15. Land Management

This Chapter identifies land management issues related to the W2CP, the predicted impacts and mitigation measures that are proposed.

15.1 Visual Amenity

Andrews Neil Urban Design Group was engaged to prepare a visual impact assessment for the W2CP, based on the structures and surface facilities proposed as outlined in Chapter 2 of this document. The visual impact assessment is summarised below, while the complete specialist report is contained in Appendix K.

The existing visual landscape of the area surrounding the Tooheys Road site and the Buttonderry site has been considered. The construction of proposed infrastructure on these two sites will introduce changes to the visual environment. Potential viewing locations have been used to understand the visual impacts of the Project at a conceptual level.

15.1.1 Regional Visual Context

The Tooheys Road and Buttonderry Sites are located between eight and nine kilometres north of Wyong. The significant visual elements in the region are shown on Figure 15.1.

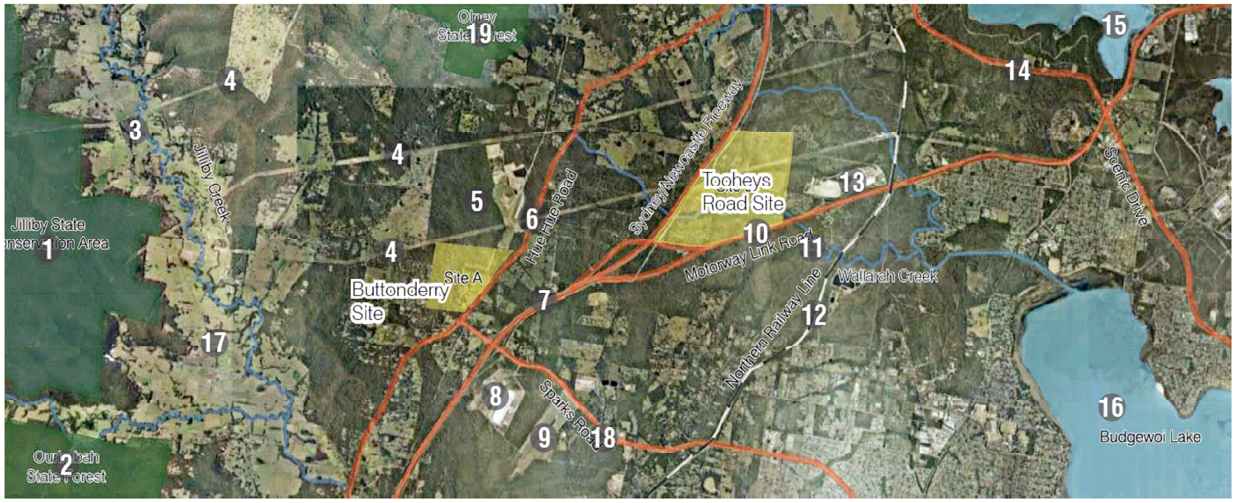
15.1.2 Buttonderry Site Visual Character

The Buttonderry site falls away to the east and northeast towards Hue Hue Road. There is a continuous ridge arcing around from the south towards the north. The density of tree cover falls off with the landfall, to the west of this ridge. The dense tree cover to the south of the site extends to the intersection of Hue Hue Road and Sparks Road. To the north, the dense tree cover extends for a number of kilometres and surrounds the swathe of cleared land of the Buttonderry Waste Management Facility.

The west-side arcing ridge-line mentioned above forms the north-eastern boundary of the rubbish tip, separating that boundary from visual exposure to Hue Hue Road.

Opposite the site on Hue Hue Road is an area zoned for industrial use. This parcel (Precinct 14) is part of the Wyong Employment Zone (WEZ). To the north of this is land owned by WACJV which extends to the F3 (Sydney – Newcastle) Freeway where it runs parallel to the Tooheys Road site.

An overhead transmission line and easement just north of the site runs westward across the Buttonderry Waste Management Facility, through land owned by WACJV and across the F3 Freeway into and through the Tooheys Road site.



1. Jilliby State Conservation Area & Wyong State Forest;
2. Ourimbah State Forest;
3. Jilliby Jilliby Creek;
4. Overhead Transmission Line Easements;
5. Buttonderry Waste Management Facility;
6. Hue Hue Road;
7. F3 (Sydney – Newcastle) Freeway;
8. Warner Industrial Park;
9. Warnervale Aerodrome;
10. Motorway Link Road;
11. Wallarah Creek;
12. Main Northern Rail Line;
13. Quarry and Ceramics Factory;
14. Wyee Road;
15. Mannering Lake;
16. Budgewoi Lake;
17. 'The Valleys';
18. Sparks Road; and
19. Olney State Forest.

Andrews Neil URBAN DESIGN GROUP

Figure 15.1 Key Visual Elements of the Region

15.1.3 Tooheys Road Visual Character

The landscape surrounding the Tooheys Road site is characterised by undulating farmland, dense native vegetation to the north (owned by the Darkinjung Local Aboriginal Land Council) and dense native vegetation to the south which is a mix of freehold and Crown Reserve. The F3 Freeway is located along the western boundary of the site and runs north to south. An overhead transmission line and easement runs across the northern part of the site.

The Motorway Link Road follows a ridgeline to form the southern boundary of the site. Beyond this the landscape has dense tree cover to (the unformed) Mountain Road. The land to the east of the site is generally lower-lying, while that to the west and north-west of the F3 Freeway consists of a series of consistently more elevated ridgelines.

Further to the southwest, the land lying between the Freeway and Hue Hue Road is generally lower-lying and comparatively cleared. To the northwest only the southerly slope below Bushells Ridge Road has been cleared. The ridgeline which passes through the site from its northwest corner to the mid-point of the eastern boundary, extends to the east as far as the Motorway Link Road.

Directly west of the site across the F3 Freeway lies land owned by WACJV. To the east is a clay quarry and tile factory that, along with the proposed W2CP development site at Tooheys Road, are identified in the State Government's Central Coast Regional Strategy as Constrained Employment Land.

The successive low ridges and valleys extending beyond the south of the Tooheys Road site and the Motorway Link Road are generally densely vegetated. The topography and vegetated state of this surrounding land provides a visual barrier for the lands dedicated for existing and future urban development area further to the south (refer Figure 15.1). For example, the separation distance between the Tooheys Road product stockpile location and the elevated parts of the Warnervale Town Centre development site will be over three kilometres.

15.1.4 Viewing Points – Buttonderry Site

The rezoning of all lands to the east of the Buttonderry site for the Wyong Employment Zone (WEZ) will make viewing zones and viewsheds in that direction compatible with the proposed development. The land immediately to the north of the development area is owned by WACJV and is not occupied by any dwellings. The Buttonderry Waste Management Facility is located beyond the northeast of the WACJV property.

In addition to a band of dense vegetation, there is a steep rise from east to west along the southern boundary of the site. This ridge and dense tree cover obscure views into the site from the south and the west. The views into the site are limited by existing vegetation and the topography.

15.1.5 Viewing Points – Tooheys Road Site

From the south, vegetation along the Motorway Link Road allows for filtered or no views into the site. From Bushells Ridge Road in the north, portions of the site are currently visible. From the F3 Freeway along the western boundary, intermittent, short distance views are available into the site, while the majority is screened by existing mature vegetation. To the east, visibility is restricted by dense mature vegetation.

The views into the site are limited by existing vegetation and the topography, however available views will be reduced dramatically through mitigation measures proposed as can be seen from the photomontages below.

Well beyond the filtered and partial views from the middle distance of the locally elevated Motorway Link Road there are no opportunities for significant views to the Tooheys Road site due to distance, intervening topography and existing vegetation. The proposed Warnervale Town Centre (WTC) development site occurs well to the south of the Tooheys Road site and over two and a half kilometres beyond the Motorway Link Road.

The visual character of the WTC and potential landscape issues associated with its development have been considered as part of the assessments undertaken for Landcom (*Visual Assessment Warnervale Town Centres*, AndrewsNeil, September 2005) and addressed in the State Significant Site Study, DOP, January 2008. The majority of the WTC development site slopes away from the Tooheys Road site direction which will not afford views to the W2CP surface facilities.

The remaining elevated areas in the north-west part of the WTC which have a northern aspect are bounded by mature vegetation that will mainly be retained in the approved urban development plan. Most views would be blocked or screened by higher buildings or vegetation. Any potential viewpoints to Tooheys Road from a building upper storey will be over a distance of approximately three kilometres. Such views would represent only a very small element of wide district views and would not be intrusive. The W2CP infrastructure at Tooheys Road would not intrude on the horizon line. Accordingly, there is no likelihood for significant visual interaction or impacts with the WTC. This is demonstrated by the limited visibility and impacts by major electricity transmission structures from that distance even though they often protrude into the skyline.

As can be seen from the photos below, there are very few publicly accessible vantage points to view the Tooheys Road site and these are only available from passing motorists on either the F3 Freeway or Motorway Link Road. The view would be intermittent and eventually screened by existing and proposed visual screen plantings.

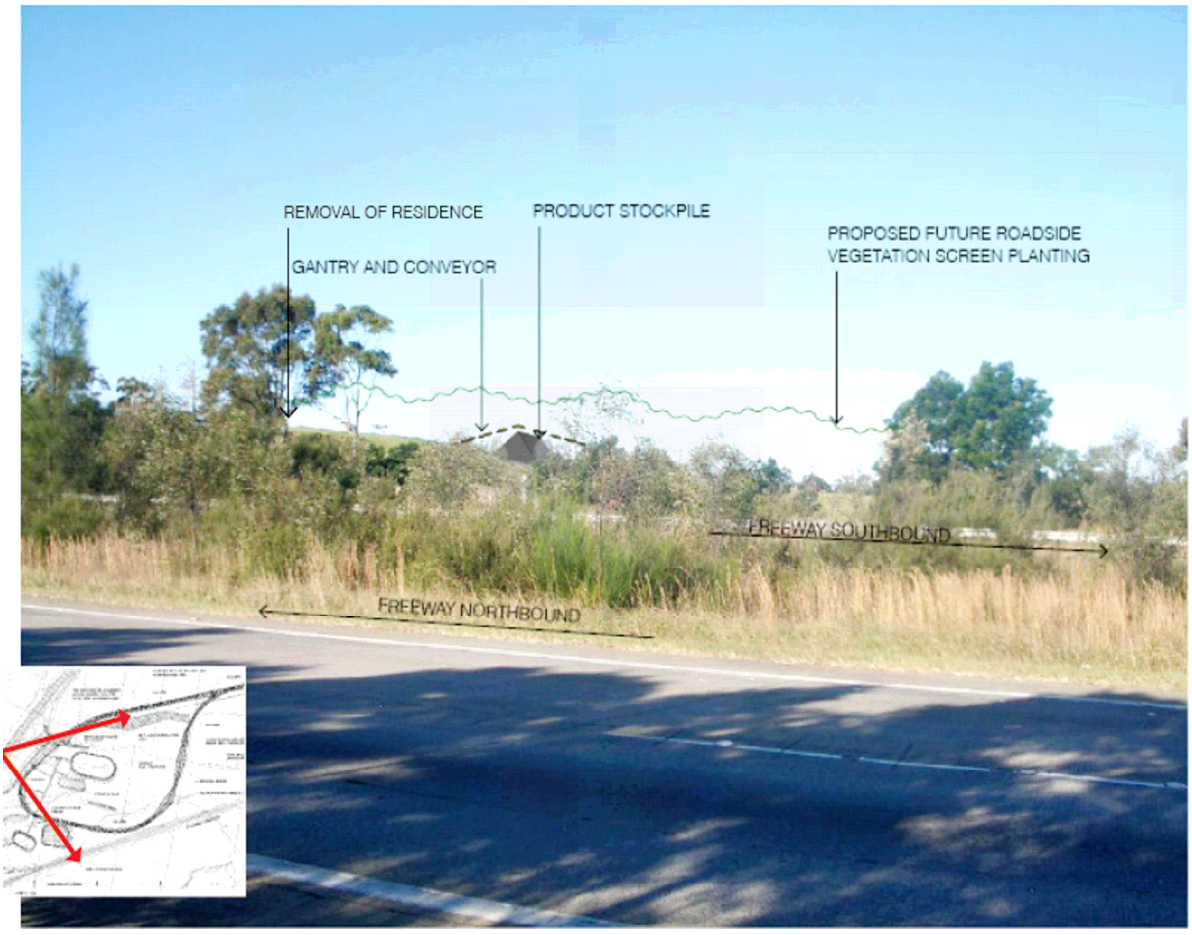


Figure 15.2 View from Northbound Lane of F3 Freeway

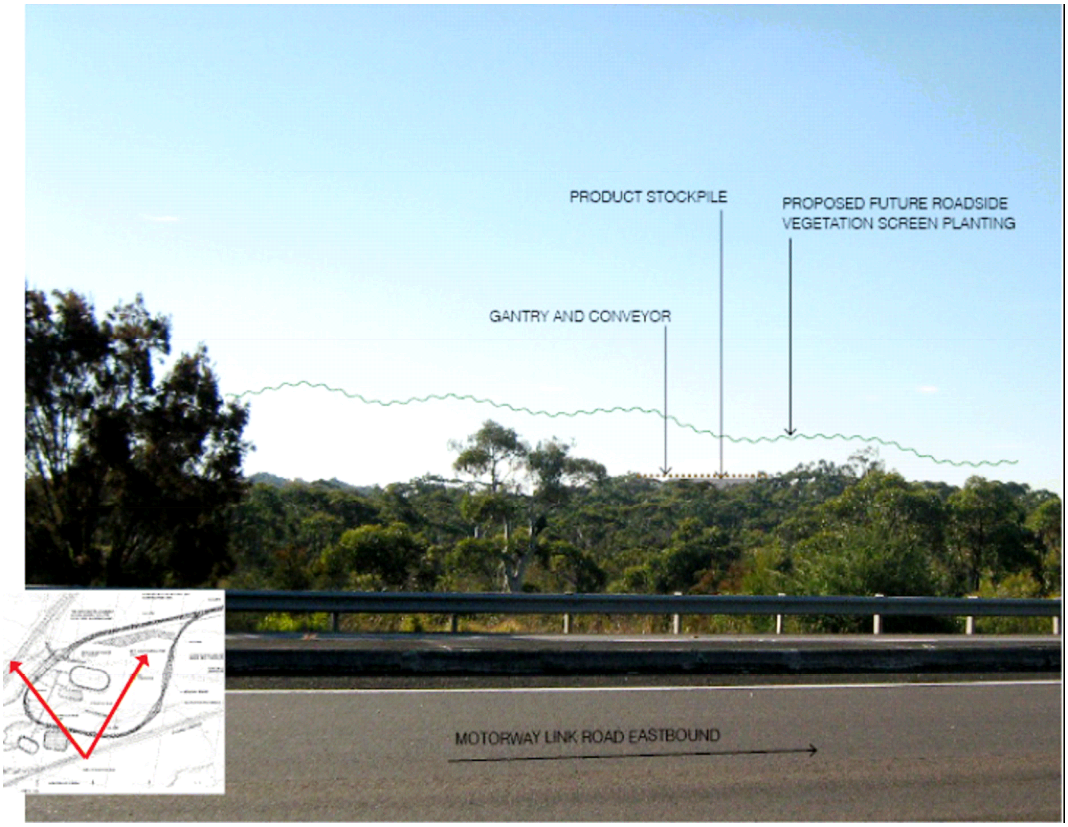


Figure 15.3 View of Tooheys Road Site from Motorway Link Road

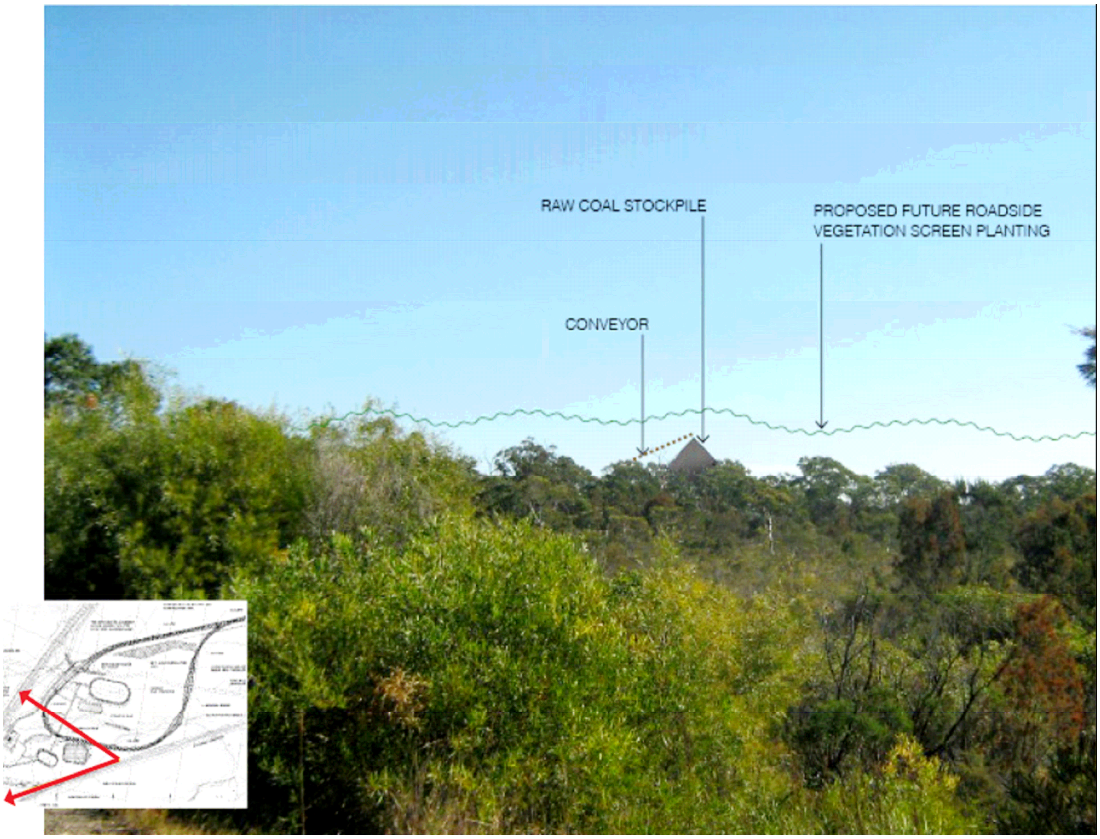


Figure 15.4 View of Coal Stockpile looking backward (to the west) from adjacent to Motorway Link Road

15.1.6 Visual Impact Assessment

In order to assess the visual impacts of the W2CP, the proposed infrastructure sites are compared to the existing fabric of the sites. These impacts are on the fabric, character and quality of the landscape, primarily concerned with:

- Landscape components;
- Landscape character;
- Special interests eg conservation or heritage sites; and
- Effects on people of the changes in available views through intrusion or obstruction and whether important opportunities to enjoy views may be improved or reduced.

The surface facilities for the project are likely to be visible from some public accessible vantage points and isolated residential locations. Possible infrastructure locations have been constrained by the increased development pressure in the local area and land acquisition issues. Also, the Wyong local community (as opposed to the region) has no traditional ties with the mining industry and the Central Coast is considered to be a tourist destination.

Most of the prominent surface facilities are to be sited on the Tooheys Road site. The rail line will be located on an elevated ridge but will be afforded some visual screening. This location will be visible to some nearby residents as well as people travelling along the Sydney-Newcastle Freeway. This is a main road and part of the National Road Network.

The main ventilation facility will be situated on the Buttonderry site, opposite a former rural residential area which has now been designated for future industrial development. The intervening natural topography will screen the ventilation and building facilities from any residential areas, however, it is likely that it will still be apparent from some public roadsides and other viewpoints.

Visual impacts of the proposed infrastructure are determined by assessing the location of the proposed facilities (and their characteristics such as height) in relation to the nearest residences. Representative viewpoints to the Tooheys Road and Buttonderry sites were selected according to most prominent views. Also, the visual impacts on other publicly accessible areas such as roads were considered. View points from key vantage points are shown are shown in Figure 15.5, Figure 15.6, and Figure 15.7. The most significant visual feature proposed on each site (as discussed above) was used to provide a conservative assessment of the extent of visual impacts.

Figure 15.5 View Across Tooheys Road Site from Key View Point on Bushells Ridge Road

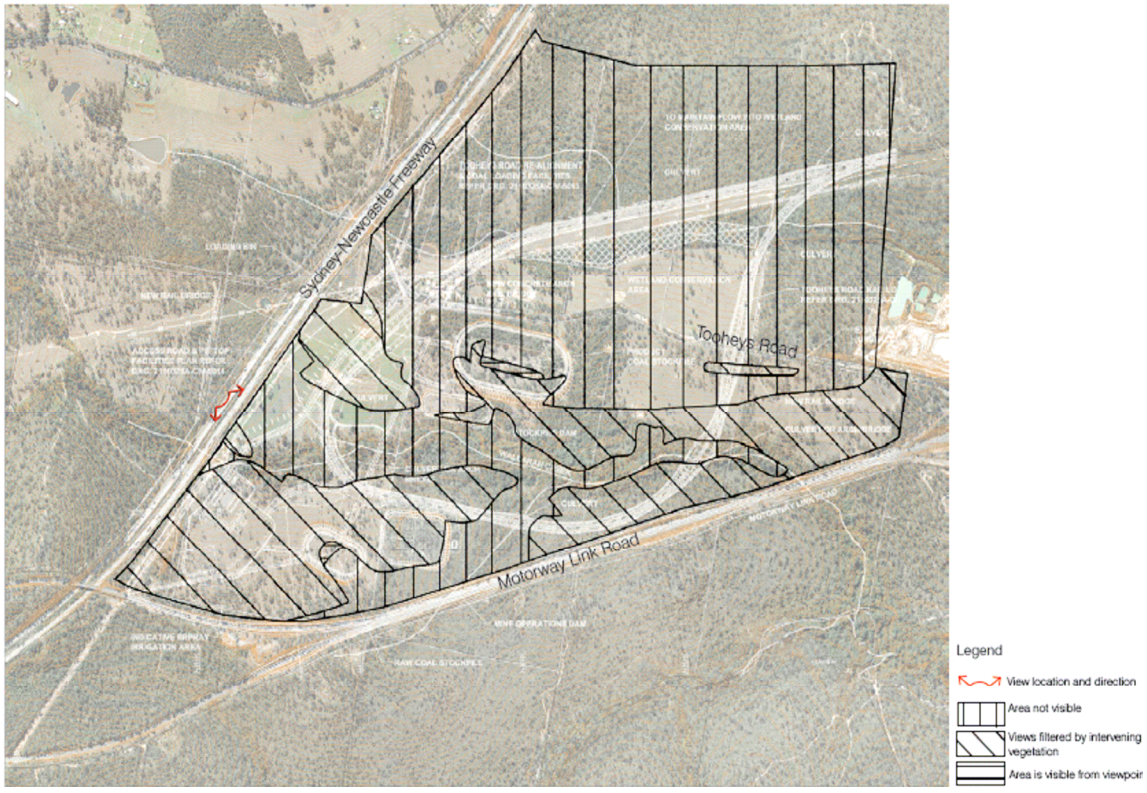


Figure 15.6 View Across Tooheys Road Site from Key View Point on the F3 Freeway

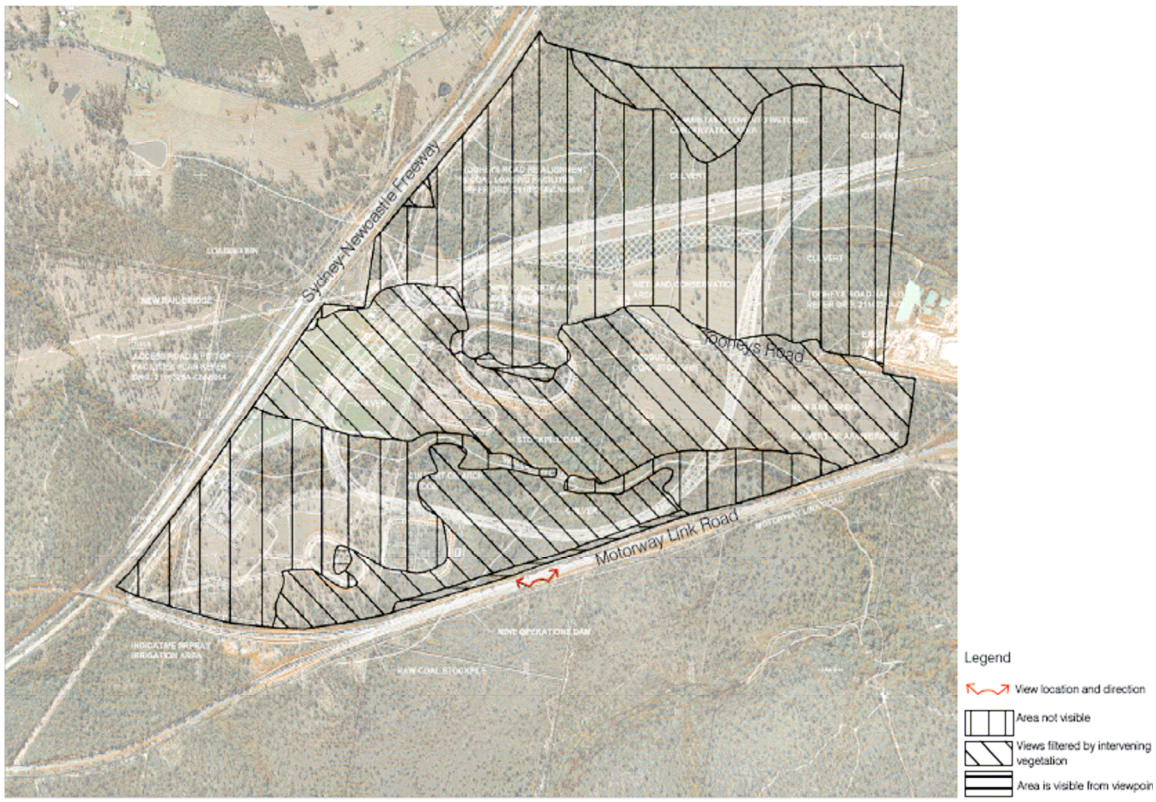


Figure 15.7 View Across Tooheys Road Site from Key View Point on Motorway Link Road

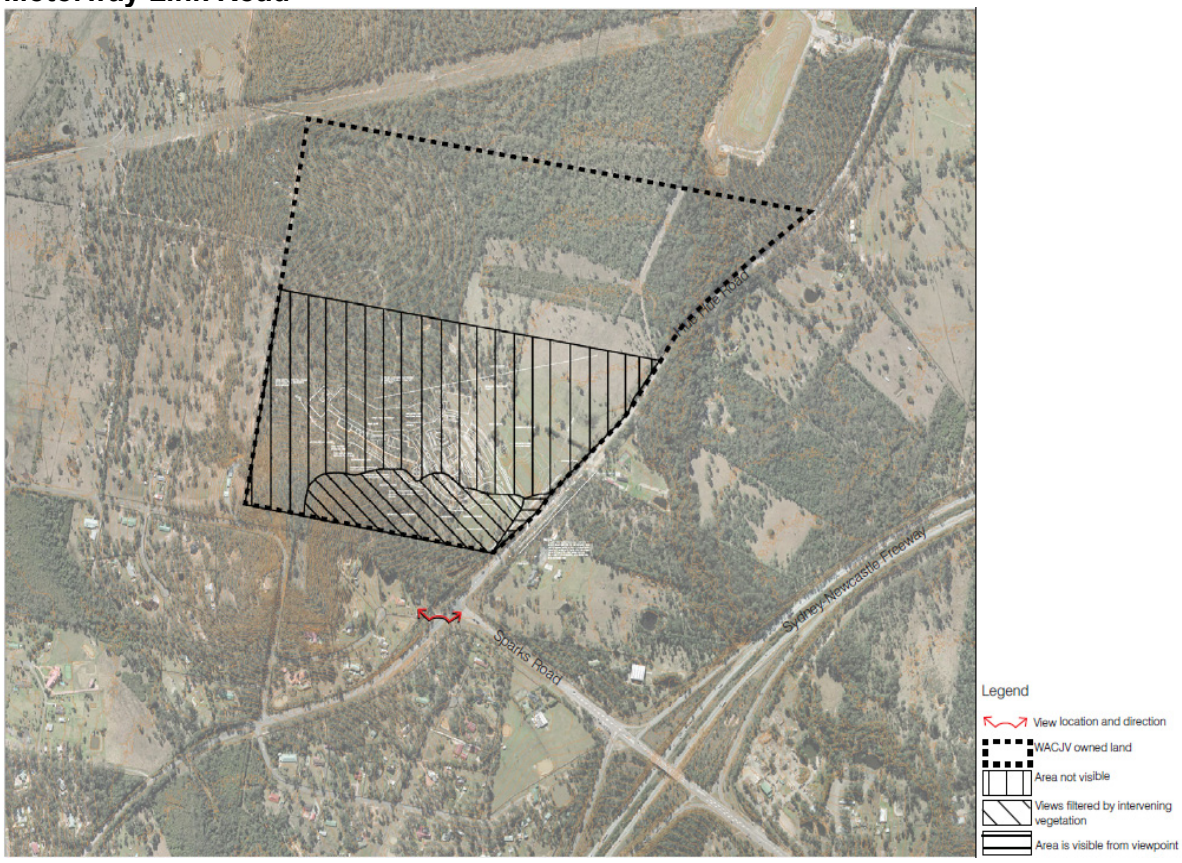


Figure 15.8 View Across Buttonderry Site From Key View Point at the Junction of Hue Hue Road and Sparks Road

The available views to the Buttonderry Site are quite limited as shown on Figure 15.8 and Figure 15.9.

Buttonderry Site

The changes to the existing landscape associated with the proposed facilities at the Buttonderry site include:

- ❒ Excavation for buildings and dams;
- ❒ Addition of hardscape elements and surfaces;
- ❒ Removal of existing trees;
- ❒ Cutting and filling to implement level changes for access, buildings and storage areas;
- ❒ Introduction of formal landscape elements; and
- ❒ Mass planted acoustic mound.

Based on these changes to the existing landscape at the Buttonderry site, it is assessed that the resulting impact will be moderate. The classification of the impact as moderate means that the site will have a visual impact on a limited area at a local scale, and may be mitigated during the detail design stage.

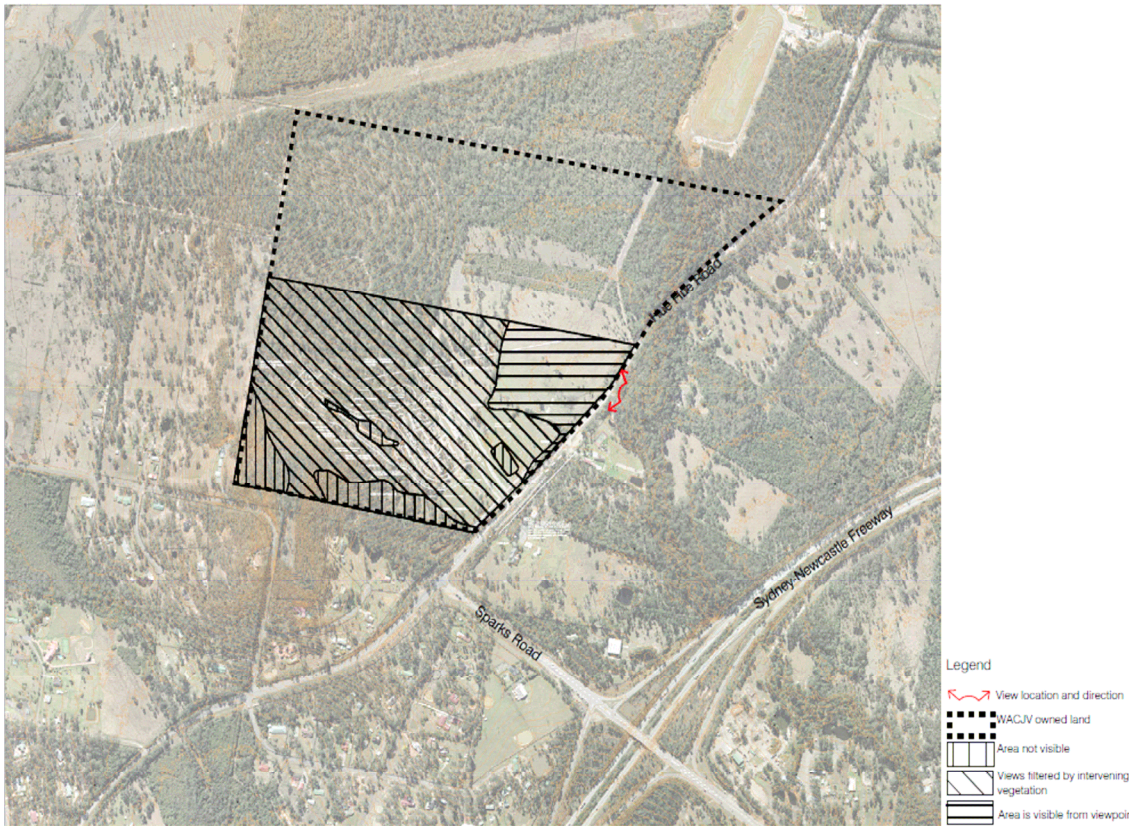


Figure 15.9 View Across Buttonderry Site from Key View Point from Hue Hue Road to the West

Tooheys Road Site

The impacts associated with the Tooheys Road site includes:

- ❒ Addition of hardscape elements and surfaces;
- ❒ Removal of existing trees;
- ❒ Cutting and filling to implement level changes for rail loop, access, buildings and storage areas;
- ❒ Formalisation of access to the site via Tooheys Road involving the introduction of railway bridges and the sealing of the existing road;
- ❒ Wallarah Creek will have engineered crossings for the access track and rail loop;
- ❒ Conveyor belts used in the transfer of coal; and
- ❒ Introduction of formal landscape elements.

The Tooheys Road Site can be viewed by traffic from two major roads:

- ❒ F3 Sydney-Newcastle Freeway – major roadway linking the cities of Sydney and Newcastle and provides the main access between Sydney and the coastal towns north of Sydney; and
- ❒ Motorway Link Road is also a main road for traffic travelling between Sydney and Newcastle.

The view of the proposed infrastructure on this site will be visually dominant, particularly to traffic travelling south along the Freeway and northbound traffic on the Link Road overpass over the F3 Freeway (the Wallarah Interchange). However it will only be visible for a few seconds assuming the viewer will be travelling at the speed limits of up to 110 km/h. A selective revegetation program and landscaping will assist in reducing the visual impact.

Bushells Ridge Road runs along Bushells Ridge to the north of the Tooheys Road site, linking Kiar to Doyalson. Viewers on Bushells Ridge Road west of the F3 Freeway may see intermittent views of the proposed infrastructure on the Tooheys Road site. This is particularly the case along the ridgeline near the intersection of Tooheys Road and Bushells Ridge Road. Viewers on Bushells Ridge Road east of the F3 Freeway are unlikely to experience views of the proposed infrastructure due to a vegetated ridge between the road and the site which will screen much of the infrastructure from view.

Tooheys Road currently traverses the main infrastructure site and therefore will be relocated as part of the development of this site. The road is used by local residents as a short cut between the Motorway Link Road and Bushells Ridge Road. The raw and product coal stockpiles will be dominant features along this part of Tooheys Road. Future vegetation screening and landscaping may offer some amelioration.

The proposed mine will operate 24 hours a day and therefore activity at night will require illumination of the site. To ameliorate traffic safety hazards, night lighting will be required to be directed away from the Freeway, Link Road and Tooheys Road.

15.1.7 Views from Travel Routes

Hue Hue Road provides an alternative access to Wyee from Wyong, via Kiar. The eastern boundary of the Buttonderry site is adjacent to Hue Hue Road. It is likely that viewers along Hue Hue Road will see the proposed facilities, unless further screening at the boundary of the site with Hue Hue Road is provided. It will be important to ensure that night-lighting of the facilities is screened away from Hue Hue Road. Tree planting was undertaken along the boundary of Hue Hue Road in July 2002, to assist in screening the proposed facility from the road.

Intermittent views to the Tooheys Road site will be available from the F3 Freeway, primarily when travelling north and from the Motorway Link Road when travelling east. Views into the site are limited by existing vegetation and topographical shielding. These sight lines however are recongnised in the landscape design and will be progressively screened by tree plantings on elevated landscape bunds.

15.1.8 Mitigation Measures

The primary mitigation measure has involved the careful location and layout of the two main infrastructure sites to avoid visual intrusion. Intermittent views of the Tooheys Road site from the F3 Freeway and Bushells Ridge Road will not be significant.

In addition to enhancing the existing tree planting along Hue Hue Road undertaken in July 2002 in order to screen the Buttonderry site facilities, further tree screening is also planned for the Tooheys Road site during the construction phase. The main tree screens will be developed on the western and southern side of the development on bunds created during the construction phase. This work will further assist visual screening from motorists as well as residences.

Artist impressions of the Buttonderry site are provided as Figure 15.10 and Figure 15.11. This shows the typical architectural treatments available for this site as well as the very limited views available from Hue Hue Road.

Figure 15.10 Artist Impression of Buttonderry Site

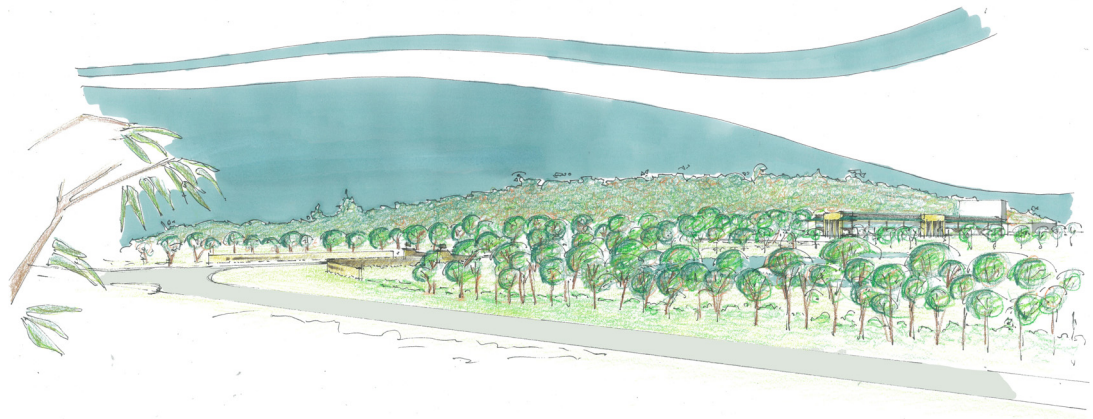


Figure 15.11 Artist Impression of Buttonderry Site from Hue Hue Road

More specifically, mitigation measures to be employed at the Buttonderry site include:

- The proposed detention dam will be screened with selective planting to form a landscape feature, while still functioning as a mine pollution control system;
- Dense mass planting of endemic species will screen the majority of the site from view;
- Species proposed and formal landscape design will reflect the existing landscape character;
- Acoustic mound will screen and deflect noise associated with activities occurring on the site and act as a visual screen;

- There is a possibility to design the entry road to retain existing landscape and prevent direct views into the site;
- In the area to the west where it is proposed to retain the existing vegetation, a maintenance program will be implemented; and
- The proposed buildings and infrastructure will be of a consistent character with the proposed business park located opposite.

Mitigation measures to be employed at the Tooheys Road site include:

- Retention of vegetation along road fronts and riparian corridors and supplementary planting to thicken existing vegetation;
- Dense mass planting of endemic species on site to screen buildings from view;
- Dense mass planting of endemic species are proposed to screen coal conveyor belts;
- Dense mass planting of endemic species to screen dams on site from view.
- Retain vegetation along Tooheys Road and use erosion control measures where disturbances occur. Proposed bridges to cross rail line will not be visible below the cutting;
- Riparian vegetation will be retained and a maintenance program will be implemented to further enhance the riparian zone;
- Removal of the existing residence will create a more consistent landscape panorama; and

Overall site masterplans have been prepared which detail the above proposals for both the Buttonderry and Tooheys Road sites. These are shown as Figure 15.12 and Figure 15.13

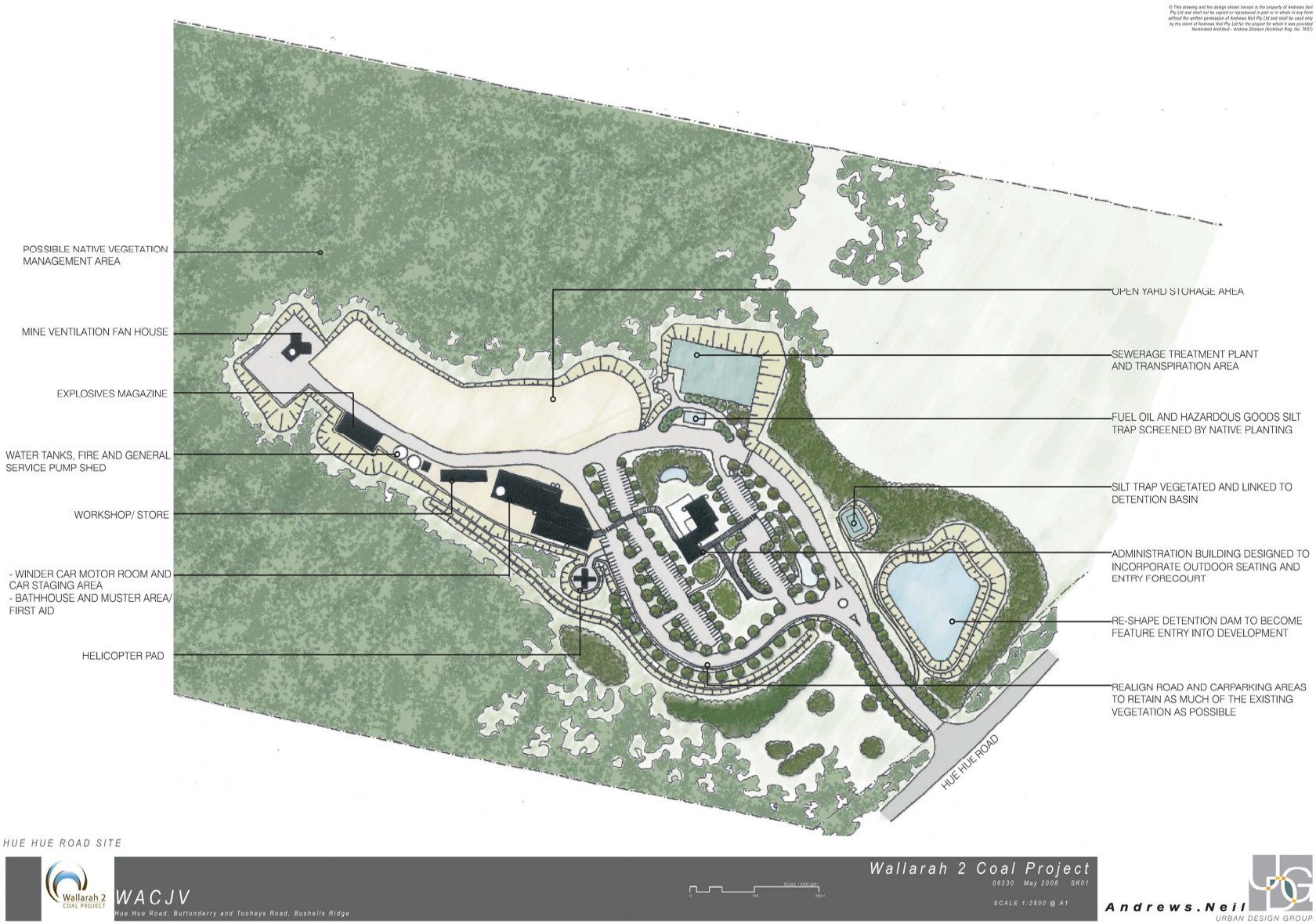


Figure 15.12 Buttonderry Site Master Plan

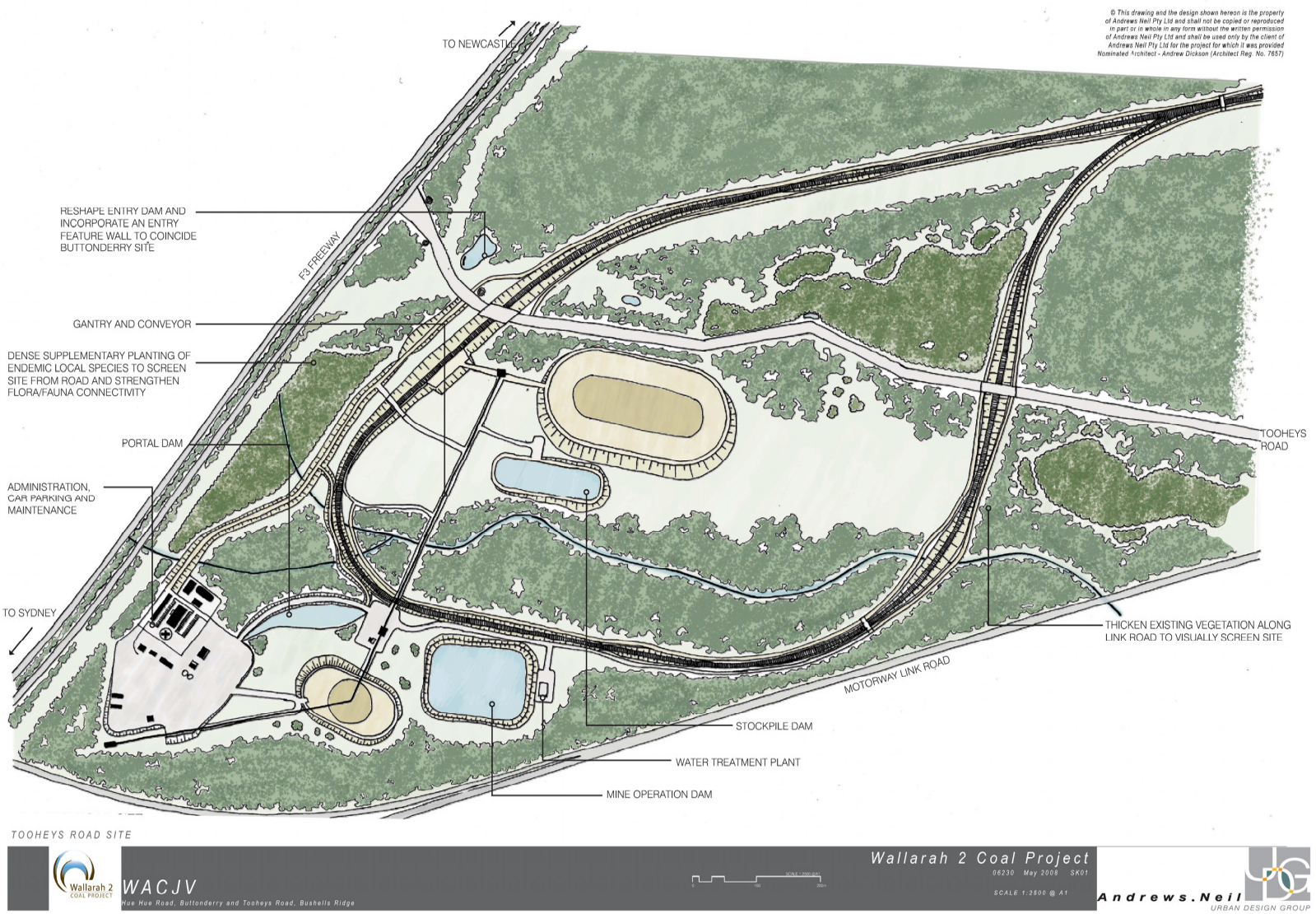


Figure 15.13 Tooheys Road Site Master Plan

15.1.9 Visual Amenity Conclusion

The findings of the visual impact assessment are that the sites have a consistently moderate rating in the areas of Scenic Quality, Visual Absorption Capacity and Visual Impact Rating. This means that the sites in their existing states are not particularly significant, there are no heritage items to be considered and the landscape is consistent and typical of the area surrounding the sites. Also, the landscape will neither completely conceal nor expose the proposed development but has the ability to soften the visual impact from outside the boundaries of the sites prior to mitigation.

However, in conjunction with the proposed mitigation as shown in the Landscape Concept Masterplans, the visual impact will be reduced to low levels. The Landscape Concept Masterplans for the sites show a sensitivity to the issues of scenic quality and visual impact. The mitigation measures proposed will include the continuation and enhancement of the endemic vegetation, and the design intention is to screen the major built components from identified key viewpoints. This proposes that both sites receive supplementary planting of endemic species to thicken existing screening vegetation. This will result in more effective screening of the sites from major transport arteries and identified key view points as well as providing stronger flora/fauna connectivity across the sites.

Additionally, the Buttonderry site has a proposed utility dam that will be landscaped in such a way that it can become an aesthetic landscape feature. An acoustic mound, which is proposed to be mass planted, will also continue and thicken the proposed screening.

The assessment has also shown that both the Tooheys Road and Buttonderry sites are well located from a visual impact perspective having few publicly accessible vantage points. The Tooheys Road site cannot be viewed from Blue Haven and the proposed Warnervale Town Centre development site occurs over 2.5 kilometres south of the Motorway Link Road.

15.1.10 Implications from Strategic Inquiry

The 2008 report produced from the Strategic Inquiry found that:

"The Panel does not consider that visual impacts will be a significant constraining factor for any potential development of mine surface facilities at Tooheys Road, or for the mine ventilation shaft and access facilities at Buttonderry"

15.2 Land Use and Regional Context Analysis

A Regional Context Analysis was prepared by Andrews Neil Urban Design Group which is contained in full as Appendix J. The assessment concluded that the proposal is compatible with the strategic planning for the region which has recognised the importance of the location for resource extraction and employment generating purposes since the 1977 Structure Plan to the 2008 Central Coast Regional Strategy.

The subregion containing the project area accommodates several significant types of land use ranging from light industrial, commercial and housing developments to small townships and small acre farms. Major transport routes traverse the area near the W2CP including the F3 Freeway, Motorway Link Road and the Main Northern

Railway Line. The western area features heavily timbered hills most of which are included in State Forests.

The sites proposed for the W2CP surface facilities were purchased several years ago by the WACJV. Advice was sought from Wyong Shire Council at the time to ensure that the sites met the requirements of local and regional planning.

With the proposed long term use of these properties as surface facilities areas for the mine, they have been maintained in a rural residential style, however some of the properties have been occupied and grazing land use has generally continued. Regular slashing of paddocks, weed control and general maintenance has been carried out.

15.2.1 Planning Strategies for the Central Coast

Gosford-Wyong Structure Plan 1977
The Gosford-Wyong Structure Plan was prepared by the then NSW Department of Environment (now DECCW) to address medium and long term urban development needs in Wyong Shire associated with the expansion of Sydney. Three structure plans were proposed. The three structure plan models were the "grid", the "radial corridor" and the "linear". The radial corridor was considered to be the most appropriate, however, all three plans provided for a concentration of future growth in the Warnervale area.

The plan also recognised the existence of "significant coal reserves" and the potential for mining resources in the region:

"some significant pockets of natural resources exist within the future urban boundary and to enable future extraction these must be protected from urban development... the aim has been to avoid sterilising these resources"

The structure plan identified the Tooheys Road site for urban development however this was later refined following the recognition of the potential for mining in the region.

Draft Sydney Regional Environmental Plan - Wyong Development Areas and Coal Mining
By the mid 1980's concern was raised that future residential development would be in conflict with any future underground coal mining activities. In 1986, the government formed a working party to resolve the conflicts between urban development requirements and the need to manage the coal resource and in 1987 released draft Sydney Regional Environmental Plan – Wyong Development Areas and Coal Mining. It should be noted that the draft Sydney REP has since been superseded by more recent strategies. However the precinct numbers and names are still used for general reference by Council, consultants and developers.

The overall purpose of the draft REP was to ensure that the sequencing of underground coal mining did not conflict with the release of land for urban development. The general aims of the draft REP were to identify medium-long term urban development areas and to maximise the potential for the recovery of major coal resources of economic significance to the State.

Urban Development Program 1988
The Urban Development Program (UDP) is a State government program that coordinates the planning and servicing of new residential land in identified urban

release areas. The UDP provided a five year development program within the longer term framework of the Metropolitan Strategy for the Greater Sydney Region.

The UDP for 1988 was adopted by Council as the overall staged investigation and release of new areas for residential development in Wyong Shire. Changes in the timing and release of some areas had to be altered due to coal mining activities and service availability.

Infill release areas at Gwandalan, Blue Haven and Kanwal were rezoned in 1989/1990. Greenfield release areas at Warnervale East and Wadalba North-West were subsequently released in 1993. In 2002, the Warnervale East area (precinct 7b) and Wadalba North West (Precinct 8c) remained the main area of future supply of residential lots in the Shire. Overall, more than 8000 residential lots in the UDP areas plus 1300 non-UDP lots have been created since 1988 (refer Figure 15.14 for location of UDP release areas).

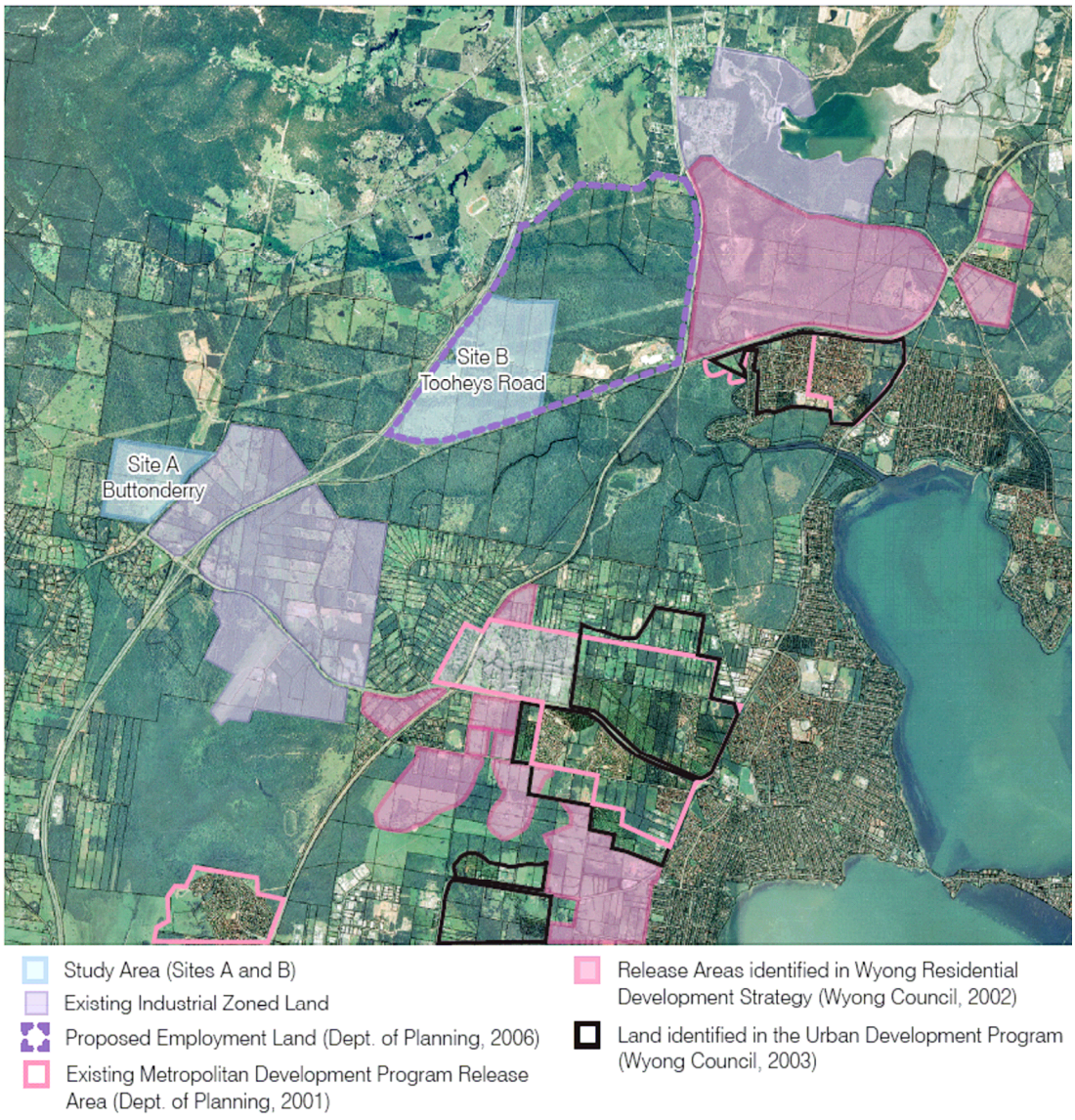


Figure 15.14 Urban Development Program and Wyong Residential Development Strategy Release Areas

The proposed W2CP surface facility sites were excluded from the UDP because of the potential for mining activity.

Cities for the 21st Century 1995
Cities for the 21st Century reviewed the 1988 Metropolitan Strategy and provided a framework for future planning and management in the Greater Metropolitan Region of Sydney, Newcastle, the Central Coast and Wollongong.

While the strategy was aimed at the broader region of Sydney, Newcastle and Wollongong, it identified the Central Coast as one of the major growth areas of the region. The document recognised that a considerable amount of regional planning had been previously undertaken in the Gosford-Wyong Structure Plan of 1975, and reaffirmed the importance of "*acknowledging the region in its own right*" in order to provide "*the need to stimulate employment growth and to address the existing high unemployment levels"* experienced by its residents. Section 117 Ministerial Direction No. 4 – Central Coast provided for the implementation of Cities for the 21st Century in order to apply the principles of more compact cities and sustainable regions.

The W2CP is consistent with the document as it provides for a high level of employment growth not only from the coal mine construction and ongoing operation (over 40 years), but also in terms of the flow-on effects to the surrounding centres with the development of industries traditionally associated with coal mining. This will assist in the Central Coast developing into a '*region in its own right*' as the dependence on supply of these activities from other centres, mainly Sydney and Newcastle, will be reduced.

Shaping the Central Coast 2000
In early 2000, the then Department of Urban Affairs and Planning exhibited Shaping the Central Coast which noted a number of issues experienced in the region arising from rapid population growth as follows:

- A shortage of jobs and vulnerability to economic downturns;
- Lags in the provision of human services and public transport;
- Loss of biodiversity and open space to urban and rural uses;
- Estuarine and lagoon water pollution as a result of urban development and runoff; and
- A sense of being overshadowed by Sydney and a lack of regional autonomy.

Proposed settlement outcomes identified in the strategy include a compact, efficient and ecologically sustainable urban form, increased local employment opportunities with a compatible mix of residential, commercial and other uses and a built environment designed and constructed to a high quality.

Future development opportunities in Wyong Shire were reduced considerably with the Shaping the Central Coast plan indicating a smaller development footprint than was previously provided for in the 1987 draft REP - Wyong Development Areas and Coal Mining.

Key strategies of Shaping the Central Coast included development in new areas to have a higher level of human services, environmental protection, accessibility, employment, amenity, energy efficiency and quality urban design than previously required.

"Shaping the Central Coast" was adopted by the NSW State Government in 1998. However, in recognition of the lack of mechanisms for its implementation, neither Gosford nor Wyong Councils have formally adopted the plan until the State Government developed a relevant Action Plan. A draft Action Plan was subsequently prepared in 2003 by both Gosford and Wyong Councils. One of the key goals to assist in achieving the plan is 'Investing in the Economy'. The outcomes to meet this are:

- Employment choice and income opportunities
- Business opportunities
- Diverse and robust economy

These outcomes are to be met through creation of local jobs, encouraging employment-generating development, encouraging local economic development initiatives, relocating jobs to the region and targeting employment in specific industries. The W2CP is consistent with the direction of the Plan and Actions as it provides a high level of local employment and encourages the development of the Central Coast as a region that is able to provide its own major services, reducing the demand on surrounding centres.

Whilst Wyong Council has adopted the draft Action Plan, the State Government has not.

Wyong Residential Development Strategy 2002

The overall purpose of the Residential Development Strategy is to ensure that residential development in Wyong Shire can proceed in accordance with expected growth rates and over-arching strategies such as Shaping our Cities, SEPP 53 - Metropolitan Residential Development, Draft SEPP 66 - Integration of Land Use and Transport, the Urban Development Program and Metropolitan Urban Development Program.

Of the areas designated for growth, only 282 of the proposed 15,829 lots are outside areas identified in Shaping the Central Coast as "urban districts". The sites identified for development of the Wallarah 2 Coal mine are not identified for residential development.

The latest Metropolitan Development Program (MDP) figures released by the Department of Planning are from 2002. The five year MDP program estimates lot production for the Sydney region for the 5 years 2003-2008 of 33,145 lots. This includes the Central Coast. Wyong LGA lot production is forecast as 2,310 lots or 6.9% of this MDP total.

Although the northern section of Wyong Shire is designated as the area to receive the greatest growth on the Central Coast, the proposal does not disrupt the program as no residential development is scheduled for either site or within two kilometres of the Tooheys Road surface facilities.

The expected growth for the region requires a large job base. The proposal provides a substantial opportunity to address this matter through the provision of employment and flow on effects to the centres by way of support services that traditionally locate in close proximity to mine operations. In this way the proposal will act as a catalyst for community development on a large scale.

Draft Wyong Conservation Strategy 2003
The draft Wyong Conservation Strategy was prepared by Wyong Council in 2003. Council staff are currently reworking the draft Strategy.

The areas earmarked for employment lands and residential release were generally excluded from the Conservation Strategy to be consistent with current policy settings within the region and Wyong Shire as a whole. In this way, the model for the Conservation Strategy was set up to avoid making conservation targets in certain locations identified as being of strategic, social or economic significance to Wyong Shire. The Tooheys Road site (identified as Site B on Figure 15.15) is identified as a 'High' social/economic development priority to the region and was excluded from the Conservation Strategy. The Buttonderry site (identified as Site A) was not included in the Conservation Strategy study.

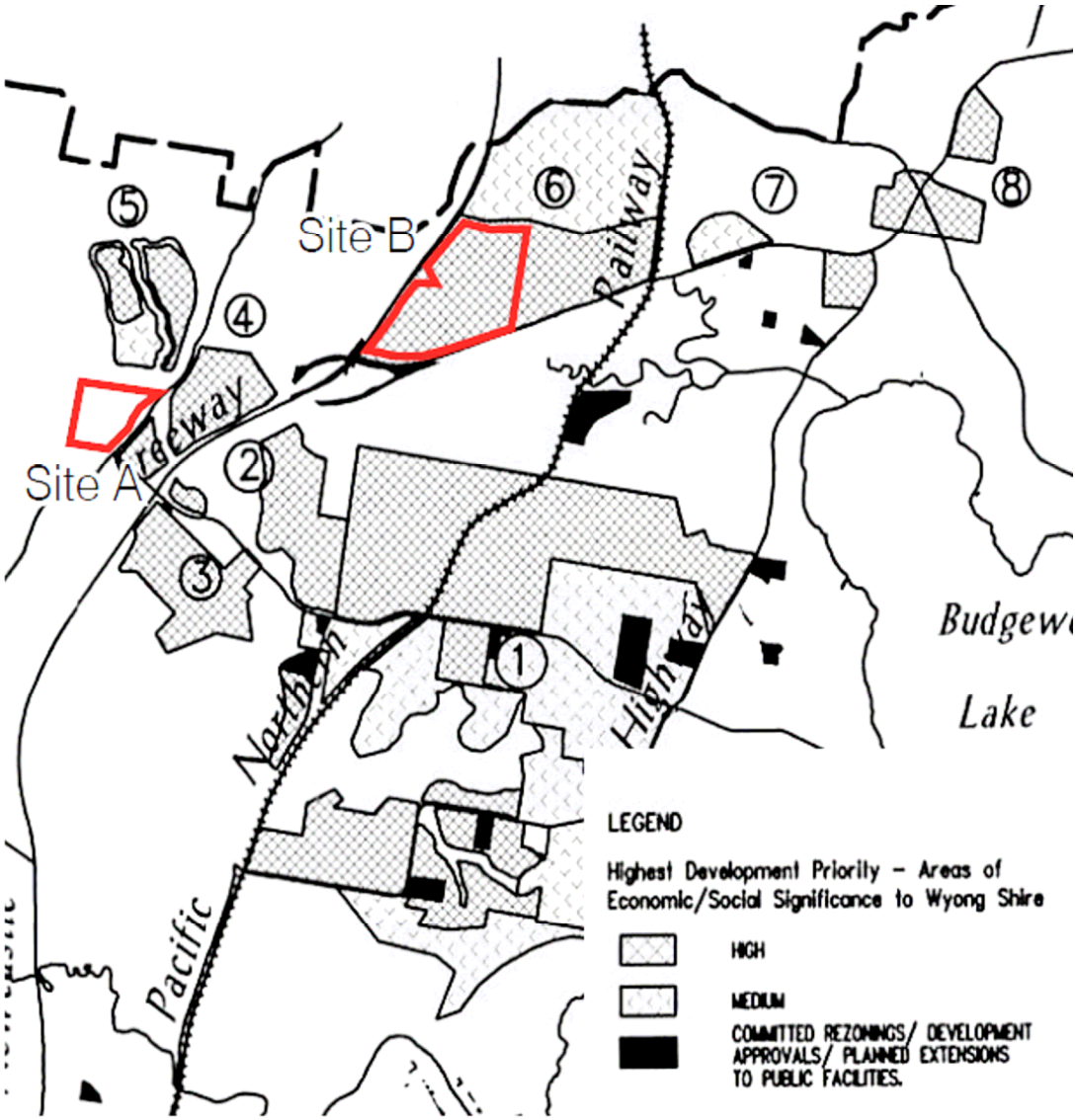


Figure 15.15 Draft Wyong Conservation Strategy (WSC, 2003)

Warnervale District Strategy
Warnervale has been identified as a major growth area since the release of the Sydney Region Outline Plan in 1968. Warnervale District Centre is currently being

planned as part of the Warnervale Area Planning Strategy. It is a joint project between Wyong Council and the State government. The new district centre will be located in an area west of Hiawatha Road, south of Hakone Road, north of Sparks Road and east of the Bruce Crescent rural residential area.

In accordance with the regional strategy, Council, the Department of Planning and the Department of Transport have completed an Urban Area Strategy for Warnervale (the Warnervale District Planning Strategy) and have commenced an Urban Design Masterplan for the proposed new district centre at Warnervale. The centrepiece of the district centre is to be a new railway station and interchange with retail and commercial development, district level community and recreation facilities, government agency services and medium and high density residential development in a surrounding mixed use core area. This new transport and activity hub will be the urban development focus for northern Wyong Shire and is to be the centre of the urban district.

On 7 November 2008, the Warnervale Town Centre (WTC) Amendment 24 was gazetted for inclusion in the State Environmental Planning Policy (Major Development) 2005 as a state significant site. Zoning for this area has now been configured to enable achievement of the objectives and targets of the Warnervale District Strategy.

Development near the new centre will be medium to high density housing, appropriate within close proximity to a major transport node. The proposal is appropriately located to provide employment to the developing centre.

Wyong Shire Management Plan

Generation of local jobs is highlighted as one of the key focus areas of the Management Plan for the Shire. The document reveals that more than 24,000 residents are currently employed outside the Shire and that in June 2008 Wyong Shire's unemployment rate is historically 2-5% above that for NSW (7.6% compared with 4.6%).

The plan aims to reduce the pressure on people to commute outside the area for work and facilitates local economic development by creating an environment in which industry can be competitive through the rezoning of land for employment-generating purposes. The Management Plan aimed to get unemployment down to 7.5% for the 2007/2008 period. Once construction begins, the proposal can assist in achieving this rate which is still well above the NSW benchmark figure of 5.0%.

It is anticipated that the mine will have a life in excess of 40 years. Employment over this time will engage approximately 300 directly in the workforce participating in mine operations and a further estimated 750 jobs indirectly, through businesses benefiting from the mine development.

As part of the W2CP, WACJV proposes that a Community Enhancement Program be implemented (as part of a Voluntary Planning Agreement) following final project approval. WACJV will organise a Community Trust which would be chaired by a suitably qualified person nominated or approved by the Department of Planning. It is envisaged that members of the Trust will represent the local community, wider community, small and large business within the Central Coast.

The W2CP will work with Wyong Council and relevant educational institutions to implement training and education programs for the project as well as to facilitate local employment opportunities within the Wyong Shire. The formation and funding

of the Trust has been discussed with the Community Liaison Committee and suitable local projects and environmental enhancement programs have been sought. The program is to be refined closer to project finalisation.

Central Coast Regional Strategy 2006-2031
The Central Coast Regional Strategy was prepared by the Department of Planning consequential to the release of the Sydney Metropolitan Strategy in 2005. The document was finalised in July 2008.

The Strategy provides for Wyong Shire's population to increase and to surpass that of the Gosford local government area (anticipated to occur in 2016) and the greatest challenge is to create local job opportunities to match labour force growth.

Key features of relevance to the proposed W2CP include the development of Tuggerah-Wyong as the major centre for Wyong Shire and diversifying precincts around the centre. The proposal complements this outcome by providing the basis for local employment near the centre as well as promoting the growth of the centre by those industries that benefit from coal mining development.

The project will create 300 jobs directly of which around 70% which could be recruited locally. It is anticipated that a minimum of 750 additional jobs will also be created indirectly from follow on development in the centres and support businesses elsewhere. The growth of employment on the Central Coast will achieve the desired outcome of self containment as the reliance on Sydney/Newcastle will be reduced.

The proposal represents a major development that will add to the region's existing resource base which, in turn, will drive new employment opportunities. This will increase competition positioning between Sydney and Newcastle for industrial and logistics businesses.

SEPP (Major Projects) 2005 Amendment 21 - WEZ
The Wyong Employment Zone (WEZ) was gazetted as a State significant site as part of the SEPP (Major Projects) 2005 on 7 November 2008. The WEZ is located adjacent to the Sydney-Newcastle Freeway at the Sparks Road interchange and totals 744 ha in size. It is bounded by Porters Creek Wetland to the south, bisected by Sparks Road and bordered by Hue Hue Road to the west.

Of the 744ha of land, approximately 340 ha are proposed for development, with the remainder identified and zoned for environmental conservation and water management purposes. This will enable treatment of stormwater and maintenance of wetting and drying cycles downstream in Porters Creek Wetland.

The WEZ is of regional importance having been identified in the Central Coast Regional Strategy for employments lands. The introduction of the WEZ will assist in delivering employment targets as set out in the Central Coast Regional Strategy.

At present, there are few large areas of contiguous parcels of industrial land within the Central Coast available which can accommodate the needs of large firms and industries. The purpose of the WEZ is to provide such an area which promotes economic development within Wyong Shire. The rezoning of the site enables a wide range of employment generating industrial, manufacturing, warehousing, storage and research purposes.

It is anticipated that the area will facilitate approximately 6,000 local jobs and generate a minimum of $1.5 billion of investment in the Central Coast economy.

The western extent of this State Significant Site is located adjacent to the Buttonderry Site, on the eastern side of Hue Hue Road. The W2CP proposal will significantly assist in the achievement of the above mentioned employment targets. The Central Coast Research Foundation has estimated that 2,989 jobs (totalling 5,125 'job-years') are expected to be created on the Central Coast as a result of the mine's three year construction phase. Over 1,800 jobs will be created in the first year of construction alone. In the mine's first year of operation it is expected to generate an additional 428 jobs in the Central Coast economy which will rise to 726 jobs at full production. A further 336 jobs in the Hunter Region will be sustained by the project during operations.

The total potential expenditure in the Central Coast economy from the three years of the mine's construction is expected to be approximately $600 million. This will create a total stimulus to the Central Coast economy of over $1 billion during the construction phase. On top of this will be significant ongoing direct expenditure and flow-on effects to the local economy in the order of $200 million per annum. Total revenue to Governments over the life of the project will be over $1 billion.

SEPP (Major Development) 2005 Amendment 24 - WTC

The Warnervale Town Centre (WTC) was gazetted as a State significant site as part of the SEPP (Major Development) 2005 on 7 November 2008. The WTC is bounded by Hakone Road to the North, Hiawatha Road to the east, Sparks Road to the south and extends west of the Great Northern Railway Line.

The site consists of approximately 119 ha, of which 79 ha are proposed for development with the remainder to be utilised for public recreation, environmental management and conservation.

The rezoning of the WTC site will assist in delivering the housing and employment targets as set out in the Central Coast Regional Strategy and Metropolitan Development Program by providing housing for up to 5,000 residents and servicing over 40,000 people in the broader Warnervale area.

The Wallarah 2 Coal Project is ideally located to provide employment opportunities for this developing centre without any adverse impact.

15.2.2 Impact on Planning Strategies

The proposed Wallarah 2 Coal Project is consistent with the relevant planning strategies applicable to the region. The level of employment generation, potential for export of surplus water and electricity services, community growth and support initiatives and flow on effects to the surrounding centres in terms of business growth, are advantageous to the developing north Wyong area and indeed the Central Coast as a whole.

There is to be no significant negative impact on the closest residential area of Blue Haven in terms of acoustic or air quality. Appropriate design measures have been taken to ensure that the visual impact of the development of both sites is not significant. In particular, the development of Buttonderry site, will appear as a business park style development and not like a mine development at all, in keeping with the expectations of the adjacent Wyong Employment Zone.

15.2.3 Mining and Resource Recovery

Available natural resources have lead to the establishment of a number of extractive industries in the north of the region with coal mining being a major source of local income. The eleven underground mines currently or recently operating are:

- Mandalong Colliery;
- Cooranbong Colliery;
- Newstan Colliery;
- Chain Valley Bay Colliery;
- Moonee Colliery;
- Wallarah Colliery;
- Endeavour Colliery;
- Myuna Colliery;
- Awaba Colliery;
- Munmorah Coal Mine; and
- Wyee Colliery (Mannering).

15.2.4 Industry

The Shire supports three main industrial/commercial centres. Enterprise Drive (Tuggerah Business Park) straddles Ourimbah Creek and links the southern lake areas with Tuggerah. The Tuggerah Strait commercial area is also close to Tuggerah, whilst the North Wyong Industrial Area links Watanobbi to the newly developing Warnervale area. Council is focussing on expanding industrial and commercial development in the Warnervale/Sparks Road area, and the Tooheys Road area. The Tooheys Road area is currently designated for large industrial enterprises and has been zoned accordingly. The Tooheys Road site for the project which will house the main surface infrastructure is located within the Bushells Ridge Precinct.

15.2.5 Forestry

State Forests dominate this area known as 'the valleys'. The connected Wyong and Olney State Forests, parts of which have been transferred into a State Conservation Area, continues north into the forested Watagan Mountains, which stretch towards Wollombi and the Hunter region. To the west of the valleys, the steep upland country continues through Dharug and Wollemi National Parks to merge with the Great Dividing Range. Ourimbah State Forest is south of the Yarramalong Valley, this area merges with the more gentle slopes of the Somersby Plateau.

15.2.6 Recreation and Tourism

Wyong and the Central Coast are a popular tourist destination and area for recreational activities. Its close proximity to Sydney, while providing wide open spaces, beaches and mountains have lent itself to the development of a thriving tourist industry.

The region offers numerous styles of holiday accommodation ranging from apartments, resorts, hotels and motels, caravan and camping grounds, bed and breakfast, farmstay, cottages, and health and wellbeing retreats.

Tourist attractions include museums, heritage tours, art galleries and studios, vineyards and farm activities. There are a range of activities available that include fishing, boating and yachting, water sports and adventure activities.

15.2.7 Land Use Impact Assessment

Both surface facility sites are located in predominantly rural land and as such would not normally be considered compatible. However, the sites are located within a future employment zone (identified in the Central Coast Regional Strategy) and the area will evolve in time to support a number of new industries.

Over time, the mine facilities will form an integral component in a future industrial and employment precinct. The services that the mine will bring will complement future industries and is in line with local and State government planning objectives for future employment zones and industrial land in the area.

The underground extraction area will not alter the existing land uses of either the Dooralong or Yarramalong Valleys. These agricultural and rural residential uses will remain unaffected.

15.3 Land Capability

15.3.1 Agricultural Land in the Project Area

NSW Agriculture determines the suitability of land to support agricultural activity and has developed a land classification of different levels of agricultural suitability. This classification considers climate, topography, soil characteristics, erosion, cultural and physical requirements for various crops and pastures and existing socio-economic factors such as infrastructure. Generally, Classes 1, 2 and 3 are suitable for soil based agriculture such as turf farming and orchards. Class 4 is suitable for grazing whilst Class 5 has limited suitability for agricultural production. Importantly, Class 1 is considered to be prime agricultural land and NSW Agriculture attempts to protect Class 1 land from development throughout the State. A more detailed description of Agricultural Land Class definitions is found in Table 15.1.

Table 15.1 Agricultural Land Class Definitions

Class	Definition
1	Arable land suitable for intensive cultivation where constraints to sustained high levels of agricultural production are minor or absent.
2	Arable land suitable for regular cultivation for crops but not suited to continuous cultivation. It has moderate to high suitability for agriculture, but edaphic (soil factors) or environmental constraints reduce the overall level of production and may limit the cropping phase to a rotation with sown pastures.
3	Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with pasture. The overall production level is moderate because of edaphic or environmental constraints. Erosion hazard, soil structural breakdown and other factors including climate may limit the capacity for cultivation and soil conservation or drainage works may be required.
4	Land suitable for grazing but not for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques. Production may be seasonally high but the overall production level is low as a result of major environmental constraints.
5	Land unsuitable for agriculture or at best suited to only light grazing. Agricultural production is very low to zero as a result of severe constraints, including economic factors, which preclude land improvement.

Source: NSW Agriculture

NSW Agriculture has classified the agricultural land in Yarramalong Valley and parts of Dooralong Valley as shown on Figure 15.16. The Figure shows that land in the floodplain of the Yarramalong and Dooralong Valleys is largely Class 2 agricultural land. The land that falls under this class is considered by NSW Agriculture to be a priority for preservation (Wyong Shire Council, 1998a).

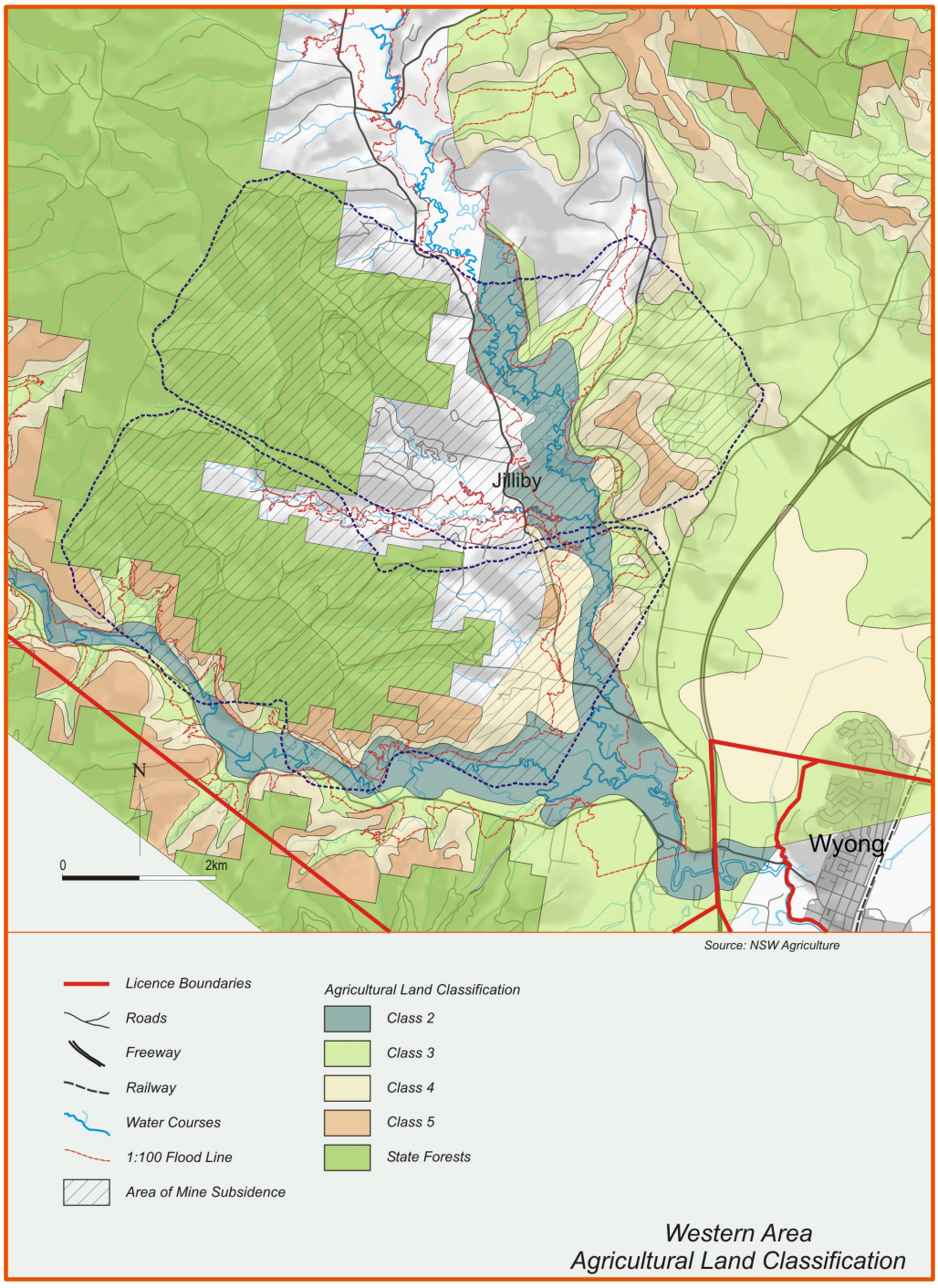


Figure 15.16 Agricultural Land Classification

Due to the presence of Class 2 agricultural land within the proposed subsidence area, there are a number of horticultural activities in the floodplains including turf

farming, market gardens and nurseries. Orchards are also located on the foot slopes where soils are relatively deep and free from flooding. Further up the valleys as the floodplain narrows, extensive grazing predominates. Grazing also exists in the lower parts of the Valleys in the Class 2 agricultural land. The dominant agricultural land use in the valleys is grazing.

In the Dooralong and Yarramalong Valleys over the last 20 years, large holdings have been fragmented and converted to hobby farms, rural weekend retreats, market gardens and horse studs. While population density is unlikely to increase significantly due to zoning and flood limitations, this trend is likely to continue and therefore the existing number of intensive agricultural businesses is likely to decrease in the long-term. According to the Central Coast Regional Strategy 2006-2031, the current land use within the Dooralong and Yarramalong Valleys are generally expected to continue. This will maintain future agricultural opportunities, limit population densities in the water catchment and maintain the attractive rural landscape.

15.3.2 Impacts of the Wyong Coal Project on Agricultural Land

Subsidence impacts, through changes in hydrological characteristics, landform and erosion in the floodplain may impact upon the land within each agricultural classification. These changes could promote some areas to a more arable classification and degrade others to a lesser classification. The area of each agricultural land classification with the zone of subsidence is included in Table 15.2.

Table 15.2 Agricultural Land Classifications in Zone of Potential Subsidence

Agricultural Land Classification	Area within Subsidence Zone (ha)	% of Total Area
2	541.5	14.2%
3	519.8	13.6%
4	562.2	14.7%
5	221.3	5.8%
State Forest and State Conservation Area	1980.2	51.8%

Table 15.2 indicates that the majority of land that would be impacted by subsidence is State Forest, State Conservation Area or otherwise of moderate agricultural significance, with the exception of the Class 2 land that follows the floodplains.

15.4 Soils and Erosion Control above the Mining Area

This section describes the soils present above the mining area. The only potential impact on soil resources above the mining area will be through possible erosion resulting from subsidence. Information regarding the soils in the mining area was obtained with reference to the *Department of Conservation and Land Management "Soil Landscapes of the Gosford – Lake Macquarie 1:100 000 Sheet*.

Further discussion of the potential for subsidence to result in surface erosion of the soils is presented in detail in Section 6.6.5, while soils that will be directly affected

from the proposed W2CP are limited to the surface facilities areas and are discussed in Section 2.13.9.

15.4.1 Woodburys Bridge

The Woodburys Bridge soil landscape is generally found on gently undulating rises and rolling low hills on Patonga Claystone on the Central Coast Lowlands. It occurs predominantly around the Wyong, Woodburys Bridge and Warnervale areas, and on the footslopes of the Wyong River and Jilliby Jilliby Creek.

This soil landscape has moderate sheet and rill erosion potential when the ground cover is removed and steep batters on mudstone are prone to severe rilling and slaking.

Dominant soil materials within this landscape include:

- wo1 – Dark brown pedal fine sandy loam;
- wo2 – Hardsetting dull yellowish brown sandy clay loam;
- wo3 – Reddish brown slaking pedal clay ; and
- wo4 – Yellowish brown pedal sandy clay.

Where the soils are present on siltstone and mudstone, the general occurrence is <10 cm of dark brown pedal fine sandy loam (wo1) overlying 10 – 40 cm of hardetting dull yellowish brown sandy clay loam (wo2) and >150 cm of slaking reddish brown strongly pedal clay (wo3) and some Soloths in poorly drained areas. The boundaries between the soil materials are sharp or clear, and total soil depth is >200 cm. Occasionally wo1 has been lost through erosion and wo2 is exposed at the surface. Sometimes wo2 is absent and wo1 overlies wo3.

Sandstone outcrops often occur as capping on the crests and as thin bands outcropping on the slopes. In these cases, generally 5-30 cm of wo1 overlies <100 cm of yellowish brown pedal sandy clay (wo4) and sandstone bedrock. Total depth ranges from 50-150 cm, and the boundaries between the soil materials are sharp.

The fertility of the soils tends to be low to very low. These materials are very strongly to strongly acid with very low nutrient status, very low phosphorus, low cation exchange capacity, very low to low water-holding capacity and have high potential aluminium toxicity. Soil volume for root penetration is generally high while general fertility is low.

Limitations of the Woodburys Bridge soil landscape are extreme erosion hazard, high foundation hazard, high run-on, and seasonal waterlogging in localised locations. High to severe limitations for regular cultivation due tot eh severe erosion hazard. Moderate limitations exist for judicious grazing provided a protective permanent vegetated cover is maintained.

The soil landscape has moderate to high limitations for urban development. Due to the moderate to high foundation hazard, special foundations may be required. Steep batters should be avoided due to the low wet bearing strength and unstable nature of these materials.

15.4.2 Mandalong

The Mandalong Soil Landscape occurs on steep hills on Patonga Claystone Formation in the Watagan Mountains. Major occurrences occur around Durren

Durren and Dooralong and on footslopes of the upper reaches of Jilliby Jilliby Creek near Lemon Tree.

Within this soil landscape, gully erosion is often present along roadside drains and rill erosion and minor gully erosion occurs on poorly maintained unsealed roads. Earth batters are prone to slumping, and rill and severe sheet erosion have occurred in disturbed areas.

Dominant soil materials include:

- ml1 – Hardsetting stony brown sandy clay loam;
- ml2 – Slaking cracking plastic pedal clay; and
- ml3 – Yellowish brown pedal clay with sand grains.

Sandstone cappings commonly occur on crests and ridges with <10 cm of hardsetting stony brown sandy clay loam (ml1) overlying <100 cm of yellowish brown pedal clay with sand grains (ml3). The boundary between the soil materials is sharp or clear and the total soil depth is 50-150 cm.

On the slopes two main soil types occur – soils which develop on siltstone and mudstone substrate, and soils which develop on sandstone substrate.

In areas of claystone, up to 15 cm of ml1 overlies up to 300 cm of slaking cracking plastic pedal clay (ml2), Brown Podzolic Soils and Yellow Podzolic Soils. Total soil depth ranges from 50 – 300 cm, and the boundary between the soil materials is sharp or clear.

Where <300 cm sandstone bands occur, <10 cm of ml1 overlies 10-100 cm of ml3. total soil depth is 50 – 150 cm, and the boundary between the soil material is clear.

Drainage lines are incised and benched. Up to 150 cm of saturated ml2 overlies bedrock, or sandstone bedrock is exposed at the surface. Boulders and cobbles are common.

Limitations to development on the Mandalong Soil Landscape are mass movement hazard, extreme erosion hazard, steep slopes, localised run-on, foundation hazard and localised rock outcrops.

The fertility of the soil material is low. Soil nutrient status including phosphorus is very low, organic matter is low to very low, cation exchange capacity is moderate, available water-holding capacity is low and the soils are sodic. The topsoil is very strongly acid and has high potential aluminium toxicity whilst the claystone subsoil is often strongly acid at the top grading to strongly alkaline with depth. Soil volume for root penetration is high. The general soil fertility is low.

This soil landscape has a high foundation hazard. Limitations include steep slopes, mass movement hazard, highly erodible soils, extreme erosion hazard. ml2 has low wet bearing strength, high soil plasticity and high shrink-swell. The depth to subsoil is <15 cm and total soil depth is 50-300 cm. There are high to severe limitations for urban development and high to severe limitations for both cultivation and grazing.

15.4.3 Watagan

The Watagan Soil Landscape is located predominantly on rolling to very steep hills and slopes with local relief of 50-220 m. Slope gradients of >25% and crests and

ridges are convex and narrow (<300 m). Hillslopes are steep with talus slopes often containing sandstone boulders.

Although the soils of this landscape occur on steep slopes in a high rainfall area, they are usually stabilised by a good ground cover of leaf litter and / or vegetation. Where this ground cover is removed by bushfires and logging activities, severe sheet erosion occurs. Minor rill and gully erosion are associated with some roads, fire trails and logging tracks.

Dominant soil materials include:

- wn1 – Friable dark brown loam;
- wn2 – Hardsetting yellowish brown sandy clay loam;
- wn3 – Mottled earthy sandstone colluvium;
- wn4 – Brown strongly pedal clay;
- wn5 – Light grey mottled clay; and
- wn6 – Earthy yellowish brown light sandy clay loam.

These soils are very complex due to the range of soil parent materials present and by the transportational process operating on the steep slopes. Limitations to development on these soils include mass movement hazard, steep slopes, rock fall hazard, extreme erosion hazard, shallow soils in localised areas, seasonal waterlogging in localised areas, foundation hazard, and localised rock outcrops.

Fertility of the soil material ranges from moderate to low. wn1 has a moderate fertility, is moderately acid with high organic matter, moderate cation exchange capacity, moderate available water-holding capacity, moderate calcium and potassium levels. Phosphorus appears to be the main limiting nutrient. The other topsoil (wn2) has a low fertility and is hardsetting, sodic, has a high potential aluminium toxicity and is strongly acid with a low available water-holding capacity, low organic matter, very low cation exchange capacity, and very low nutrient status.

The subsoils have a low to moderate fertility. They are very strongly to strongly acid with moderate available water-holding capacity, moderate cation exchange capacity, and moderate nutrient status except phosphorus which is very low. The subsoils, except wn3, all have high potential aluminium toxicity. Root penetration can be limited in some areas due to localised shallow soils. The general soil fertility is low to moderate.

The foundation hazard of this soil landscape is high with the major limitations being steep slopes, mass movement hazard, and extreme erosion hazard. Other localised limitations include highly plastic subsoil, low wet bearing strength, moderate shrink-swell, very high erodibility, high run-on and seasonal waterlogging. Depth to subsoil in 20-50 cm. Total soil depth varies considerably from <50-200 cm. There is high to severe limitations for cultivation and grazing.

15.4.4 Erina

The Erina Soil Landscape occurs on rolling hills and footslopes of the Erina Hills. It includes Gosford, Erina and parts of Kincumber, Lisarow, Copacabana, Terrigal, Ourimbah, Killarney Vale, Berkeley Vale and Foresters Beach. It also occurs on the footslopes of Wyong and Jilliby Creeks and as broad crests and ridges in Ourimbah and Wyong State Forests. Within the proposed mining area, there is only one small patch situated on the western boundary, within Wyong State Forest.

Little appreciable erosion is currently apparent where a good vegetative cover is present. Dominant soil materials include:

- er1 – Weakly pedal brownish black fine sandy loam;
- er2 – Hardsetting brown weakly pedal clay loam;
- er3 – Yellowish brown sandy clay;
- er4 – Brown strongly pedal clay;
- er5 – Light grey mottled strongly pedal clay; and
- er6 – Brown earthy sandy clay loam.

Where the soils are present on shale parent material, there is generally <15 cm of weakly pedal brownish black fine sandy loam (er1) overlying 10-30 cm of hardsetting brown clay loam (er2) which in turn overlies >100 cm of strongly pedal reddish brown clay (er4). Occasionally er1 is absent and er2 is exposed at the surface. Total soil depth is >100 cm and boundaries between soil materials are usually clear. This soil is found in poorly drained areas and the pallid mottled grey clay (er5) is commonly resent as a deep subsoil and total soil depth is >200 cm.

In areas where the soil is on a sandstone parent material, up to 20 cm of er1 overlies 20-35 cm of er2 which then overlies up to 150 cm of yellowish brown sandy clay (er3). Total soil depth ranges from <100 cm on crests to 50->150 cm on slopes. Boundaries between soil materials are sharp or occasionally gradual. Occasionally a light grey clay (er5) occurs as a deep subsoil derived from shale material.

Deep coarse sandstone footslope soils are generally up to 40 cm of er1 overlying 20-50 cm of er2 and >150 cm of brown earthy sandy clay loam (er6). Total soil depth is >200 cm, and the boundaries between the soil materials are gradual.

In drainage lines, over 100 cm of er1 occurs by itself or up to 60 cm of er1 overlies >150 cm of er6.

Limitations to develop on the Erina Soil Landscape are very high erosion hazard, seasonal waterlogging in localised areas, localised foundation hazard, localised mass movement, localised steep slopes, and localised high run-on.

Fertility of soil materials is low to very low. The topsoil (er1) has low fertility. It is strongly acid and has high organic matter, moderate phosphate, but other available nutrients, cation exchange capacity and available water-holding capacity are low. The other soil materials have low to very low fertility. They are very strongly acid with low to very low nutrient status with low to moderate cation exchange capacity and available water-holding capacity. er2 and er3 are sodic and er2, er4, er5 and er5 have high potential aluminium toxicity. Soil volume for root penetration is generally high. The general soil fertility is low to moderate.

Generally, this soil landscape poses moderate limitations for urban development and a generally low to moderate limitation for grazing. Gentle (<10%) slopes have moderate limitations for regular cultivation whilst steeper slopes have severe limitations for regular cultivation.

15.4.5 Gorokan

The Gorokan Soil Landscape generally occurs on undulating low hills and rises on the Central Coast Lowlands north of Wyong on Tuggerah Formation.

The Gorokan Soil Landscape has moderate sheet erosion and the removal of the sandy topsoil have occurred where the protective vegetative cover has been disturbed. This results in a hardsetting layer being exposed at the surface which inhibits plant growth and increases surface runoff and subsequent erosion.

Dominant soil materials of this landscape include:

- gk1 – Loose dark brown loamy sand;
- gk2 – Yellowish brown hardsetting clayey sand;
- gk3 – Yellowish brown strongly pedal clay; and
- gk4 – Light grey massive clay.

The occurrence of the dominant soil materials is fairly uniform across the landscape. However, soil depths of materials do vary considerable. Shallower soils generally occur on crests and upper slopes whilst deeper soils are found on the lower slopes.

Limitations of the Gorokan Soil Landscape are very high erosion hazard, localised run-on, localised seasonal waterlogging, localised high foundation hazard, and moderate foundation hazard elsewhere.

The fertility of the soil material is low. Soils are low in organic matter, low in available nutrients, with low to moderate cation exchange capacity and available water-holding capacities. gk1, gk2 and gk4 are sodic and have high potential aluminium toxicity. Hardsetting topsoils (gk2) are often exposed at the surface. Soil volumes for root penetration are often limited on crests and upper slopes. Soil depths range considerably from shallow on crests and ridges and upper slopes to moderately deep to deep on footslopes.

The foundation hazard is generally moderate except on claystone and siltstone lenses where >50 cm of wo3 occurs and a high foundation hazard may be present. Limitations include plastic subsoils with a moderate shrink-swell potential, localised areas of high run-on and seasonal waterlogging. Depth to subsoil is 30-50 cm, and total soil depth ranges from 50->150 cm. These soil landscapes have high to severe limitations for regular cultivation but low limitations for grazing.

15.4.6 Yarramalong

The Yarramalong Soil Landscape is located on Floodplain on Quaternary alluvium along Yarramalong, Jilliby Jilliby, Ourimbah and Dora Creeks in the Watagan Mountains as well as on the alluvial flats in the Erina Hills.

Active stream bank erosion is common along the main drainage line of Wyong, Jilliby Jilliby and Cedar Brush Creeks.

Dominant soil materials include:

- ya1 – Loose brown sand;
- ya2 – brown pedal loam;
- ya3 – Earthy yellowish brown sandy clay loam; and
- ya4 – Brown pedal clay.

A large variety of soils occur within this soil landscape, and the stratified sequence of soil materials is often very complex. Limitations to development including flooding hazard, high run-on, localised areas of permanent waterlogging, seasonal waterlogging, localised stream bank erosion and localised foundation hazard.

Fertility of soil materials is low. Soil materials are strongly acid, are sodic, have low nutrient status, low cation exchange capacity and low to moderate available water-holding capacity. ya1 has a high potential aluminium toxicity and soil volume for root penetration is high. General soil fertility is low to moderate.

These soils generally have high to severe limitations for urban development and generally low limitations for cultivation and grazing. Localised areas of heavier soils on the poorer drained country in the low tract floodplain have high to severe limitations for cultivation.

15.4.7 Implications for the W2CP

The soils that will be encountered during construction do not pose any significant constraint. Normal erosion and sedimentation controls will be implemented as discussed in Section 2.13.9 and will satisfactorily safeguard against sedimentation impacts off site.

15.5 Fire Management

15.5.1 Bush Fire Prone Land

A bush fire prone area/land is an area of land that can support a bush fire or is likely to be subject to bush fire attack. In general, a bush fire prone area is an area mapped for a local government area that identifies the vegetation types and associated buffer zones. These are generally areas consisting of or close to bush fire hazards such as forest or grasslands.

Bush fire prone areas are subject to development and planning controls designed to improve the survivability of developments that are exposed to a bush fire hazard. Bush fire prone land maps are prepared by local councils across the State and are certified by the Commissioner of the RFS.

Wyong Shire Council has produced a map of bush fire prone land covering the LGA. Under this map, the Buttonderry Site is classified as “Bush Fire Prone Land – Vegetation Category 1”, while the Tooheys Road site contains land classified as:

- Bush Fire Prone Land – Vegetation Category 1;
- Bush Fire Prone Land – Vegetation Category 2; and
- Bush Fire Prone Land – Vegetation Buffer – 100 m and 30 m.

There are a number of consequences of the land being classified as bush fire prone, as discussed in the following sections.

15.5.2 Legislation Affecting Bush Fire Prone Land

Development in bush fire prone areas of NSW is subject to *Planning for Bush Fire Protection 2006* and *Australian Standard: 3959 Construction of Buildings in Bush Fire Prone Areas (AS:3959)*.

On 1 August 2002 the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Rural Fires Act 1997* were both amended to enhance bush fire protection through the development assessment process.

The EP&A Act establishes a system for requiring bush fire protection measures on bush fire prone land at the Development Application stage. In the case of the W2CP, where planning approval is sought under Part 3A of the EP&A Act, approval for the project is determined by the Minister of the Department of Planning, which may involve consultation with the NSW Rural Fire Service (RFS).

Planning for Bush Fire Protection, 2006 provides the necessary planning considerations when developing areas for residential use in residential, rural residential, rural and urban areas when development sites are in close proximity to areas likely to be affected by bushfire events. It requires certain bush fire protection measures to be included to render a building less susceptible to damage or destruction from bush fire.

While this document is not directly applicable to the W2CP (since the document is designed for residential use), basic principals contained within have been adapted to develop a Bush Fire Strategy for the W2CP.

15.5.3 Bush Fire Planning for the W2CP

As responsible land owners, WACJV will manage their properties to ensure that they do not pose a fire hazard to the surrounding areas. This is particularly important in areas such as the Tooheys Road site, where a large tract of native vegetation is located nearby.

A bushfire management plan will be prepared for the land owned by WACJV, in accordance with the principles set out in "Planning for Bushfire Protection 2006" (DOP), and will likely include the following strategies aimed at minimising the risk of a fire originating from or spreading onto the company's property.

15.5.4 Fire Breaks

The purpose of fire breaks is to provide a physical break in the vegetation with the aim of preventing the further spread of a bush fire. Firebreaks are also important in providing access for fire fighting equipment through the vegetation, as well as escape routes if needed.

The location of firebreaks is an important factor in determining their effectiveness. Firebreaks will be constructed in the following locations:

- Along boundaries with adjacent neighbouring properties not owned by Wyong Areas Coal Joint Venture;
- Along strategic internal fencelines;
- Around surface structures;
- Beneath and adjacent to company owned high-voltage powerlines; and
- Along road and railway boundaries.

The fire breaks will be a minimum of 10 m wide (15 m along roadsides), and will be cleared of all vegetation with the exception of the ground cover. It is important that the ground cover remains to prevent soil erosion, which could potentially result in the fire breaks being unsuitable for the passage of vehicles. Occasional canopy trees may be left if they are of conservation value or considered important in providing fauna habitat areas.

The fire breaks will be maintained on an as needs basis to ensure their effectiveness. Maintenance will involve slashing of grasses and new growth and

pruning of any remaining large trees or overhanging trees from outside the fire break.

15.5.5 Reduced Fuel Load

The fuel load refers to the amount of material present that may burn in a bushfire. The most important fuel is that on and near the ground, however the shrubs and even the crowns of forest trees can contribute fuel to a high-intensity fire.

The important characteristics of fuel that determine fire behaviour are the fineness of the fuel, the structure of the fuel bed (its height, compactness and continuity), the amount of fuel available for burning and the moisture content of the fuel. The fuel that is most important in determining the spread of a forest fire is the forest litter-bed. This refers to the leaves, twigs and bark less than 6 mm in thickness that lie on the forest floor. Larger fuels, such as branches and logs, burn out after the flame front has passed.

The amount of fuel and the height of the fuel affect the intensity of the fire and the height of the flames. The less the fuel load, the less there is to burn and the less intense the fire. The lower the fuel height, the lower the height of the flames.

The moisture content of the fuel includes the amount of moisture held by both the dead plant parts (dead fuel moisture) in the litter and in the fine stems of the living plants (live fuel moisture). The dead fuel moisture determines how readily the fuel will ignite and how completely it will burn. The dead fuel moisture changes during the day depending on the temperature and the relative humidity of the air. The live fuel moisture is high and has to be dried out by the flames burning in the dead fuels before it will ignite.

The most common method of reducing the fuel load in an area is through “hazard reduction burning”, or “preventive burning”. Preventive burning removes the fuel load of an area and will reduce the intensity and speed of a fire through the area. In past years it was common practice to undertake preventive burning on a regular and large scale basis, however the potential damage to forest ecosystems through such management strategies has since been recognised.

In order to protect the ecological integrity of the forest and provide habitat areas for native fauna, each block of land identified within the WACJV land holding will undergo preventive burning under a staggered 7 year cycle. Through this strategy there will be higher fuel loads in some areas, while in other areas the fuel load has been significantly removed with various levels in between. This system provides a compromise between preserving the environmental integrity of the forests while still managing the threat and spread of bushfires.

Preventive burning is best carried out early in the season when the weather is mild and fires are more likely to self-extinguish. All burning will be carried out by the Rural Fire Brigade.

15.5.6 Fire Fighting Water Supply

All fire fighting water supply requirements has been incorporated into the design of the surface facilities. This includes onsite dams, fire mains and hydrants. The main dams on WACJV owned property will also be available for both onsite fire fighting purposes as well as the Rural Fire Service.

15.6 Warnervale Aerodrome Height Restrictions

Both the Tooheys Road and Buttonderry facility sites lie on the outer edge of the Warnervale Aerodrome flight path height restrictions. The restrictions take the form of a series of height contours relative to the aerodrome which identify the lower limits of airspace above which objects may become obstacles to aircraft operations. These are referred to as Obstacle Limitation Surfaces (OLS). The OLS contours are used as a tool for land use planning to limit the height of buildings, structures, trees, etc. in the vicinity of the aerodrome and to determine the need for any relevant measures such as lighting. These OLS contours are shown on Figure 15.17.

Both site location facilities comply with the height restrictions however it is noted that the intervening hills and vegetation sheltering both sites extend into the flight path along with other built structures. The specific requirements for the project stemming from the OLS or related aviation guidelines, if any, will be determined during the detail design stage. The operators of the aerodrome will be advised when cranes will be used on site during construction.

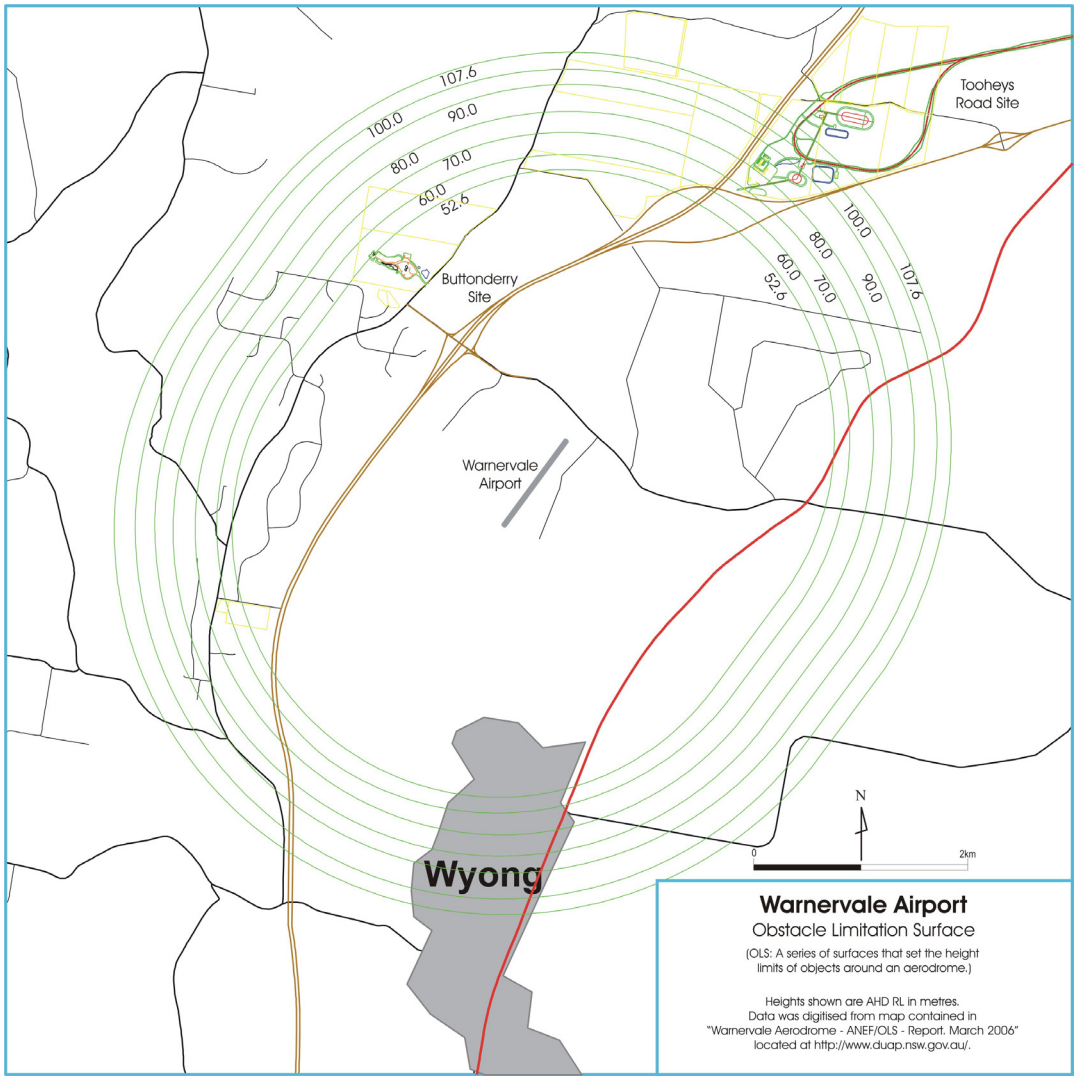


Figure 15.17 Warnervale Aerodrome Obstacle Limitation Surface