SECTION 2

PROJECT DESCRIPTION

COWAL GOLD MINE

E42 MODIFICATION

Environmental Assessment

COWAL GOLD MINE E42 MODIFICATION ENVIRONMENTAL ASSESSMENT

SECTION 2 - PROJECT DESCRIPTION

AUGUST 2008
Project No. HAL-06-26
Document No. SECTION 2-N (00232035)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

2 PROJECT DESCRIPTION

A summary of the approved CGM is presented in Table 1-1 along with the changes proposed by the E42 Modification. This section provides further detail about the proposed changes.

2.1 EXPLORATION HISTORY AND OREBODY DESCRIPTION

Exploration History

Exploration drilling along the western side of Lake Cowal has been undertaken since 1981. From 1988 to 1994, exploration effort through infill and deep drilling was concentrated on the E42 orebody to increase confidence in the resource. The E42 orebody was at the centre of the Cowal Gold Project for which Development Consent was issued in 1999. By the time of the Development Consent, over 550 holes had been drilled in the E42 orebody.

Additional drilling of the E42 orebody was undertaken between 2001 and 2005. During this time, approximately 430 drill holes were developed to define areas of geological uncertainty.

Estimation of the mineral resources and reserves within the E42 orebody continues to be refined, through resource modelling and mine planning (incorporating drilling and sampling undertaken to date, including that described above). This on-going refinement has resulted in the potential for further development of the E42 orebody (i.e. extraction of additional ore), which is the subject of this EA.

Orebody Description

The mineralisation within the E42 orebody is hosted within a sequence of Ordovician volcaniclastic rocks (informally named the Lake Cowal Volcanic Complex). The volcaniclastic sequence is intruded by several Late Ordovician diorite/gabbro stocks and mafic to intermediate dykes. There are numerous faults and shear zones which transect the orebody. The host rocks do not outcrop and are overlain by a Tertiary-aged lateritic profile and Quaternary sediments.

Gold mineralisation primarily occurs in quartz-carbonate-sulphide veins. The veins occur throughout the E42 deposit, although observations during a 1995 feasibility study by North Limited indicated that the proximity to faults and shear zones is the primary determinant of mineralisation.

The veins have a consistent and similar strike orientation of 305 to 310 degrees (^{o}) and dip 30 to 35^{o} to the south-west. The veins are parallel-sided and range in thickness from less than 1 to 10 millimetres (mm).

Sulphide mineralisation in the veins consists of pyrite with minor sphalerite, chalcopyrite, pyrrhotite and galena. Adularia is a common auxiliary mineral in the deposit.

Figure 2-1 shows the modified CGM open pit plan and cross-section in relation to key geological features.

As a result of changed market conditions since the Development Consent was issued for the approved CGM, the E42 Modification would increase total ore[1] production from approximately 76 Mt of ore, to approximately 129 Mt of ore. The gold ore is differentiated into oxide[2] (approximately 10%) and primary[3] (approximately 90%) ore. The two ore types are selectively handled and separated during mining and processing due to the different mineral processing requirements for gold extraction.

This ore production increase would increase gold production from approximately 2.7 Moz of gold to approximately 3.5 Moz of gold for the modified CGM.

2.2 GENERAL ARRANGEMENT

Major components that have been completed or partially constructed at the approved CGM are shown on Figure 1-3 and include:

- an open pit;
- a perimeter waste emplacement and portions of the northern and southern waste emplacements;
- northern and southern tailings storage facilities;
- a lake protection bund;
- a temporary isolation bund;
- a tailings service corridor;
- a low grade ore stockpile;
- a ROM pad;
- a process plant;
- soil stockpiles;

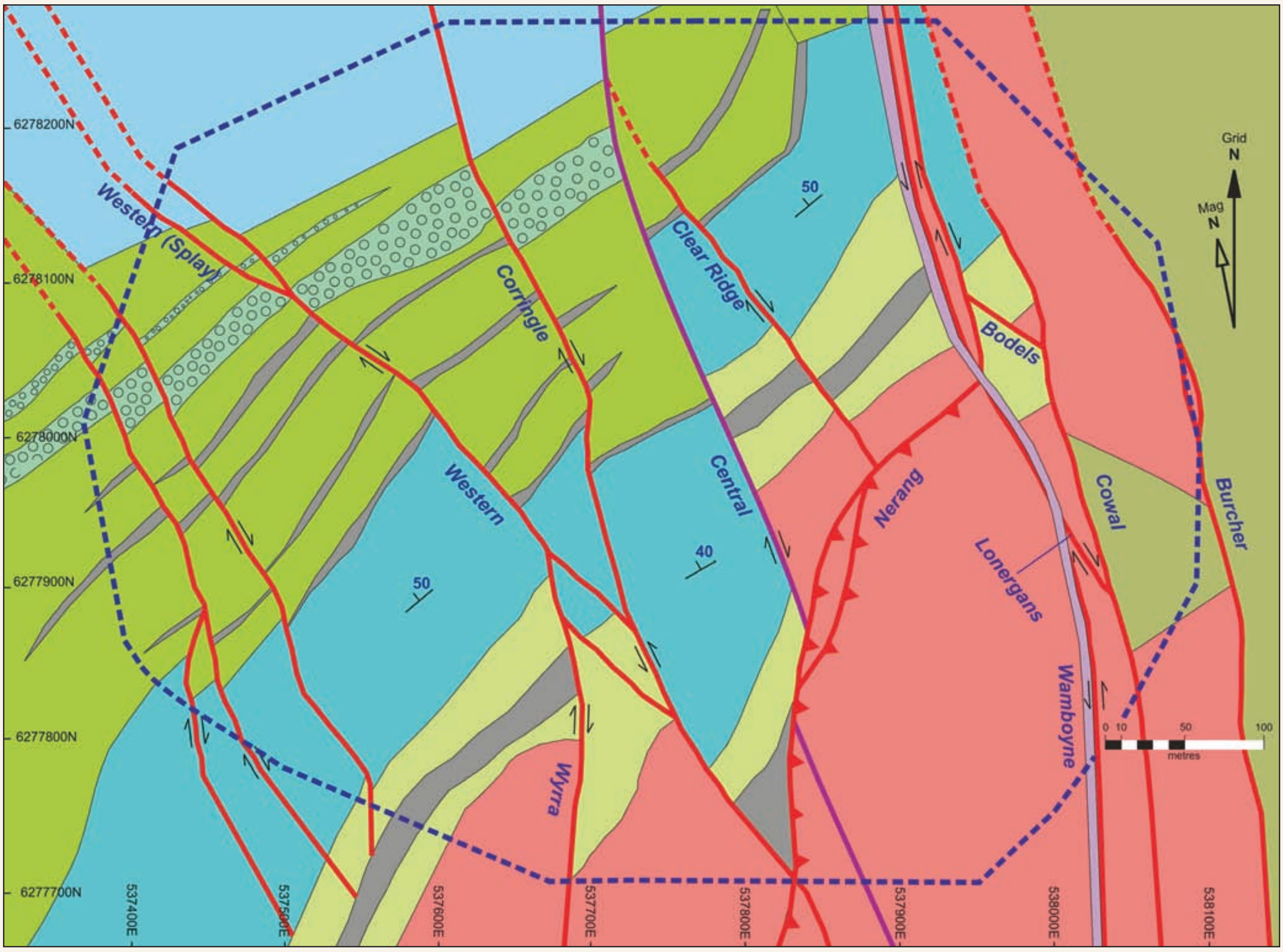
---

1 Rock containing commercially viable quantities of gold.

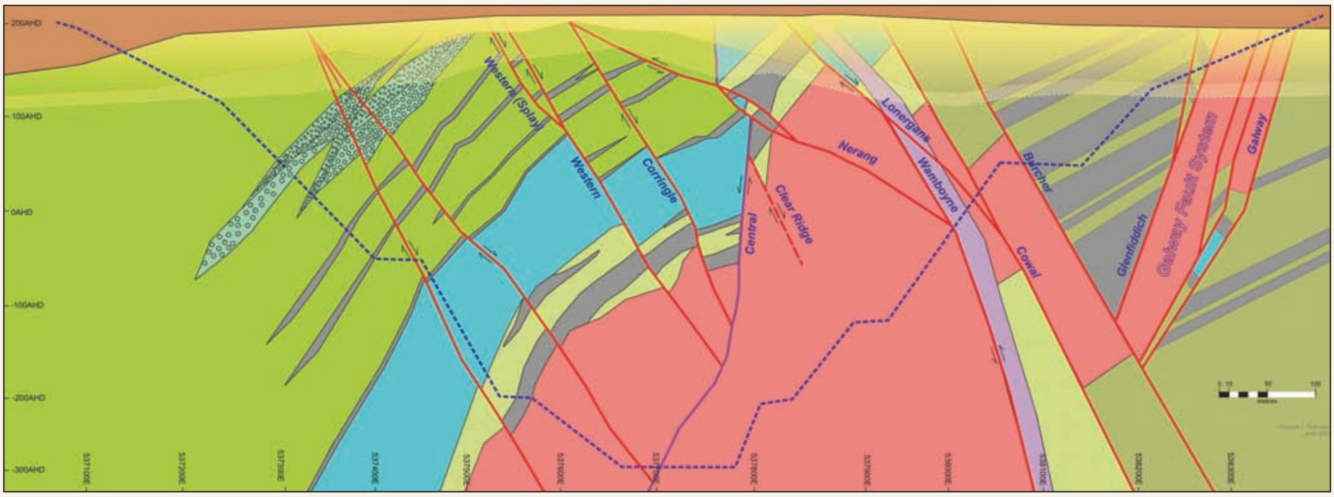
2 Oxide ore is the component of the ore which is composed of weathered (oxidised) rock.

3 Primary ore is the component of the ore which is composed of unweathered rock.

FLITCH PLAN (1050 mRL)



CROSS SECTION (6278000 N)



Transported
- Clay and Gravel (LACL/CCCL)

Upper Porphyritic Unit
- Coherent / Autobrecciated Andesite (ANP/ANAI)

Upper Volcaniclastics
- Sandstone/Conglomerate (VSG/VSC)
- Interbedded Mudstone and Sanstone (VMS)
- Graded Polymictic Deposit (VCCP)

Trachyandesite Lava
- Coherent/Autobrecciaed /Resedimented Facies (TAP/TAAI/TAAR)

Lower Volcaniclastics
- Sandstone/Conglomerate (VSG/VCCP)
- Interbedded Mudstone and Sandstone (VMS)

Easter Volcaniclastics
- Mudstone /Sandstone (VM/VSC)

Dirorite Sill
- Diorite/Monzodiorite (DI/MODI)

Diorite Dyke
- Massive Porphyritic Dyke

Weathering
- Saprolite
- Top of Saprock
- Saprock
- Top of Fresh Rock

Structures
- Fault Zone (FZ/SZ)
- Central Fault Zone
- Apparent Fault Movement
- Thrust
- Strike and Dip of Strata
- Pit: Modified CGM Open Pit

Source: Barrick, 2008

E 4 2 MODIFICATION

FIGURE 2-1
Mine Geology

ResourceStrategies

BARRICK COWAL

HAL-06-26 Sect2_018D

- an internal access road;
- an ICDS (including contained water storages);
- an UCDS;
- pit dewatering bores;
- minor internal roads and haul roads;
- buried mine borefield pipeline and associated pump stations;
- tailings storage facility fence;
- ML 1535 perimeter fence;
- mine access road; and
- electricity transmission line (ETL).

As described in Section 1, works associated with the E42 Modification are anticipated to commence in approximately Year 5 of the approved CGM. The modified CGM would extend the life of the approved CGM from 13 years to approximately 24 years. The conceptual general arrangements of the modified CGM during Years 7, 9 and 19 are shown on Figures 2-2 to 2-4. A provisional development schedule for the major E42 Modification components is shown on Figure 2-5.

2.3 MINING

2.3.1 Mining Method Overview and Mine Schedule

The mining method used at the approved CGM is typical of open pit mining operations throughout Australia and the world. The waste rock (i.e. rock containing no commercial gold) and ore is broken through a routine sequence of in-pit drilling and blasting. Broken rock is loaded into large rear dump trucks using hydraulic excavators and is then hauled from the pit to be placed within the dedicated waste emplacements or, in the case of ore, direct to the primary crusher or ROM ore stockpile.

No changes to the approved CGM mining methods are proposed as part of the E42 Modification. The provisional mining and processing schedule for the modified CGM is presented in Table 2-1.

The ROM ore stockpile pad is situated immediately north of the process plant area (Figure 1-3). The E42 Modification would increase the area of the ROM ore stockpile pad from approximately 5 ha to approximately 15 ha.

2.3.2 Open Pit Design

The approved CGM open pit has been developed in stages as the pit is widened and progressively deepened (Figures 2-2 to 2-4).

The weathering profile of the pit area consists of a sequence of transported soil, saprolite, saprock (i.e. oxide rock) and fresh (i.e. primary) rock. Single benches are used for the oxide rock, with berms approximately 12 m in width and batter angles at 45^{o} for an inter-ramp angle of 23^{o} (variable according to pit sector).

Below this, primary rock is mined in multiple benches, with berms approximately 6 m in width and batter angles between 65º to 70 º for an inter-ramp angle of 45 º (variable according to pit sector). The design configuration would allow for factors of safety which are appropriate for operating pit conditions and the long-term stability of the lake protection bund (Section 2.8.2). The berm widths and slope angles would continue to be reviewed and monitored through on-going geotechnical studies and data collection during mine development. The design configuration would be detailed in the Mining Operations Plan (MOP) which would be prepared in consultation with the DPI-MR and for DPI-MR approval. Further, the *Monitoring Programme for Detection of any Movement of Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls* (LPBMP) (Barrick, 2003a) describes a monitoring programme comprising a visual assessment and survey, as well as monitoring and management procedures to be undertaken in the event of detection of any movement of the pit/void walls. The LPBMP would be revised to include a description of the modified CGM open pit design and monitoring (i.e. survey assessment) requirements.

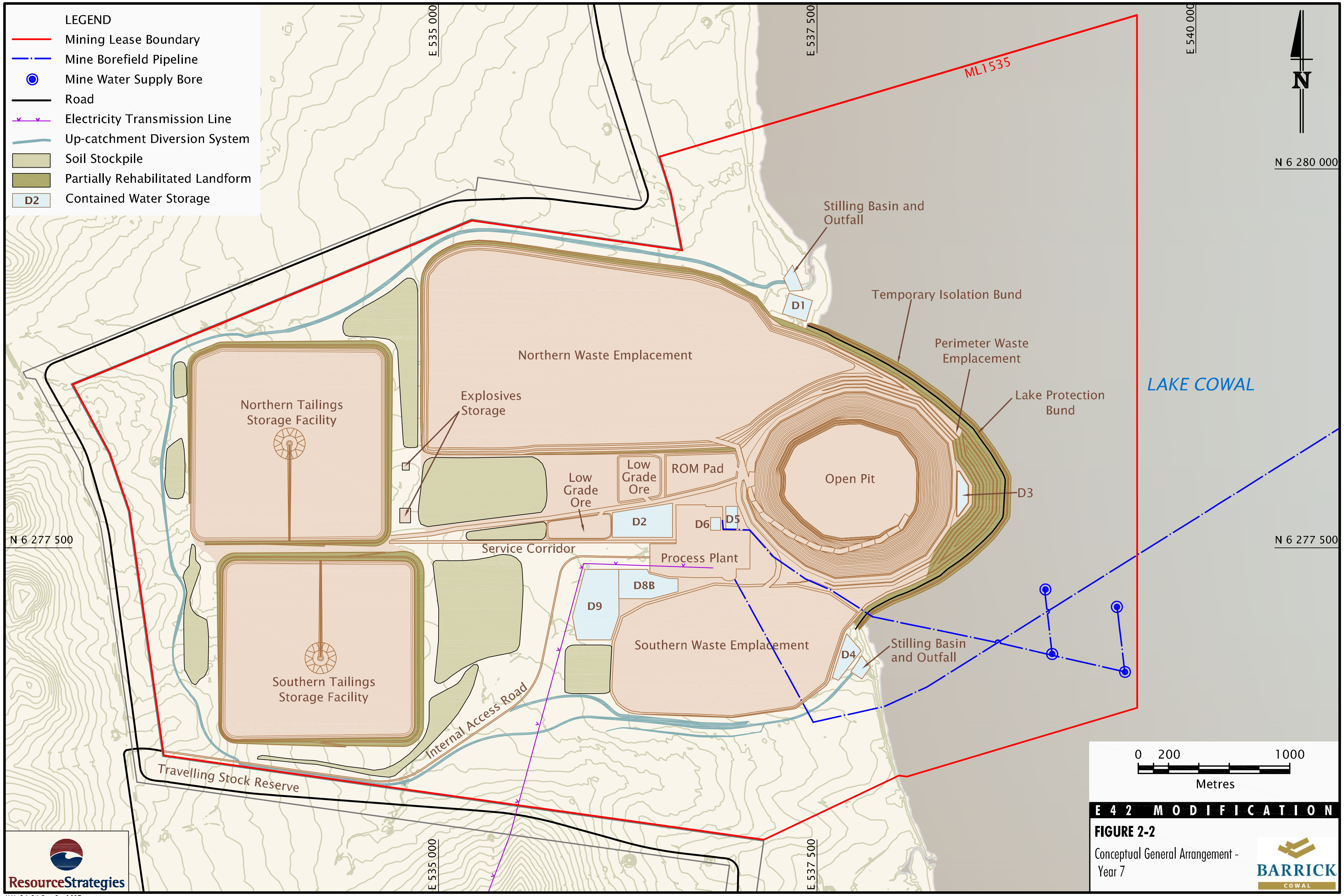
No changes are proposed to the method of development of the open pit for the modified CGM.

The E42 Modification would increase the open pit area from approximately 70 ha to approximately 130 ha, with final pit dimensions increased from approximately 1,000 m long, 850 m wide and 325 m deep to approximately 1,250 m long, 1,350 m wide and 440 m deep.

2.3.3 Mobile Equipment Fleet

The mobile equipment fleet used to extract ore and waste rock at the approved CGM includes hydraulic excavators, haul trucks, front end loaders, dozers, graders and drill rigs.

More mobile equipment fleet items would be required for the modified CGM. The typical number of each equipment type required during each year of operations for the modified CGM is presented in Table 2-2.

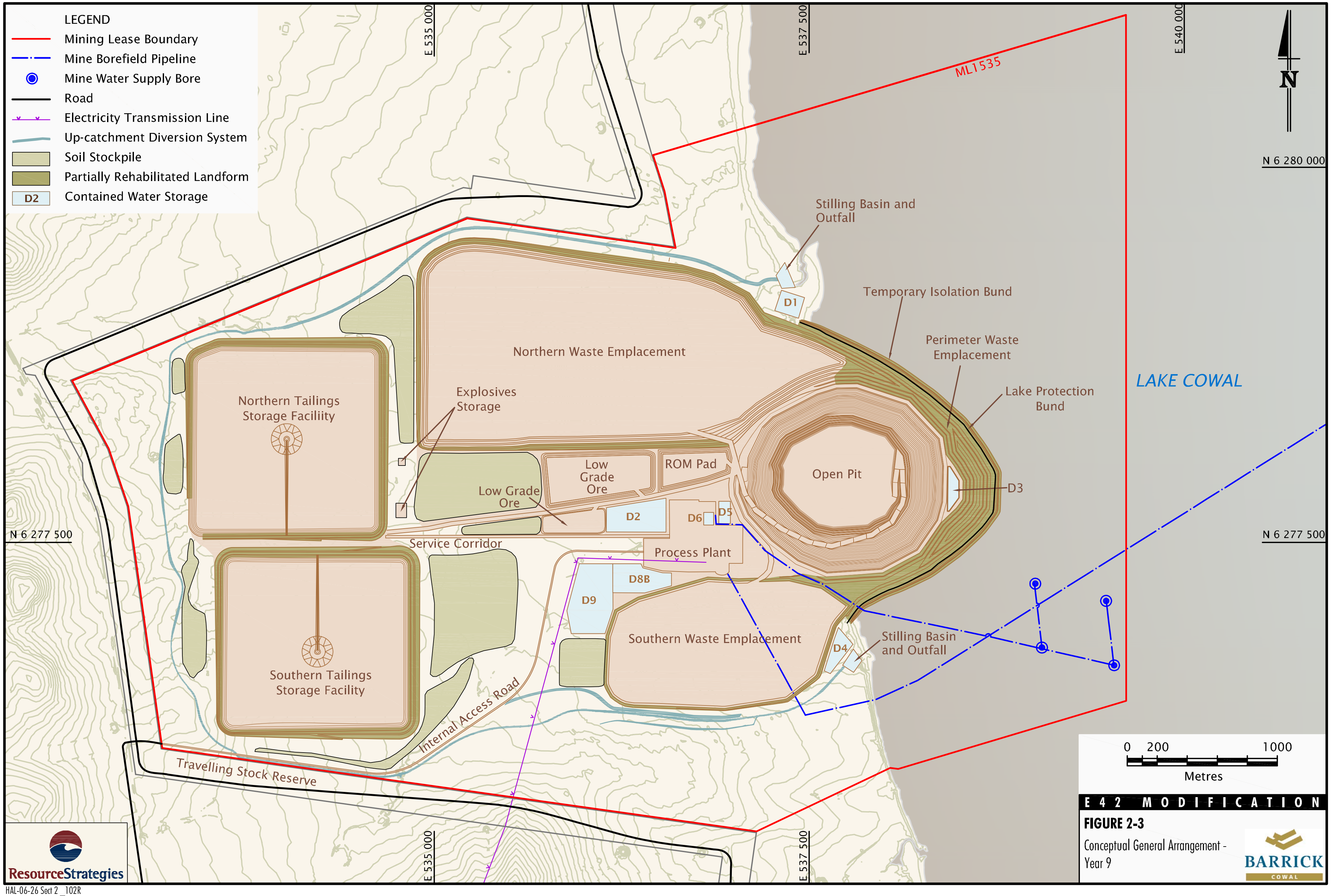


E 4 2 M O D I F I C A T I O N

FIGURE 2-2

Conceptual General Arrangement - Year 7

HAL-06-26 Sect 2 _101T

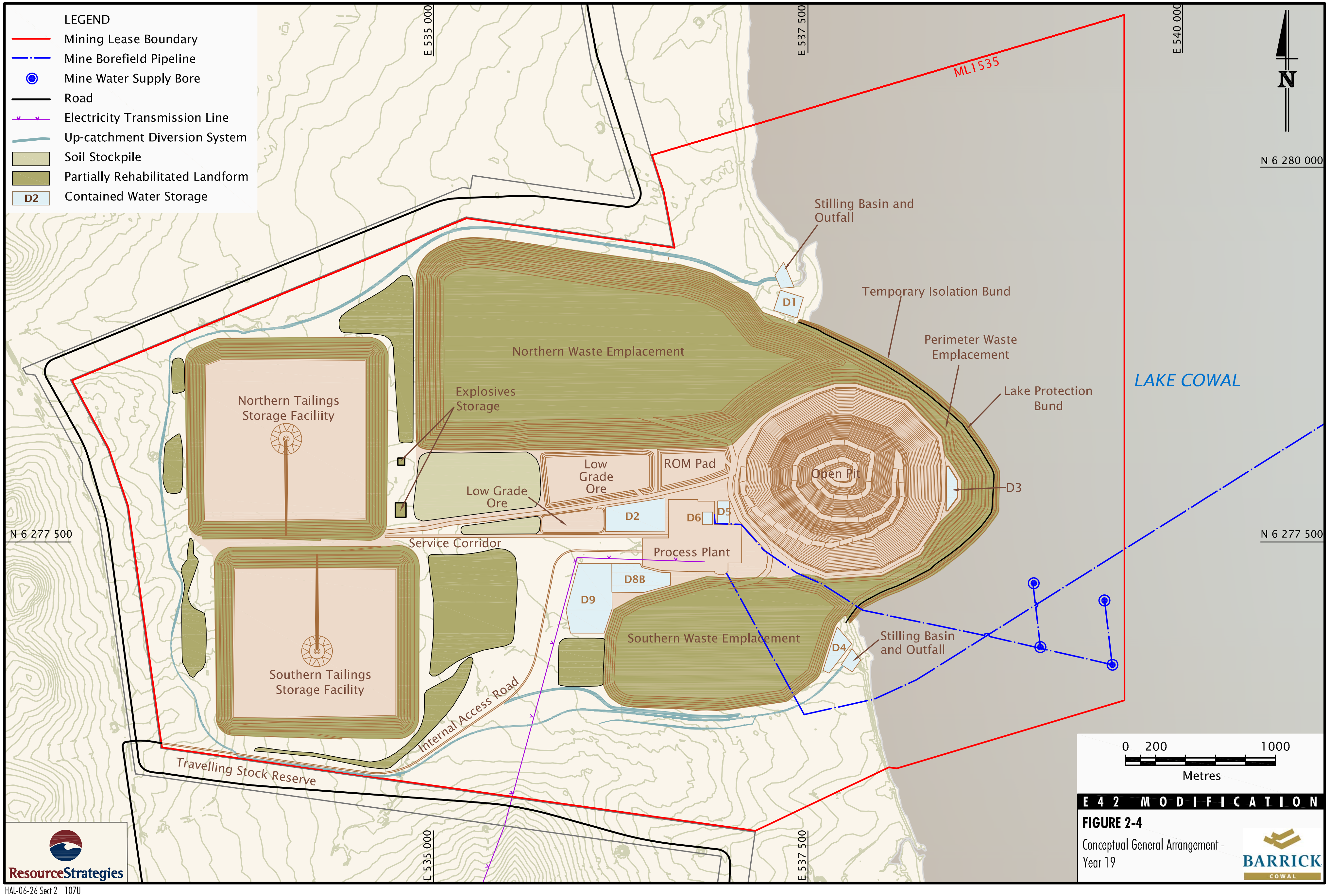


E42 MODIFICATION

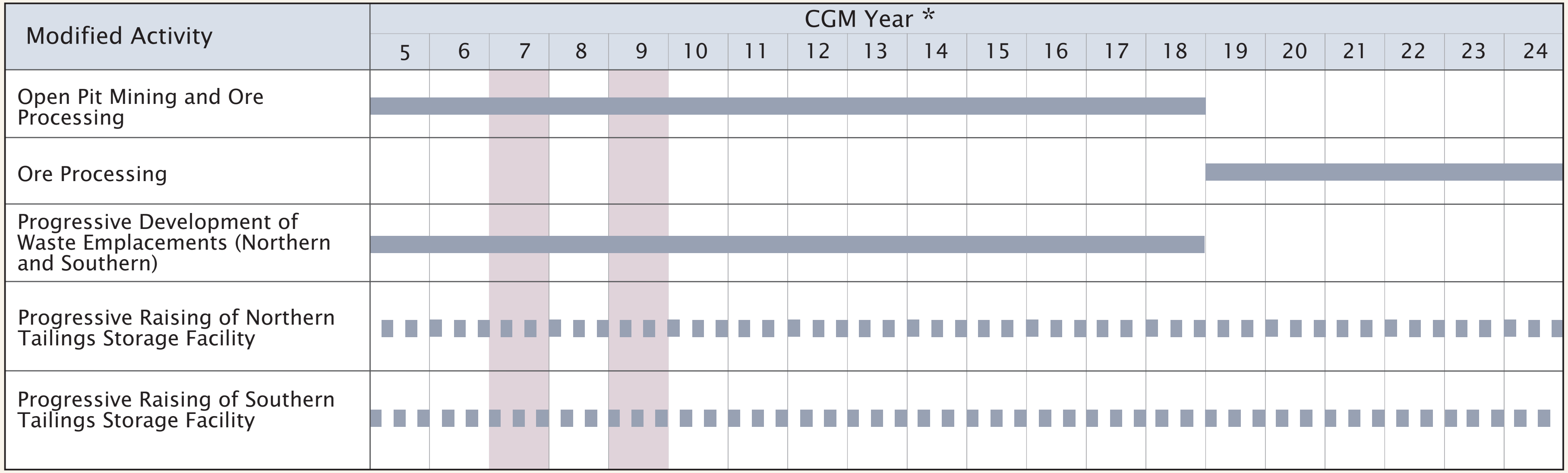
FIGURE 2-3

Conceptual General Arrangement - Year 9

BARRICK COWAL


LEGEND
Mining Lease Boundary
Mine Borefield Pipeline
Mine Water Supply Bore
Road
Electricity Transmission Line
Up-catchment Diversion System
Soil Stockpile
Partially Rehabilitated Landform
D2 Contained Water Storage
E 535 000
E 537 500
E 540 000
N 6 280 000
N 6 277 500
ML1535
N
Stilling Basin and Outfall
D1
Temporary Isolation Bund
Perimeter Waste Emplacement
Lake Protection Bund
LAKE COWAL
Northern Waste Emplacement
Northern Tailings Storage Facility
Explosives Storage
Low Grade Ore
ROM Pad
Open Pit
D3
D2
D6
D5
Service Corridor
Process Plant
D8B
D9
Southern Waste Emplacement
Stilling Basin and Outfall
D4
Southern Tailings Storage Facility
Internal Access Road
Travelling Stock Reserve
0 200 1000
Metres
E42 MODIFICATION
FIGURE 2-4
Conceptual General Arrangement - Year 19
BARRICK COWAL
ResourceStrategies
HAL-06-26 Sect 2 _107U

PROPOSED ACTIVITY SCHEDULE (YEARS)



* *The modified CGM is proposed to commence in approximately Year 5 of CGM operations (i.e. 2009). This schedule is contingent on obtaining relevant approvals*

Snapshot/Modelling Years

ResourceStrategies

E42 MODIFICATION

FIGURE 2-5

Provisional Activity Schedule

BARRICK COWAL

HAL-06-26 Sect2_017L

Table 2-1
Provisional Mining and Ore Processing Schedule

Phase	Year*	Ore Mined (Mt)			Waste Mined (Mt)	Total Mined (Mt)	Ore Processed (Mt)#		
		Oxide	Primary	Total			Oxide	Primary	Total
Mining and Ore Processing	5	3.1	13.9	17	13	30	0	6.9	6.9
	6	2	7.7	9.7	23.1	32.8	0	6.9	6.9
	7	1.3	7.3	8.6	24.4	33	0	7.5	7.5
	8	0.5	8.3	8.8	23.2	32	0	6.9	6.9
	9	0.1	8.3	8.4	26.9	35.3	0	6.5	6.5
	10	0	8.4	8.4	26.3	34.7	0	6.9	6.9
	11	0	9.1	9.1	22.3	31.4	0	6.9	6.9
	12	0	8.4	8.4	8.5	16.9	0	6.5	6.5
	13	0	8.4	8.4	4.7	13.1	0	6.9	6.9
	14	0	8.4	8.4	3.6	12	0	6.9	6.9
	15	0	9.4	9.4	2.6	12	0	6.9	6.9
	16	0	10	10	2	12	0	6.7	6.7
	17	0	7.9	7.9	2.1	10	0	6.6	6.6
	18	0	6.5	6.5	0.9	7.4	0	6.6	6.6
Ore Processing	19	0	0	0	0	0	0	6.6	6.6
	20	0	0	0	0	0	0	6.6	6.6
	21	0	0	0	0	0	0	6.6	6.6
	22	0	0	0	0	0	0	6.6	6.6
	23	0	0	0	0	0	6.9	0	6.9
	24^	0	0	0	0	0	0.1	0	0.1
Total (Approximately)		**7**	**122**	**129**	**184**	**313**	**7**	**122**	**129**

* The modified CGM is scheduled to commence in approximately Year 5 of CGM operations (i.e. 2009).
# The sequence of processing primary and oxide ores may change over the life of the mine, subject to detailed mine planning requirements.
^ Year 24 would be a partial operational year only (i.e. ore processing would occur in the first quarter only).

Table 2-2
Typical Mobile Equipment Fleet

Fleet Item	Approximate Capacity	Typical Number Required in each Year of Operation*										
		5 - 11	**12-13**	**14 - 15**	**16**	**17**	**18**	**19 - 20**	**21**	**22**	**23**	**24**
Hydraulic Excavator	994B (310 t)	3	3	3	2	2	2	1	1	1	1	1
Haul Truck	789C (184 t)	13	12	12	12	12	10	3	0	0	0	0
Haul Truck	785B (140 t)	3	3	3	3	3	3	3	3	3	3	3
Wheel Loader	992D	2	2	2	2	2	2	1	1	1	1	1
Track Dozer	D10N	2	2	2	2	2	2	1	1	1	1	1
Wheel Dozer	834H	2	1	1	1	1	1	1	0	0	0	0
Water Truck	777D	2	2	2	2	2	2	1	1	1	1	1
Grader	16H	2	2	2	2	2	2	1	1	1	1	1
Drills	165 to 200 mm	4	4	4	4	3	3	1	1	0	0	0
Tailings Lift Fleet												
Dump Truck	A40E Volvo (40 t)	4	4	4	4	4	4	4	4	4	4	4
Scraper	627F (40 t)	2	2	2	2	2	2	2	2	2	2	2
Grader	14G	1	1	1	1	1	1	1	1	1	1	1
Water Truck	Volvo A40D	2	2	2	2	2	2	2	2	2	2	2
Compactor	CAT 825	1	1	1	1	1	1	1	1	1	1	1
Track Dozer	D8	1	1	1	1	1	1	1	1	1	1	1
Track Dozer	D7	1	1	1	1	1	1	1	1	1	1	1
Excavator	ZX850 (85 t)	1	1	1	1	1	1	1	1	1	1	1

* The modified CGM is scheduled to commence in approximately Year 5 of CGM operations (i.e. 2009).

2.3.4 Blasting

As described in Section 2.3.1, the method of material extraction (ore and waste) at the approved CGM is by drill and blasting techniques. Whilst the E42 Modification would increase the typical number of holes from 170 up to 350 holes, the magnitude of blast sizes would decrease from a typical maximum instantaneous charge (MIC) of 213 kilograms (kg) to approximately 172 kg. Typical blast design details for the modified CGM are presented in Table 2-3. The E42 Modification would not change the average blasting frequency employed at the approved CGM (i.e. generally limited to one blast per day).

2.4 MINE WASTE ROCK MANAGEMENT

2.4.1 Waste Rock Quantities

The total volume of waste rock to be removed from the open pit would increase from approximately 128 Mt to approximately 184 Mt as a result of the E42 Modification. The maximum quantity of waste rock to be mined in any one year of the modified CGM would be approximately 27 Mt (Year 9). Following Year 9, waste rock quantities would progressively decrease as the ore-to-waste ratio improves. The type of ore and quantity of waste rock to be removed during each year of the modified CGM is presented in Table 2-1.

2.4.2 Waste Rock Geochemistry

Geochemical characterisation has been conducted for open pit waste rock from the modified CGM to assess potential changes to existing waste handling strategies and potential environmental impacts assessed previously. Geochemical characterisation included review of acid forming characteristics and assessment of element enrichment and solubility from previous assessments (Environmental Geochemistry International Pty Ltd [EGi], 1997; 2004) and laboratory testwork conducted for the E42 Modification (Geo-Environmental Management Pty Ltd, 2008).

A detailed account of the geochemical characteristics of waste rock from the modified CGM is presented in Appendix C.

Geochemical testing of the additional E42 Modification waste rock indicated that it has similar characteristics to waste rock from the approved CGM. E42 Modification and previous geochemical investigations indicate that oxide and primary waste rock types are non-acid forming (NAF), have high natural salinities (oxide waste) and some have the potential to develop high salinity/soluble salts (primary waste) (Appendix C).

Table 2-3
Typical Blast Design Details

Blast Design Parameter	Typical Dimension	Range
Number of Holes	350	200 to 500
Number of Rows	9	3 to 12
Hole Diameter	165 mm	115 to 200 mm
Hole Inclination (to vertical)	0	0 to 20^{O}
Bench Height	9 m	5 to 18 m
Burden	4.4 m	3 to 6 m
Spacing	5.3 m	4 to 7 m
Subdrill	1.3 m	0.6 to 1.8 m
Stemming Depth	3.6 m	3 to 4.5 m
Delay Timing	Nonel	N/A
Column Explosive	Emulsion	ANFO/Slurry/Emulsion
Powder Factor	0.82 kg/bcm	0.60 to 1.00 kg/bcm
MIC	172 kg	50 to 350 kg

kg/bcm = kilograms per bank cubic metre.

2.4.3 Waste Emplacement Construction

Waste rock at the approved CGM is placed in a continuous waste emplacement surrounding the open pit consisting of the following three areas:

- northern waste emplacement;
- southern waste emplacement; and
- perimeter waste emplacement.

The northern waste emplacement has been designed to contain the majority of the waste rock generated from the mine. The emplacement is located to the north-west of the open pit, adjacent to the low grade ore stockpile (Figure 2-2). The southern waste emplacement is located to the south-west of the open pit, adjacent to the process plant (Figure 2-2). The perimeter emplacement has been constructed to surround the open pit to the north, east and south.

The perimeter waste emplacement forms part of the series of embankments (i.e. temporary isolation bund and lake protection bund) between the open pit and Lake Cowal. The perimeter waste emplacement is located behind the lake protection bund (Figure 2-2) and has been constructed from mined oxide waste rock.

The existing temporary isolation bund and lake protection bund are described further in Section 2.8.2.

The E42 Modification would increase the height and area of the northern waste emplacement to an approximate final height of RL 275 m AHD (increased from RL 243 m AHD) and area of approximately 320 ha (increased from approximately 160 ha). The E42 Modification would also increase the height and area of the southern waste emplacement to an approximate final height of RL 255 m AHD (increased from RL 223 m AHD) and area of approximately 140 ha (increased from approximately 120 ha). The area of the perimeter waste emplacement (approximately 60 ha) would not increase. The height of the perimeter waste emplacement would be reduced in places (Figure 1-3) to enable the expansion of the open pit, whilst meeting relevant geotechnical criteria.

The total area of the waste emplacements would increase from approximately 315 ha to approximately 520 ha.

The northern waste emplacement has been designed to meet the long-term goal of directing potential seepage generated from waste emplacement areas during operation and post-closure toward the open pit. As for the existing northern waste emplacement, construction of the modified northern waste emplacement would involve surface preparation works to facilitate the direction of any permeating waters towards the open pit. The existing topography of the footprint would be altered by stripping topsoil and subsoil from the southern portion of the footprint. In addition, oxide waste rock would be placed and compacted (using haul truck movements) in the northern portion of the footprint. The resulting basement for the emplacement would slope towards the open pit and would provide drainage control (i.e. the base drainage control zone). Any waters permeating through the emplacement are expected to be intercepted by this layer and preferentially flow towards the open pit.

As for the existing southern waste emplacement, surface preparation works to facilitate drainage of any infiltrating waters towards the open pit would also be constructed for the modified southern waste emplacement.

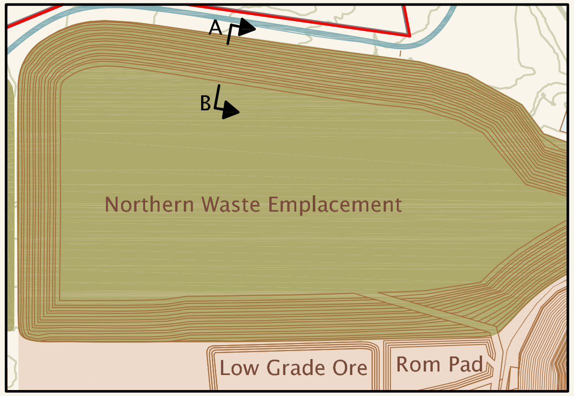
In accordance with the EPL for the approved CGM, the modified waste emplacements would be located on a base drainage control zone with a minimum slope towards the open pit of 1(vertical [v]):200(horizontal [h]).

A conceptual cross-section of the modified northern waste emplacement is shown on Figure 2-6. This cross-section is representative of the concepts for the southern and perimeter waste emplacements.

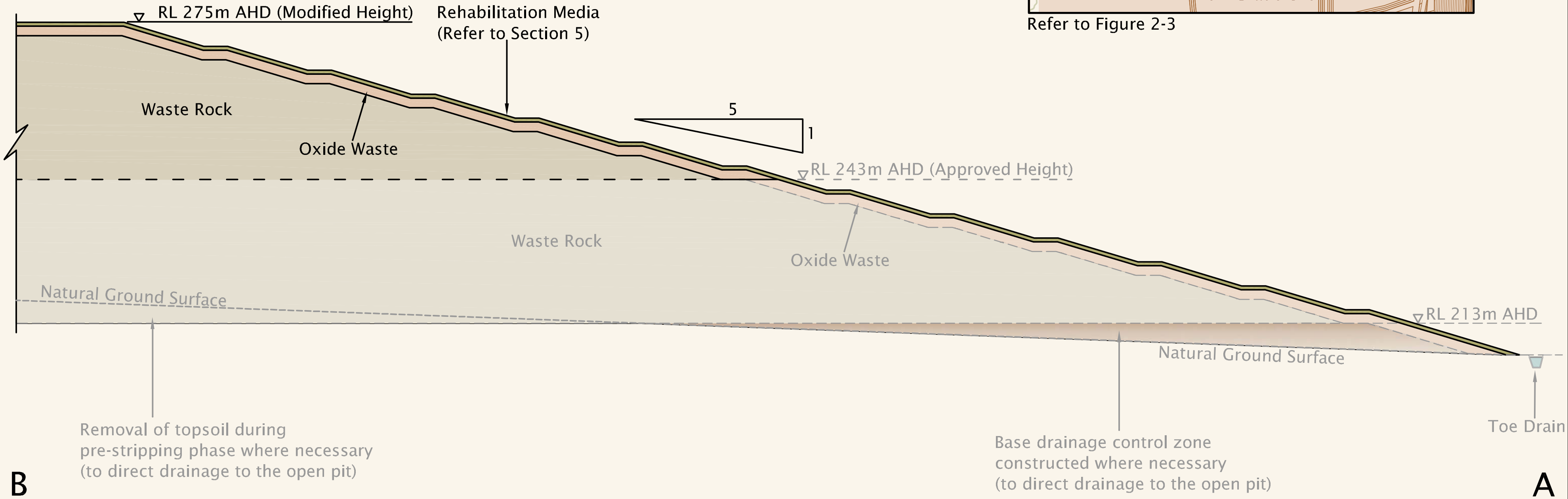
2.5 ORE PROCESSING

2.5.1 Process Overview

Figures 2-7 and 2-8 show simplified process flow sheets for the processing of oxide and primary ores at the approved CGM. The process plant has been designed for an overall availability of 90% and operates at approximately 890 tonnes per hour (tph) for oxide ore and approximately 815 tph for primary ore on average. The E42 Modification would increase the maximum ore processing rate at the approved CGM from approximately 6.9 Mtpa to approximately 7.5 Mtpa. Some of the additional ore from the E42 Modification would be low grade ore which would be stockpiled prior to processing as is the case for the approved CGM.



Refer to Figure 2-3



Not to Scale

E42 MODIFICATION

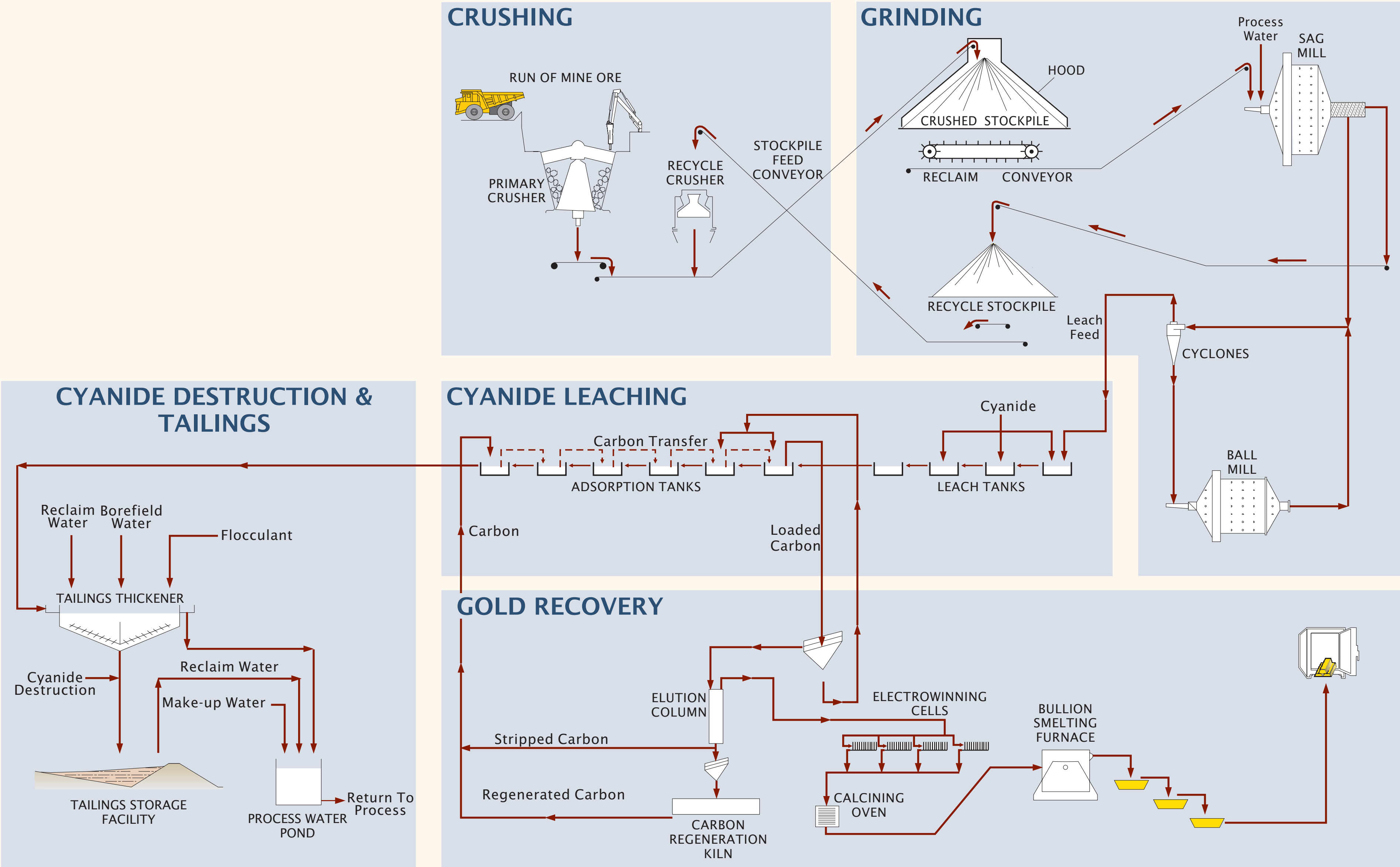
FIGURE 2-6

Conceptual Embankment Section of Modified Northern Waste Emplacement

BARRICK COWAL

ResourceStrategies

HAL-06-26 Sect 2 _105I



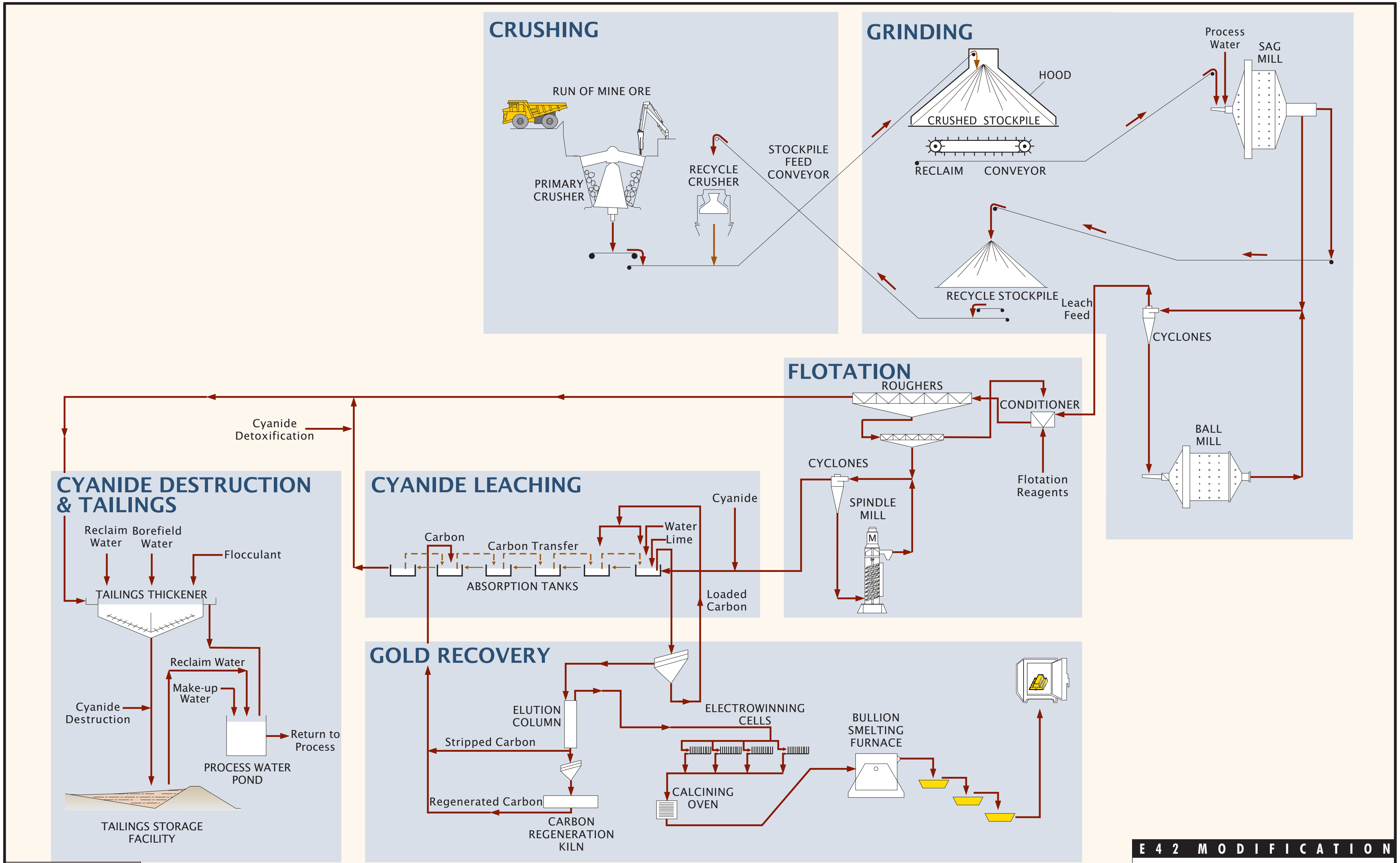
ResourceStrategies

HAL-06-26 Sect2_006F

E42 MODIFICATION

FIGURE 2-7
Oxide Ore
Process Flowsheet

BARRICK COWAL



E 4 2 MODIFICATION

FIGURE 2-8
Primary Ore Process Flowsheet

BARRICK COWAL

ResourceStrategies

HAL-06-26 Sect2_007F

The E42 Modification would result in an additional low grade ore stockpile, as well as an increase in size of the approved stockpile. The total surface area of the low grade ore stockpiles would increase from approximately 35 ha to approximately 60 ha. A provisional processing schedule for the primary and oxide ore types is provided in Table 2-1.

At the approved CGM, broken ore from the mine is stockpiled or hauled to the primary crusher located in the process plant area. The crushed ore is then conveyed to the grinding circuit in the process plant. The grinding circuit reduces the ore to a finely ground slurry. The process plant batch processes the oxide and primary ore due to their respective physical and metallurgical characteristics. After being ground, the primary ore passes through a flotation circuit where the gold ore is floated off as a froth or concentrate. This is then passed to a leaching circuit where cyanide is added to leach gold from the concentrate. The flotation circuit reduces the amount of gold ore required to be leached by about 90% (and hence, greatly reduces cyanide usage). The ground oxide ore goes directly to the leaching circuit.

The gold extracted from the cyanide leaching circuit is recovered and poured as gold bars or doré. The finely ground rock residue left after the flotation and leaching processes (tailings), is treated to destroy cyanide to prescribed limits and then pumped to the northern or southern tailings storage facility. The tailings slurry is deposited peripherally via a spigotted ring main allowing for the progressive development or 'build-up' of tailings around the surface of the tailings storages. The cyanide destruction process is described in Section 2.5.4.

No changes to these existing ore processing methods are proposed for the modified CGM.

2.5.2 Ore Processing Schedule

The sequence of processing primary and oxide ores may change over the life of the mine, subject to detailed mine planning requirements.

2.5.3 Cyanide Use

No change to the cyanide use in ore processing is proposed for the modified CGM. Sodium cyanide (NaCN) is taken from the storage facility as required and mixed in a dedicated mixing tank. The cyanide solution (mixed to 30%) is conveyed to a storage tank then to the leaching circuit where it enters the oxide leaching circuit at three points and the primary circuit at one point.

The oxide process requires more cyanide addition than that for primary ore and is required to be added in stages. Cyanide consumption for the primary and oxide circuits is approximately 0.3 kg and 0.8 kg of cyanide per tonne of ore respectively.

On exiting the leach circuit the barren slurry (i.e. tailings) passes to a thickener (in the case of oxide ore) or through a detoxification point before passing the thickener (in the case of the primary ore). In the case of primary ore the tailings from the flotation process (that is the 95% of the ore which contains no economically recoverable gold) is recombined with the barren slurry from the leach circuit in the thickener reducing cyanide levels by a 20:1 dilution.

The thickener is designed to remove water and therefore thicken the tailings. In the case of oxide ore this process recycles about 25% of the cyanide for reuse. On exiting the thickener cyanide remaining in the oxide tailings is destroyed down to approved levels. The primary tailings also pass through this destruction point and are treated where necessary to ensure approved levels are met. The cyanide destruction process and approved levels are further detailed in Section 2.5.4.

The cyanide used in the removal of gold from carbon (carbon is added to the leach circuit to adsorb the leached gold) is passed to the electrowinning circuit where it is recycled.

2.5.4 Cyanide Destruction

The approved CGM cyanide concentrations in the aqueous component of the tailings slurry stream at the point of discharge to the tailings storage facilities are:

- 20 milligrams per litre (mg/L) CN_{WAD} (90 percentile over six months); and
- 30 mg/L CN_{WAD} (maximum permissible limit at any time).

Following ore processing at the approved CGM, the tailings slurry is passed through a cyanide destruction process before being discharged to the tailings storage facilities.

Caro's Acid is currently used at the approved CGM to destroy cyanide. Caro's Acid is a mixture of sulphuric acid (H_2SO_4) and hydrogen peroxide (H_2O_2), both of which are separately transported and stored on site. The two cyanide destruction points are served by a Caro's Acid mixing chamber at each point. The main by-product from the Caro's Acid destruction process is cyanate which itself decays through natural processes.

The modified CGM would involve the use of the INCO process as an alternative method for cyanide destruction. Detailed testwork commissioned by Barrick to date indicates that this process is capable of cyanide destruction to the same current approved levels. The INCO process would be introduced when detailed design works and economic efficiency investigations have been completed. The INCO process involves the introduction of sulphur dioxide (SO_2) as sodium metabisulphite (SMBS). The reaction is catalysed by the presence of copper, which may have to be added (as copper sulphate). Air is also required, as is lime to maintain the pH at optimal levels (i.e. pH between 8 and 10) as the reaction proceeds. The two cyanide destruction points would be served by an INCO mixing chamber at each point. Similar to Caro's Acid, the main by-product from the INCO destruction process is cyanate which decays through natural processes. The geochemistry of the tailings resulting from the use of the INCO process is discussed in Appendix C.

The quantity of reagents added to the tailings (for either the Caro's Acid or INCO processes) would continue to be regulated by an on-line free cyanide measurement to monitor the effectiveness of cyanide destruction in the tailings.

The E42 Modification would not change the approved CN_{WAD} levels of the aqueous component of the tailings slurry stream.

The CMP would be revised to include a description of the INCO process. The mitigation and management measures described in the CMP (including the cyanide monitoring process) would continue for the modified CGM.

2.5.5 Consumables

A number of consumables (including chemicals and reagents or equivalents) are currently used and stored at the approved CGM, including the major consumables listed in Table 2-4. SMBS (required upon introduction of the INCO process) would be the only additional major consumable used at the modified CGM as a result of the E42 Modification. There would be no change to the role and function of the other major consumables as a result of the E42 Modification.

2.6 TAILINGS

2.6.1 Chemical and Physical Characteristics of Tailings

Geochemical testing at the approved CGM has indicated that the combined oxide and primary tailings are NAF (EGi, 1997; 2004 and Appendix C). The geochemical characteristics of E42 Modification tailings are described in Appendix C. Appendix C indicates that the tailings generated for the modified CGM would have similar geochemical characteristics to those from the approved CGM (i.e. the E42 Modification would not significantly change tailings geochemistry). The majority of oxide and primary tailings are enriched with arsenic and some of the tailings are also enriched with boron, silver, molybdenum, cadmium, antimony, lead, sulphur and zinc (*ibid.*). Testwork undertaken on the solubility of enriched elements (Appendix C, EGi, 1997; 2004) concluded that enriched elements within tailings would not be significantly soluble under the water leaching conditions of a typical tailings storage facility and therefore would be unlikely to adversely affect water quality.

A review of monitoring parameters conducted for this EA revealed that enriched parameters are included in the groundwater quality monitoring programme analyte suite except for molybdenum. Molybdenum is therefore proposed for inclusion in a review of the SWGMBMP proposed in Section 6.

The E42 Modification would increase the volume of tailings produced over the life of mine from approximately 76 Mt to approximately 129 Mt. The management of tailings is discussed in Sections 2.6.2 and 2.6.3.

Table 2-4
Major Consumables Used and Stored at the Approved CGM

Mine Area	Consumable	Consumable Role
Flotation Circuit	Interfroth 50	Frother
	PAX (Potassium Amyl Xanthate)	Sulphide collector
	Interfroth 6801B	Frother
	CMS 46	Promoter
	Copper Sulphate (Pentahydrate)	Flotation agent
CIL Circuit	NaCN	Gold extraction
	Quicklime (Calcium Oxide – CaO)	pH control in CIL circuit
	Oxygen	Aeration of leach tanks
	Carbon	Gold adsorption
Gold Recovery	Hydrochloric Acid (HCl)	Acid wash to dissolve carbonate prior to carbon stripping
	Sulfamic Acid (NH_2SO_3H)	Assists electrolysis and gold refining
	Borax ($N_2B_4O_7$)	Flux in smelting
	Silica Flour (SiO_2)	Flux in smelting
	Soda Ash ($NaCO_3$)	Flux in smelting
	Caustic Soda (NaOH)	Neutralising agent in acid stripping
	Flocculants (Magnafloc 155)	Flocculant in thickeners
	Liquid petroleum gas (LPG)	Gold recovery room furnace
	A238 Aeropromotor	Gold collector
Cyanide Destruction	H_2O_2	Cyanide destruction (oxidising agent used in Caro's Acid)
	H_2SO_4	Cyanide destruction (oxidising agent used in Caro's Acid)
Mining Operations	Diesel Fuel	Fuel for diesel engines and explosive mixture
	Ammonium Nitrate	Explosive
	Detonators/Primers	Explosive

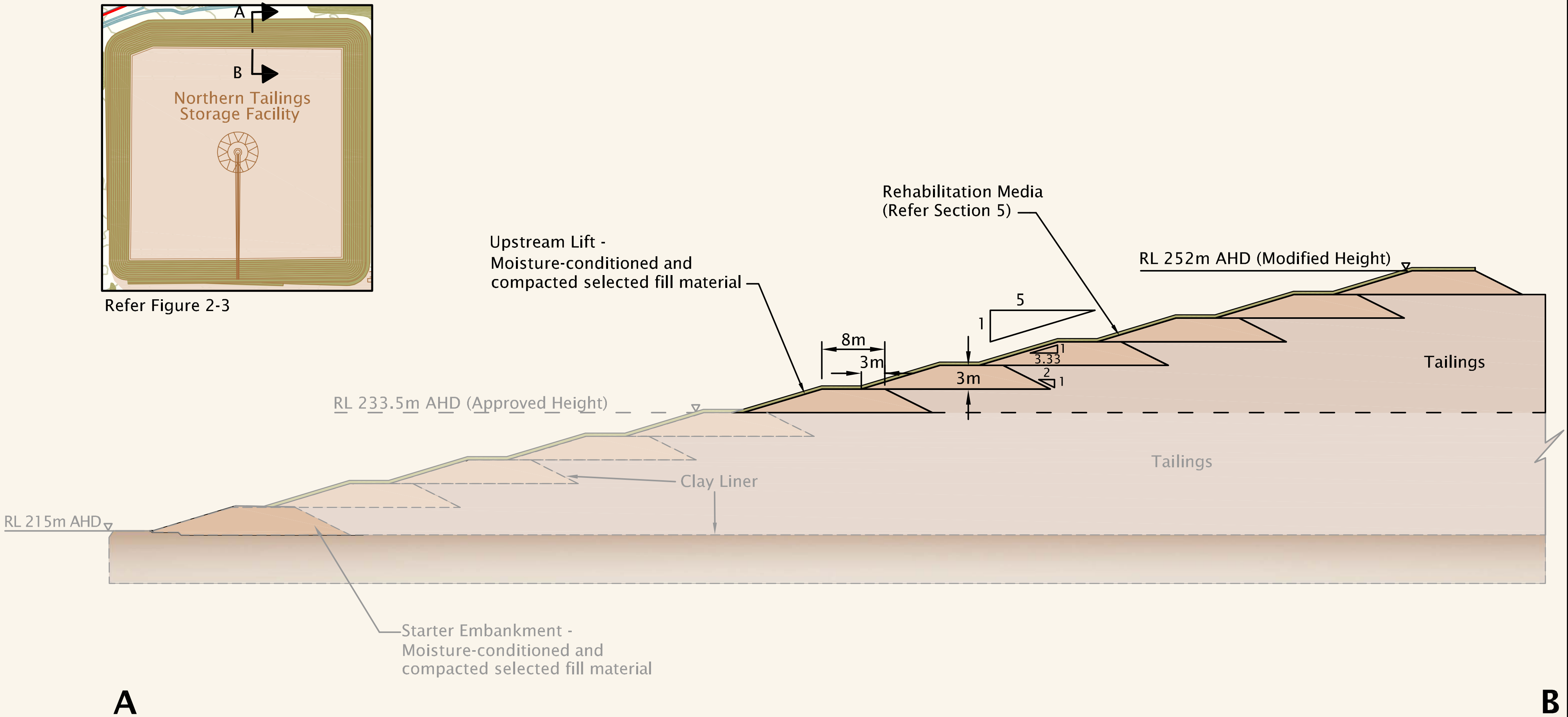
2.6.2 Tailings Storage Facilities

Tailings at the approved CGM are stored within the northern and southern tailings storage facilities (Figure 2-2). No change to the number or location of tailings storage facilities is proposed for the modified CGM.

The E42 Modification would increase the heights of the northern and southern tailings storages to a final elevation of RL 252 m AHD (from approximately RL 233.5 m AHD) and RL 256 m AHD (from approximately RL 241.5 m AHD), respectively. A conceptual cross-section of the modified northern tailings storage facility is shown on Figure 2-9.

As the tailings storage facilities are filled, the embankments would continue to be raised in a series of upstream lifts (Figure 2-9). The construction of the additional upstream lifts would follow the same lift construction methodology used to date.

The upstream lifts would be constructed using soft oxide waste rock stockpiled during mining operations, with the lift section extending from the existing embankment crest and supported by the dry tailings beach. The lifts would be constructed using a two zone method: the structural zone and the downstream rehabilitated zone. Material placed in the structural zone would be spread in approximately 300 mm thick layers and compacted to the required density. The batter angles of each lift in this zone would be approximately 1:3, with an overall batter angle of approximately 1:5 as shown on Figure 2-9. The downstream rehabilitated zone would involve flattening the outer batters.



E42 MODIFICATION

FIGURE 2-9

Modified Northern Tailings Storage Facility - Conceptual Embankment Section

2.6.3 Tailings Storage Facility Water Management

No change to the tailings storage facility water management processes is proposed for the modified CGM. Tailings storage facility water management would continue to involve maximising water re-use through the under-drainage pipe network, decant towers and water return pipeline to the contained water storage (D6) (Section 2.7). No changes to seepage flows are expected for the modified CGM (Appendix A).

The approved CGM tailings storage facilities have been designed with sufficient freeboard to store water from a 1 in 1,000 average recurrence interval (ARI) rainfall event. The required free-board is maintained as the storage fills with tailings via a series of embankment lifts.

Following tailings deposition, supernatant water drains to the central pond and decant towers. The decant tower is accessible via a causeway. An underdrainage pipe network has also been installed to facilitate drainage of the tailings mass. The bulk of the water from each tailings storage drains from the surface of the tailings and collects in the centre of each storage. This water, as well as underdrainage water, is reclaimed and used within the process plant. The decant system (including access causeway) is progressively raised during development of the tailings storage facilities.

Detailed analyses and modelling undertaken as part of the EIS indicated that limited seepage from the tailings storage facilities would occur through the storage floor. Modelling indicated that under the most conservative conditions, a cyanide plume would not move 200 m beyond the tailings storage facilities, and under the most probable conditions, the plume would not move significantly beyond the base of the tailings storages (Kalf and Associates, 1997).

Any seepage flow entering the underlying highly saline aquifers (during mining operations and for a limited time, post-closure) would be permanently diverted to flow towards the final void (Kalf and Associates, 1997). Modelling indicated that this seepage would move very slowly and would not reach the open pit during the operating life of the mine (*ibid*.). Any residual contaminants which enter the groundwater system below the tailings storage facilities are expected to either be immobilised or substantially reduced in concentration near the base of the storage (*ibid*.). The groundwater modelling indicated that residual cyanide concentrations would be reduced by a factor of one thousand (to negligible levels) near the base of the tailings storages (*ibid*.).

A number of seepage control measures have been incorporated into the tailings storage facilities for the approved CGM, including:

- the pre-stripping of surficial soils beneath the embankment footprint;
- construction of a moisture-conditioned and compacted-low-permeability storage floor, where necessary, to achieve permeability criteria;
- excavation of a central cut-off trench along the length of the starter embankment to a nominal 2.5 m below surface level or to the depth of a low-permeability clay layer, and backfilled with compacted and moisture-conditioned low permeability clay; and
- installation of an underdrainage and decant network.

These measures would continue to provide for seepage control during the modified CGM.

2.7 WATER SUPPLY

Water for the CGM is required mainly for ore processing, as well as dust suppression and potable and non-potable uses.

The majority of water used in processing operations is recycled within the plant. Water losses from the system include tailings pore water and evaporative loss principally from the tailings storage facilities. Water used for approved CGM ore processing is drawn from the following internal and external sources (which would remain for the modified CGM):

- Water returned from the tailings storage facilities (internal source) which is stored in contained water storage D6.
- Water from the open pit dewatering borefield (internal source) (the pit dewatering programme is described in Section 2.8.5) which is stored in contained water storage D6.
- Runoff water from the waste emplacements, open pit area and other disturbed areas which is collected in contained water storages (internal source) and transferred to process water storages or other retention ponds for re-use in the process plant or to satisfy other operational requirements. Further detail on the contained water storages is provided in Section 2.8.5.

- Water from the Bland Creek Palaeochannel Borefield (external source) which is pumped from four production bores within the Bland Creek Palaeochannel located approximately 20 km to the east-northeast of the CGM and which is stored in contained water storage D9.
- Licensed water from the Lachlan River (external source) which is supplied via the Jemalong Irrigation Channel to water storage D9.

The E42 Modification would extend the life of the approved CGM by approximately 11 years (from 13 years to approximately 24 years). Assuming commencement of the modified CGM in 2009, approximately 19 years of water supply would be required.

Based on the current configuration of the process plant, ore processing rates, ore types (approximately 90% of the total ore to be processed for the modified CGM would be primary ore) and recorded process plant water demand to date, the average daily external water demand for ore processing for the modified CGM would be approximately 10 ML/day.

A leach tailings thickener is proposed to redirect discharges from the leach circuit to a thickening process to achieve higher tailings slurry solids content, thereby minimising entrained and evaporative water loss at the tailings storage facilities. This would result in a reduction in water demand of approximately 2 ML/day (RMDSTEM Limited, 2008) and a revised total external demand of 8 ML/day.

The proposed water supply arrangements for the modified CGM are described below and shown on Figure 2-10.

In summary, external water supply sources would comprise (Table 2-5):

- a proposed saline groundwater supply borefield located within ML 1535;
- the Lachlan River; and
- the Bland Creek Palaeochannel.

In addition to the above other sources may become available through further investigations. Figure 2-10 identifies the priorities of use of internal and external water supply sources.

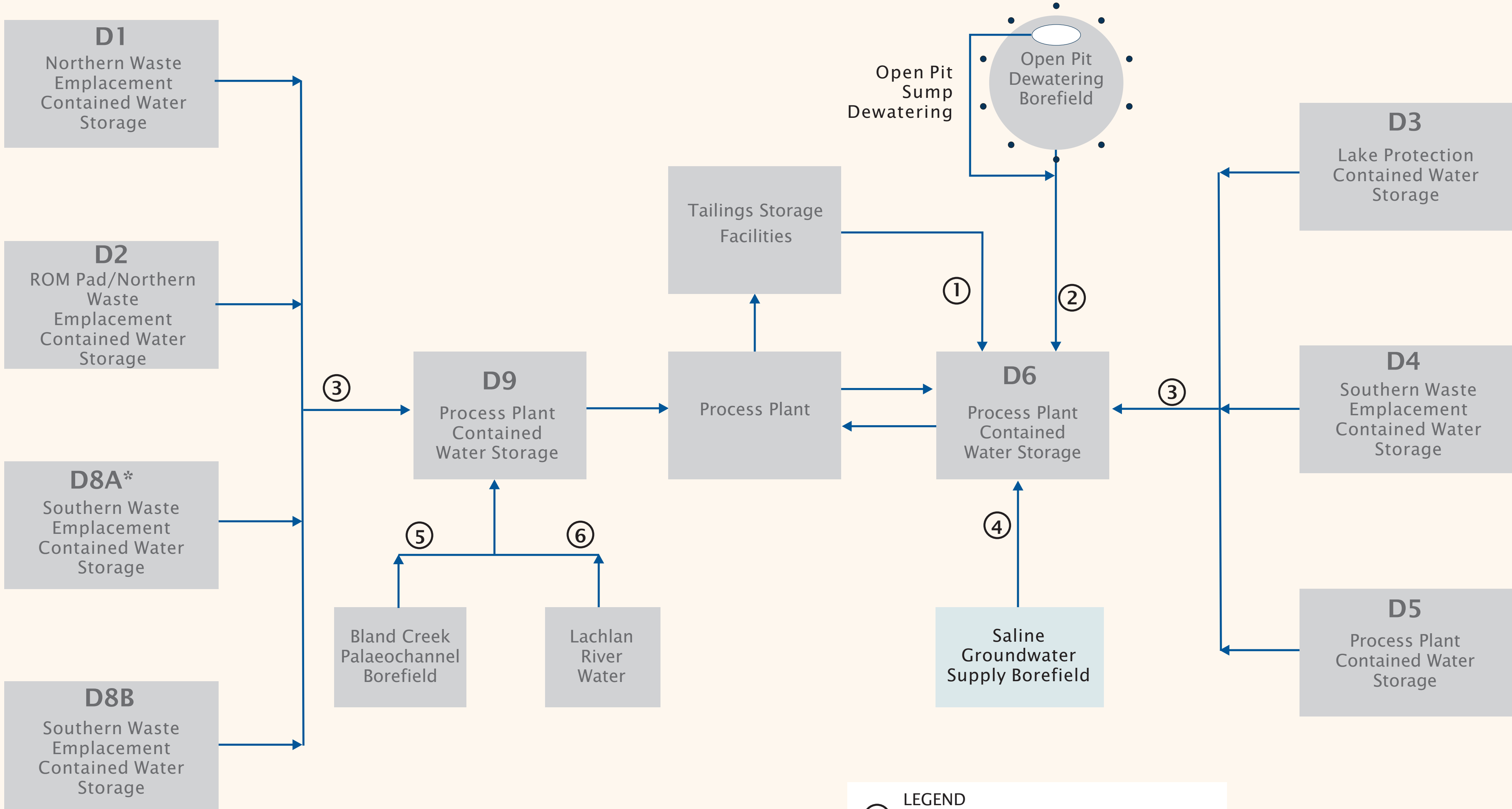
Saline Groundwater Supply Borefield

A review of mineral drilling records has identified a prospective local saline alluvial aquifer located within ML 1535 to the east and south of the approved CGM open pit. Pump tests on this aquifer (Appendix A) indicate that a borefield of approximately four bores could supply 1 ML/day of saline water (i.e. electrical conductivity of approximately 40,000 micro Siemens per centimetre [μS/cm]) to the process plant. The potential environmental impact associated with this extraction for the modified CGM is assessed in Section 4.4 and Appendix A. Figure 2-2 shows the proposed location of the borefield and associated pipeline. The borefield would be operated during times when the borefield is not inundated by Lake Cowal. It is anticipated, therefore, that this borefield would operate in drier times and be rested in wetter times when the contained water storages would make up the supply from this source.

Operation of this borefield would include the following:

- shut-down and removal of pumps during periods when the borefield is inundated by Lake Cowal;
- well-heads raised above the full storage level of Lake Cowal by construction of stand pipes;
- steel stand pipes to minimise potential damage to the bore in the unlikely event of an accidental collision;
- prominent signage at the well-heads to minimise the potential for accidental collision and damage;
- an anchored pipeline laid on the ground surface (i.e. above ground level) in a V-drain for potential spill containment;
- an underground powerline to power the pumps; and
- leak detection mechanisms including automatic shut-down capability (i.e. a pressure-based shut-down system).

In the unlikely event of pipeline failure and leakage of saline water, the spill would be controlled, contained and cleaned-up in accordance with the spill response procedures described in the HWCMP.



LEGEND
(1) Water Supply Priority
Currently Approved Water Management
Proposed E42 Modification Water Management

D8A would be removed once the modified open pit encroaches on the D8A footprint.

ResourceStrategies

E42 MODIFICATION
FIGURE 2-10
Water Supply Schematic

BARRICK COWAL

Table 2-5
Modified CGM External Water Supply

External Supply Source	Average Water Supply (approximately)		Modified CGM Life Total (approximately)
	ML/day	ML per annum	
Saline Groundwater Supply Borefield	1.0	365	6,935
Purchase of Lachlan River Temporary Water	3.9	1,430	27,250
Bland Creek Palaeochannel*	3.1	1,130	21,300
Total Proposed External Water Supply	8.0	2,920	55,400

* A total of 8,700 ML assumed extracted from the Bland Creek Palaeochannel by commencement of the modified CGM. A resultant total of 21,300 ML is available for extraction without change to the life-of-mine Bland Creek Palaeochannel limit documented in the approved CGM Development Consent (i.e. 30,000 ML).

Bland Creek Palaeochannel Borefield

Extraction from the Bland Creek Palaeochannel would continue until the total volume approved to be extracted in accordance with the Development Consent (i.e. total extraction of 30,000 ML for the life of the mine) is reached. Extraction would be managed to maintain groundwater levels above the established DWE trigger levels (Section 2.7.1). Although Coffey Geotechnics Pty Ltd (Coffey Geotechnics) have modelled continuous extraction of 8 ML/day as being sustainable with respect to maintaining groundwater levels above the DWE trigger level, supply from this source would continue for the modified CGM in the same manner as the approved CGM, by alternating between this source and the Lachlan River to manage groundwater levels and provide flexibility with respect to extraction rates and supply sources.

Lachlan River Water Entitlements

Water from the Lachlan River would continue to be accessed for the modified CGM by purchasing Temporary Water available from the regulated Lachlan River trading market. Barrick's High Security and General Security zero allocation water access licences enable trade of Temporary Water.

On average, demand of approximately 1,430 ML per annum would be required for the modified CGM from this source, however, volumes to be purchased would vary annually in accordance with the performance of the Bland Creek Palaeochannel, availability of water within the Lachlan River and availability of supply from the contained water storages within the ML. This supply source has proven to be reliable throughout the operating history of the approved CGM. Approximately 2,400 ML was extracted by Barrick in 2007.

DWE trading records (DWE, 2008) show that volumes between 4,000 ML and 36,000 ML of temporary water have been traded annually since 2004. During the history of trading under the *Water Sharing Plan for the Lachlan Regulated River Water Source, 2003* there has been adequate temporary water available on the market to supply the anticipated annual modified CGM demand from this source (i.e. approximately 1,430 ML per annum).

Potential Augmentation

In addition to the above external water supply sources, Barrick has identified additional potential sources which, upon further investigation, may augment the supply proposal. These options include:

- development of additional borefields in other saline aquifers in the region;
- the purchase of rights to existing licensed groundwater entitlements from the alluvial aquifer associated with the Lachlan River in an area disconnected from the Bland Creek Palaeochannel;
- the purchase of additional Lachlan River surface water rights via purchase or trade of High Security and/or General Security water licences; and
- development of a surface water collection system which could be installed using Barrick's harvestable water rights.

Further investigation and feasibility assessments would be undertaken for these options. Relevant approvals would be obtained should these options be identified as feasible.

The proposed water supply arrangements for the modified CGM are illustrated on Figure 2-10.

2.7.1 Groundwater Contingency Strategy

The groundwater level associated with the Bland Creek Palaeochannel Borefield is monitored on a continuous basis by DWE's groundwater monitoring bore on Burcher Road (GW036553). Contingency measures have been developed for implementation when water levels reach either RL 137.5 m AHD or RL 134 m AHD. These trigger levels relevant to the approved CGM were developed in consultation with the DWE and other water users within the Bland Creek Palaeochannel including stock and domestic users and irrigators. The E42 Modification would not change these measures and they would be continued for the modified CGM.

Contingency Measures at RL 137.5 m AHD

In the event that the groundwater level in GW036553 is below RL 137.5 m AHD, one or more of the following contingency measures will be implemented in consultation with the DWE:

- investigate the groundwater level in the Trigalana bore (GW702286) or any other impacted stock and domestic bores;
- determine the pump setting in relevant stock and domestic bores;
- determine the drawdown rate in GW702286 and other impacted stock and domestic bores;
- develop an impact mitigation plan for impacted stock and domestic bores; and/or
- set up an alternative water supply for the owner of GW702286 and other owners of stock and domestic bores, if necessary.

Contingency Measures at RL 134 m AHD

In the event that the groundwater level in GW036553 is below RL 134 m AHD, one or both of the following contingency measures will be implemented in consultation with the DWE:

- alter the pumping regime to maintain the water level in the impacted stock and domestic bores; or
- maintain a water supply to the owner/s of impacted stock and domestic bores.

2.8 SURFACE RUNOFF MANAGEMENT

The approved CGM water management system is designed to contain potentially contaminated water (contained water) generated within the mining area and divert all other water around the perimeter of the site.

The approved CGM water management system is comprised of the following major components:

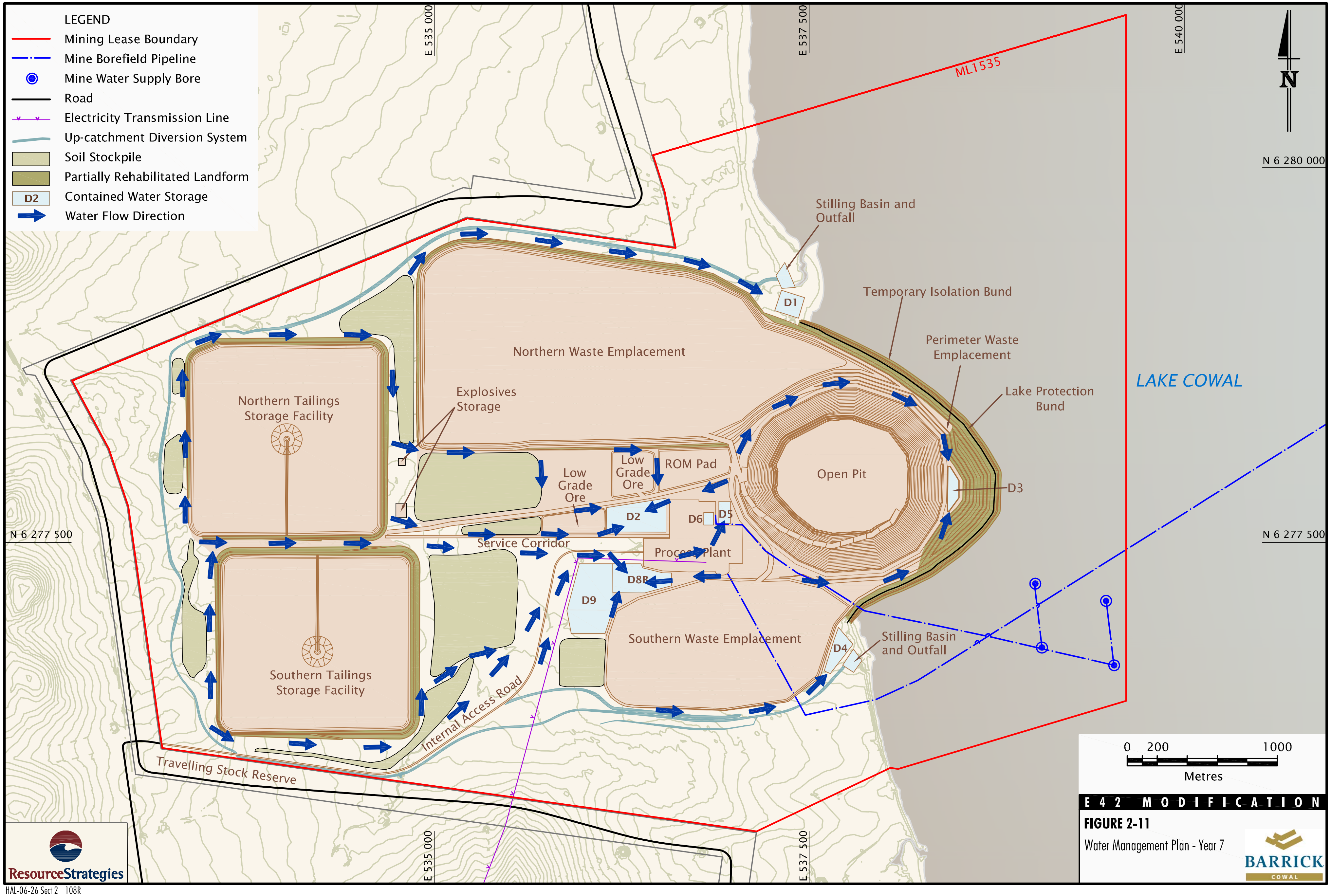
- UCDS and ICDS (including the contained water storages) (Figure 2-2);
- lake isolation system (comprising the temporary isolation bund, lake protection bund and perimeter waste emplacement, as shown on Figure 2-2);
- integrated erosion, sediment and salinity control system; and
- pit dewatering system.

Changes to the approved CGM water management system proposed for the modified CGM are described below.

2.8.1 Up-catchment Diversion System

The approved UCDS allows upper catchment surface runoff to flow around the western, northern and southern edges of the site and into the existing drainage lines (as shown on Figure 2-11).

The E42 Modification would result in changes to the alignment of the southern, western and north-eastern portions of the UCDS. The northern and north-western portions of the system would be diverted around the expanded northern waste emplacement (facilitated by the construction of the northern bund), as shown on Figure 2-11.


LEGEND
Mining Lease Boundary
Mine Borefield Pipeline
Mine Water Supply Bore
Road
Electricity Transmission Line
Up-catchment Diversion System
Soil Stockpile
Partially Rehabilitated Landform
D2 Contained Water Storage
Water Flow Direction
E 535 000
E 537 500
E 540 000
N 6 280 000
N 6 277 500
ML1535
LAKE COWAL
Stilling Basin and Outfall
Temporary Isolation Bund
Perimeter Waste Emplacement
Lake Protection Bund
Northern Waste Emplacement
Northern Tailings Storage Facility
Explosives Storage
Low Grade Ore
ROM Pad
Open Pit
D1
D2
D3
D4
D5
D6
D8B
D9
Service Corridor
Process Plant
Southern Waste Emplacement
Southern Tailings Storage Facility
Internal Access Road
Travelling Stock Reserve
0 200 1000
Metres
ResourceStrategies
HAL-06-26 Sect 2 _108R
E42 MODIFICATION
FIGURE 2-11
Water Management Plan - Year 7
BARRICK
COWAL

2.8.2 Lake Isolation System

The approved CGM lake isolation system has been constructed to hydrologically isolate the open pit and Lake Cowal during mining and post-mining. The lake isolation system is comprised of a series of isolation embankments designed to prevent the inflow of water from Lake Cowal into the open pit development area during periods of high water levels. The lake isolation system includes the temporary isolation bund, lake protection bund and perimeter waste emplacement, which are shown on Figure 2-2.

No change to the temporary isolation bund or lake protection bund is proposed as a result of the E42 Modification.

2.8.3 Internal Catchment Drainage System

The approved ICDS is a permanent water management feature designed to operate during the life of the mine and after mine rehabilitation and ML relinquishment. The system involves a low mound running alongside the UCDS, surrounding the tailings storage facilities and extending to the process plant area.

Surface waters that collect within the ICDS are managed by a series of contained water storages, bunds and drains.

Approved ICDS contained water storages for CGM runoff comprise storages D1, D2, D3, D4, D5, D8A and D8B (Figure 1-3).

Contained water storages D1 to D5, D8A and D8B are currently used to contain runoff from the waste emplacements and general site area. Water is pumped to contained water storages D6 or D9 (process water storages) for consumption during ore processing. The storages have generally been designed to contain a 1 in 100 year ARI rainfall event with the exception of D5 and D6 which have been designed to contain a 1 in 1000 year ARI rainfall event.

Changes to the current ICDS as a result of the E42 Modification include:

- an increase in storage capacity of D2 and D8B for containment of runoff from larger catchment areas;
- removal of D8A once the modified open pit encroaches on the D8A footprint and replacement by an increase to D8B; and
- minor changes to collection drains around enlarged stockpile and waste emplacement areas.

A summary of the function and characteristics of the contained storages proposed for the modified CGM is provided in Table 2-6.

2.8.4 Integrated Erosion, Sediment and Salinity Control System

Sediment control structures, dams and waterways around individual infrastructure components have been constructed at the approved CGM as part of the ICDS.

The E42 Modification would result in the relocation of some of the existing sediment and erosion control structures to accommodate the increase in the area of the waste emplacements (Figure 1-3).

2.8.5 Open Pit Dewatering

A open pit dewatering programme is currently in operation at the approved CGM to manage surface water and groundwater inflows. Significant surface water inflows are most likely to be the result of heavy rainfall events. The catchment area draining to the open pit during operation is restricted to the pit itself and the small perimeter area enclosed by the external bund. Water management structures have been installed to divert water from other areas outside this bund to contained water storages. The open pit includes water management structures (face seepage collection drains) and in-pit sumps in the floor of the open pit with a capacity to store runoff from a medium-sized (1 in 10 year) ARI rainfall event.

Groundwater and mine dewatering assessments undertaken for the EIS indicated the open pit would intersect three known saline aquifers during development. A total of 21 permanent licensed bores have been installed in a ring outside the open pit perimeter, of which 19 are currently producing water. The locations of individual bores have been targeted to coincide with structures/features (shear zones, fractured dykes and faults). Saline groundwater generated during open pit dewatering is currently pumped to the process plant for use in ore processing. A network of piezometers has also been installed to monitor draw-down levels during the life of the mine.

Table 2-6
Modified CGM Contained Water Storages

Storage Number	Catchment/Function	Approved CGM Storage Capacity (ML)	Modified CGM Storage Capacity (ML)
D1	Runoff from northern perimeter of the northern waste emplacement. Collected water pumped to D9.	58	58
D2	Runoff/seepage from ROM and low grade stockpile areas from the northern waste emplacement area and the northern tailings storage facility. Collected water pumped to D9.	115	225
D3	Runoff from perimeter catchment surrounding the open pit and the perimeter waste emplacement areas. Collected water pumped to D9.	45	45
D4	Runoff from the southern perimeter of the southern waste emplacement. Collected water pumped to D9.	66	66
D5	Process plant area drainage collection. Water pumped to D9.	50	50
D6	Process water storage. Main source of plant make-up.	25	25
D8A (whilst operational)	Runoff from southern waste emplacement. Water pumped to D9.	28	28 (whilst operational)
D8B	Runoff from southern waste emplacement and southern tailings storage facility. Water pumped to D9.	148	190
D9	Process water storage. Storage for raw water. Water pumped to D6.	802	802

The E42 Modification would not change the approved CGM pit dewatering methods. Some dewatering bores would be decommissioned as the final open pit outline of the modified CGM extends beyond the ring of currently installed bores.

2.9 ELECTRICITY SUPPLY

Electricity to the site would continue to be provided via the existing 132 kV ETL from Temora (approximately 90 km south of the CGM).

An 11 kV underground powerline would be constructed from an existing 11 kV line located in the south of ML 1535 to the saline groundwater supply bores.

2.10 MINE ACCESS

The primary access to the approved CGM including deliveries and heavy vehicles is provided from West Wyalong via the approved road which was upgraded in 2005 (Figure 1-1). Use of this road as the primary access road for light and heavy vehicles would continue for the modified CGM. Two additional routes along existing roads are proposed for use by mine employee light vehicles and shuttle buses from Condobolin and Forbes (Figure 1-1). These routes are existing roads which would not require upgrade works as a result of the E42 Modification (Appendix J).

An assessment of the existing traffic conditions in the immediate CGM area and the estimated increase in traffic generated as a result of the E42 Modification is provided in Appendix J.

2.11 MANAGEMENT OF CHEMICALS AND WASTES

2.11.1 Dangerous Goods

The transport and storage of dangerous goods at the approved CGM is conducted in accordance with relevant management plans, studies and analyses, listed below:

- Hazardous Waste and Chemical Management Plan (HWCMP);
- Transport of Hazardous Material Study (THMS);
- Cyanide Management Plan (CMP);
- Fire Safety Study (FSS);
- Final Hazard Analysis (FHA); and

- Hazard and Operability Study (HAZOP).

The transport and storage of dangerous goods required for the approved CGM would continue to be conducted in accordance with the relevant legislation, Australian Standards and codes. The approved CGM management plans, studies and analyses would be updated to incorporate the relevant modified CGM activities where required.

2.11.2 Recyclable Domestic Waste

Recyclable domestic waste from office buildings and workforce areas would continue to be collected regularly and managed by waste disposal contractors.

2.11.3 Putrescible and Non-Putrescible Waste

General solid (putrescible) waste and general solid (non-putrescible) waste (as defined in *Waste Classification Guidelines Part 1: Classifying Waste* [DECC, 2008a] [the Waste Guidelines]) would continue to be disposed in the waste emplacements on-site.

Bioremediation Waste

Site-generated hydrocarbon-impacted material would continue to be treated in the on-site designated Bioremediation Facility, and would continue to be disposed within the waste emplacements. The treated (i.e. bioremediated) waste material is classified as general solid waste (putrescible) as defined in the Waste Guidelines.

Trash Screen Oversize Waste

Trash screen oversize waste from the milling circuit would continue to be disposed within the waste emplacements. This waste is the collection of shattered and melted fragments of plastic-constructed explosive detonation devices such as Cordtex lines, Booster units, and Connectadet millisecond blast timing delay units. Some oversize sand and small rock fragments and organic (roots) materials are also present in this waste. The trash screen oversize waste is classified as general solid waste (putrescible) under the Waste Guidelines.

2.11.4 Sewage Treatment and Effluent Disposal

Sewage would continue to be treated in the on-site sewage treatment plant and would continue to be disposed of to the satisfaction of the BSC and the DECC, and in accordance with the requirements of the NSW Department of Health.

2.12 WORKFORCE

The approved CGM operates seven days a week, 24 hours per day. Personnel work on a shift basis with two twelve hour shifts worked in each 24 hour period (shifts starting at 7.00 am and 7.00 pm).

The E42 Modification would increase the approved CGM workforce to an average of approximately 350 personnel (comprised of both Barrick personnel and contractors) and up to approximately 450 personnel during peak periods. The proposed change in personnel numbers is presented in Table 2-7. No change to the operating hours of the mine is proposed.

Table 2-7
Approved and Modified CGM Workforce

Workforce	Approved CGM Workforce		Modified CGM Workforce	
	Average	Peak	Average	Peak
Barrick Employees	270		300	
Contractors	50	100	50	150
Total Personnel	320	370	350	450