

**COPPABELLA COAL MINE**  
**SOUTH ARM DIVERSION REVEGETATION PLAN**

Revegetation of Co-disposal Seepage section in Thirty Mile Creek South Arm Diversion  
December 2014

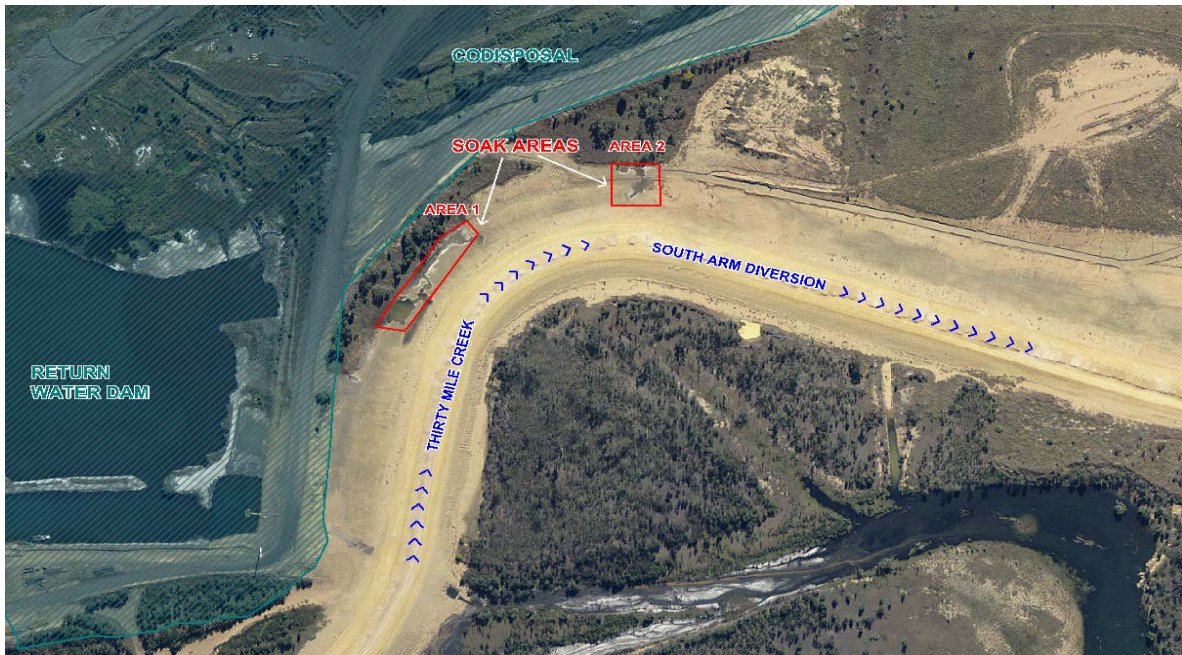
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# 1 Introduction

A revegetation plan has been implemented to mitigate seepage impacts in Thirty Mile Creek South Arm Diversion from the Co-disposal and Return Water Dam system. This revegetation plan includes the implementation of erosion protection to identified seepage areas through rock placement, grading of existing diversion levee banks to remove erosion, topsoiling of diversion levee banks and the use of grass and salt tolerant tree species for erosion and seepage mitigation. Further specifications on these individual actions have been outlined within this plan.

The soak areas identified within the Thirty Mile Creek South Arm Diversion are displayed in Figure 1 (below).



A risk assessment (Job Hazard Assessment), Permit to Disturb and Activities in a Water Course – Self Assessment were completed prior to all works commencing within this Thirty Mile Creek South Arm Diversion to address and control potential environmental risks associated with disturbance in a watercourse. These documents have been attached within Appendix A for reference.

## 1.1 Rock Placement in Soak Areas

The low clay content material of which the current diversion levee banks are constructed of, has been identified as problematic as it is prone to erosion and with the added seepage impact, has the potential reduce the structural integrity of the diversion bank. To mitigate this erosion impact and to ensure the stability of the diversion banks at the identified soak areas, the following action was completed.

1. Removal of a portion of bank at seepage areas to remove unstable material
2. Fill excavated section (rock placement) with competent Permian material

The below images (Table 1) show the soak areas prior to, during and after rock placement.

| Soak Areas Prior to Rock Placement                                                 |                                                                                      |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| AREA 1                                                                             | AREA 2                                                                               |
|    |    |
| Soak Areas During Rock Placement                                                   |                                                                                      |
| AREA 1                                                                             | AREA 2                                                                               |
|  |  |
| Soak Areas Post Rock Placement                                                     |                                                                                      |
| AREA 1                                                                             | AREA 2                                                                               |
|  |  |

**Table 1: Soak Areas Prior to, During and Post Rock Placement Works**

## 1.2 Erosion Removal on Diversion Levee Banks

Erosion scours have formed along both diversion levee banks and require remediation to improve sediment control, bank stability and enable topsoiling of levee banks. Specifications for repair grading were:

1. Grading is to removal all current scouring along banks
2. Material is to be respread over diversion
3. Grading is not to change the prior constructed specifications of the levee banks
4. Where required, competent material may be used to fill erosion scours.

The below images show the grading works being completed on the Thirty Mile Creek South Arm Diversion.



**Figure 1: Filling of erosion scours with competent Permian material**



**Figure 2: Removal of Erosion Scours**

## 1.3 Topsoiling of Diversion Levee Banks

Topsoiling of the Thirty Mile Creek South Arm Diversion levee banks was conducted by scrapers and completed to enable vegetation establishment. Images showing topsoiling activities have been provided below.



**Figure 3: Scraper conducting topsoiling on Thirty Mile Creek South Arm Diversion banks**



**Figure 4: Scraper conducting topsoiling Thirty Mile Creek South Arm Diversion banks**

#### **1.4 Vegetating Levee Banks**

Ripping and seeding activities were conducted on all graded and topsoiled areas to the following specifications.

1. Ripping activities commenced on the upper most section with ripping to occur on the contour
2. Ripping is to be at a depth of 500mm
3. Seed application is at a rate of 20kg/ha.

Grass seed mix used and applied on these levee banks was chosen for quick establishment and germination for erosion protection.

| Species Name       | Scientific Name        | Application Rate |
|--------------------|------------------------|------------------|
| Stylo Mix (Verano) | -                      | 1kg/ha           |
| Red Natal Grass    | Meinis repens          | 5kg/ha           |
| Callide Rhodes     | Chloris gayana         | 1kg/ha           |
| Sabi Grass         | Urochloa mozambisensis | 1kg/ha           |
| Indian Blue Grass  | Bothriochloa pertusa   | 2kg/ha           |

Images showing both the undertaking of ripping and seeding activities and completed ripped and seeding levee banks have been provided below.



**Figure 5: D8T Dozer with drum seeder undertaking combined ripping and seeding activities**



**Figure 6: Ripped and Seeded Thirty Mile Creek South Arm Diversion Banks (upstream)**



**Figure 7: Ripped and Seeded Thirty Mile Creek South Arm Diversion Bank (downstream)**

### **1.5 Vegetating Seepage Areas**

In addition to grass seed mix, salt tolerant shrub and tree species have been selected for seeding of the seepage areas present within Thirty Mile Creek South Arm Diversion. The aim of planting shrubs and trees within these areas is to attempt to assist in the control of erosion and reduce water logging and seepage through plant root uptake. Species which have been selected are

1. Grey Box (*Eucalyptus microcarpa*)
2. Broad-leaved Teatree (*Melaleuca quinquenervia*)
3. River Tea Tree (*Melaleuca bracteata*)

All species are endemic to the surrounding region.

The application of the salt tolerant species has occurred at both identified soak areas, including their surrounding area as indicated in the below map.



Figure 8: Areas indicating where salt tolerant tree species seed has been applied

## 2 Monitoring Program

Photo points have been set up to monitor the effectiveness of revegetation works to mitigate seepage impacts. This program will commence for a period of 2 years. The below map and corresponding table show the photo point locations set out within Thirty Mile Creek South Arm Diversion.



Figure 9: Thirty Mile Creek South Arm Diversion Seepage Photo Monitoring Locations

**Table 2: Photos from Monitoring Locations in the Thirty Mile Creek South Arm Diversion**

|                                                                                     |                                                                                      |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Soak Area 1 – Photo Point 1                                                         |                                                                                      |
|    |                                                                                      |
| Soak Area 1 – Photo Point 2                                                         |                                                                                      |
|    |    |
| Soak Area 1 - Photo Point 3                                                         |                                                                                      |
|   |   |
| Soak Area 2 – Photo Point 1                                                         |                                                                                      |
|  |  |
| Soak Area 2 – Photo Point 2                                                         |                                                                                      |
|  |                                                                                      |