Appendix D

Construction Methodology

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Abigroup
Constructing Australia's Future

Construction Methodology

Proposed Rixs Creek Rail Loop
& Associated Infrastructure

Contents

Appendices

Abbreviations

Acronyms	Glossary
AHD	Australian Height Datum
ANZECC	Australian & New Zealand Environment & Conservation Council
AS/NZS	Australian and New Zealand Standard
CEEC	Critically Endangered Ecological Communities
CHMP	Construction Heritage Management Plan
CHPP	Coal Handling & Preparation Plant
CLMP	Contaminated Land Management Plan
Cth	Commonwealth
CTP	Compliance Tracking Program
DSEWPAC	Department of Sustainability, Environment, Water, Population and Communities (Cth)
DoPI	Department of Planning and Infrastructure (NSW)
DPI	Department of Primary Industries (Fisheries, NSW)
EA	Environmental Assessment
EEC	Endangered Ecological Community
Eg	For example
EIN	Environmental Improvement Notice
EIR	Environmental Incident Report
EMP	Environmental Management Plan
EMS	Environmental Management System (as defined under AS/NZS 14001)
ER	Environmental Representative
EPA	Environmental Protection Authority (NSW)
FFMP	Flora and Fauna Management Plan
GPS	Global Positioning System
ISO	International Organisation for Standards
MCoA	Ministers Conditions of Approval
MSDS	Material Safety Data Sheets
NPWS	National Parks and Wildlife Service (NPWS) (incorporated in OEH)
NSW	New South Wales
NoW	NSW Office of Water (NSW)
NVMP	Noise and Vibration Management Plan
RMS	Roads and Maritime Services (RTA, NSW)
OEH	Office of Environment and Heritage (NSW)
SoC	Statement of Commitments
SWMP	Soil and Water Management Plan
WMS	Work Method Statement
WRMP	Waste and Reuse Management Sub-Plan
ESCP	Erosion & Sediment Control Plan
CEMP	Construction Environmental Management Plan

1.0 Introduction & Project Scope

1.1 Introduction

Rixs Creek Mine is proposing the construction of a 5.6km Rail Loop which departs from the Northern Line at approximately 223km 500m. A new train load-out facility and reclaim tunnel would be connected to the existing CHPP via a conveyor. This Construction Methodology document details the construction methods, major plant and equipment, material management arrangements, hours of work, environmental issues and site access.

A Preliminary Programme of Works and a drawing showing proposed construction ancillary facility (site compound, amenities, material laydown, stockpiles, car parking) locations and site access routes are provided in the Appendices.

1.2 Major Construction Activities

Construction and Management activities comprise:

Pre-Construction

Project Management Plans development:

- plans include overarching Project Management Plan(PMP), Work Health & Safety Plan(WHS), Construction Environmental Management Plan(CEMP) specific for the project and in accordance with scope of works and technical criteria, design, and project conditions of approval. A diagram is identifying the typical project management plans and the relations of those plans with Abigroup's integrated management system is provided in Appendix C;
- securing approvals required prior to the commencement of construction, including Early Works EMP if required; and
- providing construction programme and environmental management information for community consultation requirements.

Preliminary activities include:

- establishment site access roads and site compound;
- identification and signage of site services;
- fencing of CEEC's and Heritage sites;
- fencing of the Project Boundary;
- install erosion and sediment controls; and
- construction of transverse (clean water) drainage.

Construction

- Rail Deviation Construction including:
  - clearing vegetation within the nominated construction footprint;
  - stripping & stockpiling topsoil;
  - construction of internal haul roads;
  - bulk earthworks – cut to fill within the rail alignment;
  - bulk earthworks – cut to spoil to designated spoil area;
  - excavation, lay and backfill of drainage pipe culverts;
  - construction of a new concrete culvert to access inside loop;
  - construct visual bund;
  - construction of rail track for loop ;
  - cut and embankment batter stabilisation;
  - landscaping following construction;
- Possession of Railway:
  - Tie-in the new rail deviation to the existing Main Northern Rail corridor;
  - Recondition the existing formation at tie in;

- Post Possession Works including:
  - remove existing track and stack track components for reuse;
- Conveyor, train load out bin, reclaim tunnel;
- Other Construction Work:
  - Site stabilisation and rehabilitation;
  - Landscaping**;**
- Finishing works:
  - Removal of temporary construction compounds;
  - Remove and restore temporary construction compounds; and
  - General site clean-up.

2.0 Construction Method Statement

2.1 Site Establishment & Preparation

2.1.1 Release of Areas Subject to Environmental/Archaeological Inspection

A regime shall be established with the Superintendent's Representative regarding the release of areas subject to environmental/archaeological inspection.

These areas shall be identified at project commencement and fenced/barricaded off and signposted. The workforce will be advised of the locations where access is restricted at the project induction. Written evidence (Hold Point release or similar) shall be provided of the release of these areas prior to construction commencing in these areas.

2.1.2 Ancillary Facilities

The primary site compound with amenities, lunch rooms, training and meeting facilities and associated bathroom amenities will be located as shown on Appendix A. Construction personnel and visitor carparking is also identified on the map in Appendix A.

An additional satellite compound is proposed to be located inside the rail loop and will comprise of a small office, lunch room and bathroom amenities.

Laydown areas, plant and machinery parking & maintenance areas, and stockpile locations will be cleared with a suitable surface established and signposted as part of the Site Establishment programme.

Access tracks will be routed to avoid impact on existing native vegetation and endangered ecological vegetation communities where practical and in accordance with project approvals.

The installation of clean water drainage and diversions as well as erosion and sediment controls as part of the site establishment will ensure early set up of controls that will ensure impacts are kept to a minimum. Similarly the early fencing, barricading

2.2 General Earthworks

2.2.1 Establish Survey Control and Set-out

Survey control will be setup at the commencement of the project by competent surveyors. The set out will be carried out using electronic design information received from the design consultants.

2.2.2 Clearing & Grubbing

The footprint area will be cleared and grubbed as required using a bulldozer and mulching equipment. The mulch will be moved to stockpile sites for later reuse, including for use as erosion and sediment control material during the earthworks phase of the project, as per CEMP.

Where necessary, beneath the formation, grubbing will occur up to a depth of 500mm below natural surface to remove all stumps and tree roots.

2.2.3 Strip Topsoil & Stockpile

Stripping of topsoil will be in accordance with requirements on the drawings; topsoil will be stripped with and transported to nominated stockpile sites within the works.

Topsoil stockpile will be wheel rolled during the stockpiling process to ensure the sides are compacted and stable. All necessary erosion controls will be installed around the topsoil stockpiles in accordance with the Erosion and Sediment Control Plans. Stockpiles may be seeded with a mix of suitable grass species to stabilise the surface and water carts will be available for dust control as required.

2.2.4 Foundation Preparation

Foundation will be jointly inspected by Earthworks Foreman, Geotechnical Representative and Client's Representative following the removal of topsoil, to determine the suitability of the foundation. Any unsuitable material will be removed at this time. After the foundation has been approved, it shall be ripped and compacted to a depth of 150mm.

2.2.5 Removing Unsuitable (Spoil)

All unsuitable areas will be removed by excavator and will be carted using dump trucks to a spoil stockpile. Unsuitable material will be removed as directed by the Geotechnical Representative and Client's Representative.

2.2.6 Access Tracks, Haul Roads

Minimum numbers of haul roads and tracks will be provided to carry out the works in order to minimise the disturbance to the surrounding areas. The major haul route will be along the new rail corridor. Haul roads, where applicable, will require bunds to be constructed on the edges to prevent any vehicle run off and to control stormwater. All haul roads will be adequately built to carry the type of plant utilised for the works. Graders and water carts will be utilised to maintain haul roads, to ensure both the efficiency of the haul, to minimise generation of dust and to maintain drainage to minimise erosion and sediment transport.

A temporary coal haul road will be constructed around and through the works to maintain deliveries to the existing coal loading loop.

A drawing detailing this haul road is included at Appendix A.

2.2.7 Protection of the Work

All works will be protected as necessary during the course of the contract to ensure full compliance with contract specifications. Any identified damage during the course of works to the existing or finished surfaces will be maintained to the satisfaction of principal's representative.

2.2.8 Materials

At this stage it is unknown as to what pavement type materials will be won and processed on site. Depending on the agreed design the materials similar to the types listed below will have to won and processed on site or imported.

- Structural Zone, CBR >30%;
  - RS wall backfill; and
  - General fill, visual bund.
- Stormwater drainage backfill;
  - Capping Layer, CBR > 50%;
  - Drainage blanket rock; and
  - Ballast.

A more detailed material management plan, including the source material to be used and the method of processing, should be produced prior to commencing works. All the materials will be assessed and tested as described in specifications and geotechnical report for the project.

2.2.9 Mass Haul & Material Management

Following an analysis of in-situ materials for the construction a mass haul diagram should be produced to determine the following:

- Location and quantity of material in each structural zone;
- Location and quantity of material required for each embankment;
- Requirements for import material;
- Stockpiling areas; and
- Potential uses for spoil material and disposal provisions.

2.2.10 Blasting

It is likely that hard rock will be encountered and blasting will be necessary through some of the cuttings. A blasting plan will be developed in conjunction with the operations personnel at Rixs Creek and blasting subcontractor. .

2.2.11 Batter Stabilisation

A Geotechnical Consultant will determine if any batter stabilisation will be required.

2.2.12 Timing

The timing for individual activities can be determined from the overall draft Construction Programme. A copy of our programme is included at Appendix B.

2.2.13 Major Plant & Equipment

In general, top soil will be removed by scrapers, with assistance from graders as required. Excavators and moxies will be used to de-silt existing water courses and areas of deeper spoil.

The bulk earthworks will be moved by scrapers, with dozers used to assist loading, as well as dump trucks and excavators.

Compaction will be carried out predominantly using compactors and pad foot rollers. The rolling pattern will be trialled after commencing on site to determine the most effective compaction method.

Graders and water carts will be used for maintaining haul roads, spreading material in the embankments, applying water for conditioning, compaction purposes and dust control.

2.3 Track Works

The main lines adjacent to the works shall be operational during off-line works (except during possessions).

Where works are required adjacent to the operational railway or within the rail corridor, additional controls will be required as follows:

- The rail corridor will be managed as a restricted entry and secure area within the project site. Fencing will be put in place to clearly identify the restricted entry areas;
- All entry and works within the rail corridor will only be undertaken with appropriate safe working arrangements in place and under the control of an appropriate safe working officer;
- All works that are near or may affect the operational railway will be accessed and appropriate safe working arrangements will be put in place prior to the work starting;
- All persons required to work in the rail corridor area will have appropriate certification and inductions; and
- Protection officers as required will be supplied for all activities to manage the safety of railway operations.

Cranes and other plant shall be positioned failsafe to the open roads so that in the event of failure or mishandling, the furthest extent of jib/ boom cannot fall within three metres of the nearest operational line.

2.3.1 Track Construction

On completion of the earthworks and as it becomes available under a staged hand over, bottom ballast installation shall commence by taking delivery of new ballast by road truck and offload directly on to the finished formation A GPS controlled grader is used to trim the ballast to required level and line and the ballast is compacted with a roller.

Sleeper installation shall follow on from bed ballast installation. Sleepers will be delivered by road truck and offloaded by loader in piles to new formation. An excavator and sleeper grab will be used to place sleepers at the correct alignment and spacing on bottom ballast.

The rail will be distributed along the alignment by loader and then lifted in position on the sleepers by excavators. The rails will be clipped up and temporarily jointed.

Top ballast installation shall follow on from the rail placement. Ballast delivered by road to stockpile will be loaded in to moxies to place the ballast along the tracks. The ballast will be positioned by hirailed excavator and ballast regulator ready for tamping of the track.

The tamper will be delivered by road and craned on to the track. The tamper will then place the track to final design line and level. The ballast regulator will profile the ballast to the final shape and then broom the track. The tamper and regulator will be craned between the tracks.

Welding and rail adjusting shall follow on from tamping.

2.3.2 Work in Rail Possession

All work in possessions will be carried out under the required safe working arrangements controlled by suitably qualified safe working officers and with signalling support to ensure the integrity of the signalling system. The possessions used will depend on the possessions available. The following is based on the best information available at the present time.

It is intended to use two possessions to carry out track works.

Possession 1 would be used to carryout formation and install a turnout in the down track. This will involve the removal and replacement of existing track by cutting the rails, removing the rails by excavator and loader, removing the sleepers by excavator and loader and then excavating the existing track using excavators and moxies to allow for the new formation and capping.

The structural material will be placed in two compacted layers on the floor of the excavation that has been trimmed by excavator and proof rolled by roller. Moxies will be used to deliver the material from stockpiles, excavators used to spread the material and an excavator used to trim the layers ready for compacting by roller.

The capping layer will be placed in the same manner and trimmed to final levels and crossfall.

New bottom ballast will be placed and compacted as for track construction.

The sleepers will be placed as for track construction and the rails similarly placed.

Top ballast will be placed as for track construction.

The tracks will be tamped to line and level with the tamper and the ballast profiled to shape and broomed by the ballast regulator.

The rails will then be welded and stress adjusted.

The area of shoulder widening adjacent to the formation reconditioning area will be done during the possession by pulling the ballast shoulder up on the track, boxing out the capping area by excavator then placing capping to the widened area. Capping will be delivered by moxie, spread by excavator, trimmed by traxcavator and compacting by roller.

The shoulder ballast is then replaced by excavator and profiled by the ballast regulator.

The track is then certified for traffic, the signalling system tested and the possession handed back.

Possession 2 will be used to carry out the formation reconditioning and turnout installation on the up track and will follow the same process as above.

2.4 Drainage

Drainage works shall be carried out as soon as possible to enable the site to be well draining and reduce susceptibility to wet weather.

Installation of clean water open drains shall be installed where possible along with the establishment of erosion and sediment controls at the start of the bulk earthworks.

Transverse drainage shall be installed as soon as possible subject to depth of cover over the drainage line, etc.

Stormwater drainage headwalls and outlet structures will be installed progressively along with the pipes, to ensure lines are completed with minimum distribution to the earthworks and follow pavements.

Drainage works within the existing rail corridor will be done under rail possession or appropriate safe working arrangements.

2.5 Signalling

The actual signalling works required will be dependent upon the design in line with the approved ARTC Signalling Functional Specification. This will detail the types of components required to be installed. All signalling civil installation will be carried out carried out in conjunction with the civil works under a joint programme to ensure that all activates are completed in a timely manner to allow commissioning to be carried out at the correct time and to prevent unnecessary rework. This will include the installation of cable routes; signal bases; location bases; relay room bases; train detection systems; and main cable installation etc.

Cable terminations, pre testing, final testing, commissioning, and systems integration will be carried out by the nominated Signalling Design Contractor approved by ARTC. It is expected that these works will be carried out in an existing ARTC main line possession but this will be dependent upon the final complexity of the signalling design.

All signalling is to be installed and tested in as for as possible to be ready for commissioning during the second track possession.

3.0 Conveyor & Train Loading System

The key to the successful construction of this element will be the management of the procurement of the long lead key items. An access route through the Operations Area may be required for some of the larger fabricated items however most deliveries should use the new rail alignment. The area under the proposed coal stockpile would be ideal as a lay-down area for the assembly of the structures.

Reclaim Tunnel would be constructed using the cut and cover method and backfilled using free draining select quality material.

Large concrete footings would be required to support the gantry trestles.

A large lattice boom crawler crane and yard crane and several elevated work platforms would operate during the installation of the phase of the gantry, overhead conveyors and Coal Loading Bin.

4.0 Environmental Requirements

4.1 Control of Erosion & Sedimentation

Prior to commencement of any work, Erosion and Sediment Control measures will be implemented as per the ESCP prepared by specialist Soil Conservationist and approved by client representative ensuring that all existing and finished surfaces are protected from damage due to work activities, contamination from site conditions and any climate conditions, and ensuring no damage would occur beyond the disturbance boundary downstream side of works area. ESCP will always be in place during the course of individual operation and will be amended accordingly with site conditions to suit the works.

All necessary drain paths will be identified to separate clean and dirty water on site and works will be performed for the diversion, restriction or management of any flow or seepage of surface or ground water around the works for water runoff. The plan will be prepared to show dispersing of clean water either in stable areas or natural watercourses, while all measures (sediment traps, basins) will be taken to collect dirty water and re-use it for site works.

4.2 Temporary Drains

Catch drains will be formed along haul roads and access tracks for any potential hazards due to their steepness or soil erodibility. All drains will be formed to intercept and divert run off from roads to stable outlets. The configuration of these drains will include check dams, sand bags to decelerate runoff to non-erosive velocities.

All drains will be formed with adequate plant type, capacity to perform the works.

4.3 Temporary Sedimentation Control Works

Temporary sediment trapping devices will be installed downstream of the embankment works area within the Disturbance Boundary. They will be provided during construction to filter sediment-laden runoff or water from dewatering operations. They will be positioned to filter sediment before crossing the Disturbance Boundary and entering the natural watercourses downstream of the works area.

4.4 De-Watering

All water will be sampled, analysed and results assessed to ensure that any dewatering will comply with any Environment Protection Licence and/or the requirements of Section 120 of the Protection of the Environment Operations Act 1997. All dewatering activities will be in accordance with the Dewatering Procedures within the Soil & Water Management Plan and subject to a Dewatering Permit issued by the Environmental Coordinator. All dewatering activities are monitored with records maintained by the Environmental personnel.

5.0 Testing & Inspection

A quality plan will be submitted prior to the commencement of works.

A NATA accredited testing authority will be employed to undertake all testing of earthworks and concrete on site.

All select materials to be incorporated into the works will be tested and certificates attached to quality documents.

6.0 Dust Control

All works will be conducted as per CEMP, for the suppression of dust control; any exposed areas which allow revegetation to be used as dust control barrier, (Stockpiles, Mounds) will be applied as soon as practical, otherwise, a water cart will be allocated for works in areas, where dust control during earthworks operations is required.

7.0 Noise Mitigation

As the works include large sized plant and equipment, a noise control plan will also be implemented to ensure works are conducted within given time frames, affording no disturbance to the surrounded community.

If required the works to be conducted outside of times, then the affected community will be notified prior to works conducted and with Principal's representative's approval.

Construction Activity	Plant & Machinery	Daily Use
Site Establishment & Preparation	Franna telescopic crane	2
	Semi-trailers	5
	Light trucks	2
	Light vehicles	6
	Excavator 30t	2
	Dozer D6	1
	Grader 14	1
Clearing & Grubbing	Excavator/Cutter 30t	1
	Dozer D6	1
	Mulcher	1
Topsoils Stripping & Stockpiling	Wheeled Roller	1
	CAT 637 Scrapers	2
	Grader 14	1
	Excavator 30t	2
	Water Cart	1
Removing Unsuitable	Excavator 30t	2
	Dump trucks 30t Moxy	2
Access Track & Haul Roads	Graders 14	1
	Water Cart	1
Bulk Earthworks	CAT 651 Scrapers	6
	Dozer D11	1
	Dump trucks 30t Moxy	2
	CAT 825 Compactors	2
	Pad Foot Rollers	2
	Light Vehicles	6
	Excavator 30t	2
	Water Cart	2
Track Construction	Truck & Dog trucks	4
	Excavator 30t	2
	Roller	2
	Loader	2
	Komatsu PC228 Hirailed Excavator	1
	Jackson Tamper	1
	Ballast Regulator	1
	Crane 100t	1
	Dump trucks 30t Moxy	4
Drainage	Excavator 30t	2
	Semitrailers	2
	Crane 20t	1

Construction Activity	Plant & Machinery	Daily Use
Conveyor & Train Loading System	Yard Crane	2
	Lattice Boom Crawler	2
	Semitrailers	4
Revegetation	Hydromulcher/Seeder	1
	Light vehicles	2
	Water Cart	1

8.0 Revegetation

Revegetation of disturbed areas and any areas beyond the embankment footprints will take place as soon as any of the area is available, to reduce any chances of erosion and to have permanent vegetation as a barrier for water runoff.

Hydro seeding will be applied by an approved process and will include one application over each area. It will commence as soon as topsoiling is completed.

Storage tanks, containers and equipment used in the hydro seeding and mulching will be clean and free of contamination from previous operations.

Mulch placement methods will be approved by the Principal's Representative prior to the commencement of mulching.

9.0 Plant & Equipment

9.1 Earthworks and Drainage

For the cut to fill operation, the earthmoving equipment used would most probably incude:

- 651 and 637 Scrapers;
- Dump Trucks;
- D11 or D6 bulldozers;
- Water Carts;
- Cat 825 compactors; and
- Cat 14 graders.

Other equipment, such as rollers, excavators, articulated dump trucks, backhoes and loaders and tippers will also be required.

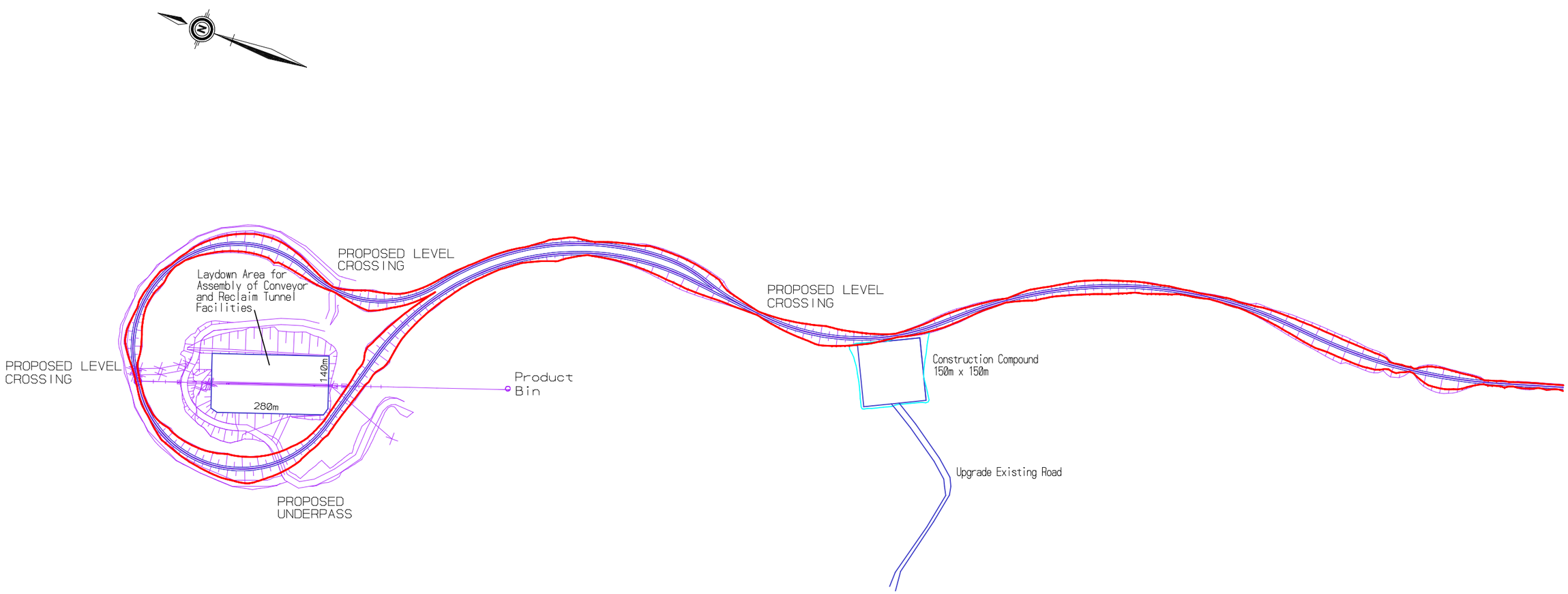
9.2 Rail Works

Specialised rail equipment will be required for the ballast, sleeper laying and rail works. This will utilize a Jackson Tamper, ballast regulator and Komatsu PC228 hirail excavator.

Where required, these will be supplemented by other equipment for the rail possession works. Plant required for these operations includes excavators, moxie dump trucks and compactors.

Appendix A

Layout Drawing



REV	ZONE	AMENDMENTS	APP'D	DATE

GENERAL NOTES / REFERENCES

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Unit 2/4 Birraba Ave
Beresfield NSW 2322
Ph 02 4028 6690

SURVEYED / DRAWN BY

CHECKED

VERIFIED

H:10000 V:10000

PLOT DATE: Wed Aug 01 12:10:14 2012 LOCATION :

RIXS Creek Rail Loop

DRAWING STATUS | DRAWING No. | REV.

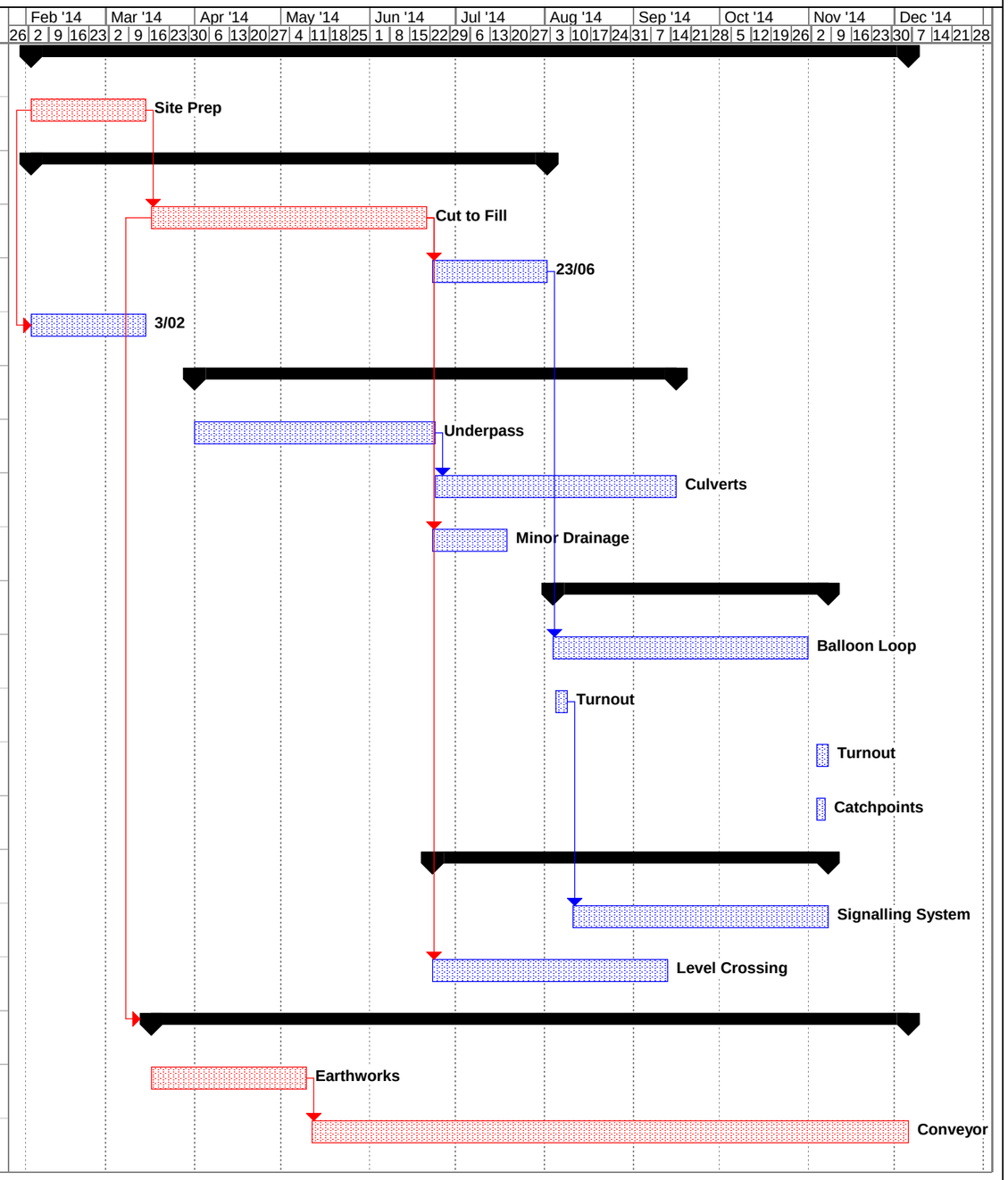
ABIGROUP STANDARD DRAWING EDITION 17/01/2012

Appendix B

Draft Programme – Level 1

ABIGROUP CONTRACTORS
Rixs Creek Rail Loop

ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	**Project Duration**	**220 days**	**3 Feb**	**5 Dec**		
2	Site Preparation Works	30 days	3 Feb	14 Mar		Site Prep
3	**Earthworks**	**130 days**	**3 Feb**	**1 Aug**		**Earthworks**
4	Cut to Filll (500,000m3)	70 days	17 Mar	20 Jun	2	Cut to Fill
5	Import, place and compact capping (30,000m2)	30 days	23 Jun	1 Aug	4	capping
6	Corridor Fencing (8km)	30 days	3 Feb	14 Mar	2SS	fencing
7	**Civil Works**	**120 days**	**1 Apr**	**15 Sep**		**Civil Works**
8	Large Underpass for loop access	60 days	1 Apr	23 Jun		Underpass
9	New Draianage Culverts (x 5)	60 days	24 Jun	15 Sep	8	Culverts
10	Minor drainage and batter stabilisation	20 days	23 Jun	18 Jul	4	Minor Drainage
11	**Trackwork**	**70 days**	**4 Aug**	**7 Nov**		**Trackwork**
12	Track (Spur and Balloon Loop 5600m)	65 days	4 Aug	31 Oct	5	Balloon Loop
13	Possession 1	4 days	5 Aug	8 Aug		Turnout
14	Possession 2	4 days	4 Nov	7 Nov		Turnout
15	New Catchpoints	3 days	4 Nov	6 Nov		Catchpoints
16	**Signalling**	**100 days**	**23 Jun**	**7 Nov**		
17	New Signalling System	65 days	11 Aug	7 Nov	13	Signalling System
18	Level Crossings x 3	60 days	23 Jun	12 Sep	4	Level Crossing
19	**Conveyor and Train Loading System**	**190 days**	**17 Mar**	**5 Dec**	**4SS**	
20	Earthworks and Drainage	40 days	17 Mar	9 May		Earthworks
21	Conveyor, bins and Train Loading system	150 days	12 May	5 Dec	20	Conveyor



Appendix C

Example Project Management Plan Integration

Figure 1: Example Project Management Plan and Management System Integration