NOTIFICATION OF INERT COVER PLACEMENT FOR SPONTANEOUS COMBUSTION AND COMPACTION TESTING FIELD TRIAL

LEIGH CREEK COALFIELDS

DECEMBER 2016

Peter Kelly

Manager Leigh Creek Coalfields

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1. Scope

Flinders Power (FP) has maintained open and collaborative communications with the regulators throughout the closure planning process for the Leigh Creek Coalfields. FP are committed to continuing this approach, as it strives to achieve a vision of completing all closure obligations with zero harm and applying best practice.

A key focus of the Leigh Creek Coalfields Mine Closure Plan (MCP) is the demonstration that rehabilitation strategies will manage risks to as low as reasonably practicable. Accordingly, FP has committed to a Spontaneous Combustion and Compaction Testing Field Trial (Field Trial) at a selected hotspot on the Western bund, to determine the behaviour of a hot spot at depth over time, and confirm the compaction ratio assumption as per the MCP.

As agreed between Flinders Power and the South Australian Department of State Development (DSD), this letter serves to notify of FP's intent to place inert cover material in preparation for the Field Trial.

Concurrent with the finalisation of the field trial design (incorporating review by DSD), preparations for the drilling of the holes for equipment installation needs to commence early January, so as to be in a position to drill at the earliest opportunity, currently forecast as late February. These preparations include profiling of the slope, followed by placement and compaction of inert cover.

2. Location - Field Trial design footprint

The Field Trial location has been confirmed at the waste dumps on the northern side and western end of the mine access road, agreed with key DSD stakeholders during recent site visits (July and November 2016), and as indicated on the plot of the field trial area, D6_M14_5 1.1, Appendix A.

In conjunction with DSD, FP has consulted several technical experts (below) regarding the design of a field trial, to provide information on the performance of a sample of rehabilitated area:

- MWH Global
- SRK Consulting
- Numac Drilling
- O'Kane Consulting

The Field Trial will include assessment of the ability of rehabilitation designs to manage spontaneous combustion for closure, as indicated by measurement of specific indicators relevant to spontaneous combustion (such as temperature and oxygen concentration at depths) across the trial area.

To enable measurement of these parameters, vertical drill holes will be required to install measuring equipment at various depths from the surface. It has been agreed that a sonic drill rig is the best option for drilling the equipment installation holes, due to the unconsolidated nature of the waste dump (and a desire to sample the drill hole material, if possible).

The Field Trial area will be constructed to planned rehabilitation designs, consistent with the MWH recommendations, (see MWH *Management of Spontaneous Combustion at Leigh Creek Lobe B Post Mining*, December 2016).

The rehabilitation designs for the area incorporating the field trial, D6_M14_5 1.0, Appendix B, include the following:

- Profiling dump batter to grade of 1:4.5
- Cover with inert material to thickness of 1.2m (post placement and compaction by dozing)
- Installing surface water control bunding at crest of dump
- Installing surface water silt traps at toe of dump

Feedback from SRK Consulting (via DSD by email, *Field Trial Clarifications,* A Scrase, 19th December 2016) has been incorporated into the design dimensions of the trial area (Appendix A), resulting in overall trial dimensions being 200m wide and full length of slope, comprising:

- Central trial area, approximately 100m wide, full length of slope, to accommodate drill holes spaced at 20m; and
- Rehabilitated areas flanking each side of the central trial area, at least 50m wide, full length of slope, to avoid edge effects on the drill holes in the central trial area

As indicated in the rehabilitation design for the area, D6_M14_5 1.0, the inside facing slopes behind the trial are also planned for sealing with inert cover, and a section of this relevant to the trial area (western section of D6_M14_6, Appendix A) will also be covered during trial preparations, to prevent air ingress from the rear of the dump, and enable the trial to best represent rehabilitated landforms. This is consistent with the rehabilitation design philosophy of the Mine Closure Plan.

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3. Timing – Field Trial inert cover placement

Due to the significant timeframes involved in collecting representative data (eg seasonal variations, sporadic frequency of rainfall events in the arid environment) and the importance of this information to understanding rehabilitation performance, it has been agreed with DSD that the Field Trial should be initiated at the earliest opportunity. This will also be necessary to meet the schedule as detailed in the MCP (page 395, *Section 16 - Monitoring Throughout the Closure Program*).

Accordingly, FP has proactively identified a supplier to undertake the drilling component of the field trial, Numac Drilling Services Australia Pty Ltd. Numac have experience installing measuring equipment in drill holes, so are also being considered for the supply and installation of the equipment.

The profiling of the field trial area is proposed to commence early January, with inert cover being moved to location mid-January, and cover in place ready for drilling to commence late February.

It is expected that this timing will align well with the finalisation of the trial design, monitoring equipment procurement, and drill rig availability.

4. Volumes - Field Trial inert cover material

The Field Trial area sits within a planned rehabilitation area, as per design D6_M14_5 1.0 (Appendix B), with inert cover for the field trial to be the same as the rehabilitation design, ie to achieve a true thickness of 1.2m post placement/compaction.

This design also specifies the source location of the cover material, ie stockpile D6_M13_1_insk. This stockpile is the most western of the dark blue stockpiles on the Inert Cover plot (Appendix C).

Cover material for the field trial area will total some 59,933lcm, comprising:

- Field Trial inert cover – 35,822lcm
- Cover at rear of Field Trial area – 24,111lcm

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5. QA/QC Process – Field Trial cover selection

FP has developed and implemented the *Cover Material Field Sampling Procedure (*page 279, *MCP* December 2016) to collect real time information to ensure the cover material selection is in accordance with established material selection criteria, and to identify and quarantine potentially hostile materials as they are uncovered form the selected stockpiles.

An independent review of the field and laboratory analyses undertaken to date (MWH, *Leigh Creek Coalfield - Cover and Rehabilitation Material Characterisation,* December 2016) has confirmed field testing is effective for identifying hostile material, as well as provided further information on the characteristics of the 171 field samples and 40 laboratory samples tested.

This information has further supported the definition of the "ideal fine, clay rich material" that can be used as a cover to a minimum thickness of 1m post placement/compaction (MWH *Management of Spontaneous Combustion at Leigh Creek Lobe B Post Mining*, December 2016).

The results for the analyses conducted on the samples taken from the stockpile that will be used for the field trial cover, ie the first 2-3 benches of the Main Series via dragline, are summarised in Table 1 below:

	Field			Laboratory		
Number of Analyses	17			4		
	Min	Max	Average	Min	Max	Average
Emerson class	2	8	4-6	NA		
Soil pH (1:5)	7.9	8.7	8.2	7.7	8.2	7.9
Net Acid Production Potential	NA			Non Acid Forming		
Clay and silt fractions (%)	NA			37	80	59

Table 1: Summary of Material Characteristics for Stockpile DLSP-C Samples

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These criteria are consistent with the Preferred Material Criteria – Externally Draining as presented in Table 2 below (page 280, Table 41, *MCP* December 2016), that will be implemented operationally in accordance with the *Cover Material Field Sampling Procedure* (Appendix MM, MCP December 2016).

Material Characteristic	Preferred Material Criteria	
	Externally Draining	Internally Contained
Dispersion Emerson Class (20hr)	EC ≥ 3	EC ≥ 3
Acid Base Accounting classification	NAF	NAF / PAF-LC
Metals in solution (leachate generated from waste rock)	Dissolved metal mg/L < ANZECC Fresh water guidelines or Dissolved metal mg/L ≈ LOR	N/A
Soil pH	pH > 6.0	pH > 5.0
Clay and silt fractions	> 60% *	> 60% *
Sand and coarser fractions	< 40 % *	< 40 % *

* Criteria on average across minimum of five samples

Table 2: Preferred Material Criteria for Rehabilitation Landforms

In addition to the implementation of these criteria, and to provide further information on the cover materials utilised, the ratio of field samples sent for laboratory analyses will be increased from the 10% for inwardly draining surfaces to 20% for externally draining slopes. This increased ratio will be applied to the analyses of the cover materials used for the field trial.

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As with all of the planned mine rehabilitation works, those required for the Field Trial will be controlled by the Inspection and Test Plan process detailed in the MCP (page 395, Section 16.1), providing control points at various stages of the rehabilitation design to ensure that work completed is aligned with design specifications.

Appendix A – Field Trial Location and Design Dimensions

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247400 247500 247600 247700 247800 247900 248000

6624900 6624800 6624700 6624600 6624500

D6_M14_6

EL216

D6_M14_5

Inert cover true thickness of 1.2m compacted

Field trial area

50m

100m

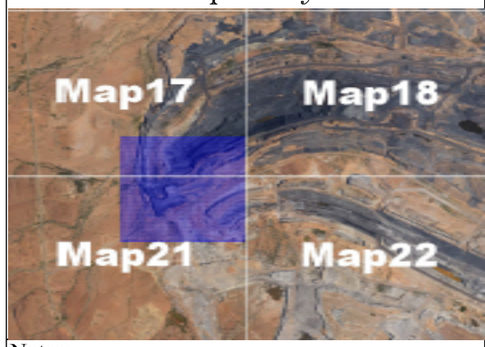
50m

247400 247500 247600 247700 247800 247900 248000

Legend

Surface contour		Railway	
Water flow direction		Road	
Natural watercourse		Powerline	
Re-profile only contour		Potable water	
Inert cover contour		MWR	
Bund crest		Mine lease boundary	
Bund toe		Inert material source	
Channel crest		Coal seam	
Channel toe		Pit void water	
Silt trap crest		Evaporation pond	
Silt trap toe		Drop structure	
Area boundary		Spot dump	
Safety bund		Cut back	
Armored bund			

Map Key



Notes:

Waste dump material for D6_M14_5 is a carbonaceous mudstone. The material was mined <2yrs ago from the MT23/MT22 cut via truck and shovel. The dump is visible from the access road to the north. The spontaneous combustion propensity is classified as high and category 2.

Stage 1 - re-profile waste dump slope to a 1:4.5 grade from EL216 to EL194.

Stage 2 - haul inert material from D6_M13_1_insk which is approximately 3,100 m from the centroid of the source to the center crest of D6_M14_5. This material will need to be hauled before the inert material profiling of D6_M14_1 to ensure adequate haul road width along the crest of D6_M14_1.

Stage 3 - inert material re-profiled at a 1:4.5 grade with a loose true thickness of 1.7m. Once the profile has been dozed a silt trap and Type A bund will be installed on the toe and crest respectively.

Stage 1 Re-profile - 180,416 lcm Stage 2 Inert material – 143,801 lcm Stage 3 Inert profile – 143,801 lcm

Field trial area

An area with a 100m strike length within D6_M14_5 will be used for the field trial as per the closure plan. The area will be covered with 1.2m true thickness of compacted inert material. On both flanks of the field trial area, 50m sections will be covered and compacted to reduce air ingress into the trial area. The western section of design D6_M14_6 will also be covered with 1.2m compacted material to eliminate air ingress coming from the north west.

Western section of D6_M14_6 - 24,111 lcm
Field trial area - 35,822 lcm
Total - 59,933 lcm

Revision Number	Date
D6_M14_5_1.1	21/12/16

Leigh Creek Coal Field
Mine Rehabilitation Plan

Dwg Number: D6_M14_5_1.1 Draw Date: 21/12/2016
Scale: 1:2100 Topography: Dec 15
Drawn By: CF Version No: 1.1
Check By: KD

40 0 20 40 60 80 100
Metres

N

Appendix B – Rehabilitation Design, Field Trial Area

247200 247300 247400 247500 247600 247700 247800 247900 248000 248100 248200 248300 248400 248500

6625200 6625100 6625000 6624900 6624800 6624700 6624600 6624500 6624400 6624300 6624200

EL194

EL198

EL192

Q seam

EL210

EL216

D6_M14_5

ROAD

ACCESS

EL210

EL208

EL206

EL204

EL202

EL200

EL198

EL196

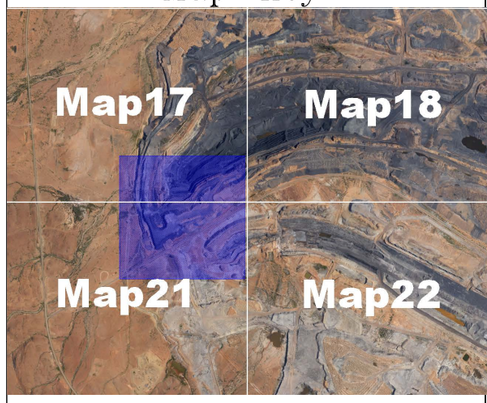
EL192

247200 247300 247400 247500 247600 247700 247800 247900 248000 248100 248200 248300 248400 248500

Legend

Surface contour		Railway	
Water flow direction		Bitumen road	
Natural watercourse		Powerline	
Re-profile only contour		Potable water	
Inert cover contour		MWR	
Bund crest		Mine lease boundary	
Bund toe		Inert material source	
Channel crest		Coal seam	
Channel toe		Pit void water	
Silt trap crest		Evaporation pond	
Silt trap toe		Drop structure	
Area boundary		Spot dump	
Armored bund		Cut back	

Map Key



Notes:

Waste dump material for D6_M14_5 is a carbonaceous mudstone. The material was mined <2yrs ago from the MT23/ MT22 cut via truck and shovel. The dump is visible from the access road to the north. The spontaneous combustion propensity is classified as high and category 2.

Stage 1 - re-profile waste dump slope to a 1:4.5 grade from EL216 to EL194.
Stage 2 - haul inert material from D6_M13_1_insk which is approximately 3,100 m from the centroid of the source to the center crest of D6_M14_5. This material will need to be hauled before the inert material profiling of D6_M14_1 to ensure adequate haul road width along the crest of D6_M14_1.
Stage 3 - inert material re-profiled at a 1:4.5 grade with a loose true thickness of 1.7m. Once the profile has been dozed a silt trap and Type A bund will be installed on the toe and crest respectively.

Stage 1 Re-profile - 180,416 lcm
Stage 2 Inert material – 143,801 lcm
Stage 3 Inert profile – 143,801 lcm

Revision Number	Date
D6 M14 5 1.0	26/11/16

Leigh Creek Coal Field
Mine Rehabilitation Plan

Dwg Number: D6_M14_5_1.0 Draw Date: 26/11/16
Scale: 1:4500 Topography: Dec 15
Drawn By: CF Version No: 1.0
Check By: PK

100 0 50 100 150 200 250
Metres

N

Appendix C – Inert Cover plot

D6_M14_1_Insk - 358,452 lcm

Designs
D6_M14_1 = 331,905 lcm
D6_M14_8 = 12,641 lcm
Total = 344,546

D6_M13_1_Insk - 1,658,418 lcm
D6_M12_1_Insk - 849,574 lcm

Designs
D6_M14_2 = 74,249 lcm
D6_M14_3 = 45,772 lcm
D6_M14_4 = 168,290 lcm
D6_M14_5 = 143,801 lcm
D6_M14_6 = 145,474 lcm
D6_M14_7 = 22,020 lcm
D6_M13_6 = 182,048 lcm
Total = 781,654 lcm

D6_M11_1_Insk - 1,491,393 lcm
D6_M10_1_Insk - 2,016,724 lcm

Designs
D6_M13_3 = 288,800 lcm
D6_M12_4 = 94,699 lcm
D6_M12_8 = 57,810 lcm
D6_M11_20 = 227,420 lcm
D6_M11_21 = 108,184 lcm
D6_M11_22 = 164, 632 lcm
D6_M10_2 = 75,332 lcm
D6_M10_4 = 49,487 lcm
D6_M10_5 = 20,543 lcm
D6_M10_6 = 6,547 lcm
D6_M9_1 = 62,215 lcm
D6_M9_2 = 50,555 lcm
D6_M9_3 = 25,775 lcm
D6_M9_4 = 104,866 lcm
D6_M9_5 = 140,481 lcm
D6_M8_1 = 212,429 lcm
D6_M8_2 = 64,563 lcm
D6_M7_1 = 72,896 lcm
Total = 1,827,238 lcm

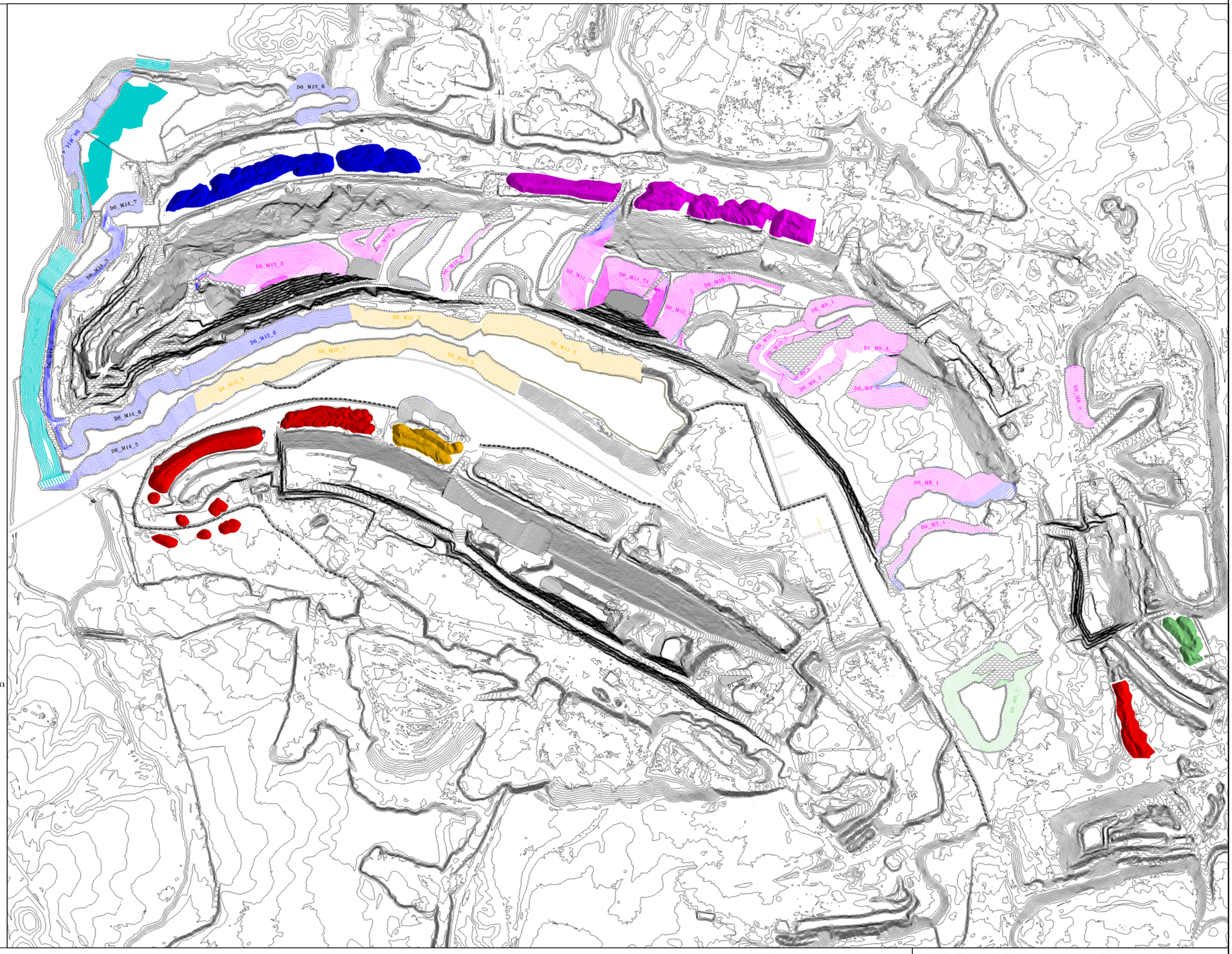
D6_M6_1_Insk - 343,278 lcm

Designs
D6_M6_1 = 222,931 lcm

D1_U27_2_Insk - 600,825 lcm

Designs
D6_M11_3 = 145,353 lcm
D6_M12_3 = 145,353 lcm
D6_M12_5 = 77,194 lcm
D6_M13_5 = 90,880 lcm
D6_M13_7 = 146,991 lcm
Total = 535,771 lcm

Non-preferred stockpile



400 0 200 400 600 800 1000
Metres

N

CLD Mining Pty Ltd

Design Name: Inert Cover
Drawn By: CF
Check By: BW
Draw Date: 8/12/16
Topography: Dec 15
Version Number: 1.0

Government of South Australia

Department of State Development

Ref: MO6536.001
ID NO: 2016D023558

5 January 2016

Peter Kelly
Manager Leigh Creek Coalfields
Flinders Power
PO Box 21, Leigh Creek SA 5731

Dear Mr Kelly

RE: Notification of Mining Operations for Leigh Creek Coalfields (Placement of Inert Cover over proposed Spontaneous Combustion and Compaction Testing Field Trial)

Thank you for submitting your notification dated 23rd December 2016, advising of Flinders Powers (FP's) intention to place inert material over re-profiled slopes in preparation for the Field Trial. The Field Trial is proposed to be undertaken at the waste dumps on the northern side and western end of the mine access road into Lobe B, Leigh Creek Coalfields.

DSD acknowledges the placement of 1.2 meter (compacted) of inert material on the re-profiled slopes of the Trial Area and the QA/QC processes described for this area only, to enable the progression of the field trial and enable timely results to be captured.

DSD notes that complete details of the Field Trial are yet to be provided by FP. DSD also reminds FP that it is yet to form an opinion on whether the approach for placement of inert cover applied to the Field Trial is an acceptable rehabilitation strategy for managing the long term risks to public safety and the environment for the site.

DSD therefore expects that the final rehabilitation strategy for the Field Trial is consistent with the requirements of the approved Development Program (currently under development).

Please contact Paul De Ionno on 08 8463 3183 or paul.deionno2@sa.gov.au should you have any further enquiries.

Yours sincerely

Greg Marshall
CHIEF INSPECTOR OF MINES

Mining Regulation

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