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5.0 THE PROPOSAL

Key points

- Mining operations of the No. 1 Open Cut Extension are to be conducted within existing Consolidated Coal Lease 713;
- It is proposed to mine Extension A in an easterly direction where an alternate access to the Sandy Creek Colliery reserves will be intersected. Mining of Extension B will commence in the northeast and proceed in a southwest direction;
- The proposal seeks to resolve issues of subsidence and spontaneous combustion by mining through affected areas, removing coal prone to spontaneous combustion and using overburden to fill voids;
- Production rates will be unchanged from current maximum production levels of approximately 1.8-2.0 Mtpa;
- The extension will continue to produce thermal coal for both export and domestic markets. Coal will be hauled by highway trucks to the Ravensworth Coal Terminal and then transported by rail to the Port of Newcastle for export. Domestic coal will continue to be hauled from the site to local power stations;
- The proposed extension relies on the existing mining infrastructure, so new environmental impacts are minimal. Where impacts occur, they are managed with care using established techniques;
- Environmental monitoring draws heavily on the system already implemented at the mine; and
- The proposal is not expected to increase current employment levels.

5.1 Overview

This section describes MCC's proposal to extend open cut mining operations in the existing No. 1 Open Cut mine within CCL 713. This proposal is for the recovery of coal in an area previously mined by underground methods, some areas of former open cut operations and unmined areas.

5.1.1 Proposal Objectives

The principal objective of the proposed No. 1 Open Cut Extension is to develop a practical and economically feasible mine plan for mining coal resources with in CCL 713. The No. 1 Open Cut Extension also includes environmental, socio economic, production and operational objectives.

Mine Plan Objectives

The mine plan will be used to provide the basic information required for an economic model and thus ultimately determines the viability of the mining operation. The key attributes of a successful open cut mine plan are:

- Efficient mine development and a low overburden ratio;
- Minimal operating risks or hazards;
- Low technical and operating risk;
- Inbuilt flexibility to adapt to a changing environment or strategy;
- Low operating costs; and,
- Minimal capital expenditure requirements.

Environmental Objectives

MCC is committed to maintaining high levels of management and compliance. The No. 1 Open Cut Extension will operate with the following environmental objectives:

- Keep noise and blasting impacts below regulatory limits, particular on surrounding residences;
- Limit air quality impacts to below regulatory limits, particular on surrounding residences;
- Manage spontaneous combustion;
- Address the issues of subsidence and pot holing;
- Follow the rehabilitation plan for effective land management practices; and,
- Manage impacts on water resources.

Socio Economic Objectives

MCC have a long relationship with the Muswellbrook community and will strive to continue that relationship while maintaining the following objectives:

- Provision of employment opportunities by the extension of mine life;
- Continue support of community groups in the Muswellbrook Shire;
- Continue the MCCCCC and communication with the local community; and,
- Consult with Aboriginal groups in respect of Indigenous cultural heritage.

Production and operational objectives

The No. 1 Open Cut Extension aims to achieve the following objectives:

- Provision of a steady supply of coal to existing customers and retain markets through to 2013;
- Provision of sufficient capping material to seal overburden and exposed coal faces, which will enable spontaneous combustion to be eliminated and the site to be decommissioned;
- Maximisation of the use of existing infrastructure;
- To mine coal economically by highwall mining methods; and
- Provision of a safe and economically feasible alternate entry into the Sandy Creek Colliery coal reserves.

5.2 Resource Evaluation

5.2.1 Location

The proposed area of Extensions A and Extension B is located within MCC's existing Colliery Holding. MCC's operations are located north of Coal Road and at their closest are approximately 1.6 km to the east of the nearest residential areas of Muswellbrook. Muswellbrook is a major regional town that lies approximately 130 km northwest of the Port of Newcastle (refer **Figure 1.1**).

Figure 5.1 shows areas previously mined and current mining areas of MCC's operations.

5.2.2 Regional Geology

Muswellbrook Shire straddles the north eastern boundary of the Sydney Basin. This boundary is delineated by the Hunter Thrust Fault, which brings Carboniferous rocks up against younger Permian rocks. The Hunter Thrust is a major reverse fault. The base of Bells Mountain coincides with this structural fault. The Aberdeen Thrust, an offshoot of the Hunter Thrust, is exposed in the highwall of the No. 2 Open Cut.

Structurally, the Muswellbrook region forms part of the Muswellbrook Anticline, which is truncated to the east by the Aberdeen Thrust. The Muswellbrook Anticline causes the Greta Coal Measures to be exposed at Muswellbrook.

The coal measures within the area are of early middle Permian Age. Coal seams are assigned to the Greta Coal Measures, which underlie a sequence of marine siltstones, sandstones and conglomerates known as the Maitland Group. Coal occurs in multiple seams within the Greta Coal Measures.

Geological cross-sections through both Extension A and Extension B are shown in **Figures 5.2** and **Figure 5.3**.

5.2.3 Previous Exploration

Exploration boreholes have shown the geology of the area to be complex in areas, however experience gained from mining these seams allows these deposits to be well understood. A drilling program will be undertaken in the Extension B area to confidently estimate coal quantities and qualities, and bring the resource up to a reserve status.

5.2.4 Geological Description

The typical geological sequence at the mine can be seen in **Figure 5.4**. Principal seams of economic interest in descending order are the Fleming Seam, the Hallett Seam, the Muswellbrook Seam (2.3 m to 5.0 m thick), the St Heliers Seam (2.5 m to 7.0 m), the Lewis Seam (2.5 m to 7.0 m) and the Loder Seam. MCC's mining operation is one of two mines in the Upper Hunter that operates in the Greta Coal Measures.

5.2.5 Coal Resources and Reserves

The coal resources and reserves contained within CCL 713 are outlined in **Section 4.2.1**. Extension A contains a coal reserve of approximately 4.6 Mt and Extension B a coal resource of approximately 7.0 Mt as shown in **Table 5.1**. The proposal will create a safe alternate access into the approved Sandy Creek Colliery. The Sandy Creek Colliery contains approximately 18 Mt of reserves.

TABLE 5.1
COAL RESOURCES* AND RESERVES

	Export (Mt)	Domestic Product (Mt)	Overburden (Mbcm)	Strip Ratio
Extension A (Reserve)	4.217	0.392	18.463	4.0:1
Extension B (Resource)	5.802	1.023	47.264	5.8:1
Total	10.019	1.415	65.727	

* Does not include any highwall mining resources.

The proposed No. 1 Open Cut Extension will also allow for the recovery of coal from the resultant highwall by auger mining. The coal resources contained within the highwall are yet to be defined.

The open cut mining operations will involve mining through previous underground workings in seams such as the Fleming Seam, St Heliers Seam, Muswellbrook Seam and the Lewis Seam. Approximately 55% of the coal resource remains unmined. The mine plan also incorporates open cut mining of the Loder Seam which is unaffected by underground mining.

Portions of Extension B have previously been mined by open cut methods down to the Muswellbrook Seam. Extension B will recover coal from the St Heliers, Lewis and down to the Loder Seam in the areas of former open cut mining operations.

5.3 Coal Quality

The coal quality of the proposed No. 1 Open Cut Extension is expected to be of a similar quality to that which is currently mined. Coal will be crushed and screened to produce product for both the domestic and export markets. Export coal can be classified as thermal coal or high energy thermal coal as shown in **Table 5.2**.

TABLE 5.2
COAL QUALITY

	Ash (%) adb	Sulfur (%) adb	Energy(kcal/kg) adb
Export Thermal	12.5	0.75	6,850
High Energy Thermal	10.5	0.75	7,050
Domestic	23	0.70	6,000

adb – air dried basis

5.4 Mining Constraints

Several constraints exist within the proposed No. 1 Open Cut Extension which could impact upon the preferred mine layout and operation. These constraints are described in the following sections.

5.4.1 Geological Constraints

The configuration and extent of the Extension A and B has been constrained by the following features:

- Extensive cindering in coal seams in the north, caused by igneous rock intrusions;
- Higher overburden to coal ratios; and
- Extensive multi-seam underground workings in the Extension B area.

5.4.2 Surface Constraints

The existing infrastructure within the 'footprint' of the No. 1 Open Cut Extension has an impact upon mine planning. Infrastructure in the path of open cut mining will need to be either relocated or replaced Items of surface infrastructure that need consideration are:

- Power lines, to the north of Coal Road, that supply power to MCC's operations. This is an aerial line supported on wooden poles and will be able to be relocated to the south of the proposed footprint of the No. 1 Open Cut Extension. Power lines are not a major surface constraint to mining;

- The fence constructed by MSB around the land affected by potholing to the north of Coal Road and the west of Bimbadeen Homestead. The materials used to construct this fence (chain wire mesh and steel pipe supports) will be able to be removed prior to mining operations and be made available for collection by the MSB. The fence does not constitute a material constraint to mining;

- A portion of the existing alignment of Coal Road lies within the planned footprint of the No. 1 Open Cut Extension. The only lands that the potentially affected portion of Coal Road services are in the ownership of MCC. MCC is seeking to purchase that portion of Coal Road from MSC and convert it into a private road. This would join with MCC's existing private Coal Haul Road at the current eastern limit of Coal Road. Purchase of the potentially affected portion of Coal Road would enable MCC to mine through the existing alignment of Coal Road. An alternative alignment for the access of MCC's No. 2 Open Cut and administration offices will be required to the south of the existing alignment. If Coal Road is not realigned to the south of the existing alignment, then the proposed footprint of the No. 1 Open Cut Extension will need to be reduced with a consequent loss of mineable coal resources in the order of 1.0 Mt and also have attendant problems with spontaneous combustion, ongoing subsidence and slope stability. The current location of Coal Road is a material constraint to an efficient and economic mine plan for the No. 1 Open Cut Extension; and

- The existing No. 2 Open Cut mine infrastructure consisting of the main workshop, administration building and bathhouse are within the footprint of the No. 1 Open Cut Extension and planned to be 'mined through' in approximately Year 8 of the mine plan. It is possible that the mine plan will be slightly modified to allow the wedge of coal below these buildings to be rescheduled as the last coal to be extracted as part of the No. 1 Open Cut Extension. In either circumstance, the removal of these buildings will occur towards the end of the mine's life and will be incorporated within a mine closure plan. Should short-term office or bathhouse facilities be required, relocatable buildings will be utilised. Approval for the use of such buildings is not part of this development application. The issue of this existing infrastructure is a consideration in mine planning and sequencing but is not a material constraint the proposed extension.

5.4.3 Spontaneous Combustion

MCC currently works the Greta Coal Measures. These Measures have a history of spontaneous combustion. Spontaneous combustion has been a long term issue at MCC since the first operation (an underground mine) opened in 1907.

Incidents of spontaneous combustion have taken place over a number of years, particularly in the spoil piles on the western side of No. 1 Open Cut. During the 1980's, this was successfully dealt with by sealing both the burning area and the material liable to spontaneous combustion with approximately 20 m of inert overburden.

Due to the composition of the coal seams and the volume of carbonaceous material within the Greta Coal Measures, these Measures have a propensity for spontaneous combustion caused by a number of factors.

In summary, the primary causes identified are:

1. Coal/Carbonaceous Shale Oxidation - the oxidation of coal and carbonaceous shale within the spoil heaps. A direct relationship was found between the percentage of carbonaceous waste and the propensity for spontaneous combustion to occur and to be sustained;

2. Heat of Wetting – When water interacts with solid coal, heat is liberated. This phenomenon can generate sufficient heat to cause oxidation in both solid and broken coal and carbonaceous material;

3. Heat of Water Condensation and Evaporation - the transfer of heat throughout an overburden emplacement area by condensation and evaporation of water contributes to the spread of spontaneous combustion; and,

4. Oxidation of Pyrite - the oxidation of pyrite, whilst not essential, can further increase the likelihood of spontaneous combustion of spoil material.

Past mining methods, particularly in open cuts, did not adequately understand or address these problems, particularly in regard to:

- Incubation periods, i.e. the time it takes for spontaneous combustion to develop;
- The need for segregation and placement of higher property spontaneous combustion material;
- The need for intensive control measures; and,
- The need for a long term solution.

A Spontaneous Combustion Management Plan, developed in 1998, dealt with operational issues but did not provide a definitive long term solution for the whole site. As part of the essential preparation for mine closure, a revised Spontaneous Combustion Management Plan to cover all mine closure issues is being developed.

Preparatory work for this plan includes:

- An audit for the identification of current areas of spontaneous combustion;
- Identification of existing overburden dumps and other areas which have a propensity for spontaneous combustion over the long term;
- Identification of higher risk areas for spontaneous combustion in the conceptual mining plan to control spontaneous combustion during the mining operation;

- Sampling of material designated as inert to confirm existing data;

- Completion of the Australian Coal Association Research Program (ACARP) study into long term spontaneous combustion control and its prevention in spoil piles and highwalls;

- Integration of safety and operational procedures into the Spontaneous Combustion Management Plan; and

- Integration of all relevant data and requirements of the Spontaneous Combustion Management Plan and the mine closure plan.

Whilst the revised Spontaneous Combustion Management Plan will be completed and submitted to the relevant Government departments, including the DMR and EPA, the plan will take up to six months to complete.

The reasons for this are:

- The audit for the identification of existing spontaneous combustion areas (particularly those at an incipient level) is best carried out in winter;

- A combined geological and inert overburden sampling program for Extension B has not yet commenced and will take some months to complete;

- The existing ACARP study results (even in a preliminary form) will not be available for until mid 2002. These data will either provide validation of current assumptions or provide real parameters for mine closure treatment of spontaneous combustion; and

- Risk Assessment studies into operational procedures have yet to be completed and need to be integrated with safety and environmental requirements and the long term mine closure objectives.

During the mining process in Extensions A and B, the existing Spontaneous Combustion Management Plan will continue to be utilised, eg when areas of spontaneous combustion are encountered, the affected material will be dumped low in spoil dump area and initially covered by a minimum of 5 m of inert material. During the mining of inert overburden from both Extensions A and B, a dumping schedule will be developed which seals all overburden, which is subject to or which has propensity for spontaneous combustion, with 10 to 30 m of inert material. This material selection, thickness and compaction requirements will be carried out to the standards developed by ACARP funded spontaneous combustion control of mine overburden.

As the projected open cut mine life is only around 10 years, a mine closure strategy which provides a long term solution to spontaneous combustion issues needs to be included in the Spontaneous Combustion Management Plan. The mine closure strategy will be undertaken in the No. 1 Open Cut, No. 1 Open Cut Extension areas A and B and the No. 2 Open Cut as well as relevant areas of previously worked underground mines.

Preliminary estimates show that approximately 15 Mbcm of suitable inert material is available while 5 to 10 Mbcm of selected inert material will be required to complete the spontaneous combustion control strategy, leaving the rehabilitated site in a long term stable condition.

5.5 Mining Method

5.5.1 Extraction Method

The extraction method for the proposed Extensions A and B will be conducted in a similar manner to existing mining methods currently employed in the No. 2 Open Cut mine outlined in **Section 4.3**. The face shovel will not be utilised in extraction of overburden and coal, as is currently utilised in No. 2 Open Cut. Coal will be extracted by hydraulic excavator and front end loaders.

5.5.2 Mining Through Underground Workings

As previously indicated, MCC will be mining through old underground workings. Special consideration must be taken to ensure the safety of workers and machinery.

Drilling

When drilling over known or potential underground workings MCC will ensure:

- Drillers are briefed on the presence of underground workings prior to commencement; and
- If broken ground is encountered the location is marked to enable the hole to be bagged off and or shorter holes drilled.

Overburden Excavation And Mining

Areas of known or potential underground workings will be defined. When voids, underground workings or subsidence are encountered, MCC will ensure:

- The identifying operator immediately notifies the open cut examiner (OCE) and all other operators in the area;
- The OCE shall assess the situation and give instruction on the appropriate action, including locating the void by survey; and

- Under no circumstances shall any person enter or attempt to enter voids or underground workings.

When exposing coal seams in an area known or suspected to contain underground workings, MCC will ensure:

- The final pass is to be completed by 'top side loading';
- Voids left open are appropriately marked with barriers, tape or witches hats;
- The excavator shall collapse all known headings as the work progresses; and,
- The dozer shall clean off the top of the coal seam when ever possible in daylight hours.

5.5.3 Mining Through Spontaneous Combustion

MCC plan to mine through areas of spontaneous combustion. Areas affected by spontaneous combustion will be identified by several methods including:

- Examination of previous information records, accumulated over last ten years, for occurrences of spontaneous combustion;
- Examination of the surface for any physical affects of spontaneous combustion such as brown or dying vegetation and increased surface temperature;
- Use of infra red photography to show areas of increased temperature; and
- Measuring borehole temperatures for temperature increases.

MCC has successful experiences in managing and controlling areas prone to spontaneous combustion. Methods used to manage mining in areas prone to spontaneous combustion include:

- Cooling the heated area with water before mining;
- Removal of the fuel by mining the coal;
- Minimisation areas of coal exposed to the air prior to mining;
- Retention of five metres of overburden above workings to exclude oxygen from areas not immediately required for mining operations;
- Limiting exposure of only small areas of coal at any one time; and

- Sealing of remaining unmined underground workings with clay or inert material to prevent the ingress of oxygen.

5.6 Overburden Management

Prior to the excavation of overburden, vegetation will be removed and topsoil will be stripped according to a topsoil management plan. Overburden will generally be emplaced within the existing void of the No. 1 Open Cut or the void created as mining operations progress in the No. 1 Open Cut Extension.

Care will be taken to identify overburden materials that can be utilised as inert capping material. There are known to be significant quantities of coal-fired capping material in the area to be mined by the No. 1 Open Cut Extension. This material will be selectively placed in accordance with the Spontaneous Combustion Management Plan for the mine. In some instances this will involve the movement of inert capping material to the No. 2 Open Cut to treat the overburden emplacements and exposed coal seams.

Some sections of the overburden may contain carbonaceous material or coal affected by spontaneous combustion which may not be suitable for sale. These carbonaceous materials will be selectively placed low in the in-pit overburden emplacements and covered by at least 5 m of inert overburden.

5.7 Mine Layout Design

A Conceptual Project Development Plan was presented to the DMR on 24 August 2001. The DMR accepted this plan as being satisfactory. The conceptual mining sequence for mine operating years 1 to 10 for Extensions A and B are displayed in **Figure 5.5**. It is anticipated that the first mine operating year will commence during 2004. The mine plan estimates a 10 year life span.

The orientation of the western extent of the proposed No. 1 Open Cut Extension in relation to the urban areas of North Muswellbrook (Queen Street) is shown in **Figure 5.6**. One topographically feature of note is that the existing rehabilitated spoil pile forms a physical barrier between the proposed mining operations of the No. 1 Open Cut Extension and the residential area of North Muswellbrook. **Figure 5.7** shows the view from the existing eastern highwall of the No. 1 Open Cut and clearly indicates that line of sight views from the proposed mining operations and North Muswellbrook are blocked by the existing rehabilitated spoil pile. The spoil pile will act as a bund that will help attenuate noise, provide a visual barrier between North Muswellbrook and mining operations and assist in the retention of dust emissions within the mining pit.

Extension A

During the first year, mining will reduce the original eastern highwall in length by approximately 50%. Mining of the Loder Seam and highwall mining within the original extent of the No. 1 Open Cut is complete. The subsequent void will be utilised as an "inpit" emplacement area. Open cut mining will progress forward in an easterly direction for approximately five years. The voids created by mining will be successively used as emplacement areas. The height of the emplacement areas will not exceed the existing highwall. The emplacement areas will be rehabilitated according to the MOP.

Sandy Creek Colliery Access

During the last year of mining operations in Extension A the existing underground headings that allow access to the Sandy Creek Colliery reserves will be intersected at a point that is being considered as an alternative entry to these reserves. The advantage of gaining entry to coal reserves of the Sandy Creek Colliery from the No. 1 Open Cut Extension includes the ability to treat and rehabilitate the final void of the No. 2 Open Cut at the cessation of coaling planned for 2005. The No. 2 Open Cut void will be rehabilitated as described in **Section 4.7**.

If access to Sandy Creek Colliery was to be, as currently approved, from the base of the No. 2 Open Cut then complete and final rehabilitation would not be achieved until mining operations in the Sandy Creek Colliery ceased. The alternative access via the No. 1 Open Cut Extension permits the full rehabilitation of the No. 2 Open Cut at a much earlier time.

Extension B

Open cut operations will commence at the northeastern limit of the identified resource as shown on F**igure 5.5**. Open cut mining in Extension B will progress in a southwesterly direction for five years. As mining moves in this direction the remaining voids will be used as emplacement areas and successively rehabilitated in a similar method to Extension A. The conceptual mining sequence indicates that in Year 8 MCC will mine through its existing offices and infrastructure. It is proposed that consideration be given to setting aside this area, as relocating the mine infrastructure may not be economically feasible. Alternatively, consideration will be given to mining the coal beneath the existing infrastructure as the last block of coal to be mined.

Highwall Mining

The proposed No. 1 Open Cut Extension will allow for coal recovery from the resultant highwall by mining methods such as auger mining. This mining technique can be utilised when open cut mining is not economic due to the ratio of overburden/interburden removal to coal recovery. Highwall mining uses an auger to bore horizontally into the coal seam and allows for the efficient recovery of coal that would not have otherwise been mined by either open cut or underground techniques. Trials to assess the viability of

auger mining have been undertaken in the existing No. 1 Open Cut. Appropriate approvals will be sought before highwall mining begins.

5.8 Mine Equipment

The mining equipment currently used in No. 2 Open Cut is outlined in **Section 4.3.5**. As the proposed No. 1 Open Cut Extension will use the similar method of extraction, the current mining equipment will be utilised in most circumstances. The face shovel is unlikely to be utilised due to safety considerations associated with working areas that have been previously mined by underground methods. There will be no draglines used in the proposed No. 1 Open Cut Extension due to similar geological constraints as encountered in No. 2 Open Cut. It is anticipated that most mining will be conducted by the use of a hydraulic excavator.

5.9 Predicted Mine Production

Predicted mine production for the proposed No. 1 Open Cut Extension is shown in **Table 5.3**. The long-term mine plan for MCC envisages the annual production rates of Extension A and B to be approximately 1.5 Mtpa. Mining of No. 2 Open Cut will be drawing to a close as operations, especially overburden removal, are commenced for Extension A. Extension B will commence operations approximately five years after coal mining commences in the No. 1 Open Cut Extension. Fluctuations in geology and mining sequence will lead to some variations in actual production rates against planned production rates. Accordingly, approval has been sought for production up to 2.0 Mtpa, to encompass any refinements in mine plans and production rates and potential production of up to 0.5 Mtpa from the Sandy Creek Colliery.

TABLE 5.3
CONCEPTUAL SCHEDULE OF COAL PRODUCTION FOR NO. 1 OPEN CUT EXTENSION

Project Year	1	2	3	4	5	6	7	8	9	10
ROM Coal Production (Mt)	0.1	0.5	1.2	1.5	1.5	1.5	1.5	1.5	1.5	0.6
Total Waste (Mm^3)	1.7	2.8	5.6	6.0	9.2	9.3	9.3	9.4	9.3	3.0
Ratio bcm:t	17.1	5.7	4.7	4.0	6.1	6.2	6.2	6.3	6.2	5.0

5.10 Coal Handling and Beneficiation

ROM coal extracted from the proposed Extension B will continue to be handled in the same manner as described in **Section 4.4**. Extension A will utilise an 'inpit' crusher to crush coal which will then be stockpiled within the pit or transported to existing stockpiles. Coal mined in Extension B is anticipated to be transported to the existing crushing facilities and stockpiled. The potential exists for some of the coal mined from Extension B to be treated by the "in-pit" crusher. As no increase in production rates is sought, MCC will use its existing infrastructure such as stockpiles, crushers and the Coalscan to handle mined coal. The coal produced from the proposed No. 1 Open Cut Extension will be sold as ROM coal and therefore will not require beneficiation.

5.11 Rejects Handling and Disposal

As the proposal involves no change to the current coal handling methods, no coal rejects will be generated. Coal will continue to be sold as ROM coal, which does not require beneficiation.

5.12 Service Infrastructure

The proposed No. 1 Open Cut Extension relies heavily on the existing service infrastructure outlined in **Section 4.5**. As there will be no increase in the employment levels on site there will be continued use of administration, service and maintenance facilities as well as amenities and car parking for the existing workforce. If any of the existing infrastructure needs to be removed to accommodate the mine plan (as shown in Year 8), then appropriate temporary facilities will be provided.

5.13 Voids

The void created by the proposed No. 1 Open Cut Extension will be treated in accordance with DMR guidelines to make the void safe for closure and to prevent the likelihood of spontaneous combustion.

The void created by the No. 1 Open Cut Extension has a potential to be used as a waste management facility for MSC. MSC operates a waste management facility and resource recovery centre in the void of former open cut mining operations conducted by MCC. MCC is willing to work with MSC in exploring the potential use of the void as a future waste management facility. The suitability of this site for a waste management was recognised and assessed by Collex in the EIS produced for the Bells Ridge Waste Management Facility in 1998. Appropriate approvals for any development will need to be sought by MSC. Final landform design for Extensions A and B is shown in **Figure 5.8**.

As part of the mine closure plan this void will be utilised either as a re-entry point to Sandy Creek Colliery or for waste management purposes or rehabilitated for lease relinquishment.

The No. 2 Open Cut void has little potential to be used as a waste management facility in the short to medium term and is planned to be treated in accordance with DMR guidelines to make the void safe for closure.

Any alternative use of the final voids would be subject to investigations and approvals that are outside the scope of the proposal presented in this EIS.

5.14 Rehabilitation of Disturbed Land

Areas disturbed due to the proposed No. 1 Open Cut Extension will be rehabilitated as an integral part of the open cut mining process. The methods of rehabilitation for the proposed No. 1 Open Cut Extension are similar to methods currently being utilised. These methods are outlined in **Section 4.7**.

The main objectives of mine rehabilitation at MCC are to create a landform which is:

- Compatible with the surrounding countryside;
- Stable in the long term; and,
- Capable of a productive form of land use.

The traditional land use in the area was beef cattle grazing. MCC's MOP envisages that rehabilitated land will have good grazing potential and high wildlife amenity. This will be achieved by maintenance of grazing capacity and the establishment of trees native to the region. Tree corridors will also be established to enhance connectivity of vegetation to surrounding remnant native vegetation, particularly to nearby Bells Mountain and Skeletar Ridge. The final landform and location of proposed vegetation corridors are shown in **Figure 5.8**.

5.15 Workforce and Working Hours

The No. 1 Open Cut Extension will continue to provide long term employment at levels similar to the current permanent workforce of 69. In a similar manner to current arrangements for working hours, as described in **Section 4.3.6**, the proposed No. 1 Open Cut Extension will have the potential to operate seven days per week.

5.16 Transportation and Markets

Product transport will follow the same method outlined in **Section 4.4.6**. Export coal will continue to be transported from the mine to the RCT and Macquarie Generation by highway trucks. Coal from the RCT will travel by rail to the Port of Newcastle.

The No. 1 Open Cut Extension will ensure the continued supply of high quality steaming coal suitable for electricity generation. Coal produced at MCC will continue to supply domestic and export markets for electricity generation. Coal is exported primarily to Asian and European markets. It is expected that spot sales of high ash coal product to Macquarie Generation will continue.

5.17 Water Management

5.17.1 Proposed Water Management Strategy

The objectives of the proposed Water Management Plan take into account the practical requirements to mine economically and safely, and the water management principles in Section 5 of the *Water Management Act 2000*. These objectives can be summarised as:

- Meet the water supply needs of the project;

- Protect the safety of people and equipment in the mine by minimising the risk of large uncontrolled inflows of water into the mine pit from the No. 2 Underground; and

- Eliminate or minimise the risk of off-site discharge of dirty or saline water, except as allowed under the EPA licence.

The water management strategy during the development will consist of the following:

- Use of the No. 1 Open Cut as a water storage from Year 3 until the end of the project. The water level in the pit will be kept below 150 m AHD;

- Use of the No. 2 Open Cut as a water storage from the beginning of Year 6. From Year 6, water will be allowed to accumulate in the pit; this eliminates the surface runoff produced by the pit from the mine water balance, whilst groundwater inflows to the pit will gradually decline because of the increasing head of water in the pit pond;

- Gradual reduction of the area of catchment Q_{C5} by up to 50%, thereby removing a portion of the water make from this catchment from the mine water system. This will be achieved by constructing new holding dams and runoff channelling structures in the catchment. This construction has commenced; and

- Construction of a new dam of up to 400 ML capacity for mine water storage (as part of the development application for the Sandy Creek Colliery) if required. It is assumed to have minimal catchment.

The storage in the No. 1 Open Cut between levels of 146 m AHD and 150 m AHD will be the amount of freeboard available from the beginning of Year 2. This freeboard is approximately 360 ML. This allows for the average addition of approximately 1 ML/day, assuming the No. 2 Open Cut pit becomes available as a water storage at the beginning of Year 3. In practice, the time lag between disposal of underground water into the No. 1 Open Cut in Year 2 of development, and the availability of the No. 2 Open Cut, would be less than 1 year.

The construction of earth bunds and dams to capture clean and silty water produced by catchment Q_{C5} will occur during the development, as spoil mounds in this catchment are rehabilitated. A Maximum Harvestable Right Dam Capacity (MHRDC) assessment will be conducted on these dams and works and appropriate licences obtained if required.

5.17.2 Hunter River Salinity Trading Scheme

Studies are being conducted on the feasibility of using an un-named tributary of Muscle Creek as a discharge channel for MCC excess mine water under the rules of the HRSTS. This would be implemented using MCCs' 11 salt credits, and a proposed flood flow discharge of up to 175 ML/day. MCC has engaged a consultant to prepare a Tributary Impact Statement for this waterway.

MCC will be holding discussions with the NSW EPA on the proposal. This water management study for the EIS has not incorporated any HRSTS discharges from the mine. Discharges allowable under the current EPA discharge licence have been incorporated.

5.17.3 Erosion and Sediment Control

MCC will apply the principles of the current Erosion and Sediment Control Plan to the No. 1 Open Cut Extension. The basic principles currently utilised for managing stormwater runoff at the mine site are outlined in **Section 4.6.6.**

5.18 Environmental Monitoring

The current monitoring system employed at MCC is assessed as being capable of monitoring the impacts of the proposed continuation and extension of mining in respect of air, water, noise and vibration.

Current environmental management procedures are outlined in **Section 4.6.1**. Regular monitoring and data collection at various MCC and surrounding sites will continue to be conducted using both company and contracted resources. The monitoring programme utilises parameters and indicators that are consistent with those reported by other mining operations in the Hunter Valley.

MCC have installed an additional blast monitor and plan to install an additional high volume air sampler in the North Muswellbrook area as part of the proposal. It is planned to establish instruments to measure wind speed and wind direction in the vicinity of the No. 1 Open Cut Extension.

Monitoring results will continue to be reported in the AEMR. The AEMR will continue to be sent to the DMR, MSC and DLWC and be included in the annual report to the EPA.

5.19 Waste Management

Overburden

The strip ratio of an open cut mine refers to the ratio of waste (overburden) removed to ROM coal recovered. The strip ratio of the conceptual mine plan for the proposed No. 1 Open Cut Extension is shown in **Table 5.4**.

TABLE 5.4 OVERBURDEN REMOVAL VOLUMES		
Year	Total waste (Mm^3)	Strip Ratio (bcm/t ROM)
1	1.7	17.1
2	2.8	5.7
3	5.6	4.7
4	6.0	4.0
5	9.2	6.1
6	9.3	6.2
7	9.3	6.2
8	9.4	6.3
9	9.3	6.2
10	3.0	5.0

Overburden will be dumped back within the pit. There will be no out of pit dumping with the exception of transporting inert material to the No. 2 Open Cut as part of the planned rehabilitation works. The maximum level height of overburden emplacement within the existing No. 1 Open Cut void will be below the existing crest of the rehabilitated western spoil pile.

Sewage, Oil, Grease, Rubbish

The practices as currently employed by MCC for the treatment of sewage, the management and storage of oils and greases and the disposal of general rubbish are outlined in **Section 4.6.3**. It is planned to maintain the current arrangement for the proposed No. 1 Open Cut Extension. As there will be no increase in the permanent workforce, there is not expected to be any change in the demand for these waste services.

5.20 Greenhouse Gas Emissions

The project will require energy in the form of electricity for fixed plant, diesel and petrol for mobile plant and diesel for explosives. Use of this electrical energy and fuel will cause emissions of CO_2. In addition the combustion of the coal produced by the mine will result in the release of CO_2. An analysis of the extent of projected emissions generated by the project is to be found in **Section 6.10.1**.

A3

PROPOSED SANDY CREEK PANELS

No.2 UNDER-GROUND MINE

No.2 OPEN CUT MINE

No.2 UNDER-GROUND MINE

No.2 OPEN CUT SOUTH-WEST EXTENSION

ST HELLIERS COLLIERY

No.2 OPEN CUT SOUTH-WEST EXTENSION

No.1 OPEN CUT MINE

COMMON OPEN CUT

No.1 OPEN CUT SOUTH-WEST EXTENSION

No.1 UNDER-GROUND MINE

HUNTER RIVER

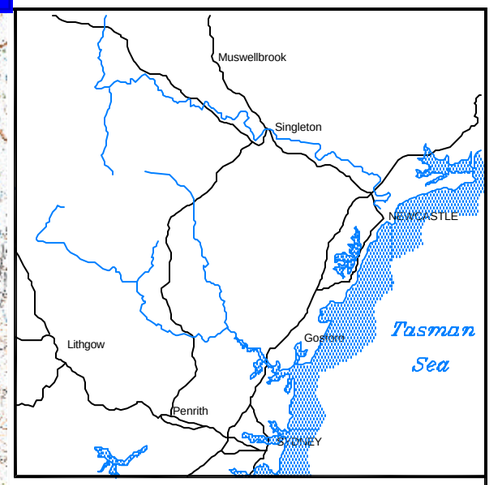
MUSWELLBROOK

SOUTH MUSWELLBROOK

DOWNFALL CREEK

DOWN

BALMORA



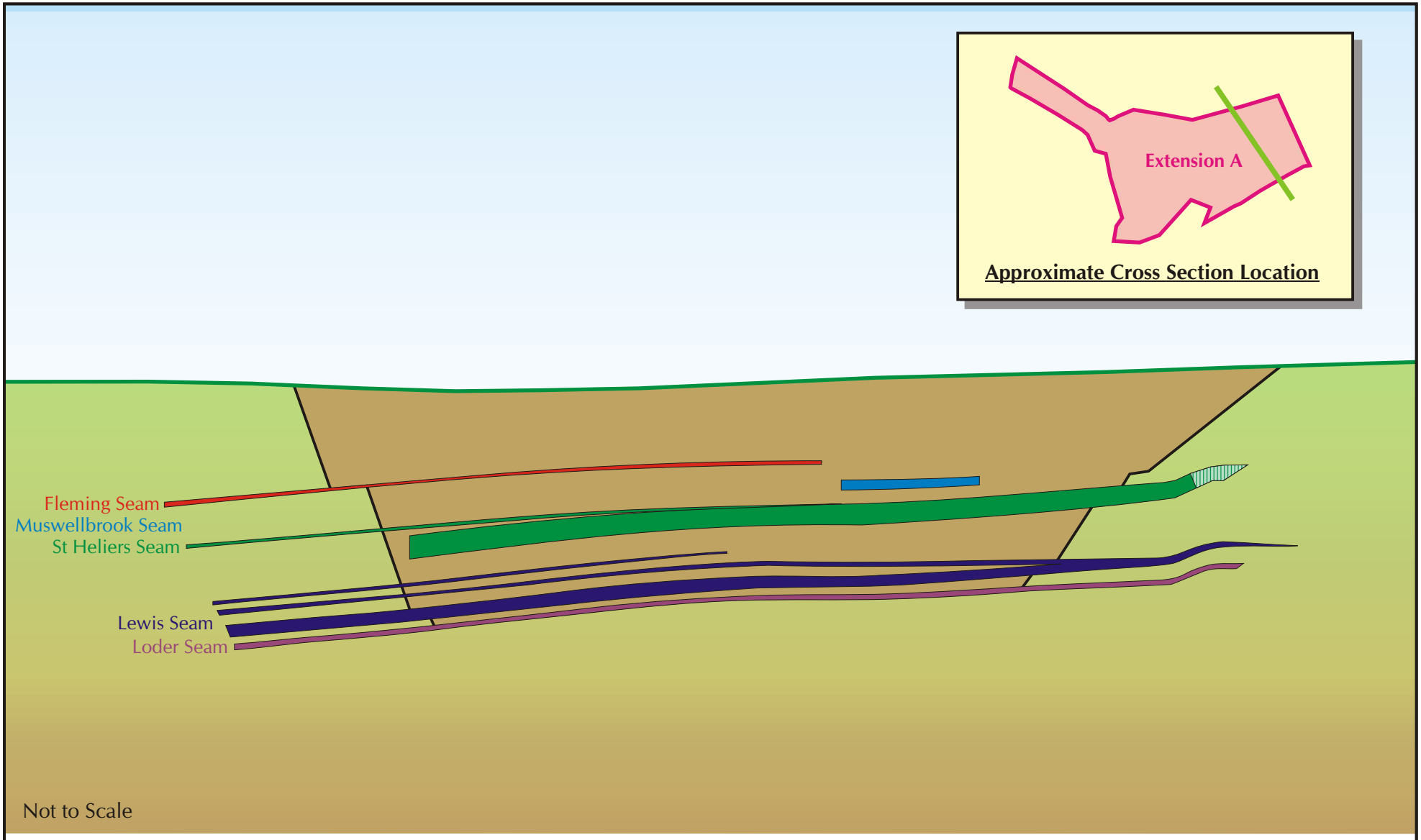
0 1.0 2.0
metres

HLA-Envirosciences Pty Limited
55-65 Grandview Street
Pymble, NSW
61 2 9988 4422

GENERAL LOCALITY MAP AND EXTENT OF MCC MINE WORKINGS
Muswellbrook Coal Company Ltd
MCC Environmental Impact Statement
No.1 Open Cut Extension, Muswellbrook NSW

FIGURE 5.1

DRAWN	PROJECT-FILE NUMBER	APPROVED	DATE	REVISED DATE
LJE	U888-022		June 2002	



LEGEND

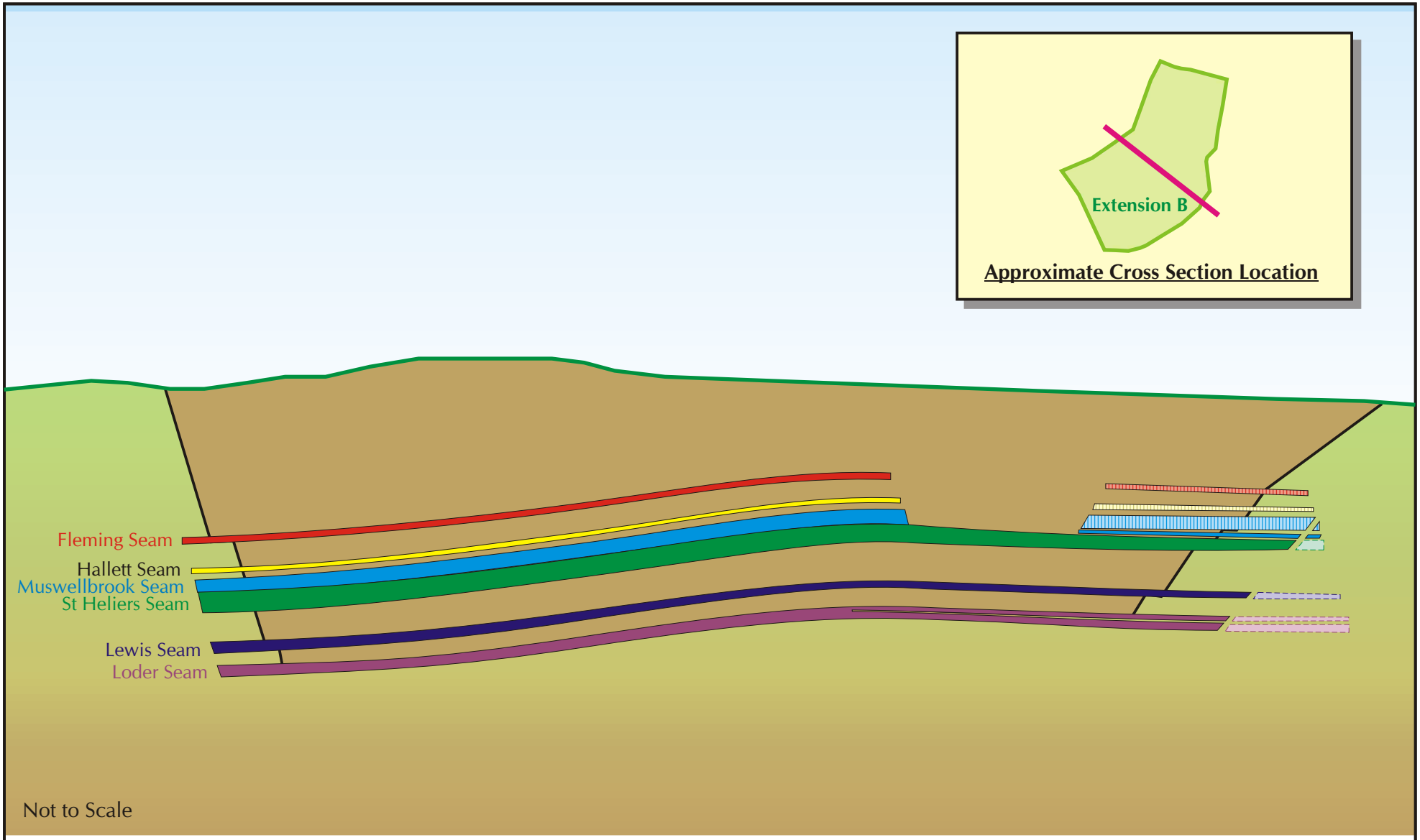
Area of Coal Seam Previously Worked by Underground Methods

MUSWELLBROOK COAL COMPANY LIMITED

Cross Section Through Extension A

FIGURE 5.2

File Name: EXTENSION A XSECT.CDR



LEGEND

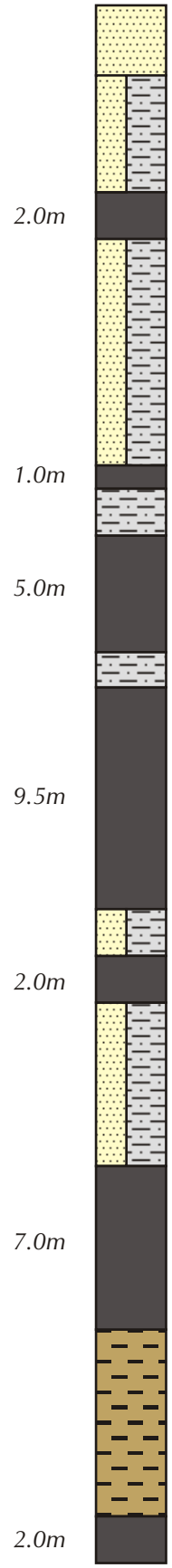
Area of Coal Seam Previously Worked by Underground Methods

MUSWELLBROOK COAL COMPANY LIMITED

Cross Section Through Extension B

FIGURE 5.3

File Name: EXTENSION B XSECT.CDR



2.0m Fleming Seam

1.0m Hallet Seam

5.0m Muswellbrook Seam

9.5m St. Heliers Seam

2.0m Upper Lewis Seam

7.0m Lower Lewis Seam

2.0m Loder Seam

LEGEND

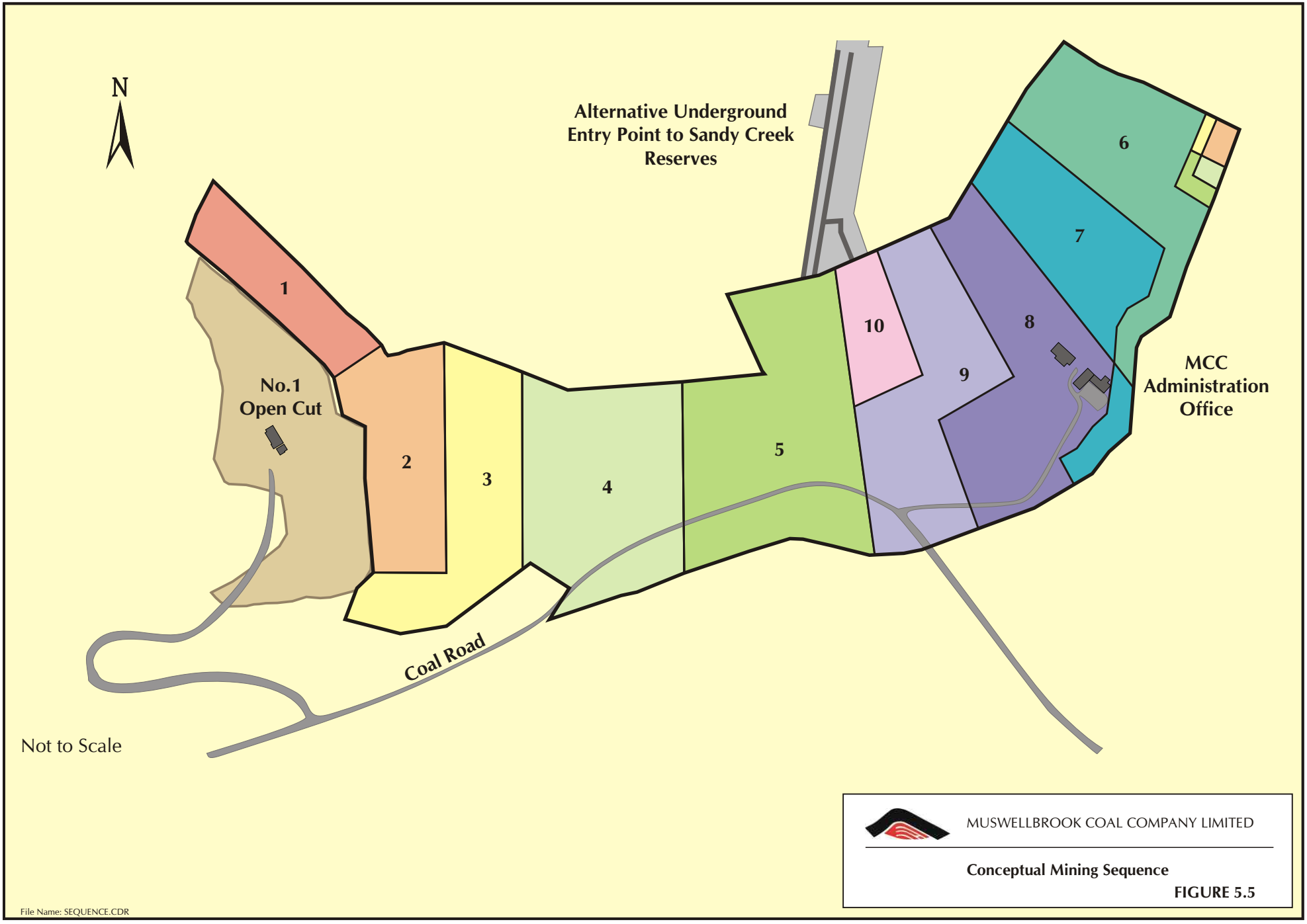
- Sandstone
- Siltstone
- Claystone
- Coal
- Sandstone/Siltstone Interbedded

MUSWELLBROOK COAL COMPANY LIMITED

Typical Stratigraphic Column

FIGURE 5.4

File Name: STRATIG.CDR


N
Alternative Underground
Entry Point to Sandy Creek
Reserves
1
2
3
4
5
6
7
8
9
10
No.1
Open Cut
MCC
Administration
Office
Coal Road
Not to Scale
MUSWELLBROOK COAL COMPANY LIMITED
Conceptual Mining Sequence
FIGURE 5.5
File Name: SEQUENCE.CDR

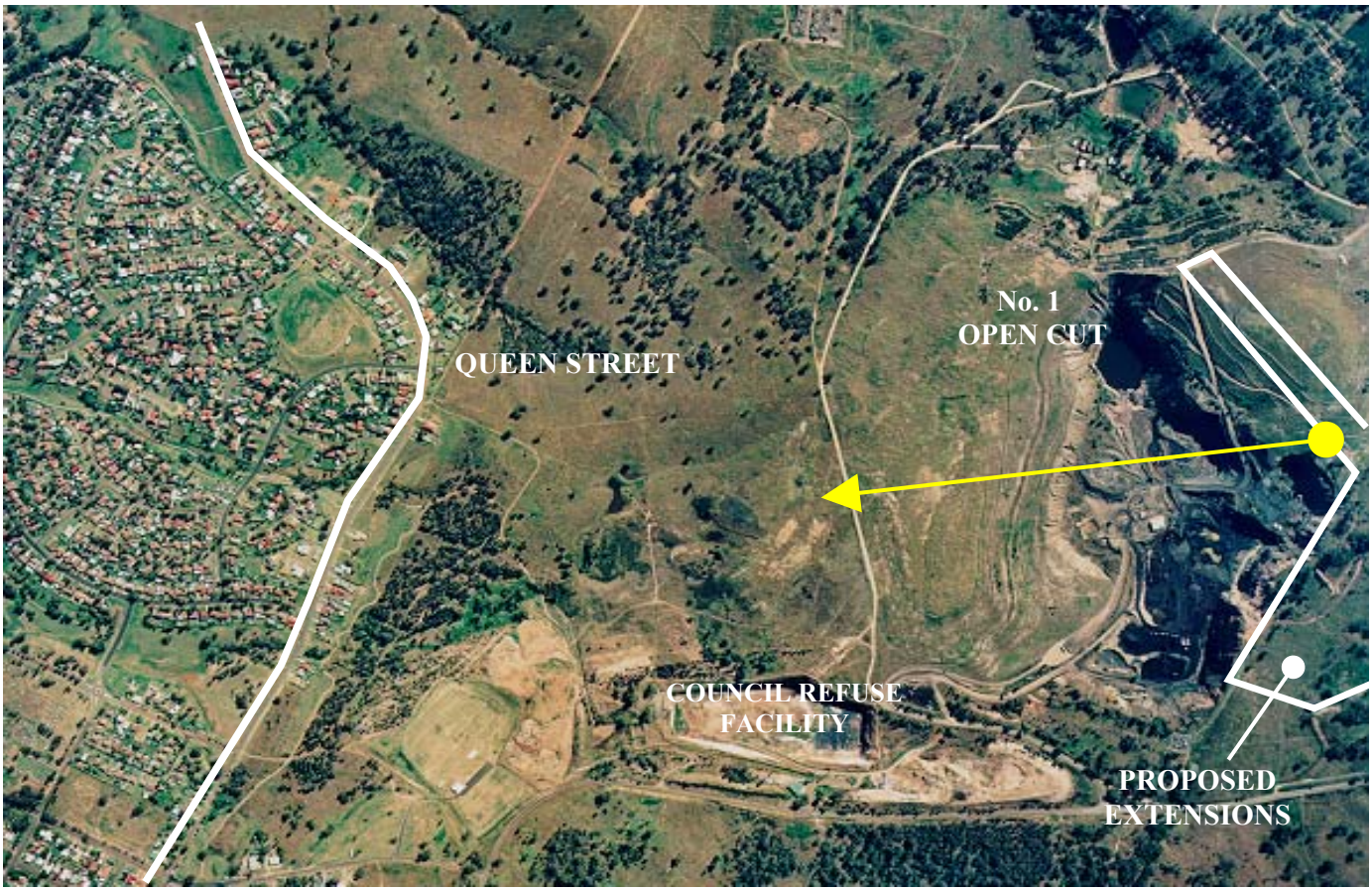


FIGURE 5.6. Orientation of viewing point on No. 1 Open Cut Highwall shown in **Figure 5.7.**

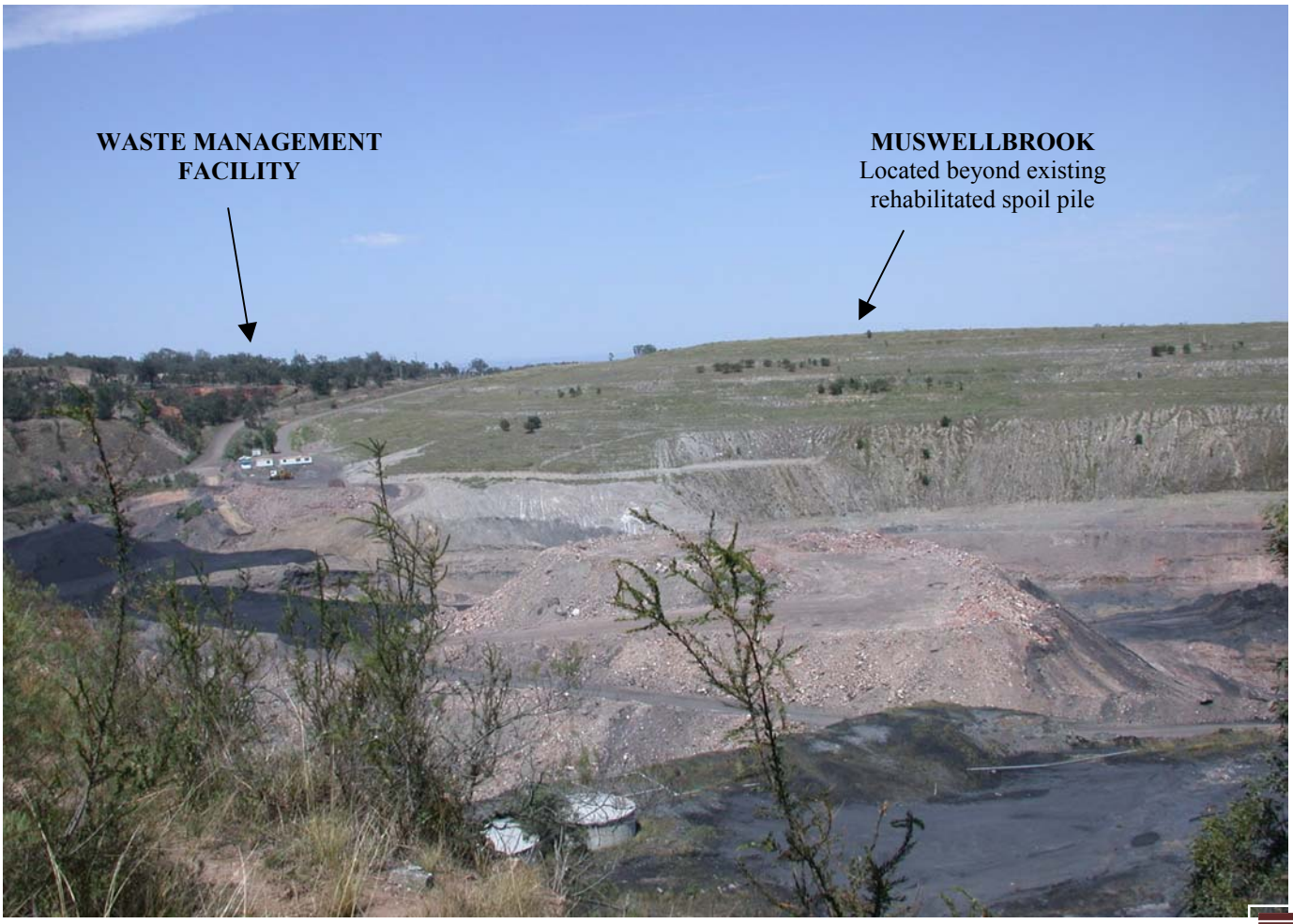
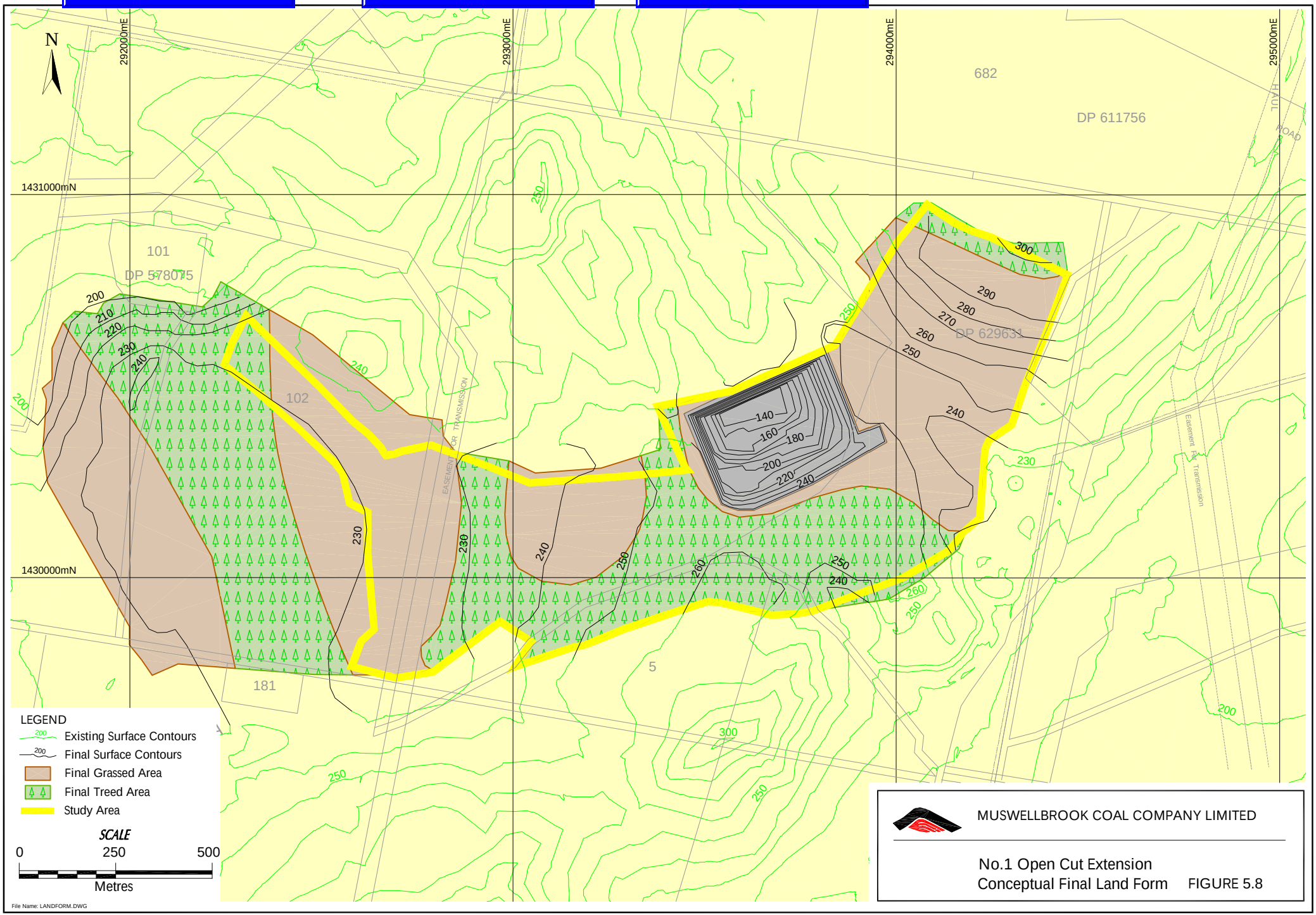


FIGURE 5.7. View to the southwest above the existing No. 1 Open Cut Highwall


N
292000mE
293000mE
294000mE
295000mE
1431000mN
1430000mN
682
DP 611756
101
DP 578075
102
181
5
DP 629631
HAUL ROAD
EASEMENT FOR TRANSMISSION
Easement For Transmsion
LEGEND
Existing Surface Contours
Final Surface Contours
Final Grassed Area
Final Treed Area
Study Area
SCALE
0
250
500
Metres
File Name: LANDFORM.DWG
MUSWELLBROOK COAL COMPANY LIMITED
No.1 Open Cut Extension
Conceptual Final Land Form
FIGURE 5.8