross banks (ie. Roll over banks or Whoa-boys) will be constructed along the access track to the Ventilation Facility (S4) to divert runoff water across and away from the track surface to a stable discharge point; refer **Figure A2.2**.
- Exact location of cross banks will be determined by surface topography, however, there will be a nominal spacing of 40 m between structures through this area.
- Cross banks will be constructed in accordance with the specifications included in **Figure A2.3**.

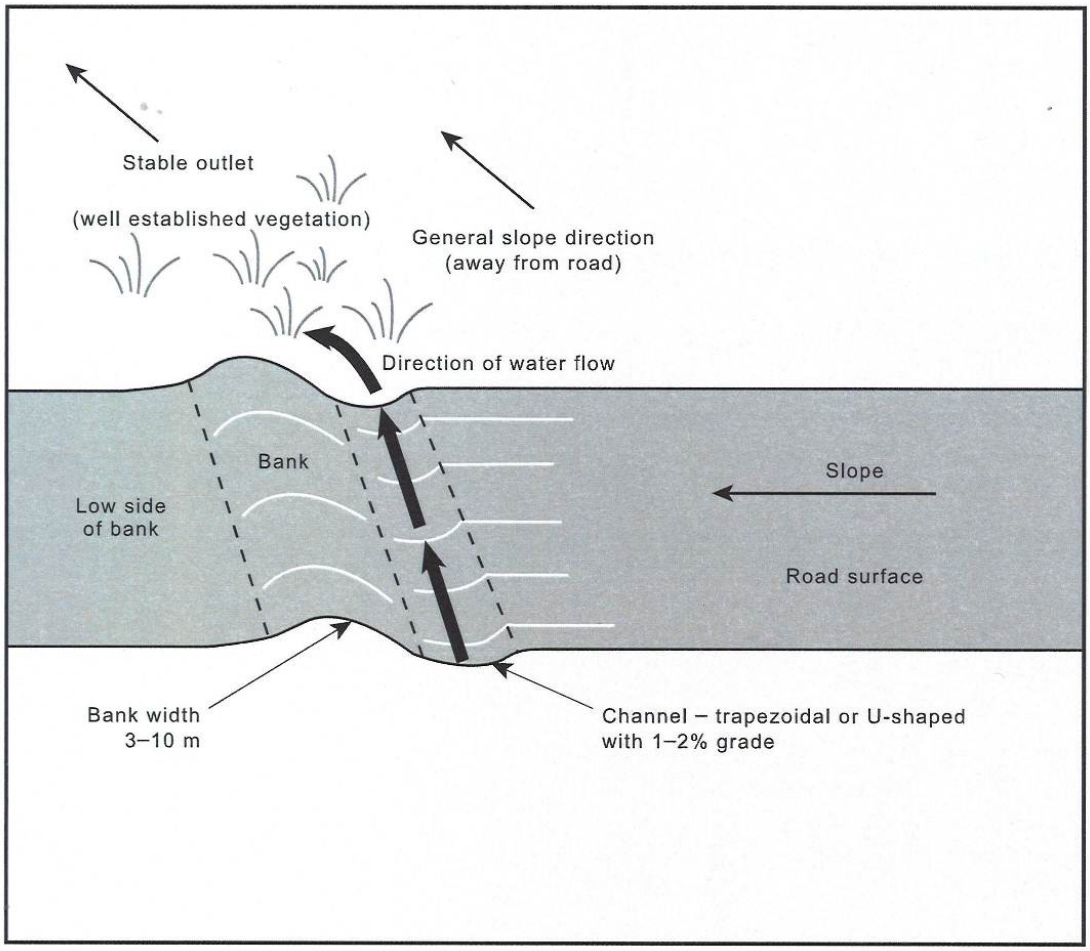

Figure A2.2: Typical cross bank layout and construction (Source: Managing Urban Stormwater; Soils and Construction – Volume 2C Unsealed Roads)

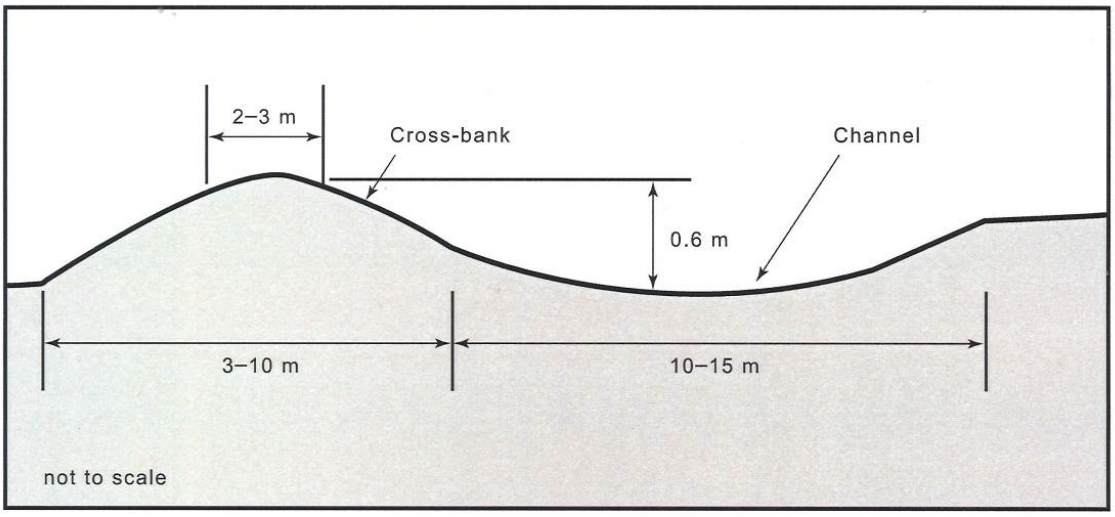

Figure A2.3: Cross bank dimensions (Source: Managing Urban Stormwater; Soils and Construction – Volume 2C Unsealed Roads)

3. EROSION CONTROL MEASURES – COMPOUND AREA

The following site specific erosion control measures will be implemented within the compound areas.

- Topsoil and forest litter material will be removed from the compound areas and windrowed to form an upslope perimeter (diversion) bank around the top side(s) of the site.
- This bank will act to minimise the volume of water *entering* the site by segregating clean upslope run-on water, from sediment laden runoff water off the site.
- Clean water from the perimeter bank will be discharged in a location(s) such that it will not run back onto the site causing erosion.
- Following removal of the topsoil, the compound area will be covered with a protective layer (50 mm) of gravel or ballast.
- Following completion of the four boreholes and construction of all ancillary buildings and structures, the compound area not required for ongoing operations will be rehabilitated.
- Rehabilitation will include reshaping of the surface as required to produce a free draining landform that mimics, as far as possible, the natural landform.
- The upper 150 mm of the rehabilitation area may be scarified or roughened prior to re-topsoiling to assist topsoil adhesion and vegetation establishment.
- Topsoil and forest litter material will be respread over the rehabilitation area. Logs and previously windrowed timber will be “randomly” scattered back over the topsoiled areas. However, care will be taken to ensure that any large logs etc. are always placed parallel to the contour to avoid concentration of overland flows.

4. SEDIMENT CONTROL MEASURES – INFRASTRUCTURE CORRIDOR

Effective erosion control will minimise the requirement for sediment control. Hence erosion control, including progressive rehabilitation, will be a priority. In addition to the site management strategies listed above, the following site specific

sediment control measures will be implemented on the infrastructure corridor works:

- In areas where the ground slope below the outlet of the mitre drain is less than 5% gradient, the coarse textured soils will generally fall out of suspension within the confines of the mitre drain, and periodically removed as required.
- In areas where the slope gradient below the outlet of the mitre drains is greater than 5%, sediments have the potential to be moved off site. In these instances, sand and/or aggregate filled sandbags may be used to construct a temporary sediment trap across the outlet of the mitre drain; refer **Figure A2.4**.
- As an alternative, a small excavated sediment sump (approximately 1 m^3 capacity) may be excavated at the end of the above mitre drains to effectively convert them into a spoon drain.
- Timber and other vegetation cleared from the alignment may also be selectively placed and tightly stacked across the outlet of the mitre drains to act as a temporary sediment barrier.
- All these areas will be monitored on a daily basis as part of the site management protocol.

5. SEDIMENT CONTROL MEASURES – COMPOUND AREA

Effective erosion control will minimise the requirement for sediment control. Hence again erosion control, including progressive rehabilitation, will be a priority. In addition to the site management strategies listed above, the following site specific sediment control measures will be implemented on the compound area.

- In addition to the use of selectively placed and tightly stacked timber and vegetation as a downslope sediment barrier, the principal sediment control structure at the compound area will be the sediment basin.
- The sediment basin will be situated to take full advantage of site topography. It will be constructed using very large concrete blocks and will be designed to suit Project requirements. .
- A Bidim A34 grade needle punched geotextile will be used as additional filter medium in front of the concrete blocks.

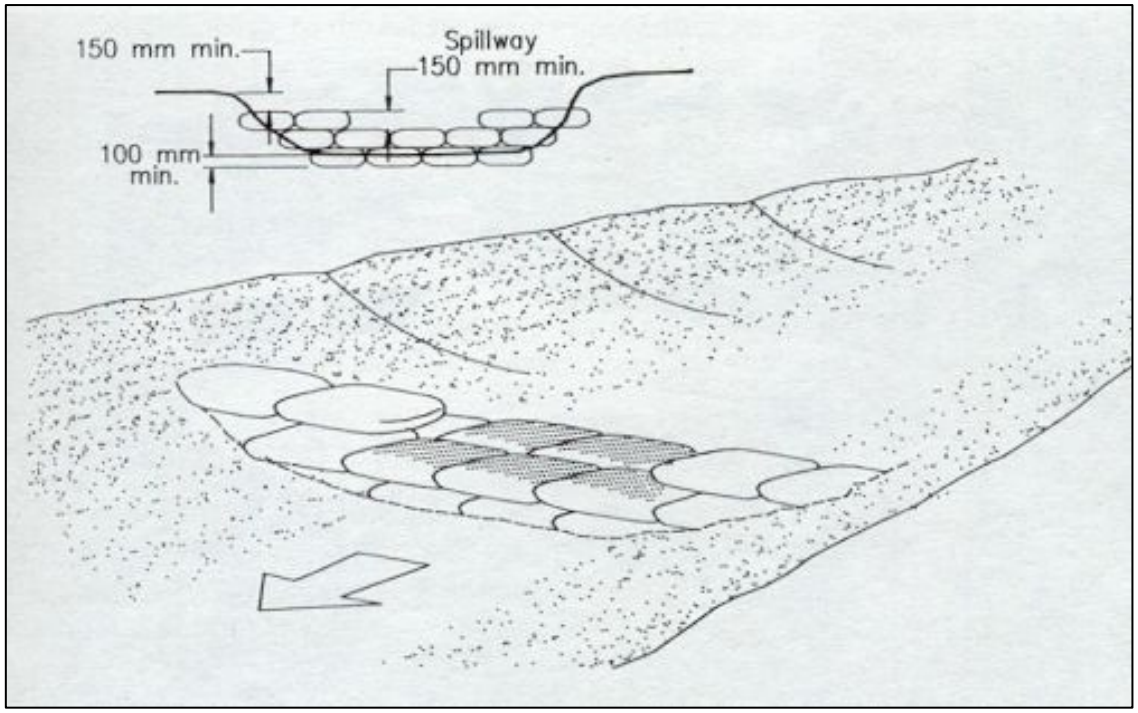

Figure A2.4: Diagrammatic representation of a sandbag sediment trap across the end of a mitre drain

- Basin sizing calculations has been undertaken for the S4 site in accordance with the procedure detailed in the "Blue Book" for Type F basins with due regard to the soil landscape unit present at the S4 site. The sediment basin for the S4 site will be constructed to a volume of 3000 m^3 (refer **Figure 1**). Operation of the sediment basin will be monitored on a daily basis as part of the site management protocol.