Benga Mining Limited operating as Riversdale Resources

Benga Mining Limited
12331 - 20 Avenue
Po Box 660
Blairmore, Alberta, T0K 0E0
Phone: +1 403 753 5160
Business Number 84170 9538

October 16, 2017

Alberta Energy Regulator
Suite 1000, 250 – 5th Street SW
Calgary, Alberta T2P 0R4

Attn: Africa Geremew<email address removed>

Dear Mr. Geremew:

Re: Benga Mining Ltd. – Grassy Mountain Coal Mine Project – *Coal Conservation Act* Application – Appendix 1C Addendum

During the preparation of Appendix 1D – Fence-line *Water Act* Application and Appendix 1E – *Water Act* Water Licence Application, some minor changes to the coal wash plant were made to improve water conservation and recovery for the Grassy Project. These minor modifications to the coal wash plant have been described in the following attachment.

Please consider this submission as an addendum to Appendix 1C to the Coal Conservation Act application which is an addendum to the August 12, 2016 submission.

Included in this submission package are the following documents:

- Appendix 1C – *Coal Conservation Act* Addendum for coal wash plant modifications;
- Appendix 1D– *Water Act* Fence-line Approval Application; and
- Appendix 1E – *Water Act* Licencing Application.

Please do not hesitate to contact the undersigned if there are any questions regarding these applications.

Sincerely,

<Original signed by>

Cal Clark, Manager Sustainable Development
Benga Mining Ltd.
cc. Nadia Haider, AER

Grassy Mountain Coal Mine Project
Appendix 1C:
Coal Conservation Act Application Addendum

October 2017

List of Tables

List of Figures

1.0 INTRODUCTION

Benga Mining Limited (Benga), a wholly owned subsidiary of Riversdale Resources Limited (Riversdale), is proposing to develop a nominal 4.5 million clean metric tonnes (CMT) per year metallurgical coal mine (for steel production), referred to as the Grassy Mountain Coal Project (the Project). The Project is located in southwest Alberta, approximately 150 km southwest of Calgary, in the Crowsnest Pass, and will cover areas within Townships 08 and 09 and Ranges 03 and 04, West of the 5th Meridian. The proposed metallurgical coal processing facility is planned to be located approximately 7 km north of the community of Blairmore.

The Project will involve a surface metallurgical coal mine, a coal preparation plant (CPP) with associated infrastructure, an overland conveyor system, which will parallel an existing high grade access corridor and connect to a rail load-out facility, and a new section of rail track. Water is needed to operate the mine, including the coal wash plant which is the major user of water and wash water. Water collected on the site as part of the Fence-line approval will be used to supply the project needs.

During the preparation of the *Water Act* Fence-line Approval Application and the *Water Act* Water Licence Application, some design modifications to the coal wash plant were made, that included the addition of a coarse rejects centrifuge. Benga have incorporated into the CPP design additional mechanical dewatering technology of the product coal and the coarse reject material in the CPP as a measure to reduce annual operational water requirements for a project of this size (Figure 1-1). The CPP will require 57 litres per raw metric tonne (RMT) of licenced make up water, to replace water lost in the product coal that leaves the site and water that leaves the CPP in the reject material to be co-emplaced with the mine waste either in the waste dumps or back into the pit.

The addition of the coarse reject centrifuges has resulted in some changes to Section C – Project Description being required. These changes are provided in the following sections.

2.0 PROPOSED CHANGES TO SECTION C.2

With the addition of the coarse reject centrifuges, the following changes to Section C of the Application have been made. The sections where changes were required have been reproduced and the changes have been highlighted.

2.1 Section C.2.2.10 Washability

The total moisture content in the clean coal will be *8.3%* (previously was 10%). This was also presented in Section C.2.3.2.2 Product Coal Characteristics and C.2.4.6.2 Hyperbaric Disk Filter.

2.2 Section C.2.3.3.5 Coarse Rejects Handling

The coarse and fines reject handling system will be combined onto a single rejects belt with the belt press filter cake (ultrafines reject):

- reject capacity:
  - maximum reject rate (minimum 40% yield) 600 t/h [nom] (ad).
- reject coal handling:
  - ROM truck specification 220 tonne class truck
  - reject bin size 300 t
  - reject bin overflow stockpile size 5,000 t

Excess surface moisture from the rejects belt and the rejects bin will be captured and recycled back in the process water. This is expected to amount to 30Ml per year.

2.3 Section C.2.4.6.4 Dewatering Screens and Centrifuges

Coarse (-50 mm +1.7 mm) and fine (-1.7 mm +0.25 mm) reject material will be dewatered by vibrating screens as follows:

- coarse reject material dewatered by multi-slope (banana) screen with a drain and rinse section to recover maximum magnetite. This technology efficiently washes off adhering medium while dewatering coarse reject;
- fine reject material dewatered by a high frequency screen, which is efficient in both through-put and dewatering capability; and
- *coarse reject will be further dewatered after screening, with a conventional vibrating basket centrifuge similar to the coarse product centrifuge.*

2.4 Section C.2.5.1 Plant Water Balance

The coal handling and preparation plant has been designed with water conservation as a key priority. Unlike many western Canadian coal preparation plants, the proposed Grassy Mountain plant will not discharge fluid tailings into a storage pond. Dewatering of all the product and rejects streams inside the plant has been incorporated into the design to minimize the amount of makeup water required in the process. Some of the makeup water leaves the site in the finished washed coal product and some remains in the recombined tailings stream (dry tailings) that gets co-disposed with the mined rock in the SRDA. For the dewatering of the product, the latest technology has been incorporated combining coarse and fine dewatering with hyperbaric filters for the ultrafine product. Coarse coal centrifuges will dewater the coarse product and the effluent stream will be recycled as process water within the

plant. Fine coal scrolling centrifuges will be used to dewater fine coal and the effluent stream will be used as feed into the ultrafine circuit. Ultrafine coal will be dewatered *via* hyperbaric disc filter which the effluent of the filter will report to the coal thickener and be used as process water within the plant. Dewatering of the coarse and fine reject will be done by banana screen and high frequency screen respectively. *Coarse reject will also be further dewatered with a conventional vibrating basket centrifuge.* Ultrafine reject will be dewatered using belt press filters creating a conveyable and stackable reject when combined with the coarse and fine fractions. The only water to leave the plant will be the moisture difference between the raw coal and the dewatered product and rejects.

A series of wash-down hoses will be available for clean-up within the CPP, product and reject stations. CPP wash-down system is accompanied by floor-sump pumps which will pump any water and material back into the plant. Within the raw coal, product and reject stations there will be concrete floor sumps from which material and any wash-down water can be collected in a front end loader and placed onto the plant floor to be pumped back and recovered within the process.

A plant water balance flow sheet has been included as *Figure 1-1 (was originally Figure C.2.5-1)* and an overall CPP Material balance has been included *as Figure 2-1 (was originally Figure C.2.5-2).*

2.5 C.2.5.2.1 Coal Processing Plant Sampling Points

Two extra sampling points were added to Table C.2.5-1 *which is now Table 2-1*.

Table 2-1 CPP Sampling Points

Sample	Location	Type
Coarse Reject Centrifuge Product	*Front of Coarse Coal Centrifuge*	*Manual*
Coarse Reject Centrifuge Centrate	*Centrate Pipe Under Centrifuge*	*Manual*

2.6 C.2.6.4 Coal Preparation Plant

Figure C.2.6-6 shows the wash plant basic flow diagram. *This figure has been updated and is shown as Figure 2-2.*

2.7 Section C.2.6.5.2 Dense Medium Circuit (Coarse Coal Circuit)

The deslime screen oversize coal fraction from each deslime screen will be processed through a dedicated dense medium circuit, *i.e.* the oversize of one deslime screen will report to one DMC feed sump which will report to one DMC and the oversize from the second deslime screen will report to

the second DMC feed sump which will report to the second DMC (Figure C.2.6-7). *This figure has been updated and is shown as Figure 2-3.*

The process flow description below describes one of the parallel DMC circuits.

The coarse coal fraction received from the desliming screen will be sluiced with magnetite slurry (correct medium) at a controlled density into the DMC wing tank. Coal and medium slurry will be pumped at a constant pressure and flow rate into the ceramic lined 1,150-mm diameter DMC. The higher density reject material will discharge from the DMC *via* the cyclone spigot into the underflow collection box, whilst the lower density material will report to the overflow collection box *via* the cyclone vortex finder.

Higher density reject material collected from the cyclone will be directed into the reject drain and rinse feed box where it will be distributed across the width of a 2.4 m x 6.1 m, multi-slope reject screen (banana screen). The initial drain section of the screen will remove the majority of the magnetite slurry. The rinse section will collect the remaining adhering medium, utilising a series of spray bars and dams to recover the magnetite.

Coarse reject material from the reject drain and rinse screen section will report to one centrifuge for reject dewatering. The centrifuge will be a horizontal basket type and will discharge product directly onto the reject conveyor, CV-702.

Lower density product material collected from the cyclone will be directed into the product drain and rinse feed box where it will be distributed across the width of a 3.6 m x 6.1 m, multi-slope product screen (banana screen). The initial drain section of the screen will remove the majority of the magnetite slurry. The rinse section will collect the remaining adhering medium, utilising a series of spray bars and dams to recover the magnetite.

2.8 Section C.2.6.5.9 Rejects and Tailings Disposal

Dewatered tailings filter cake will be collected on a short rejects transfer conveyor (CV-701) within the CPP building Tailings Filter annex. The transfer conveyor will have a nominal capacity of 300 tph.

The main rejects conveyor (CV-702) will first receive coarse and fines rejects from the discharge of the reject D&R and HF screens prior to receiving the tailings filter cake *via* the rejects transfer conveyor (CV-701). This helps minimise the likelihood of filter cake material adhering to the conveyor belt, and maximises handleability of the rejects through the materials handling system.

The main rejects conveyor (CV-702) will have a nominal capacity of 600 tph. The conveyor will have a weigh scale (WT-701) and a single stage sampler (SA-701) will be installed on the conveyor to take samples of the plant reject material as required. This conveyor will direct all the rejects to the rejects bin (BN-701). The section of the main rejects conveyor (CV-702) that will not be inside the CPP will be fully enclosed and insulated and will be heated.

The rejects bin (BN-701) will have a capacity of 300 tonnes, and will be designed for loading rear dump trucks up to the size of a Komatsu 930E. The reject bin discharge gate will be hydraulically operated and equipped with a drainage system to help drain water from the bin. The rejects bin will have insulated cladding on the top and underside areas of the bin and a heated cone section to help keep rejects material above freezing.

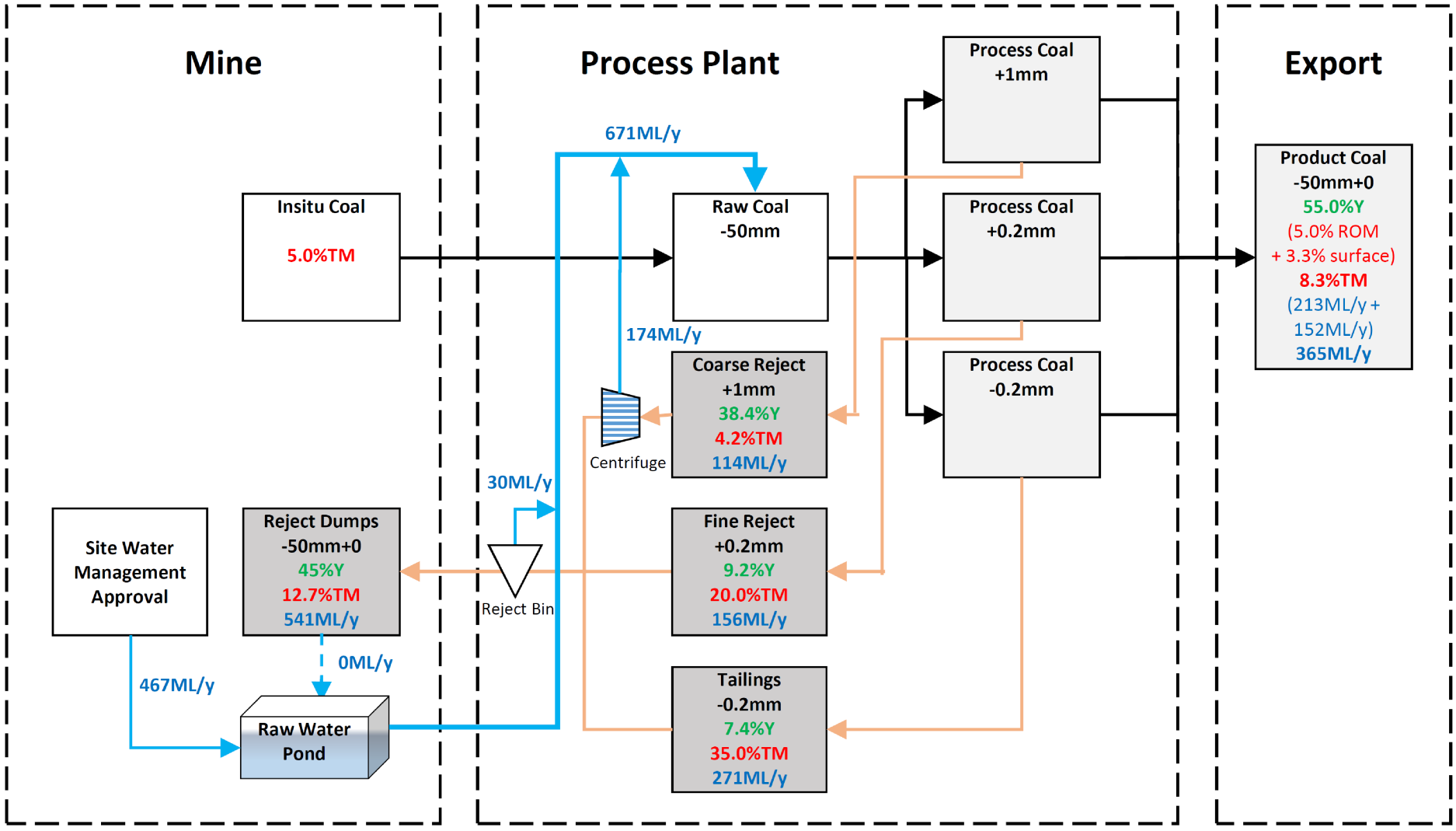
The concrete truck pad underneath the rejects bin will be electrically heated to minimise freezing of any spillage on the truck drive path, providing a safe, year-round operation (Figure C.2.6-12).

Both the rejects conveyor (CV-702) and the rejects bin (BN-701) will be equipped to capture excess surface water for recycling as process water back into the plant.

3.0 SUMMARY

Benga has revised the appropriate sections of the application that required changing as a result of the addition of the coarse reject centrifuges the coal wash plant. Benga has also reviewed the Application to determine if these changes would have an impact on the assessments that were completed and the conclusion was the assessments will not change. The main impact of the modifications to the CPP results in greater water conservation and recovery, so less overall make-up water is required for the Project.

Figures



PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

PLANT WATER BALANCE (467ML/y) INCLUDING REJECT SIZING, AND COARSE REJECTS CENTRIFUGE

PROJECT:	14-00201-01
DRAWN BY:	SL/JDC
CHECKED BY:	DM
DATE:	MAY 18, 2017

NOTES

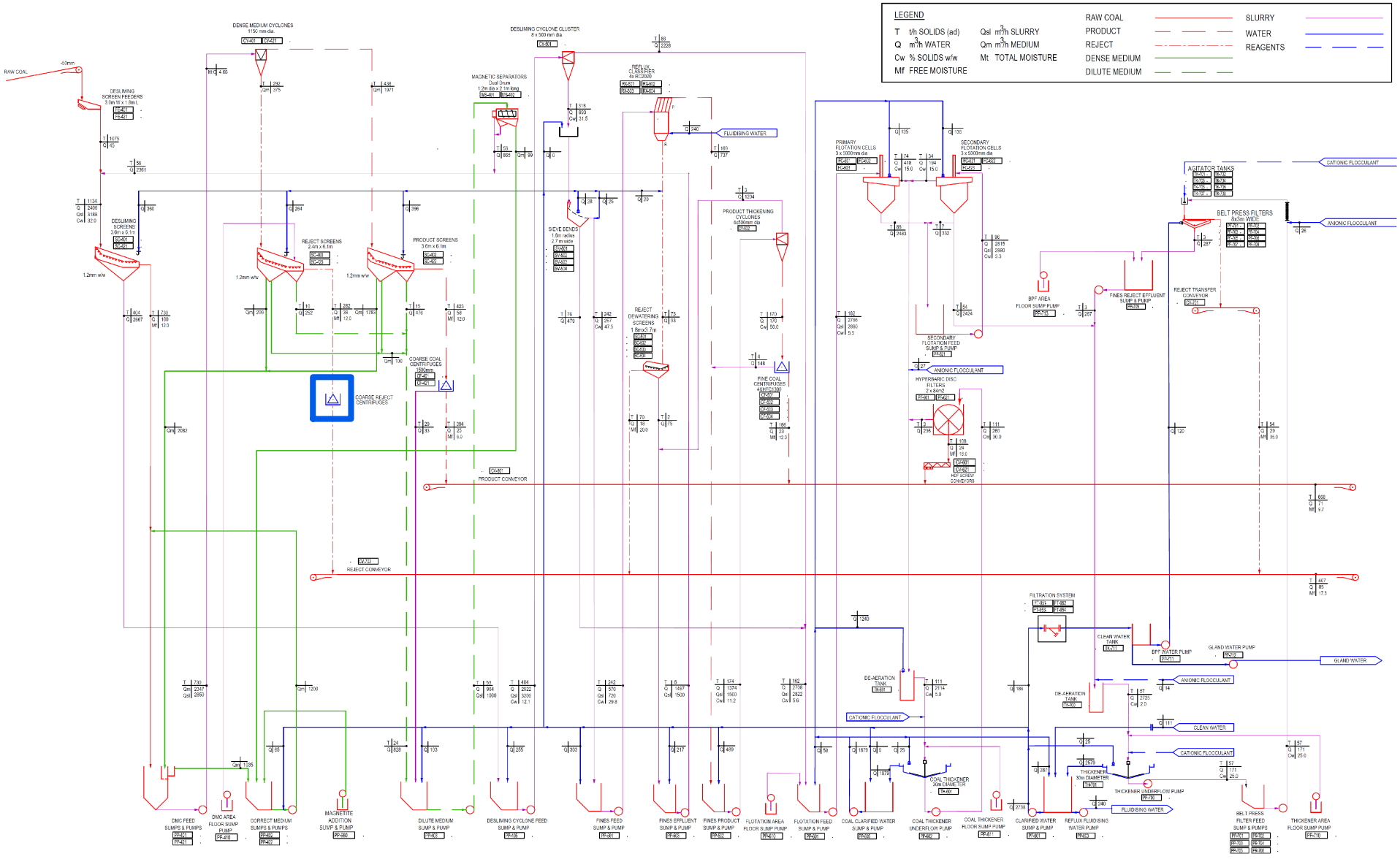
RIVERSDALE RESOURCES, 2017

SCALE: N/A

FIGURE

1-1

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Licence Applications\Water Act\Appendix 1E\Fig 1-1 Plant Water Balance.mxd



LEGEND

Modification to CCA Application

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

TITLE

OVERALL CHPP MATERIAL BALANCE (Formerly C.2.5-2)

NOTES

SEDGMAN, 2016

SCALE: N/A

MILLENNIUM EMS Solutions Ltd.

PROJECT: 14-00201-01

DRAWN BY: JDC

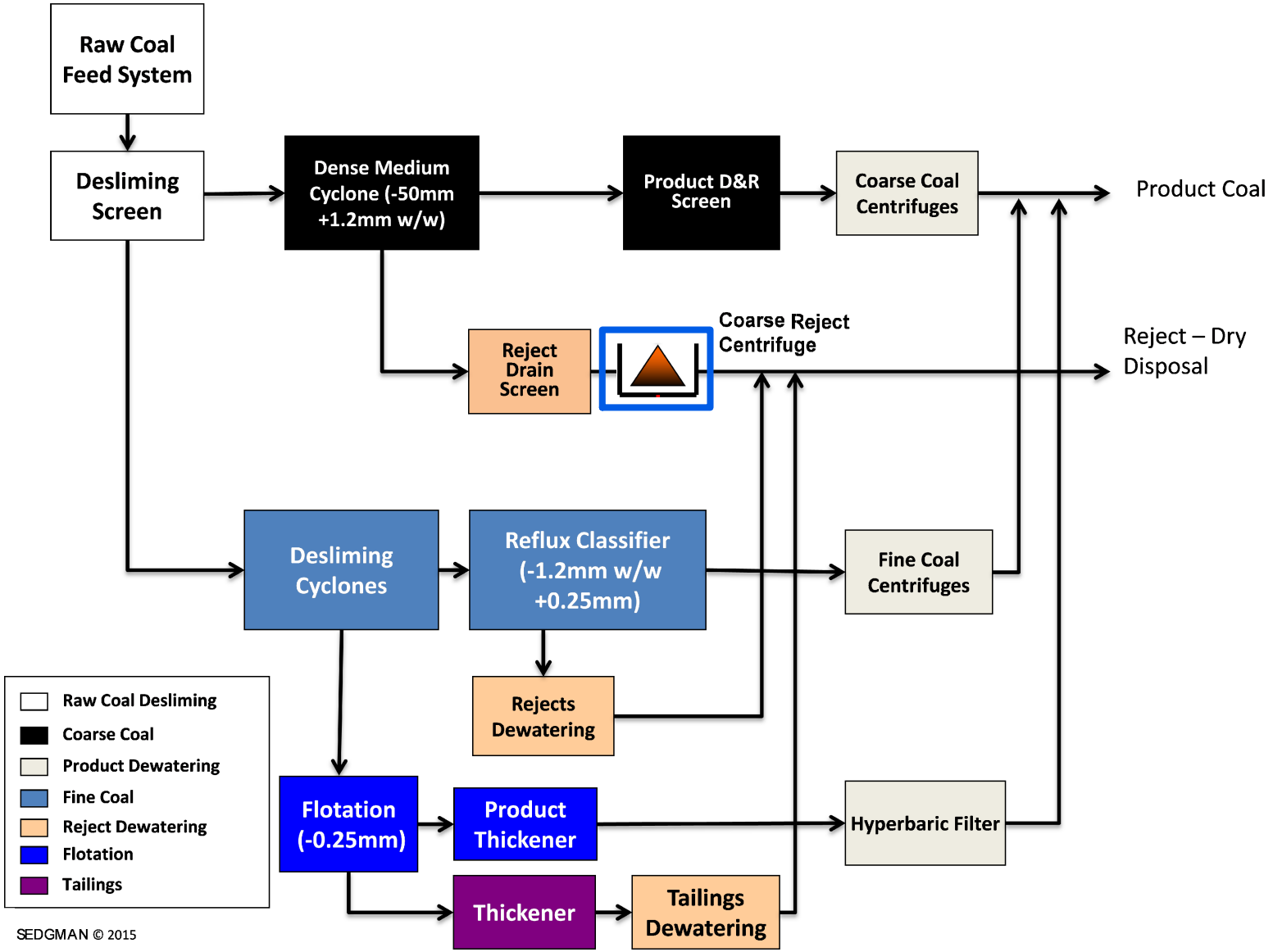
CHECKED BY: DM

DATE: MAY 18, 2017

FIGURE

2-1

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Licence Applications\Water Act\Appendix 1E\Fig 2-1 CHPP Material Balance.mxd



LEGEND

Modification to CCA Application

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

CPP BASIC FLOWSHEET (Formerly C.2.6-6)

PROJECT:	14-00201-01
DRAWN BY:	JDC
CHECKED BY:	DM
DATE:	MAY 18, 2017

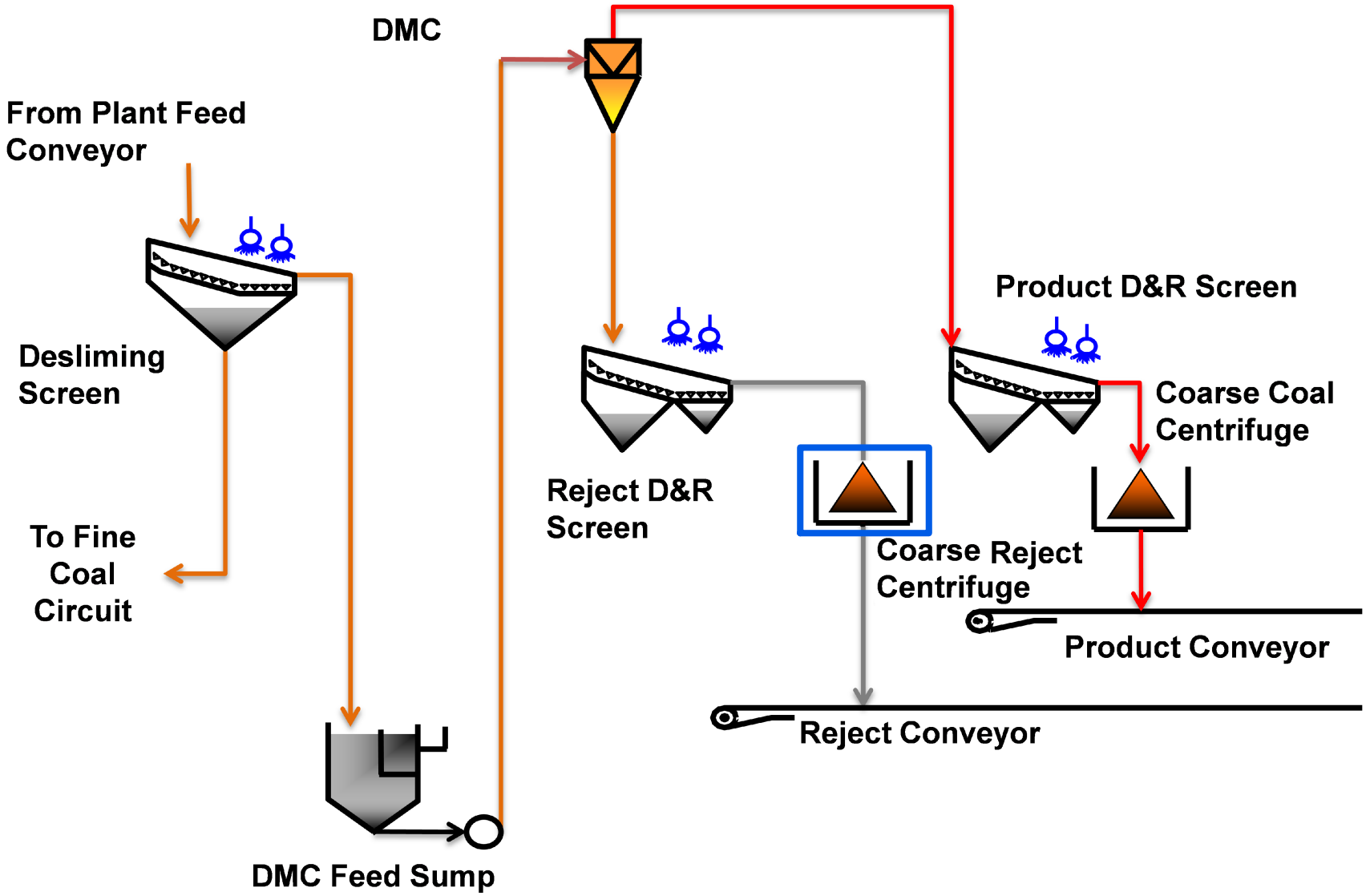
NOTES

RIVERSDALE RESOURCES, 2017

SCALE BAR: N/A

FIGURE **2-2**

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Licence Applications\Water Act\Appendix 1E\Fig 2-2 CPP Basic Flowsheet.mxd



LEGEND

Modification to CCA Application

PROJECT: RIVERSDALE RESOURCES — **GRASSY MOUNTAIN COAL PROJECT**

MILLENNIUM EMS Solutions Ltd.

TITLE: **COARSE COAL CIRCUIT FLOWSHEET (Formerly C.2.6-7)**

PROJECT: 14-00201-01	
DRAWN BY: JDC	
CHECKED BY: DM	
DATE: MAY 18, 2017	

NOTES: RIVERSDALE RESOURCES, 2017

SCALE BAR: N/A

FIGURE: **2-3**

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Licence Applications\Water Act\Appendix 1E\Fig 2-3 Coarse Coal Circuit Flowsheet.mxd