BMC Dragline Move Rehabilitation Management Plan

1 December 2016

Table of Contents

1.0 Introduction

1.1 Purpose

The primary purpose of this ***Dragline Move Rehabilitation Management Plan*** is to ensure effective processes and activities are implemented as part of the Dragline Move Project to rehabilitate disturbed lands following the relocation of the dragline.

1.2 Scope

The ***Dragline Move Rehabilitation Management Plan*** covers rehabilitation objectives, methods and monitoring of rehabilitation along the dragline corridor. In an integrated approach, it combines both operational and environmental requirements into a single document.

2.0 Project Description

2.1 Overview of Operations

BHP Billiton Mitsui Coal (BMC) is proposing to relocate a dragline from Goonyella Riverside Mine (GRM) to South Walker Creek Mine (SWC) along a route approximately 77km in length. The dragline move is planned to take place so that the dragline can be operational by 1 July 2017 or earlier if possible. The relevant dragline is a Marion 8050 dragline weighing approximately 3500 tonnes. It has a boom length of 99 metres (m) and width of 28m. The dragline will be travelling with the boom up and the bucket removed. It will be approximately 68m high with an additional 5m for the transporter.

As part of the Project, BMC proposes to:

- Decommission the current dragline operations at Goonyella Riverside Mine as part of current approved mining activities
- Transport the dragline along a temporary special purpose track or roadway, established through the implementation of vegetation clearing, fill placement and related civil work activities in areas within the proposed dragline move corridor where ground conditions are inadequate to enable the dragline to advance
- Rehabilitate the dragline move corridor
- Commission and operate dragline at South Walker Creek Mine as part of current approved mining activities.

The dragline transport route is located in the vicinity of the towns of Moranbah, Nebo and Coppabella within the Isaac Regional Council Local Government Area of Queensland. The proposed alignment of the relocation route generally follows the alignment used for a previous dragline move from South Walker Creek Mine to the Goonyella Riverside Mine carried out in 2000. However, the alignment has changed in certain locations due to changes in land use since 2000. The Project will involve the construction of a temporary unsealed roadway, 40m to 80m wide, and the transport of the dragline on a specialised transporter, followed by rehabilitation of disturbed areas.

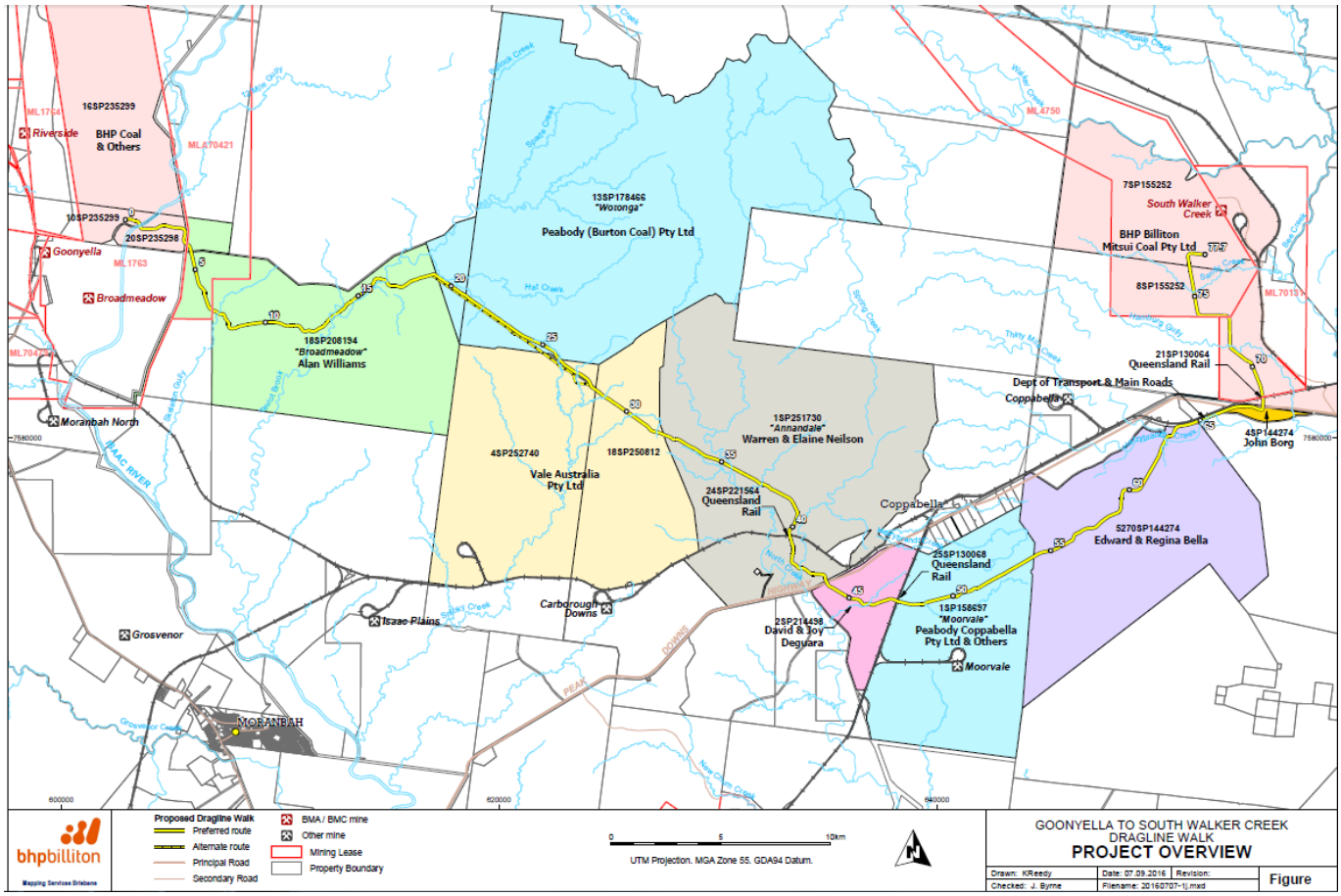
2.2 Project alternatives

BMC considered alternative routes for the dragline move to the north and further south of the Carborough Range (which is not able to be traversed by dragline transporters). However, all these alternatives involved greater clearing of native vegetation, and longer routes.

The selected route predominately follows the path of a previous dragline move and maximises use of previously cleared areas.

2.3 Alignment

The proposed alignment of the dragline move route generally follows the alignment used for a previous dragline move between South Walker Creek Mine and Goonyella Riverside Mine carried out in 2000. However, the alignment has changed in certain locations due to changes in land use since 2000. The proposed alignment and intersected properties are illustrated in Figure 1.



3.0 Existing Environment

3.1 Flora and Fauna

The proposed corridor traverses vegetation landscapes consisting mainly of pasture grasslands and woody vegetation (remnant and regrowth), mostly composed of dry sclerophyll species.

Woody vegetation encountered along the corridor is primarily comprised of:

- Eucalyptus woodland and open forest
- Acacia woodland and shrubby woodland
- Acacia and/or Casuarina open forest

The Project area contains both minor and major drainage channels of the Fitzroy Catchment. Specifically, the dragline transport corridor intersects watercourses on 42 occasions.

The dragline transport corridor intersects with six areas of mapped Essential Habitat. Four of these areas are associated with records of Squatter Pigeon (southern subspecies), and the remaining two are derived from past records of Ornamental Snake.

State significant biodiversity corridors intersect the dragline transport corridor at the western and eastern extents. The western corridor (part of the Denham Range Corridor) is associated with habitats within and between the Burton Range and Isaac River riparian habitat immediately to the north of the study area. The dragline transport route transects the eastern biodiversity corridor (part of the Carborough Range Corridor) at the southern extent of the Kerlong and Carborough Ranges. This corridor then continues in an easterly direction and incorporates Dipperu National Park, riparian habitats of Denison and Funnel Creeks, towards the western slopes of the Connors Range and linking with the Great Eastern Ranges Corridor.

3.2 Hydrology

The watercourses intersected by the corridor are ephemeral, the Isaac River being the largest. Watercourses are expected to be dry or with pools of stagnant water at the time of Project execution.

3.3 Soils

From a geological perspective, the route can be divided into three sections, namely:

- 0 – 17 km Tertiary sediments comprising sandstone, mudstone and conglomerate and their weathered derivatives
- 17 – 43 km Triassic lithic sandstone, green to reddish brown mudstone and minor conglomerate
- 43 - 77 km Tertiary colluvial and residual clay, silt sand and gravel developed over older land surfaces

Except for an isolated area of volcanic rock, the bedrock geology along the route is similar comprising low strength sedimentary strata (sandstone, siltstone and mudstone) overlain be alluvial, colluvial and residual soils.

Greater variability can be seen in the soils mapping with the soils comprising four groups:

- Shallow rocky soils (Du)
- Texture contrast soils comprising a leached sandy surface layer overlying a clayey subsoils (Co, Mo)
- Uniform red and yellow low medium plasticity sandy clay and clayey sand (J)

- High plasticity, potentially expansive heavy clay soil with some gilgai (Bl, Da, & Hu)

The expected soil types and estimated lengths along the route are provided below:

Bl: Brigalow plains and cracking clay soils on weathered Tertiary clay and older rocks along the central axis of the area (2.4km)

Co: Alluvial plains with box on texture-contrast soils throughout the area (5.0km)

Da: Lowlands with Brigalow and cracking clay soils on weathered and fresh Permian shales and lithic sandstone in the north and centre (12.5km)

Du: Hills with lancewood and narrow-leaved ironbark on weathered Tertiary and Permian rocks in the north-west, centre and south-east; shallow rocky soils (3.8km)

Hu: Blackbutt and Brigalow on weathered clay plains occurring in most parts of the area; texture-contrast and cracking clay soils (12.2km)

J: Table lands and plains with narrow-leaved ironbark and red and yellow earths on intact Tertiary land surface throughout the area except in the north-east and extreme south (8.2km)

Mo: Lowlands with box and texture-contrast soils on undissected Tertiary land surface throughout the area except in the extreme south and north-east (33.0km).

4.0 Supporting studies

4.1 Ecological assessment

An ecological assessment was carried out for the purpose of the Project and gave consideration to Matters of National Environmental Significance and Matters of State Environmental Significance. The assessment involved a desktop assessment and field surveys along the full length of the corridor. For further information see referral and BAAM report which is on the EPBC website – Reference *2016/7788*.

4.2 Geotechnical investigations

Geotechnical field testing has been completed, incorporating Dynamic Cone Penetrometer tests at 500m spacing in conjunction with 1.5m auger holes at 1000m spacing along the alignment. Dynamic Cone Penetrometer tests were manually completed by a single operator and drop a hammer from a fixed height, counting the number of blows taken for each 100mm of penetration. These results were then used to estimate an allowable bearing capacity for each layer based on the relationship presented in Determination of Allowable Bearing Pressure Under Small Structures, M.J. Stockwell, New Zealand Engineering, 15 June 1977.

In addition, specific testing has been completed at critical locations including infrastructure and creek crossings, and in the vicinity of diversion roads. This has been completed to ensure adequate bearing conditions are available in abutment locations and suitable select fill is available for crossings.

Soil sampling was completed and sent off for laboratory testing to determine suitability for reuse and to optimise rehabilitation specifications for the alignment. These results have been utilised to determine the rehabilitation specifications outlined 7.0.

The investigations have been completed under the supervision of a Registered Professional Engineer of Queensland (RPEQ) qualified engineer.

5.0 Overview of Disturbance Activity

5.1 Clearing and Soil Stripping

The project will require clearing of all vegetated sections of the relocation route to a minimum 40m width (35m travel width plus 5m side clearance. The required corridor width will be greater than the minimum 40m in some sections of the alignment due to ground conditions (i.e. for stockpiling of stripped topsoil). In vegetated areas, the required corridor width will in some cases be 60m or 80m to allow for vehicular traffic past the dragline and cleared vegetation stockpiling on the edges of the roadway. However, in ecologically sensitive areas involving MNES, the minimum 40m width corridor will be applied for the majority of cases in order to limit disturbance. In those areas, “breakout” stockpiling areas of cleared vegetation are required when the 40m wide section of corridor is 500m long or more. These vegetation stockpiling areas have been chosen wherever possible to avoid MNES but will increase the corridor width locally. This approach will result in a lesser total disturbance to MNES than a standard rule involving a breakout area every 500m or so.

5.2 Waterway Crossings

To avoid the likelihood of the watercourse conveying flow during the dragline crossing, the transportation will occur outside of the wet season. To support the dragline and achieve the required vertical geometry, the watercourse will be filled to provide a 35m wide crossing point. Low flow culverts will be provided at larger crossings such as the Isaac River, Skeleton Gully, Teviot Brook and Thirty Mile Creek to convey any incidental water flow while the crossings are in place.

Construction of the water crossings will be scheduled such that they are completed just prior to the dragline crossing occurring, and then removed immediately to minimise the amount of time that the watercourses are filled. The dragline will only cross a watercourse when no water is flowing in the watercourse.

6.0 Rehabilitation Strategy

6.1 Rehabilitation Objectives and Outcomes

Once the dragline move is complete, the pathway will be decommissioned. As the route is located predominantly within lands not owned, leased or managed by the proponent, plans for vegetation restoration will be subject to agreement with the various land owners.

The rehabilitation objectives for the Dragline Move Corridor include:

- Encourage the regeneration of existing vegetation communities
- Maintain ecosystem functioning and retain ecosystems in the landscape, particularly in connectivity areas through the respread of cleared vegetation and seeding.
- Erosion and sediment control measures/devices will be installed, where/as required by ground conditions (e.g. ripping of slopes, placement of rocks/gravel, erosion control blankets, hydromulching, etc.)
- Restore watercourses ground profile to original state
- Reinstatement of cleared riparian vegetation. Subject to local ground conditions, this may include placement of cleared vegetation over the disturbed area (including seedbank), seeding (e.g. hydroseeding), planting of seedlings

The outcomes are:

- The resultant corridor is safe, stable, non-polluting and sustainable;
- Watercourses are stable and water quality is preserved

7.0 Rehabilitation Specifications

7.1 Removal of Fill

7.1.1 General Fill

Any placed and compacted general shall be removed and returned to the borrow or excavated area. All borrow areas shall be locally shaped to maintain existing drainage lines and excavated areas returned to the original lines and levels prior to commencement of works.

7.1.2 Imported Fill

Any placed and compacted imported shall be removed and stockpiled at an area designated by the Company. The stockpile shall not exceed a height of 3m and shalll be locally shaped to maintain existing drainage lines.

7.2 Topsoil and Revegetation

The Contractor shall complete the following rehabilitation works:

- Prior to reinstatement of topsoil, rip subsoil materials to a depth of 200-300mm to break compaction. The target distance between rip lines shall be 300mm apart.
- As per the design Drawings topsoil fertilizer and subsoil amelioration shall be provided as per the requirements in Table 1.

Table 1: SMU & Rehabilitation Requirements

SMU	Land System	Topsoil	Subsoil Amelioration
A	Junee	Apply DAP fertiliser at 200 kg/ha plus Gypsum at 1 t/ha	Gypsum at 1 t/ha
B	Durandell		Gypsum at 2 t/ha
C	Blackwater, Connors, Daunia		Gypsum at 3 t/ha
D	Humboldt, Monteagle		Gypsum at 4 t/ha

- Embankments steeper than 1V:4H shall be seeded by hydromulching with a Bonded Fibre Matrix (BFM), EnviroStraw BFM or equivalent, product at a rate of 4t/ha.
- The general alignment can be seeded by:
  - Direct Drilling;
  - Broadcasting and harrowing;
  - Or hydromulching at a rate of 4t/ha.
- Seed shall be a mix of warm season perennials that are drought tolerant and suited to a range of soil types, light conditions and soil moisture ranges.

- A seed mix of 11 grass species is provided below in Table 2, to be applied at a total rate of 45kg of seed per hectare. The seed mix should include at least 7 of these 11 species with the rates adjusted accordingly to total 45kg seed per hectare.
- Seed mix is based on coated seed for all species except green couch.
- No cover crop is required.

Table 2: Grass Seed Mix

Common Name	Species	Rate (kg/ha)
Keppel Couch	Bothriochloa pertusa cv. Keppel	4
Tolgar-Rhodes Grass	Chloris gayana cv. Tolgar	4
Strickland Digitaria	Digitaria milanjiana cv Strickland	3
Forest Bluegrass	Bothriochloa bladhii ssp. Glabra cv. Swann	4
Brunswick Grass	Paspalum nicorae cv. Blue Dawn	3
Digit Grass	Digitaria eriantha ssp. eriantha cv. Premier	3
Creeping Bluegrass	Bothriochloa insculpta	4
Green Couch	Cynodon dactylon	6
Floren Bluegrass	Dichanthium aristatum cv. Floren	4
Saraji	Urochloa mosambicensis cv. Saraji	3
QLD Bluegrass	Dicanthium sericeum	7

- Gypsum (calcium sulphate $CaSO_4$ shall meet the following parameter requirements:
  - A minimum of 80% of Gypsum
  - A moisture content of < 15%
  - Have a total content (x-ray fluorescence test) of:
    - > 20% Calcium (C)
    - > 15% Sulphur (S)
    - < 2 % Sodium Chloride (NaCl)
  - Have a particle size distribution of:
    - 100% by weight to pass a 6mm sieve
    - 80% by weight to pass a 4mm sieve
    - 50% by weight to pass a 2mm sieve
  - If manufactured, have a total content of heavy metals:
    - < 0.001% Cadmium (Cd)
    - < 0.01% Lead (Pb)

7.3 Waterway Rehabilitation

In addition to the general rehabilitation requirements detailed above, the Contractor shall ensure the following works are completed at water crossings.

- Blend the landform in with the adjacent embankments and be shallower than 1V:2H
- When reinstating the upper subsoil layer, incorporate gypsum at rate of 4t/ha.
- Reinstate the topsoil at the surface above the upper subsoil.

7.4 Reinstatement

To promote connectivity cleared vegetation will be respread where practicable. Weeds will be sprayed following the movement of the dragline.

As the route is located predominantly within lands not owned, leased or managed by the proponent, plans for reinstatement will be subject to agreement with the various land owners.

8.0 References

Advisian (2016). BMC Dragline Move Project SPA Application. Approval document prepared by Advsian on behalf of BHP Billiton

Advisian (2016). BMC Dragline Move Project EPBC Referral Application. Approval document prepared by Advsian on behalf of BHP Billiton

BAAM (2016). BMC Dragline Move Project Terrestrial Ecology MNES Assessment. Unpublished report prepared by Biodiversity Assessment and Management Pty Ltd (BAAM) for Advisian on behalf of BHP Billiton Mitsui Coal.

Landloch (2016). BHP Billiton Dragline Mobilisation Project: Goonyella – Riverside Mine to South Walker Creek, Land Assessment for Soil Management and Rehabilitation, Unpublished report prepared by Landloch for Hatch on behalf of BHP Billiton