Tasman Extension Project

Environmental Impact Statement

SECTION 2

PROJECT DESCRIPTION

Resource Strategies

DONALDSON COAL

Part of Gloucester Coal

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

2 PROJECT DESCRIPTION

Mining operations at the Tasman Underground Mine are currently conducted in accordance with existing Development Consent (DA 274-9-2002). Newcastle Coal Company Pty Ltd, a wholly owned subsidiary of Donaldson Coal is seeking Development Consent for the Project which would consolidate and replace the existing Development Consent (DA 274-9-2002) for the Tasman Underground Mine.

This section provides a description of the existing operations and a description of the Project.

2.1 OVERVIEW OF THE EXISTING TASMAN UNDERGROUND MINE

The Tasman Underground Mine commenced in May 2006, with underground mining commencing in September 2006. The Tasman Underground Mine is approved to produce 975,000 tpa of ROM coal using bord and pillar mining methods with a combination of total and partial extraction. Underground mining operations are currently undertaken 24 hours per day, 7 days per week.

The approximate extent of the existing and approved underground mine workings at the Tasman Underground Mine is shown on Figure 2-1.

Subsidence Management Plan (SMP) Approval has been granted for the following (Figure 2-1):

- Panel 1;
- Panels 2 to 4;
- Panel 5;
- Panels 6 to 9; and
- Panels 10 to 15.

A summary of the existing operations undertaken at the Tasman Underground Mine is provided below. Key approvals and documentation pertaining to the existing Tasman Underground Mine are described in Section 6.1.

2.1.1 Underground Mining Operations

The Tasman Underground Mine is a bord and pillar operation, which uses continuous miners for first workings and secondary extraction.

This process of extraction accommodates irregular shaped coal deposits, enables adjustment to extraction for better management of subsidence and maximises efficiency of the operation.

ROM coal extracted during first workings and secondary extraction by the continuous miners is directly transported (using shuttle cars) to underground conveyer system, which transport the coal to the surface. Alternatively, to reduce spillage from the conveyer system, ROM coal is passed through an underground feeder breaker, which reduces the size of the ROM coal prior to transfer to the conveyer system.

When mining encounters hard rock associated with faults or dykes that cannot be cut with the continuous miners, small scale drill and blast operations are used.

A description of the underground mining method for the Project is provided in Section 2.6.

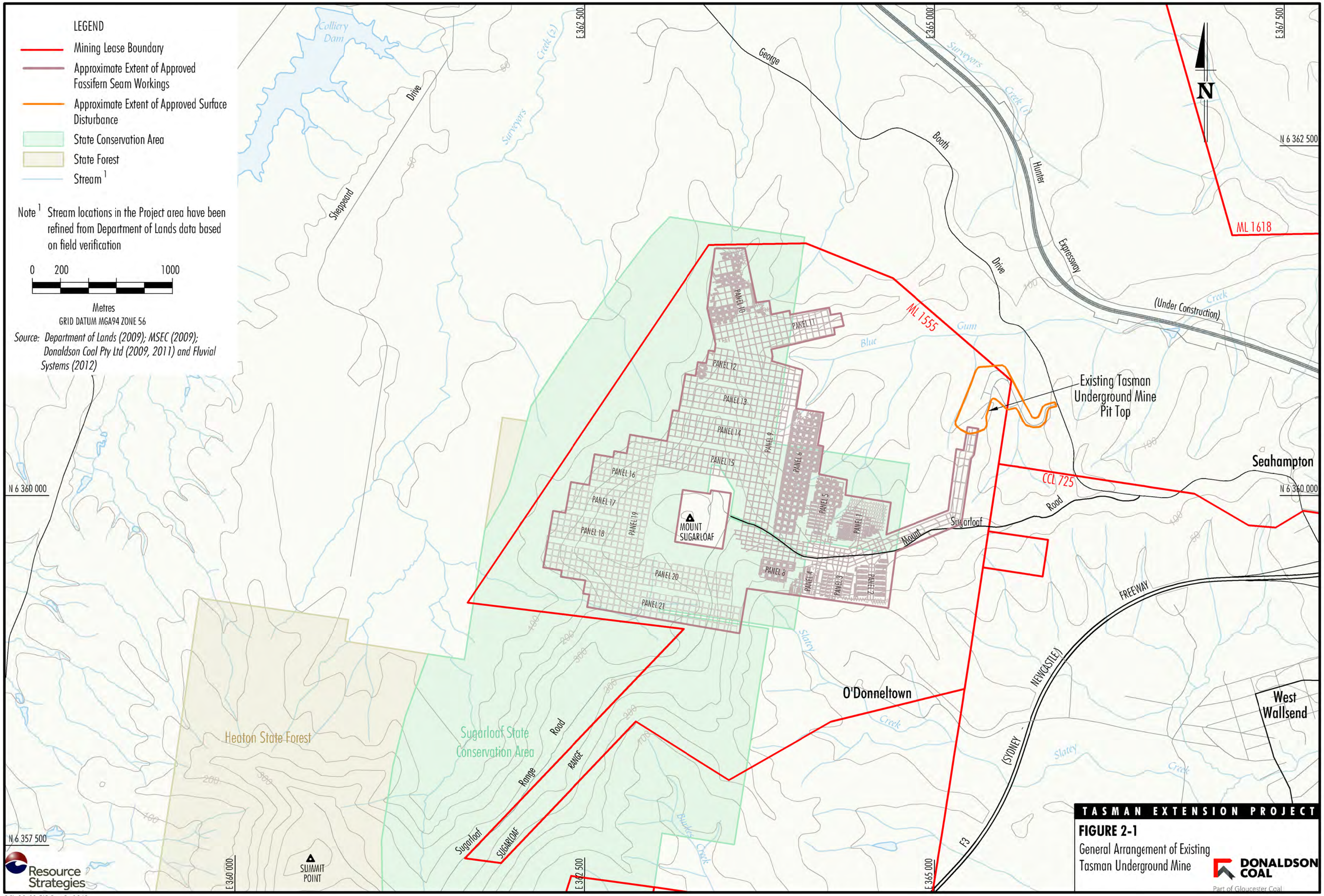
2.1.2 Tasman Underground Mine Pit Top

The operations at the current underground mining area are supported by the existing Tasman Underground Mine pit top which is located off George Booth Drive (Figure 2-1). The existing Tasman Underground Mine pit top (Figure 2-2) includes the following:

- ROM coal handling infrastructure;
- administration facilities;
- ventilation fan;
- worker amenities and stores buildings;
- workshop compound;
- bunded fuel tank area;
- transformer; and
- other miscellaneous mine infrastructure.

The existing mobile equipment fleet at the Tasman Underground Mine pit top includes:

- water truck;
- front end loader;
- bucket machines; and
- other miscellaneous equipment.



TASMAN EXTENSION PROJECT

FIGURE 2-1

General Arrangement of Existing Tasman Underground Mine

DCL-09-01 EIS Sect 2_106D

Source: *Department of Lands (1998); MSEC (2009) and Donaldson Coal Pty Ltd (2009)*

TASMAN EXTENSION PROJECT

FIGURE 2-2

Tasman Underground Mine Pit Top General Arrangement

DONALDSON COAL

Resource Strategies

DCL-09-01 EIS Sect 2_103E

2.1.3 ROM Coal Handling, Transport and Processing

ROM coal mined from the existing Tasman Underground Mine is stockpiled at the existing pit top. ROM coal is then reclaimed from the stockpiles by front end loader and loaded onto trucks (up to 19 metre [m] long Stag B-Doubles) for transport to the Bloomfield CHPP via approximately 16 km of public roads (i.e. George Booth Drive and John Renshaw Drive) (Figure 1-2).

ROM coal dispatch from the Tasman Underground Mine to the Bloomfield CHPP is approved to be undertaken between 7.00 am to 10.00 pm Monday to Friday, in accordance with DA 274-9-2002.

ROM coal from the Tasman Underground Mine is processed at the Bloomfield CHPP, prior to rail transport to the Port of Newcastle and other customers. The Bloomfield CHPP is owned and operated by Bloomfield, and is approved to operate under the Abel Underground Mine Project Approval (05_0136) (Section 2.4).

Commercial arrangements exist between Donaldson Coal and Bloomfield for the handling and processing of ROM coal at the Bloomfield CHPP, and the loading of product coal to trains for transport to customers.

2.1.4 Tailings and Coarse Reject Management

Under the Abel Underground Mine Project Approval (05_0136), tailings and coarse rejects associated with the processing of ROM coal from the Tasman Underground Mine at the Bloomfield CHPP are disposed in open cut voids and emplacement areas at the Bloomfield Colliery (Section 2.4).

2.1.5 Water Management

Surface Water Management Infrastructure

Existing and/or approved water management infrastructure at the Tasman Underground Mine includes the following:

- clean water diversion banks and drains;
- two pollution control dams, with total capacity of approximately 10,000 cubic metres (m^3);
- an oil/water separator;
- dirty water rock lined drains and reinforced concrete pipes draining to the pollution control dams;
- process water storage tank with capacity of approximately 150 m^3; and
- two potable water tanks with total capacity of approximately 300 m^3.

Water Management System

The existing Tasman Underground Mine water management system operates in accordance with Environment Protection Licence (EPL) 12483, DA 274-9-2002 and existing Site Water Management Plan, and comprises the following:

- separation of undisturbed area runoff from disturbed area runoff, with clean water transported off-site via clean water diversion banks and drains;
- transfer of disturbed area runoff either directly to the pollution control dams, or via the oil/water separator, reinforced concrete pipes and/or rock lined drains;
- capture of groundwater inflows in one of the pollution control dams, with re-use as process water (via the process water storage tank) or transfer and permanent storage in abandoned workings within the West Borehole Seam located beneath the current workings in the Fassifern Seam;
- delivery of make-up water from the Bloomfield Colliery and/or Donaldson Open Cut Mine (if required); and
- delivery of potable water via licensed contractor water carts.

Excess water from groundwater inflows or stormwater runoff collected at the pit top are directed to the pollution control dams or returned directly into abandoned workings within the West Borehole Seam. Alternatively excess water is managed through increased use of the water truck on-site.

2.1.6 Other Infrastructure and Supporting Systems

Electricity Supply and Distribution

Electricity to the Tasman Underground Mine is supplied via an 11 kV overhead electricity transmission line from West Wallsend.

Effluent Treatment and Disposal System

The existing on-site wastewater management system at the Tasman Underground Mine collects and treats sewage effluent and greywater generated from the bathhouse, workshop and administration facilities. Treated effluent is used for irrigation within the TransGrid 330 kV transmission line easement (Figure 2-2) to the south of the existing pit top.

2.1.7 Environmental Monitoring and Management

The Tasman Underground Mine environmental management system includes various environmental management plans and programs that have been developed and implemented since operations commenced in 2006, including:

- Environmental Management Strategy.
- Environmental Monitoring Program.
- Site Water Management Plan.
- Flora and Fauna Management Plan.
- Road Transport Protocol.
- Bushfire Management Plan.
- SMPs (including Subsidence Monitoring Programs).
- Abel Underground Coal (Integrated with Donaldson Open Cut, Tasman Underground and Bloomfield Open Cut Coal Mines) Integrated Environmental Monitoring Program.

Donaldson Coal would continue to implement the existing plans and programs at the Tasman Underground Mine, and where necessary would review and revise them (in consultation with the relevant regulatory authorities) for the Project.

Further details of the existing content and/or revision of these plans and programs for the Project is provided under the relevant environmental aspect headings in Section 4 and elsewhere in this EIS.

The Tasman Underground Mine has an extensive environmental monitoring regime. A summary of the existing monitoring and management regime is provided in Table 2-1, and the locations of relevant monitoring sites are shown on Figure 2-3.

2.2 COAL RESOURCE, MAJOR GEOLOGICAL FEATURES AND EXPLORATION ACTIVITIES

Stratigraphy

The Project is located in the Newcastle Coalfield within the north-eastern portion of the Permo-Triassic Sydney Basin (NSW Department of Mineral Resources [DMR], 1995).

The Late Permian Newcastle Coal Measures contain a number of workable seams throughout the Newcastle Coalfield, but of these coal seams, only the Fassifern and West Borehole Seams are presently considered to be of economic significance to the Project.

Underground mining currently occurs at the Tasman Underground Mine in the Fassifern Seam within the Boolaroo Formation of the Newcastle Coal Measures (Figure 2-4).

The Project would involve underground mining operations in the West Borehole Seam to the north and west of the approved Fassifern Seam workings. The West Borehole Seam is located within the Lambton Formation and is the basal unit of the Newcastle Coal Measures (Figure 2-4) (Appendix A). The West Borehole Seam is located approximately 175 m below the Fassifern Seam.

In the southern portion of the proposed underground mining area, the West Borehole Seam comprises the Nobbys Seam, Dudley Seam, Yard Seam and Borehole Seam (in descending order). The immediate roof above the proposed workable section comprises 1 to 2 m of coal (generally the Dudley and Nobbys Seams) and the Nobbys Tuff, which is a tuffaceous claystone approximately 1 to 8 m thick (Appendix A).

A sandstone channel unit splits the upper two seams (Nobbys and Dudley) from the workable seam in the northern portion of the proposed underground mining area. The Nobbys Tuff unit is located between 5 and 52 m above the proposed workable section in the northern portion of the proposed underground mining area (Appendix A).

The working floor below the West Borehole Seam is the Waratah Sandstone, which is consistent across the Project area. The Waratah Sandstone conformably overlies the Tomago Coal Measures (Figure 2-4).

Seam Characteristics

The West Borehole Seam has a south-eastern bedding dip across the proposed underground mining area associated with the southern arm of the Four Mile Creek Anticline to the west. The depth of cover (i.e. distance below the surface) of the West Borehole Seam is also driven by topography associated with Sugarloaf Range.

In the proposed underground mining area, the West Borehole Seam has a depth of cover between approximately 50 m (in the west) and 420 m (in the east) (Figure 2-5). Secondary workings would not occur at depths of cover less than 50 m.

The thickness of the West Borehole Seam varies across the proposed underground mining area, primarily as a result of seam splitting associated with the sandstone channel unit. The proposed underground mining area is located where the West Borehole Seam thickness exceeds 2.5 m.

Table 2-1
Summary of the Tasman Underground Mine Environmental Management and Monitoring Regime

Environmental Aspect	Environmental Management Documentation	Environmental Monitoring
Subsidence	• SMPs.	• *Subsidence* – Survey assessment, photographic monitoring and visual inspections before, during and after mining.
Land Resources	• Environmental Monitoring Program. • SMPs. • Bushfire Management Plan.	• *Meteorology* – Meteorology station located at Tasman Underground Mine pit top. • *Slope Stability* – Survey assessment, photographic monitoring and visual inspections before, during and after mining. • *Weeds* – Donaldson Coal-owned land. • *Bushfire Protection* – visual inspection of fire breaks.
Air Quality	• Environmental Monitoring Program. • Abel Underground Coal (Integrated with Donaldson Open Cut, Tasman Underground and Bloomfield Open Cut Coal Mines) Integrated Environmental Monitoring Program.	• *Dust Deposition* – D1, D2, D3. • *High Volume Air Sampler (HVAS)* – Seahampton Rural Fire Service (RFS) station.
Noise	• Environmental Monitoring Program. • Abel Underground Coal (Integrated with Donaldson Open Cut, Tasman Underground and Bloomfield Open Cut Coal Mines) Integrated Environmental Monitoring Program.	• *Attended Monitoring* – 76 Railway Street West Wallsend, Seahampton RFS station.
Surface Water	• Site Water Management Plan. • Environmental Monitoring Program. • SMPs. • Abel Underground Coal (Integrated with Donaldson Open Cut, Tasman Underground and Bloomfield Open Cut Coal Mines) Integrated Environmental Monitoring Program.	• *Surface Water Quality* – BG1, BG2, BG3. • *Surface Water Flow* – BG1.
Groundwater	• Site Water Management Plan. • Environmental Monitoring Program. • SMPs. • Abel Underground Coal (Integrated with Donaldson Open Cut, Tasman Underground and Bloomfield Open Cut Coal Mines) Integrated Environmental Monitoring Program.	• *Groundwater quality and level* – TA 23, TA 24, TA 28, TA 32A,B,C, B004, B017A,B.
Flora and Fauna	• Flora and Fauna Management Plan. • Environmental Monitoring Program. • SMPs. • Abel Underground Coal (Integrated with Donaldson Open Cut, Tasman Underground and Bloomfield Open Cut Coal Mines) Integrated Environmental Monitoring Program.	• *Flora quadrats* – Surface disturbance area and compensatory habitat. • *Floristic transects* – Surface disturbance area. • *Fauna trapping transects* – Surface disturbance area and compensatory habitat. • *Ecosystem health* – visual inspections before, during and after mining.
Road Transport	• Road Transport Protocol.	• *Driver Behaviour and Compliance* – six monthly independent audits.

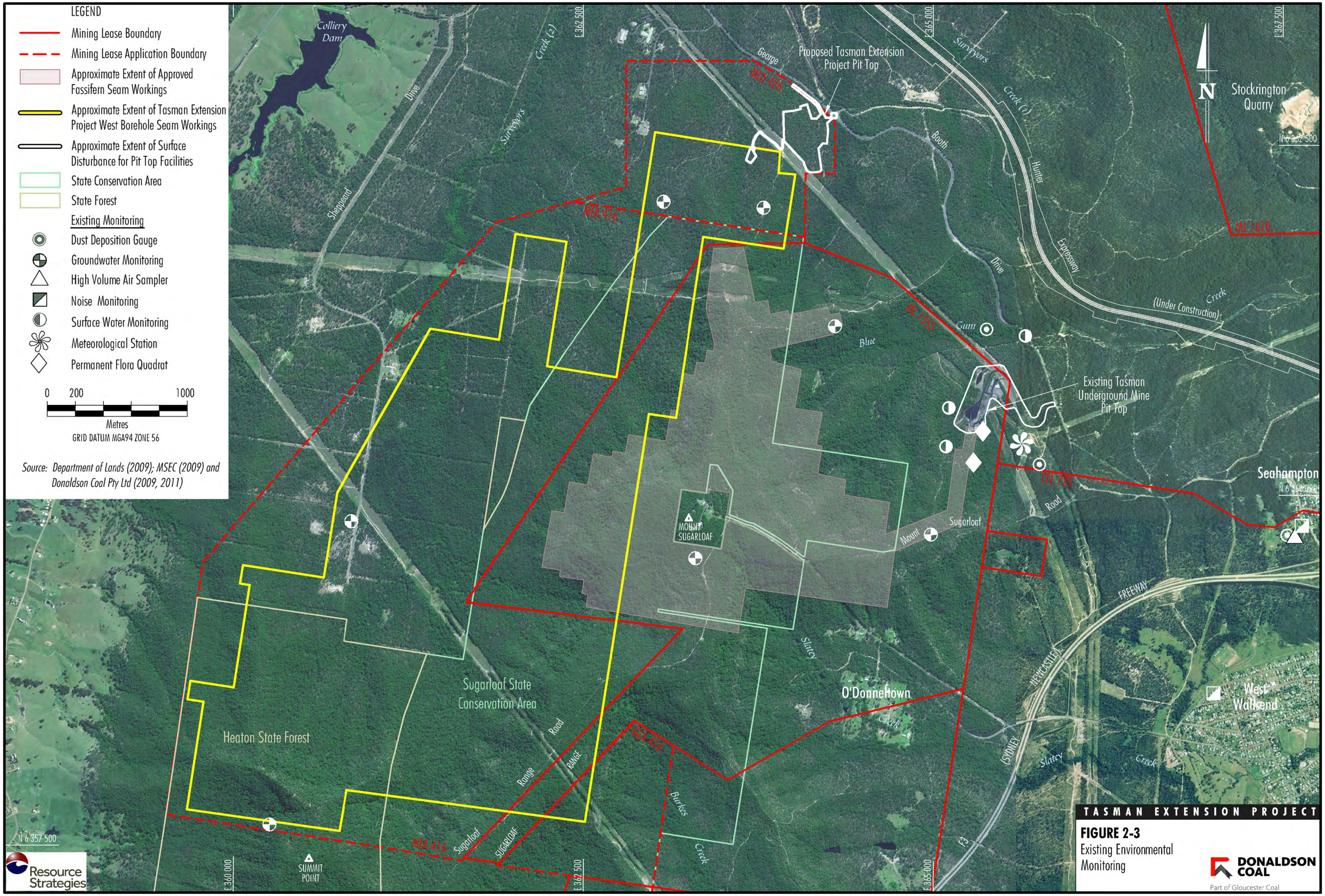
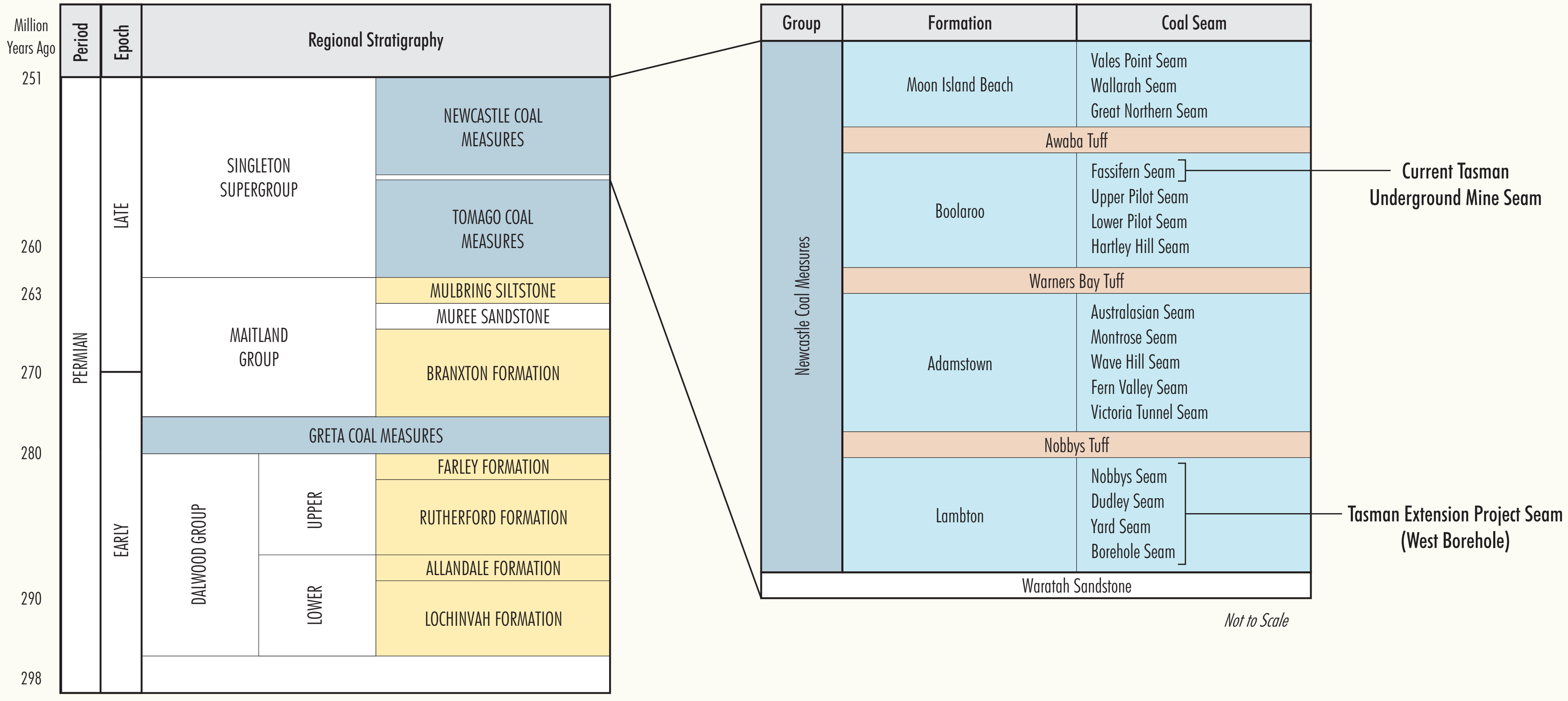


FIGURE 2-3
Existing Environmental Monitoring

DCL-09-01 EIS Sect 2_105G

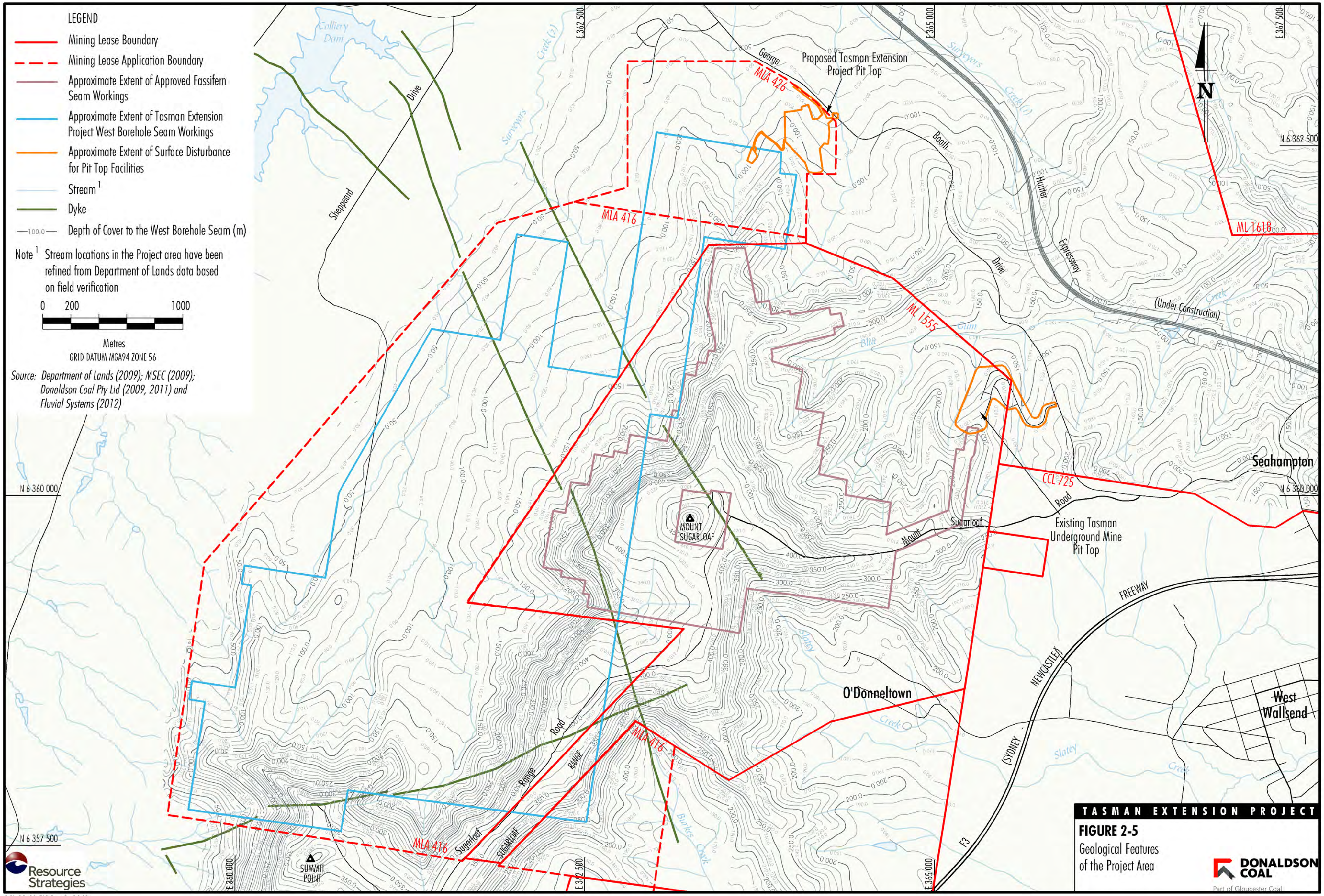


Source: Donaldson Coal (2011)

TASMAN EXTENSION PROJECT

FIGURE 2-4
Indicative Stratigraphy of the Project Area

DCL-09-01 EIS Sect 2_001B



TASMAN EXTENSION PROJECT

FIGURE 2-5
Geological Features of the Project Area

DCL-09-01 EIS Sect 2_104G

Thickness of the West Borehole Seam is between 3.5 and 4 m across the majority of the area and up to 4.95 m (Appendix A).

The West Borehole Seam is classified as a high ash (approximately 32 percent [%]) and low sulphur (approximately 0.6%) coal.

Geological Features

In the south-west of the Newcastle Coalfield, the West Borehole Seam is extensively intruded by an igneous sill (DMR, 1995). There are also a number of known major structures (e.g. dykes) in the vicinity of the proposed underground mining area.

The location and characteristic of dykes and faults within the West Borehole Seam (Figure 2-5) have been inferred from record tracings, aero-magnetic surveys, ground magnetic surveys, surface mapping and mine mapping within the Fassifern Seam. Dykes are predicted to be doleritic in composition and up to 10 m thick (Donaldson Coal, 2011). Associated sills and cinder zones of up to 10 m on either side of each dyke are anticipated (Donaldson Coal, 2011).

Faults and dykes have the potential to interfere with coal production and underground mine development. Where dykes are too hard to be cut through by the continuous miners, specific management measures (e.g. small scale drill and blast measures) would be required to break through the dykes and permit access to coal beyond the dyke.

Coal Resource

The measured and indicated coal resource within the West Borehole Seam is approximately 30.6 Mt.

The recoverable coal reserve from the West Borehole Seam for the Project is approximately 18.7 Mt of coal.

Exploration Activities

During the life of the Project, mine exploration activities including in-seam and surface-to-seam drilling would continue to be undertaken ahead of the underground mining operations to investigate geological structure, coal quality and seam morphology as input to detailed mine planning and engineering studies.

Surface-to-seam exploration activities would generally require only small surface disturbance areas and would involve the use of surface drilling rigs and supporting equipment above the proposed underground mining areas (Figure 2-6a).

Other exploration activities would be carried out as required and in accordance with the relevant exploration licences.

2.3 PROJECT GENERAL ARRANGEMENT

The Project general arrangement is shown on Figures 2-6a and 2-6b including extents of underground mining in the Fassifern and West Borehole Seams.

The main activities associated with the development of the Project would include:

- continued underground mining of the Fassifern Seam using a combination of total and partial pillar extraction methods within ML 1555 (Figure 2-6a);
- underground mining of the West Borehole Seam using a combination of total and partial pillar extraction methods (Figure 2-6a);
- production of ROM coal up to 1.5 Mtpa;
- development of a new pit top facility, associated ROM coal handling infrastructure and intersection with George Booth Drive (Figure 2-6a);
- development of ventilation surface infrastructure (Figure 2-6a);
- continued transport of Fassifern Seam ROM coal from the existing Tasman Underground Mine pit top to the Bloomfield CHPP via truck on public and private roads (Figure 1-2) to approximately 2015 (inclusive);
- transport of West Borehole Seam ROM coal from the new pit top to the Bloomfield CHPP via truck on public and private roads;
- progressive development of sumps, pumps, pipelines, water storages and other water management equipment and structures;
- ongoing exploration activities;
- ongoing surface monitoring, rehabilitation and remediation of subsidence effects; and
- other associated infrastructure, plant, equipment and activities.

The Project is a proposed extension of underground mining operations at the Tasman Underground Mine for an additional operational life of approximately 15 years. It includes all those activities included in the existing Development Consent (DA 274-9-2002) except where they are expressly stated not to be applied for.

Additional details of each of the main Project components are provided in the subsections below.

2.4 PROJECT INTEGRATION

A description of the potential interactions between the Project and surrounding mining developments is provided in Attachment 4. Potential cumulative impacts associated with these developments have been considered in this EIS (Section 4).

A summary of the key interactions between the Project and both the Bloomfield CHPP and Abel Underground Mine is provided below.

The Project includes the transport of ROM coal via public roads to the Abel Underground Mine. ROM coal would then continue to be transported via sealed internal roads to the Bloomfield CHPP for processing and rail loadout.

Bloomfield owns and operates the Bloomfield CHPP within CCL 761. The Bloomfield CHPP is approved to operate under the Abel Underground Mine Project Approval (05_0136) until approximately December 2028 at a maximum ROM coal processing rate of 6.5 Mtpa.

In addition to ROM coal from the Project, the Bloomfield CHPP would continue to process ROM coal from the Abel Underground Mine, Donaldson Open Cut Mine, Bloomfield Colliery and other sources.

Tailings and course rejects from the Bloomfield CHPP would continue to be disposed in the open cut voids and emplacement areas at the Bloomfield Colliery, pursuant to the Abel Underground Mine Project Approval (05_0136).

Figure 2-7 provides a schematic diagram showing the handling of coal and reject material from the Project, and the integration with the Abel Underground Mine and Bloomfield CHPP.

<u>It should be noted that the Development Application to which this EIS relates does not seek approval for any modification to the approved Bloomfield CHPP or Abel Underground Mine</u>.

In December 2011, Donaldson Coal lodged an application for the Abel Upgrade Modification with the DP&I (05_0136 Mod 3). As a component of the Abel Upgrade Modification, Donaldson Coal is seeking approval for the receipt, internal transport, handling, processing and rail loadout of coal from the Project, and management of associated rejects.

Donaldson Coal would continue to operate in a co-operative manner with the Bloomfield Colliery operations. Commercial arrangements between Donaldson Coal and Bloomfield regarding handling and process of coal from the Project would be reviewed and revised throughout the life of the Project, as required.

2.5 PROJECT CONSTRUCTION/ DEVELOPMENT ACTIVITIES

The Project would use the existing Tasman Underground Mine pit top and supporting surface infrastructure until the completion of mining in the Fassifern Seam. Additional infrastructure and upgrades to existing infrastructure are required to support the Project and would progressively be developed in parallel with ongoing mining operations, including:

- development of a new pit top, including box cut and drift access to West Borehole Seam and ROM coal handling infrastructure;
- development of the roundabout and access road to the new pit top;
- development of ventilation surface infrastructure; and
- underground mining equipment upgrades.

An indicative Project schedule is provided in Figure 2-8.

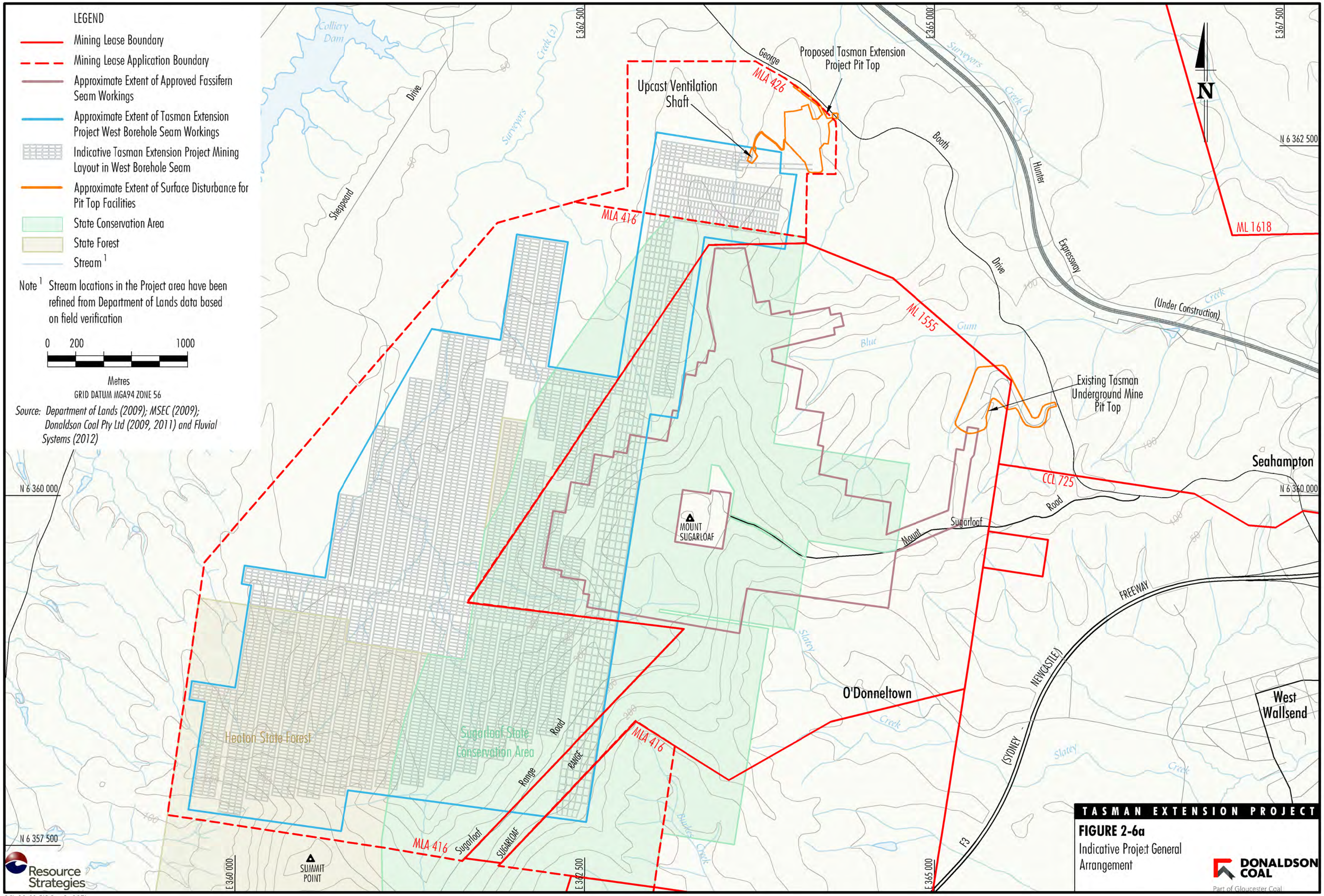
Additional mobile equipment would be required for short-periods during the Project construction/ development activities. As surface construction of the new pit top would be undertaken over a period of up to 18 months, the number and type of equipment would be expected to vary depending on the activity being undertaken.

The peak indicative construction fleet is detailed in the Noise and Vibration Impact Assessment (Appendix I).

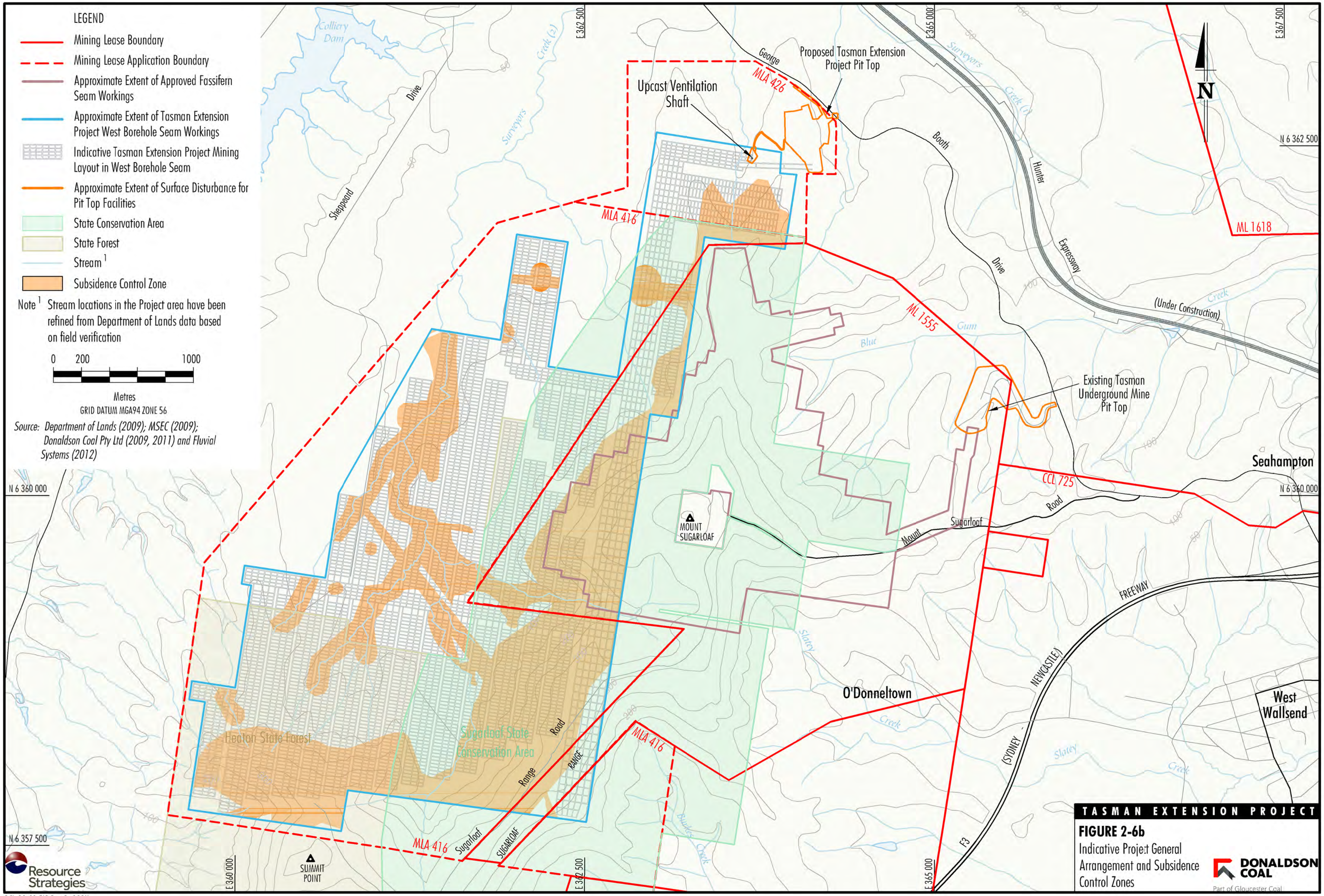
2.5.1 Development of the Access Road to the New Pit Top

Access to the new pit top would be via a sealed access road off George Booth Drive.

Development of the access road to the new pit top would involve the construction of a new intersection with George Booth Drive. The intersection would consist of a roundabout with George Booth Drive and the access road to the Daracon Buttai Quarry.



DCL-09-01 EIS Sect 2_107I

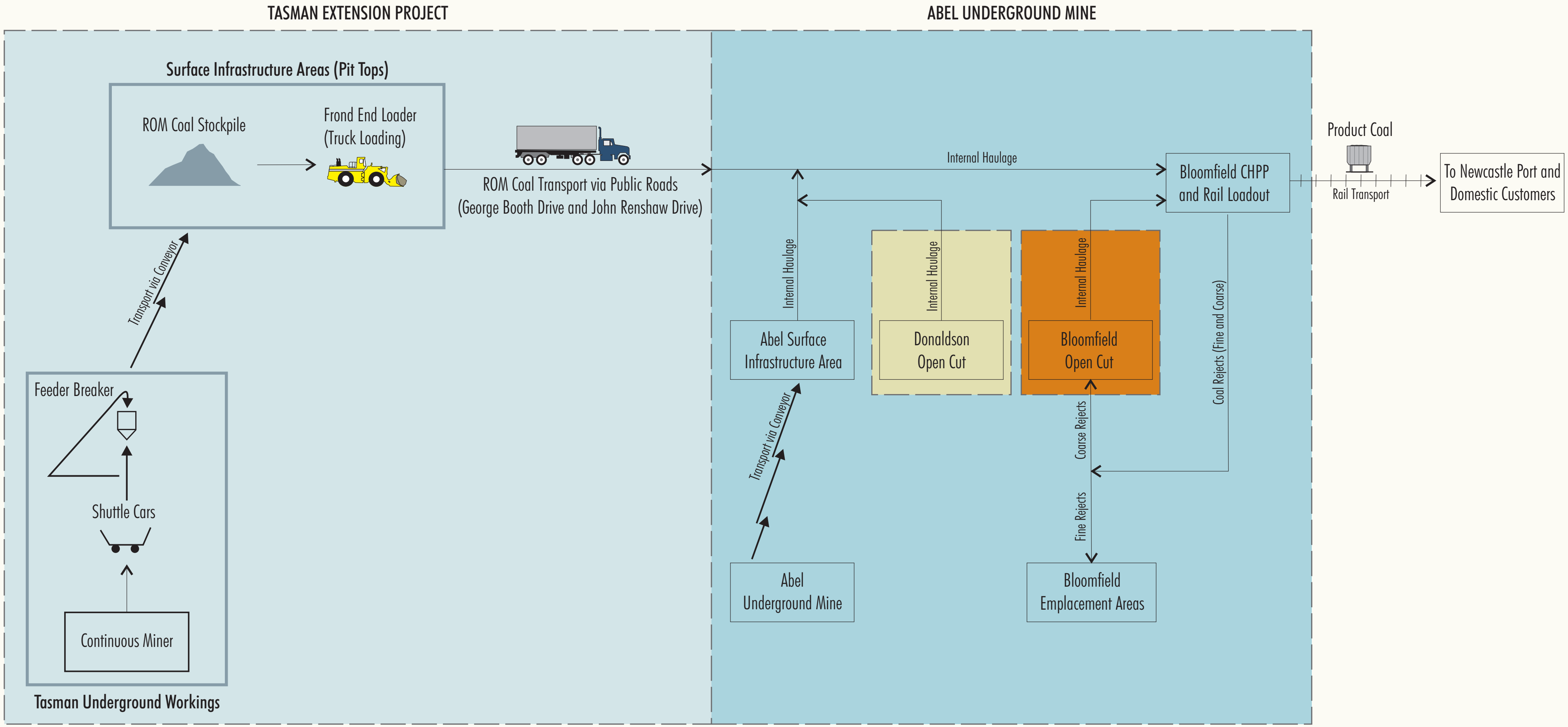


TASMAN EXTENSION PROJECT

FIGURE 2-6b

Indicative Project General Arrangement and Subsidence Control Zones

DCL-09-01 EIS Sect 2_108H



Note: The processing of ROM coal, handling and transportation of product coal and handling and disposal of coal rejects would be approved under the Abel Underground Mine Project Approval (05_0136).

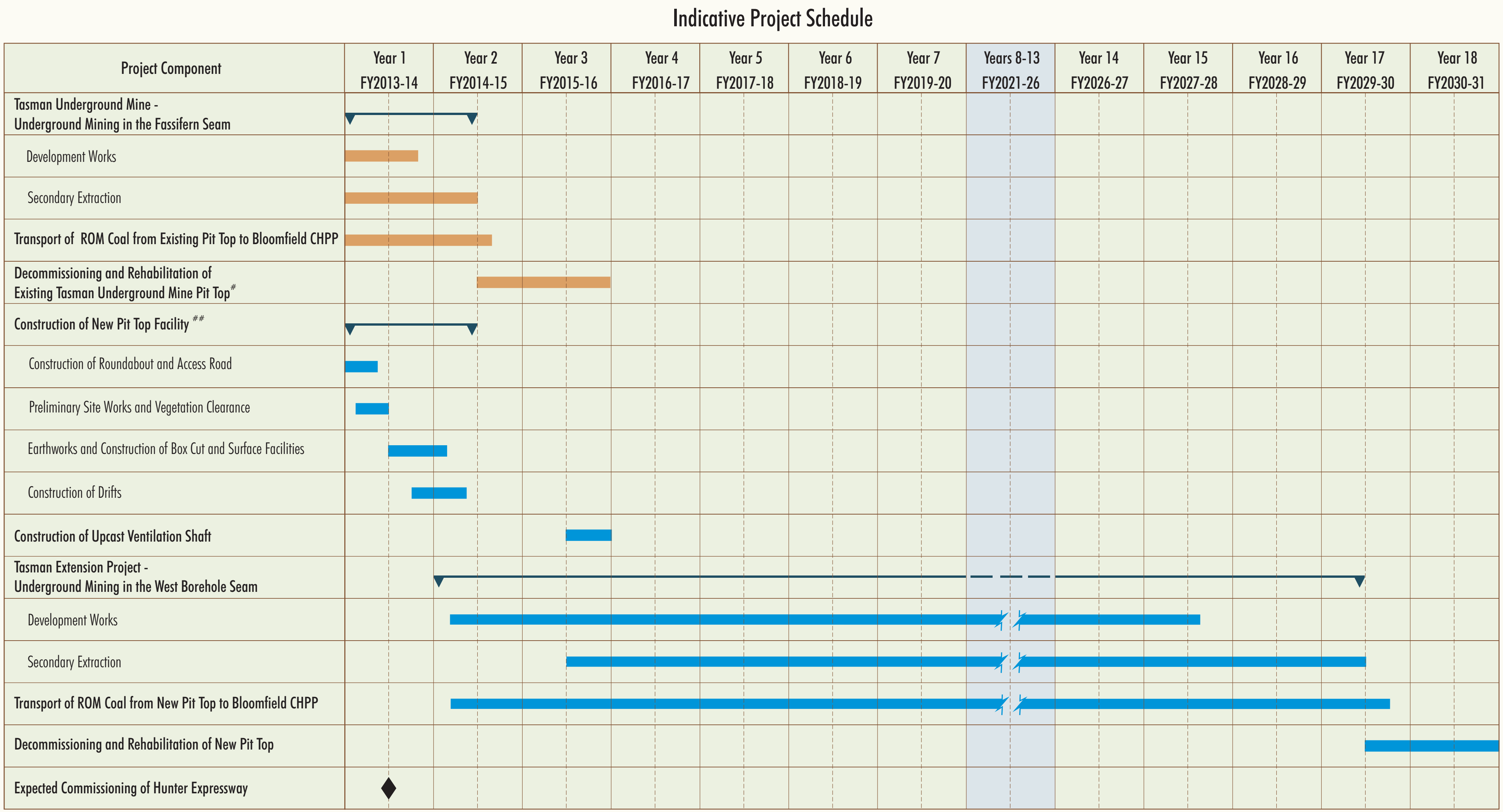
Project Approvals
- Bloomfield PA 07_0087
- Donaldson DA 98/01173 and DA 18/698/22
- Abel PA 05_0136

Source: Donaldson Coal (2012)

TASMAN EXTENSION PROJECT

FIGURE 2-7
Indicative Coal Handling Schematic

DCL-09-01 EIS Sect 2_002I



Existing/Approved Tasman Underground Mine (DA-274-9-2002)

Tasman Extension Project - Additional Components

\# Decommissioning and rehabilitation of the pit top may be delayed and the pit top placed under care and maintenance subject to necessary approvals under the *Mining Act, 1992*.

\## Construction of the new pit top facility would start in early 2013 subject to all necessary approvals being in place.

Source: Donaldson Coal (2012) and Ardill Payne & Partners (2012)

TASMAN EXTENSION PROJECT

FIGURE 2-8
Indicative Project Schedule

DCL-09-01 EIS Sect 2_003G

Construction of the roundabout and access road would be completed prior to the commencement of major earthworks at the new pit top (Figure 2-8).

2.5.2 Construction of New Pit Top and Access to Underground Workings

The Project would involve the development of a new pit top to provide access to the West Borehole Seam and associated surface facilities required for underground coal mining and ROM coal handling.

Construction of the new pit top facility would involve:

- site survey and demarcation, including a vegetation clearance protocol (VCP);
- vegetation clearance and topsoil stripping;
- installation of temporary erosion and sediment controls (e.g. filter fencing and bales);
- construction of internal roads;
- excavation of the boxcut (to allow construction of drifts to the West Borehole Seam);
- construction of culverts, diversion drains, contour drains and water storage dams;
- construction of a visual bund along George Booth Drive;
- construction of the administration and workshop areas and other site services;
- installation of conveyor and ROM coal handling infrastructure;
- creation of a visual bund;
- installation of appropriate security (e.g. fencing and boom gates) to prevent unauthorised access to the site; and
- other miscellaneous activities.

The limited amount of available topsoil would be stockpiled for use on areas disturbed during the construction phase and/or used in creation of the visual bund.

The new pit top would comprise ROM coal handling infrastructure, administration facilities, worker amenities and stores buildings, workshop compound, bunded fuel tank area, electricity reticulation, water management equipment and structures and other associated infrastructure. An indicative general arrangement of the new pit top is provided in Figure 2-9.

The new pit top would be developed during the first 18 months of the Project. Construction activities would generally be restricted to daytime hours (i.e. 7.00 am to 6.00 pm).

Access to the underground workings would be via two drifts constructed from the boxcut at the new pit top. The drifts would be constructed by two road headers and construction would occur 24 hours per day, seven days per week in the final six months of the pit top construction period (Figure 2-8).

Waste rock from the excavation of the boxcut, drifts and other earthworks would be used for construction on-site or trucked to the Donaldson Open Cut Mine and emplaced in the open cut. If necessary, the Donaldson Open Cut Mine Development Consent (DA 98/01173 and 118/698/22) would be modified separately to allow for the receipt and management of Project waste rock. The combined trucking of coal and waste rock would not exceed the maximum approved daily tonnage (i.e. 4,000 tonnes per day) and would be within the proposed haulage hours (Table 1-1) except in the case of exceptional circumstances[1].

Alternatively, subject to suitable commercial arrangements and relevant approvals, some Project waste rock may be trucked to Daracon's Buttai and/or Stockrington Quarries via the proposed roundabout on George Booth Drive and the privately-owned Daracon Buttai Quarry access road.

2.5.3 Construction of New Upcast Ventilation Shaft

An upcast ventilation shaft and associated fan and ancillary infrastructure would be constructed as a component of the Project to provide adequate ventilation of the underground workings.

Construction of the new upcast ventilation shaft site would involve:

- grading and levelling of existing bush tracks;
- development of a 5.5 m diameter, 100 m deep, concrete or steel lined shaft;
- installation of a new ventilation fan;
- installation of associated electrical switchroom, transformer and ancillary infrastructure for the ventilation fan;
- installation of a power supply to the upcast ventilation shaft site;
- installation of appropriate security (i.e. fencing) to prevent unauthorised access to the shaft site; and
- other associated activities.

---

1 Exceptional circumstances include unexpected events such as a significant disruption to the haulage route. Hours would be extended in accordance with a contingency plan in the Road Transport Protocol with the agreement of the DP&I.

Source: Donaldson Coal (2012) and Ardill Payne & Partners (2012)

TASMAN EXTENSION PROJECT

FIGURE 2-9
Indicative Arrangement of the New Pit Top

DONALDSON COAL

Resource Strategies

DCL-09-01 EIS Sect 2_109K

The shaft would be constructed using the 'raise bore' method by a raise bore machine. A pilot hole would be drilled from the surface prior to the remainder of the shaft being excavated from the bottom of the shaft upwards. Using this method, material from the excavation would be removed from the bottom of the shaft via the existing underground system, surfacing at the existing portal.

Drilling of the shaft would occur 24 hours per day, seven days per week, while the remainder of construction activities (e.g. vegetation clearance and installation or surface infrastructure) would be generally limited to daytime hours (i.e. 7.00 am to 6.00 pm). The construction period is expected to be approximately 20 weeks.

2.5.4 Underground Mining Machinery Upgrades

Over the life of the Project it is anticipated that a range of underground mining equipment would be replaced or upgraded as a component of general maintenance or to increase efficiency.

2.5.5 Upgrades at Private Driveways on ROM Coal Haulage Route

Donaldson Coal undertook upgrade works at a number of private driveways located on George Booth Drive between Richmond Vale Road and John Renshaw Drive including road shoulder widening and sealing as a component of the road upgrades for the existing Tasman Underground Mine.

As a result of community consultation, Donaldson Coal has identified a number of supplementary improvements that could be made to further improve road safety for private vehicles turning at, or in the vicinity of, private driveways located on George Booth Drive between Richmond Vale Road and John Renshaw Drive (Section 4.12.3).

Such improvement works that have been identified include (Appendix Q):

- provide additional or extended sealed shoulder widening for vehicles making left turns into private driveways;
- provide additional or extended widening of the shoulders for vehicles passing a propped vehicle making a right-hand turn into a private driveway;
- trimming or removing vegetation that obscures sight lines;
- relocation of guide posts;
- relocation of signage; and
- consideration of the relocation of some electricity transmission line poles that are located within the road verge.

Donaldson Coal would implement private driveway/George Booth Drive safety improvement works, subject to separate assessment and approval, within one year of obtaining Development Consent for the Project, should it be approved.

2.6 UNDERGROUND MINING OPERATIONS

Underground mining currently occurs at the Tasman Underground Mine in the Fassifern Seam. The Project would involve continued underground mining in the Fassifern Seam and underground mining in the West Borehole Seam (Figure 2-6a).

Underground mining operations would continue to be conducted 24 hours per day, 7 days per week.

2.6.1 Indicative Mine Schedule

The provisional mine schedule for the Project presented in Table 2-2 is based on the planned maximum ROM coal production rate of up to 1.5 Mtpa. The timing may however vary to take account of localised geological features, detailed mine design, market conditions, mining economics or relevant Development Consent conditions that are imposed by the NSW Minister for Planning and Infrastructure.

The western extent of the West Borehole Seam underground mining area includes areas with a depth of cover of approximately 50 m (Figure 2-5). The eastern extent is bounded by historic underground workings in the West Borehole Seam undertaken as part of the closed Stockrington No. 2 Colliery.

The southern extent of the workings is bounded by an east-west trending dyke (Figure 2-5), with further exploration activities required to the south of the dyke to define future resource potential.

Table 2-2
Indicative Mine Schedule

Year	Fassifern Seam ROM Coal (kt)	West Borehole Seam ROM Coal (kt)	Total ROM Coal (kt)	Total Product Coal (kt)[1]	Total Coal Rejects (kt)[1]
1 (FY2013-14)	578	-	578	455	123
2	185	766	951	691	260
3	-	1,155	1,155	907	248
4	-	1,428	1,428	1,086	342
5	-	1,428	1,428	1,021	407
6	-	1,428	1,428	1,038	390
7	-	1,500	1,500	966	534
8	-	1,500	1,500	926	574
9	-	1,500	1,500	889	611
10	-	1,500	1,500	903	597
11	-	1,428	1,428	906	522
12	-	1,428	1,428	923	505
13	-	1,428	1,428	885	543
14	-	1,017	1,017	620	397
15	-	464	464	283	181
16	-	462	462	282	180
17	-	241	241	147	94
Total	**763**	**18,673**	**19,436**	**12,928**	**6,508**

1 Note that the processing of ROM coal, handling and transportation of product coal and handling and disposal of coal rejects would be in accordance with the Abel Underground Mine Project Approval (05_0136) and any relevant modifications (Section 2.4).

kt = kilotonne.

2.6.2 Coal Mining and Subsidence Effects

The operational methodology and equipment currently in use at the Tasman Underground Mine would also be employed for the Project, subject to equipment upgrades as described in Section 2.5.4.

The West Borehole Seam varies in thickness from approximately 2.5 to 4.95 m within the proposed underground mining area (Section 2.2). It is anticipated that approximately 2.5 m of the West Borehole Seam would be extracted during the Project underground operations.

Bord and pillar mining involves the extraction of coal using first workings from a network of underground roadways (known as panels) followed by the extraction of a portion of the remaining coal (secondary extraction).

The bord and pillar mining method involves the following four stages:

- *Formation of Main Roadways (first workings)* – coal is extracted to create stable and non-subsiding main roadways to provide access to groups of mining panels. Generally this is a 4 or 5 heading layout with roadways for ventilation, coal conveyors and access for employees and materials.
- *Formation of Panels (first workings)* – from the main roadways, panels approximately 160 m wide are developed to a logical boundary such as the limit of a conveyor, a geological anomaly, the mine boundary or a depth of cover constraint. Individual panels are separated by a barrier pillar that is left intact.
- *Extraction of Panels (secondary extraction)* – from the panel boundary and retreating back to the main roadways, coal pillars that were formed during panel development are removed, known as 'pillar extraction'. It is during this stage that the level of extraction can be adjusted to manage impacts to surface features. This part of the mining process causes the roof to collapse or 'goaf', which is the mechanism that creates subsidence.
- *Extraction of Main Roadway Pillars (secondary extraction)* – as a group of panels is completed, if the main roadways that serviced them have no long-term use, the coal pillars may be removed.

Secondary extraction from the remaining pillars of coal would be conducted using a combination of partial and total extraction.

Partial extraction involves the removal of coal either in the form of partial extraction from the remaining coal pillars or the removal of alternate pillars. Total pillar extraction is an extension of partial extraction where as much coal can be as safely and economically mined is removed from each panel.

Subsidence Effects

Extraction of coal by bord and pillar mining methods results in the vertical and horizontal movement of the land surface. The land surface movements are generally referred to as subsidence effects. The type and magnitude of subsidence effects is dependent on a range of variables which include the mine geometry and topography, the layout of unmined pillars, the number of seams mined, the coal recovery from each seam, the nature of superincumbent strata and other geological factors.

The subsidence movements of relevance to the Project are systematic subsidence movements, far-field horizontal movements and sub-surface strata movements, and are described in detail in the Subsidence Assessment (Appendix A) and below. Detailed predictions are provided in Section 4.2.

Systematic Subsidence Movements

Systematic subsidence movements are described using the following terminology:

- *Subsidence* – usually refers to the vertical movement of a point at the surface and is expressed in units of millimetres (mm). In the Newcastle Coalfield for single seam mining, maximum subsidence rarely exceeds 60% of the extracted seam thickness (Appendix A).
- *Tilt* – is the change in the slope of a land surface as a result of differential subsidence and is expressed in units of millimetres per metre (mm/m) or a change in grade where 1 mm/m = 0.1%.
- *Curvature* – is the rate of change of tilt over distance (or bending of the land surface) and is expressed in units of 1/km or is inverted to obtain the radius of curvature expressed in units of km. Locations that experience ‘hogging’ curvature are more likely to experience tensile strains and locations that experience ‘sagging’ curvature are more likely to experience compressive strains. A multiplication factor of 10 to the curvature provides a reasonable estimate for the average tensile and compressive strains.
- *Tensile strain* – is the change in horizontal distance between two points at the surface where the distance increases (i.e. stretching) and is typically expressed in units of mm/m.
- *Compressive strain* – is the change in horizontal distance between two points at the surface where the distance decreases (i.e. squeezing) and is typically expressed in units of mm/m.
- *Horizontal movement* – is the absolute horizontal movement of a point at the surface and is expressed in units of mm.

Far-Field Horizontal Movements

Far-field horizontal movements are mine-induced, *en masse* horizontal displacement of the surface and generally only have the potential to damage long, linear features such as pipelines, bridges and dam walls. Far-field horizontal movements are typically small (only detected by precise survey); tend to be movements towards the extracted panel area; and are accompanied by low levels of strain (e.g. <0.1 mm/m).

Sub-Surface Strata Movements

The caving and subsidence development process above a pillar extraction panel usually results in sub-surface fracturing and shearing of sedimentary strata in the overburden. The extent of fracturing and shearing is dependent on mining geometry and overburden geology.

International and Australian research on underground mining interaction with groundwater systems indicates that the overburden may be divided into essentially three or four zones of surface and subsurface fracturing. The zones are generally defined in ascending order (i.e. from the seam level) as (Appendix A):

- *Caved Zone* – refers to the immediate mine workings roof above the extracted workings, which has collapsed into the void left after the coal seam has been extracted. The caved zone usually extends for 3 to 5 times the mining height above the roof of the mine workings.
- *Fractured zone* – zone has been affected by a high degree of bending deformation, resulting in significant fracturing and bedding parting separation and shearing. The fractured zone comprises *in-situ* material and is supported by the collapsed material in the caved zone.

- *Continuous or Constrained zone* – comprises confined rock strata above the fractured zone which has also been deformed by bending or sagging action, but because they are constrained, have absorbed most of the strain energy without suffering significant fracturing or alteration to the original physical properties.
- *Surface zone* – comprises unconfined strata at the ground surface in which mining induced tensile and compressive strains may result in the formation of surface cracking or ground heaving. In the Newcastle Coalfield, the surface zone is assumed to extend to depths of 5 to 10 m.

An analysis of the likely height of each of the above zones overlying the extracted panels is provided in Appendix A.

Subsidence Impacts

The types and magnitudes of each of the above systematic, far-field horizontal and sub-surface strata movements are used in determining a range of potential subsidence impacts (Section 4.2.4) as follows:

- displacement (e.g. total subsidence and horizontal movements);
- surface cracking (e.g. transient and total compressive and tensile strains);
- changes in stream bed gradients (e.g. total tilt);
- slope instability (e.g. tensile stains and tilt);
- erosion/scouring (e.g. incremental and total tilt and strains);
- changes in stream alignment (e.g. total tilt and strains);
- increased ponding/flooding (e.g. total subsidence); and
- depressurisation of groundwater aquifers (e.g. sub-surface strata movements).

Assessment of the environmental consequences of the subsidence impacts described above on groundwater resources, surface water resources, aquatic ecology, terrestrial flora, terrestrial fauna, Aboriginal cultural heritage, non-Aboriginal cultural heritage and visual character are provided in Sections 4.4 to 4.11 and 4.19, respectively.

2.6.3 Subsidence Performance Measures and Adaptive Management

The bord and pillar mining method allows for subsidence impacts to be varied by increasing or decreasing the amount of coal extracted in particular areas.

As a component of the Project, Donaldson Coal would adopt subsidence performance measures for significant surface features (Table 2-3).

These performance measures would be achieved by implementing SCZs to manage subsidence effects on the surface feature and achieve the subsidence performance measure. The SCZs may involve partial extraction or limiting extraction to first workings (i.e. no secondary extraction) in some areas. The proposed design parameters for the SCZs to meet the performance measures are presented in Table 2-3 and the extent of the SCZs is shown on Figure 2-6b.

Detailed Extraction Plans would be prepared to demonstrate the mine design is such that the subsidence performance measures would be achieved.

Donaldson Coal would implement an adaptive management approach to ensure the performance measures are achieved for the Project. Adaptive management would involve the monitoring and periodic evaluation of environmental consequences against the performance measures, and adjustment (if necessary) of the SCZs (i.e. mine design and extent) to achieve the adopted performance measures.

Figure 2-10 provides a schematic representation of the adaptive management process.

2.6.4 Underground Mine Access

Access to the underground mining area in the Fassifern Seam from the existing Tasman Underground Mine pit top would continue to be via the mine adits which extend from the surface to the completed and current underground mining area.

Following completion of mining in the Fassifern Seam, the underground mine access along with existing Tasman Underground Mine pit top would be decommissioned or placed under care and maintenance subject to necessary approvals under the *Mining Act, 1992*.

Table 2-3
Proposed Subsidence Surface Constraints, Performance Measures and Subsidence Control Zones[1]

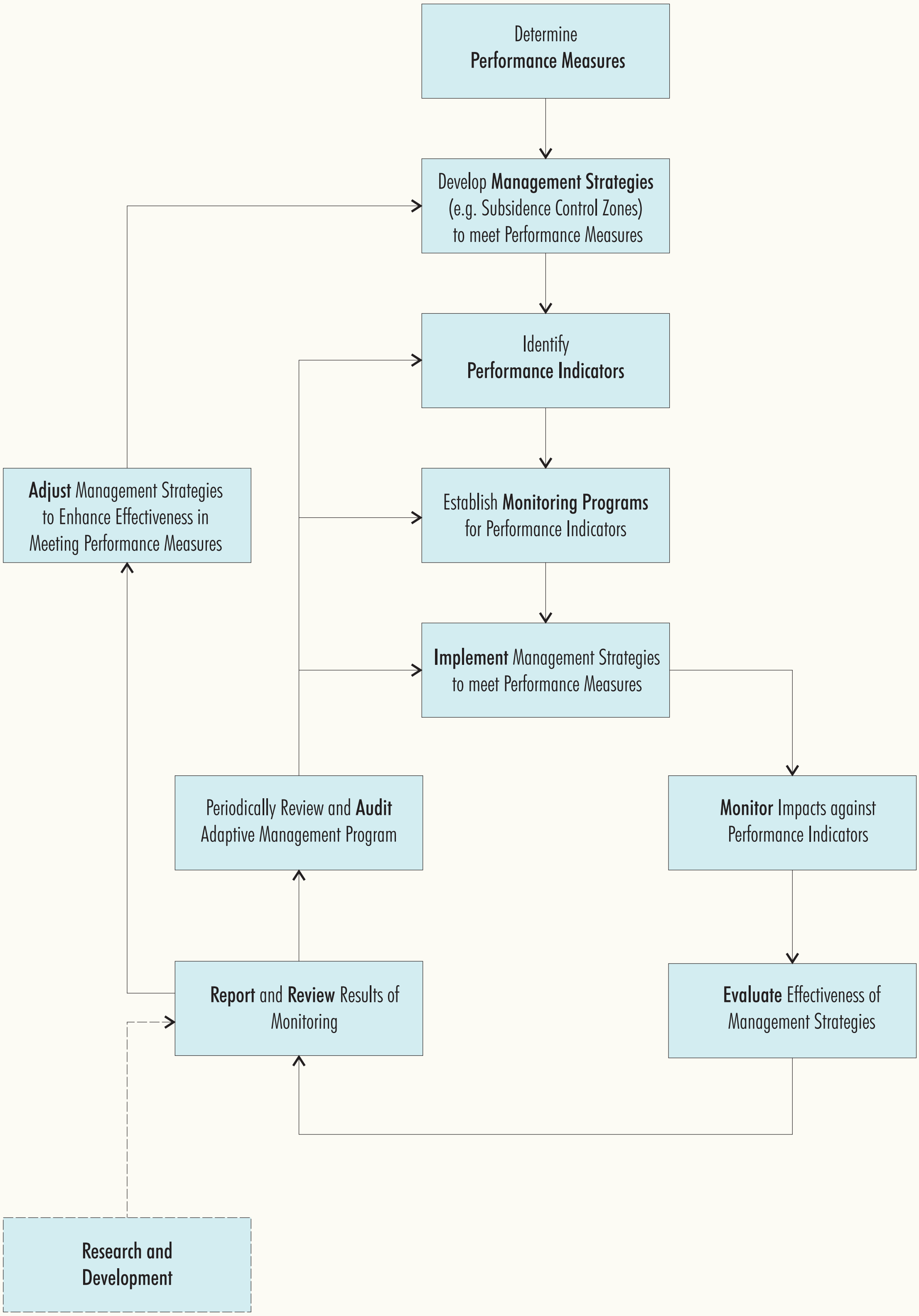
Surface Feature	Subsidence Performance Measure	Subsidence Control Zone[2]
Communication Towers on Mount Sugarloaf	Maintain safety and serviceability. No damage to structures or loss of service.	First workings only within 45 degree (°) angle of draw resulting in less than 2 mm subsidence and 10 mm horizontal displacement.
Fibre Optic Cables (FOCs)	Maintain safety and serviceability. Damage must be fully repaired or compensated.	Partial extraction with stable remnant pillars resulting in less than 300 mm of subsidence (unless FOCs can be relocated by agreement with the infrastructure owner or is suspended on electricity transmission towers).
TransGrid Towers	Maintain safety and serviceability. Damage must be fully repaired or compensated.	First workings only within 26.5° angle of draw resulting in less than 20 mm subsidence, 5 mm/m tilt and 2 mm/m strain (may be relaxed if cruciform footings can be installed and agreement reached with the infrastructure owner).
Ausgrid Towers	Maintain safety and serviceability. Damage must be fully repaired or compensated.	Maximum extraction (except where within another SCZ).
Principal Residences	Maintain safety. Serviceability to be maintained and/or fully compensated. Damage must be fully repaired or compensated.	First workings only within 26.5° angle of draw resulting in less than 20 mm subsidence, 5 mm/m tilt and 2 mm/m strain (may be relaxed if agreement reached with the owner).
Cliff Lines	Minor impact resulting in negligible environmental consequence. No additional risk to public safety.	First workings only within 30 m of a cliff line greater than 20 m in length resulting in less than 150 mm subsidence. Partial extraction with stable remnant pillars resulting in less than 300 mm of subsidence for all other cliff lines.
Steep Slopes	Minor impact resulting in negligible environmental consequence. No additional risk to public safety.	Partial extraction with stable remnant pillars resulting in less than 300 mm of subsidence beneath slopes greater than 1 in 2. Maximum extraction beneath slopes between 1 in 3 and 1 in 2 (except where within another SCZ).
3rd Order Streams[3] or above	Negligible environmental consequences (that is, negligible diversion of flows and negligible change in the natural drainage behaviour of pools). Negligible connective cracking to underground workings.	First workings only within 26.5° angle of draw resulting in less than 20 mm subsidence at the edge of the bank.
1st and 2nd Order Streams[3]	Not more than minor environmental consequences. Negligible connective cracking to underground workings.	Partial extraction with stable remnant pillars resulting in less than 300 mm of subsidence where the depth of cover to the stream is less than 80 m.
Coastal Warm Temperate – Sub Tropical Rainforest and Alluvial Tall Moist Forest (Groundwater Dependent Ecosystems) and Hunter Lowlands Redgum Forest on 3rd Order Streams[3]	Negligible environmental consequence.	Partial extraction with stable remnant pillars resulting in less than 300 mm of subsidence.

1 Proposed subsidence performance measures and SCZs are subject to further consultation with surface feature owners and relevant government agencies.

2 Proposed SCZs may be modified through the adaptive management process (Figure 2-10).

3 In accordance with the Strahler stream order system.

Note: Cliff Lines - a continuous rock face with minimum height of 10 m and minimum slope of 2 to1.
Minor - Relatively small in quantity, size and degree given the relative context.
Steep Slopes - an area of land having gradient between 1 in 3 and 2 in 1.
Negligible - Small and unimportant.



TASMAN EXTENSION PROJECT

FIGURE 2-10
Adaptive Management Process

DCL-09-01 EIS Sect 2_005D

Two drifts from the box cut at the new pit top would be constructed from the surface to the underground mining area in the West Borehole Seam to allow for employee, machine and material access (Section 2.5.2).

2.6.5 Major Underground Equipment and Mobile Fleet

The existing major underground equipment and mobile fleet currently used for mining in the Fassifern Seam comprises:

- surface bucket loader;
- surface forklift;
- water truck;
- continuous miners;
- shuttle cars;
- feeder breakers;
- multipurpose vehicles;
- personnel transporters; and
- bucket machines.

During the transition in mining from the Fassifern Seam to the West Borehole Seam, the existing major underground equipment and mobile fleet would be transferred to the West Borehole Seam in the order of the development crew (first workings) followed by the extraction crew (secondary workings).

It is anticipated that a range of underground mining equipment would be replaced or upgraded as a component of general maintenance or to increase efficiency over the life of the Project (Section 2.5.4).

2.6.6 Ventilation Systems

The existing ventilation system at the Tasman Underground Mine comprises a ventilation adit and ventilation fan. Following completion of mining in the Fassifern Seam the existing Tasman Underground Mine pit top, including ventilation system, would be decommissioned or the ventilation system would continue to be maintained if the pit top is placed under care and maintenance.

A ventilation shaft, fan and associated surface infrastructure would be installed near the new pit top (Section 2.5.3 and Figure 2-6a) to maintain a safe working environment within the West Borehole Seam underground workings.

Methane testing (undertaken as part of the recent exploration program) indicates that the West Borehole Seam generates low levels of methane. Therefore, it is unlikely that methane extraction equipment would be required. However, if the workings experience methane generation from strata above or below the target seam that impedes production or overloads the ventilation system, in seam gas drainage may be used.

2.6.7 Mine Dewatering

Groundwater inflows to the underground workings and water used for dust suppression and cooling of underground mining equipment would accumulate in the pollution control dams at the existing pit top and the mine water storage dam at the new pit top. The accumulated water would also continue to be returned directly back into abandoned workings within the West Borehole Seam. Further details of the Project water management system is provided in Section 2.9.

2.7 ROM COAL HANDLING AND TRANSPORT

ROM coal mined from the Fassifern Seam and West Borehole Seam would be stockpiled at the existing and new pit tops, respectively.

ROM coal would then be reclaimed from the stockpiles by front end loader and loaded onto trucks for transport to the Bloomfield CHPP for processing. ROM coal would be transported along public roads (George Booth Drive and John Renshaw Drive) to the Abel Underground Mine, and then along sealed internal roads to the Bloomfield CHPP.

Approval for the internal transport of Project ROM coal to the Bloomfield CHPP would be in accordance with the Abel Underground Mine Project Approval (05_0136) and any relevant modification (Section 2.4).

Completion of mining in the Fassifern Seam would result in a reduction in the distance of ROM coal haulage by approximately 6 km (return trip).

Total road haulage (including ROM coal transport and waste rock from the new pit top construction) for the Project would be maintained at existing approved volumes up to 4,000 tonnes per day prior to commissioning of the Hunter Expressway. Following commissioning of the Hunter Expressway, the Project would involve ROM coal transport of up to 6,200 tonnes per day along George Booth Drive and John Renshaw Drive.

Movement of ROM coal would be restricted to 7.00 am to 10.00 pm Monday to Friday and 7.00 am to 6.00 pm Saturday, except in the case of exceptional circumstances[2]. ROM coal transport would be limited to no more than 26 Saturdays in a financial year. ROM coal transport would not occur on Sundays or public holidays.

2.8 REHABILITATION ACTIVITIES AND REMEDIATION WORKS

The Project includes ongoing rehabilitation and remediation activities and rehabilitation at mine closure.

Further details of the Project rehabilitation and mine closure activities are provided in Section 5.

2.9 WATER MANAGEMENT

The water management system for the Project comprises the management of groundwater inflows to underground mining areas, and surface runoff from rainfall, at both the existing and new pit tops. A detailed description of the Project water management system is provided in Appendix C, and is summarised below.

2.9.1 Existing Pit Top Water Management System

A description of the existing and approved water infrastructure and management system is provided in Section 2.1.5. During the continued operation of the existing pit top as part of the Project, the water management system at the existing pit top would continue as per the existing and approved water management system described in Section 2.1.5.

There would be no interaction between the proposed water management system for the new pit top facility and the water management system at the existing pit top area. On this basis, water management at the existing pit top area is not considered further in this EIS.

2.9.2 New Pit Top Water Management System

The water management system at the new pit top would be based on the water management system at the existing pit top (Section 2.1.5). The existing Site Water Management Plan would be revised to incorporate the construction and operation of the new pit top facility. A schematic of the water management system for the new pit top facility is shown on Figure 2-11.

Surface Water Management

Runoff from rainfall at the new pit top facility would either be:

- directed off-site (untreated) for runoff from undisturbed areas;
- directed off-site via sediment traps/bio-retention systems for runoff from areas where handling of coal and/or hydrocarbons does not occur (e.g. administration office area); or
- directed to an on-site surface runoff storage dam (Figure 2-9) via sediment traps and/or sumps for runoff from areas where the handling of coal and/or hydrocarbons would occur.

The storage capacity of the surface water runoff dam would be designed to (Appendix C):

- meet the water requirements of the new pit top facility (e.g. for dust suppression); and
- retain excess runoff from a 20 year average recurrence interval storm without discharge to the natural environment.

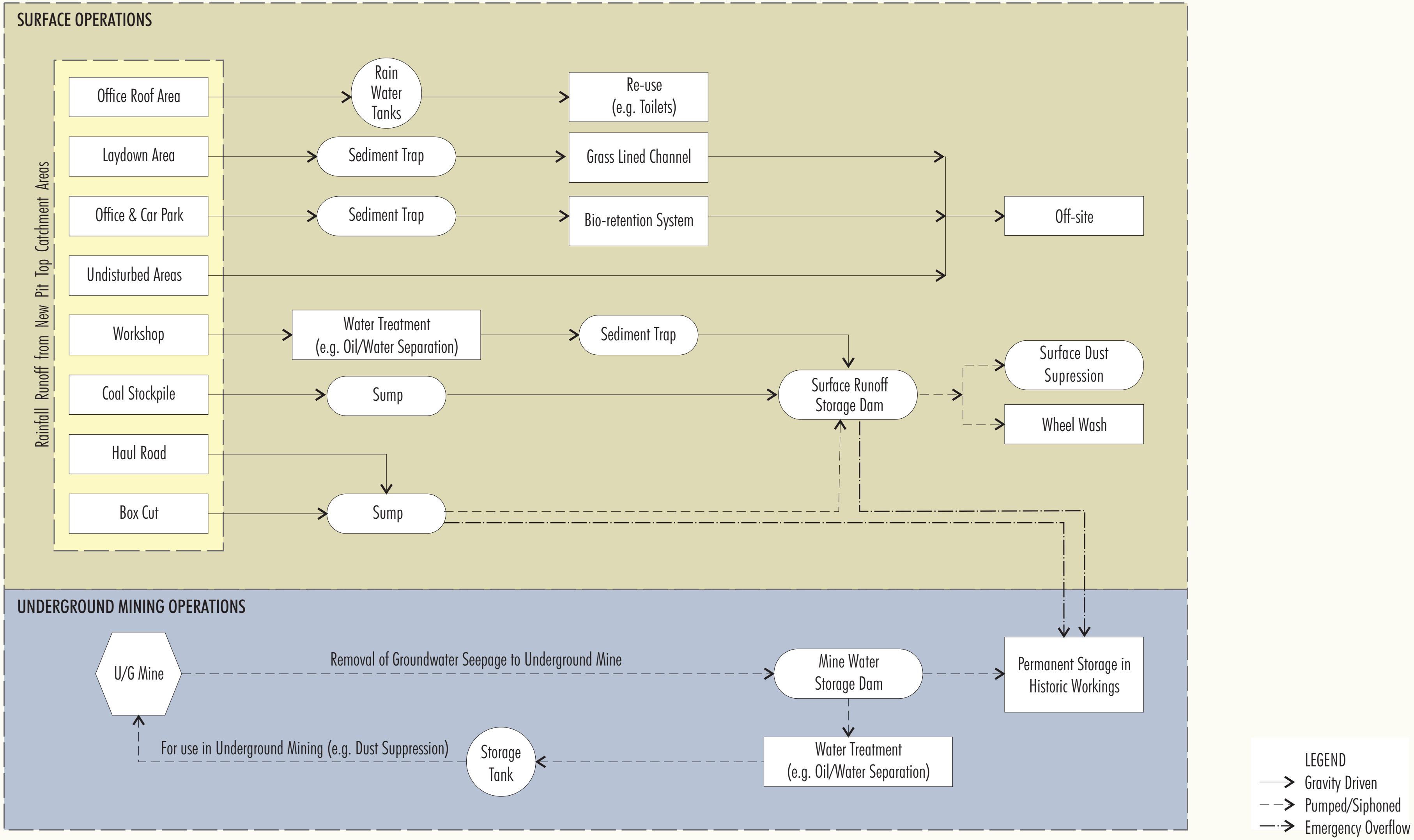
Water stored in the surface runoff dam is not proposed to be transferred off-site. As a contingency (e.g. following extreme weather events), water from the surface runoff dam would be transferred to the historic underground workings in the West Borehole Seam (Figure 2-11).

Groundwater Inflows and Permanent Storage

Groundwater inflows at mining areas would be captured in sumps, and piped to the mine water storage dam at the new pit top facility. Excess water from groundwater inflows would be returned directly into historic workings in the West Borehole Seam (Figure 2-11). It is estimated that there would be sufficient storage for excess groundwater inflows in the historic workings in the West Borehole Seam (Appendix C). Water stored in the mine water storage dam would not be transferred off-site.

---

2 Exceptional circumstances include unexpected events such as a significant disruption to the haulage route. Hours would be extended in accordance with a contingency plan in the Road Transport Protocol with the agreement of the DP&I.



Source: Ardill Payne & Partners (2012) and Evans & Peck (2012)

TASMAN EXTENSION PROJECT

FIGURE 2-11

Indicative Water Management Schematic of the New Pit Top

Resource Strategies

DONALDSON COAL

DCL-09-01 EIS Sect 2_006F

A summary of the expected groundwater balance over the life of the Project is provided in Table 2-4.

Table 2-4
Groundwater Balance over the Life of the Project

Source	Volume (ML)
Groundwater Inflow to Workings[1]	5,035
Excess Stormwater	415
Total Water Stored in Historic Workings in West Borehole Seam	5,450

Source: After Appendix C.

ML = megalitres.

[1] Includes a total of approximately 460 ML of water re-cycled to the underground workings from the mine water storage dam for operational purposes, as this water is assumed to be pumped out of the underground workings with the groundwater inflow with no losses.

Water Consumption and Water Supply

Water required for surface operations at the new pit top facility (e.g. for dust suppression on roads and the ROM coal stockpile) would be preferentially sourced from the surface water storage dam. Any supply shortfall would be sourced from the mine water storage dam.

Water required for underground mining operations (e.g. for cooling and underground dust suppression) would be sourced from the mine water storage dam, which has been designed to store approximately 1 month's supply of underground mining water requirements.

Surface Water Balance

A predictive assessment of the surface water balance for the new pit top facility has been conducted, and is presented in Appendix C.

The surface water balance model was run using 125 years of daily rainfall data, from which key statistics for years representing the median, 1:10 dry and 1:10 wet years have been extracted, and are provided in Table 2-5. Note that as rainfall patterns are different in years with comparable rainfall totals, the performance of the surface water management system is illustrated by the year corresponding to the runoff statistic (median, 1:10 dry and 1:10 wet) (shown bold in Table 2-5), as well as the closest year on either side of the median, 1:10 dry and 1:10 wet years, when ranked in order of annual runoff total.

Table 2-5
Surface Water Management System Statistics

Calendar Year	Rainfall (mm)	Runoff (ML)	Supply Shortfall (ML)	Storage Empty Days	Discharge to Bore		Overflow to Creek	
					ML	Days	ML	Days
Median Runoff Years								
1909	1,013	34.8	1.8	24	16.6	18	0.0	0
1895	**1,036**	**35.0**	**0.0**	**0**	**21.5**	**53**	**0.0**	**0**
1999	1,035	35.2	0.0	0	21.8	25	0.0	0
1:10 Dry Years								
1888	615	20.3	3.5	39	9.3	12	0.0	0
1901	**708**	**21.0**	**0.0**	**0**	**4.5**	**6**	**0.0**	**0**
1907	700	21.1	0.0	0	6.9	19	0.0	0
1:10 Wet Years								
1931	1,291	53.1	0.0	0	36.3	68	0.0	0
1927	**1,227**	**53.5**	**0.0**	**0**	**37.9**	**32**	**0.0**	**0**
1891	1,418	54.5	0.0	0	41.7	79	0.0	0

Source: After Appendix C.

Notes: Bolded rows indicate median, 1:10 dry and 1:10 wet years. Other rows indicate the closest year on either side of median, 1:10 dry and 1:10 wet years, when ranked in order of annual runoff total.

2.10 OTHER INFRASTRUCTURE AND SUPPORTING SYSTEMS

2.10.1 Administration Facilities, Bathhouse, Workshops and Surface Facilities

The existing administration facilities, workshop compound, worker amenities and stores buildings at the existing Tasman Underground Mine pit top would continue to be used until completion of mining in the Fassifern Seam.

As a component of the Project, administration facilities, workshop compound, worker amenities and stores buildings would be constructed at the new pit top to service mining in the West Borehole Seam.

2.10.2 Access Roads

The existing pit top is accessed via a sealed road from George Booth Drive.

The Project would require the construction of a sealed access road and new intersection with George Booth Drive at the new pit top (Section 2.5.1).

2.10.3 Electricity Supply and Distribution

Power supply to the existing Tasman Underground Mine pit top would continue via the 11 kV electricity transmission line from West Wallsend.

Electricity system upgrades would be required for the power supply to the new pit top and would be the subject of a separate assessment and approvals process. Power supply would likely comprise an overhead 33 kV electricity transmission line from Heddon Greta. Power supply for construction and initial development of the mine would be provided by extension of the existing 11 kV supply to the Orica facilities (subject to separate assessment and approval) or diesel generators.

2.10.4 Site Security and Communications

Existing site security measures would be retained for the existing pit top. Site security measures (e.g. fencing and boom gates) would be installed at the new pit top to prevent unauthorised access to the site.

The existing communications systems at the surface facilities and underground mining operations at the existing pit top would be retained for the Project. Landlines for surface and underground communications at the new pit top would be developed. The provision of a connection to the pit top would be the subject of a separate assessment approvals process.

2.10.5 Potable Water

The potable water supply for the Project would continue to be purchased from a contractor (currently Ace Water Cartage). A potable water network would be constructed to service the new pit top.

Rainfall runoff from the roof of the administration building would be captured in water storage tanks, and used as a source of water for on-site toilet flushing.

2.11 WASTE MANAGEMENT

The Project would generate waste streams that would be similar in nature to those generated at the existing Tasman Underground Mine. The key waste streams would continue to comprise:

- sewage and effluent;
- recyclable and non-recyclable general wastes; and
- other wastes from mining and workshop activities (e.g. waste oils, scrap metal and used tyres).

Donaldson Coal would continue to apply general waste minimisation principles (i.e. reduce, re-use and recycling where practicable) to minimise the quantity of wastes that require off-site disposal. No on-site rubbish disposal or landfill is proposed.

2.11.1 Sewage Treatment and Effluent Disposal

The existing on-site wastewater management system at the Tasman Underground Mine pit top would continue to be used for the Project until completion of mining in the Fassifern Seam. An on-site treatment and disposal system would be constructed at the new pit top in accordance with *Environmental Guideline: Use of Effluent by Irrigation* (NSW Department of Environment and Conservation [DEC], 2004a).

2.11.2 Recyclable and Non-Recyclable General Domestic Wastes

All recyclable and non-recyclable general domestic waste (i.e. putrescible or non-putrescible General Solid Waste[3]) would continue to be stored temporarily on-site prior to collection on a regular basis by a licensed waste contractor.

Where licensed contractors handle waste, those contractors would be required to comply with their own licence agreements with the NSW Environment Protection Authority (EPA). Waste would be disposed of at an EPA approved waste facility that is licensed under the NSW *Protection of the Environment Operations Act, 1997* (PoEO Act).

2.11.3 Other Waste Types

Other waste types likely to be produced over the life of the Project include those listed in Table 2-6.

2.12 MANAGEMENT OF DANGEROUS GOODS

The transportation, handling and storage of all dangerous goods at the Tasman Underground Mine is conducted in accordance with the requirements of the *Storage and Handling of Dangerous Goods – Code of Practice 2005* (WorkCover, 2005).

Hydrocarbon Storage

Hydrocarbons used on-site for the Project would include fuels (petrol and diesel), oils, greases, degreaser and kerosene. All fuel storage facilities are constructed and operated in accordance with the requirements of Australian Standard (AS) 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids.*

Explosives Storage

Explosives would only be stored on-site temporarily during blasting activities in accordance with AS 2187.2:2006 *Explosives – Storage and Use – Use of Explosives.* Excess explosives would be returned to the supplier.

Material Safety Data Sheets and Chemical Storages

No chemical or hazardous material would be permitted on-site unless a copy of the appropriate Material Safety Data Sheet (MSDS) is available on-site or, in the case of a new product, it is accompanied by a MSDS. Relevant MSDSs are kept on-site within the Safety Management System.

2.13 WORKFORCE

The existing mining operations at the Tasman Underground Mine have an operational workforce of approximately 110 personnel (excluding service providers and general management). At full development, the operations workforce would increase to approximately 150 personnel (excluding service providers and general management).

The operational hours at the Project would generally be 24 hours per day, seven days per week.

The current shift arrangements at the Tasman Underground Mine would be retained, with the start and finishing times generally as follows (subject to minor variations to start and finishing times due to operational requirements):

- Daytime Shift – 6.30 am to 4.30 pm.
- Afternoon Shift – 2.30 pm to 10.30 pm.
- Night Shift – 9.30 pm to 7.30 am.

An additional workforce of up to 20 personnel would be required for the construction of the new pit top and development mains. Surface construction/ development activities would generally be restricted to daylight hours (i.e. 7.00 am to 6.00 pm). Underground construction works and drilling of the ventilation shaft would be undertaken up to 24 hours per day. The construction phase for the new pit top facilities would be approximately 18 months and would be approximately 20 weeks for the new ventilation infrastructure.

[3] Described or pre-classified waste in *Waste Classification Guidelines Part 1: Classifying Waste* (NSW Department of Environment, Climate Change and Water [DECCW], 2009a).

Table 2-6
Other Wastes Likely to be Generated by the Project

Example of Waste	Indicative Waste Type[1]	Management Method
Tyres	Special	Temporary storage on-site prior to removal from site by appropriately licensed contractor.
Used oils/hydrocarbons	Liquid	
Explosives, lead acid batteries, containers that have not been cleaned and that have contained dangerous goods	Hazardous	
Building and demolition wastes	General Solid Waste (non-putrescible)	
Glass, plastic, rubber, plasterboard, ceramics, bricks, metal, paper, cardboard, etc.		
Workshop wastes (i.e. drained oil filters and rags and oil-absorbent materials that only contain non-volatile petroleum hydrocarbons and do not contain free liquids)		

[1] Indicative only – described or pre-classified wastes in *Waste Classification Guidelines Part 1: Classifying Waste* (DECCW, 2009a).