# Supporting Information

## Coppabella Mine

Application to Amend Environmental Authority
EPML00579213

Prepared for Peabody Energy Australia PCI (C&M Management) Pty Limited | April 2024

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**Document history and status**

| Revision | Date | Description | By | Review | Approved |
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| V0-1 | 29/01/24 | Draft | D Borombovits | T Rohde | T Rohde |
| V1-1 | 09/02/24 | Draft | D Borombovits | PEACM | T Rohde |
| V1-2 | 14/02/24 | Final Draft | D Borombovits | PEACM | T Rohde |
| V1-3 | 16/02/24 | Final | D Borombovits | PEACM | PEACM |
| V2-4 | 02/04/24 | Final | D Borombovits | T Rohde | PEACM |

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| V2-5 | 15/04/24 | Final | D Borombovits | PEACM | PEACM |

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# 1.0 Introduction

## 1.1 Coppabella Coal Mine

Coppabella Coal Mine (the Mine) is an open cut coal mining operation that produces pulverised coal injection (PCI) coal, semi-soft coking coal and thermal coal for export. Peabody Energy Australia PCI (C&M Management) Pty Limited (PEACM) operate the Mine which is owned by several joint venture partners that form the Coppabella and Moorvale Joint Venture (CMJV). It is authorised under environmental authority (EA) EPML00579213, mining leases (MLs) 70161, 70163, 70164, 70236 and 70237 and petroleum lease (PL) 1015.

The Mine is approximately (~) 10 kilometres (km) north-east of Coppabella township and ~31 km south-east of Nebo in Central Queensland within the Isaac Regional Council local government area (LGA).

## 1.2 Purpose and scope

PEACM, on behalf of the EA holders, is applying to amend conditions C1 and C4 of the EA.

An EA amendment is needed to:

- modernise *Table C1,* which:
  - includes residual void(s) for which no post-mining land use is proposed; and
  - should clearly reflect that the low walls, end walls and highwalls are part of the non-use management area (NUMA);
- update *Table C1*, which contains projective surface areas that are not consistent with current disturbance or the life of mine (LOM) plan; and
- update *Table C3*, which authorises four discrete final voids that are not consistent with the final landform.

This report has been prepared by SGM Environmental Pty Limited (SGME) on behalf of PEACM to support the EA amendment application (the supporting information).

### 1.2.1 Progressive rehabilitation and closure plan

Once the EA has been amended, the progressive rehabilitation and closure (PRC) plan will be submitted to the Department of Environment, Science and Innovation (DESI) under Section 802(2) of the *Environmental Protection Act 1994* (EP Act). The PRC plan will identify NUMAs which are consistent with the amended EA.

Under section 112 of the EP Act, a NUMA is an area of land the subject of a PRC plan that cannot be rehabilitated to a stable condition after all relevant activities for the PRC plan carried out on the land have ended.

The definition of land in stable condition is given in section 111A of the EP Act, where:

> *Land is in a stable condition if —*
>
> - *the land is safe and structurally stable, and*
> - *there is no environmental harm being caused by anything on or in the land, and*
> - *the land can sustain a PMLU.*

A PMLU is the purpose for which the land will be used after all environmentally relevant activities carried out on the land have ended (section 112 of the *Environmental Protection Act 1994* (EP Act)).

### 1.2.2 Pre-lodgement meeting

A pre-lodgement meeting was held with DESI on 13 October 2023. The following information was discussed regarding the proposed amendment:

- previous consultation with the department, land outcome documents (LODs) and void definition;
- maximum disturbance footprint;
- inability to support a PMLU;
- hydrogeology and residual void(s) outcomes;
- location, size and extent of the NUMA; and
- potential impacts to environmental values (EVs).

### 1.2.3 Information requirements for amendment applications

The requirements for a properly made amendment application are described in the EP Act.

Section 226 of the EP Act sets out the requirements for amendment applications. How they have been met by this application are in Table 1.

**Table 1 General amendment application requirements**

| EP Act | Report reference / comment |
|---|---|
| 226 Requirements for amendment applications generally<br>(1) An amendment application must —<br>(a) be made to the administering authority; and | Refer to the application form. |
| (b) be in the approved form; and | Refer to the application form. |
| (c) be accompanied by the fee prescribed by regulation; and | Payment will be made upon application. Refer to the application form. |
| (d) describe the proposed amendment; and | Refer to Section 2.0. |
| (e) describe the land that will be affected by the proposed amendment; and | Refer to Section 7.4. |
| (f) include any other document relating to the application prescribed by regulation. | All documentation required by regulation has been supplied with this application. |
| (2) However, subsection (1)(d) and (e) does not apply to an application for a condition conversion. | Not applicable. The application is not a condition conversion. |

#### 1.2.3.1 Response from the Department

In a letter dated 1 March 2024 from Juliana McCosker (Manager – Environmental Services) to Peabody, the Department has asked for further information to support the proposed amendment. The letter was in response to the amendment application made 16 February 2024. The following information was requested:

- details of any diversion of Humbug Gully Creek required to mitigate the impacts to the natural watercourse associated with the relocation of the proposed void;
- a description of the environmental values (EVs) of land in the location of the proposed single void, including a description of the risk and likely magnitude of impacts, details of the management practices proposed and the relevance of any potential offsets to the EV of land; and

- provide a description of the EV of land for the proposed NUMA of 460 ha, a description of the risk and likely magnitude of impacts, details of the management practices proposed and details of how further mine domains that make up the NUMA can be rehabilitated.

How the requested information was addressed is in Table 2.

**Table 2 Requirements for information to support the EA amendment**

| Supporting information | Report reference |
|---|---|
| **Humbug Gully Creek Diversion** | |
| Design plan and stages. | Section 5.1 |
| Details regarding the environmental values (EVs) likely to be affected by the proposed amendment. | Section 7.9.2 |
| Details of any emissions or releases likely to be generated. | Section 7.9.2.5 and 7.9.2.6 |
| A description of the risk and likely magnitude of impacts. | Section 7.9.2.5 |
| Details of the management practices proposed. | Section 5.1.2.3 |
| Details of how the creek diversion will be rehabilitated. | Section 5.1.2.4 |
| **Residual void** | |
| Description of the EV of land in the location of the proposed single void. | Section 4.1.1 and 7.4.1 |
| Description of the risk and likely magnitude of impacts. | Section 7.4.2, 7.4.3 and 7.9.1.9 |
| Details of the management practices proposed. | Section 4.5 |
| Potential offsets to the EV of the land. | Section 7.4.3 and 7.9.2.1 |
| **NUMA** | |
| Description of the EV of land for the proposed NUMA of 460 ha. | Section 7.5.1 and 7.9.1 |
| Description of the risk and likely magnitude of impacts. | Section 7.5.2, 7.5.3 and 7.9.1.9 |
| Details of the management practices proposed. | Section 4.6 |
| Detail how further mine domains that make up the NUMA can be rehabilitated. | Section 6.0 |

## 1.3 Structure

This supporting information document includes the following sections:

- Section 2.0 — proposed amendment;
- Section 3.0 — landform design;
- Section 4.0 — residual void(s) including:
  - inability to sustain a PMLU;
  - location, size and extent;
  - associated community consultation;
  - relevance to local land use planning;

  - rehabilitation and management practices; and
  - proposed completion criteria;
- Section 5.0 — Humbug Gully Creek diversion, including:
  - design plans and stages; and
  - diversion design details;
- Section 6.0 — other disturbance domains;
- Section 7.0 — environmental values of, and potential impacts to:
  - surface water;
  - groundwater;
  - wetlands;
  - land;
  - land use;
  - air;
  - acoustics;
  - waste; and
  - ecology
- Section 8.0 — justification for assessment level decision including public notification; and
- Section 9.0 — conclusions.

# 2.0 Proposed amendment

The current conditions, proposed amendment and comments / justification are in Table 3.

**Table 3 Summary of proposed EA amendments**

| Condition | Description | Proposed amendment | Comments / justification |
|---|---|---|---|
| C1 | Rehabilitation landform criteria<br>All areas significantly disturbed by mining activities must be progressively rehabilitated to the final land description as defined in ***Table C1 – Final land use and rehabilitation approval schedule*** (Table 4). | Rehabilitation landform criteria<br>All areas significantly disturbed by mining activities, except for the areas identified as a NUMA in Figure 1, must be progressively rehabilitated to the final land description as defined in ***Table C1 – Final land use and rehabilitation approval schedule.***<br>*Table C1* to be amended to include residual void / NUMA of 460 hectares (ha) consisting of a water filled void of 80 ha, and high wall and low walls of 380 ha. | *Table C1* excludes some disturbance areas such as highwalls, low walls and creek diversions. *Table C1* also contains projective surface areas that are not consistent with current disturbance or the LOM.<br>A post-mining land suitability classification of Class 5 is conditioned for the residual void(s) in *Table C1*. Class 5 land is considered unsuitable for the specified land use as it has limitations that singly or in aggregate are so severe that the benefits would not justify the inputs required to initiate and maintain sustainable production in the long term.<br>Water quality in the residual void(s) would be incompatible with the PMLU. Therefore, the residual void(s) will be nominated as a NUMA. |

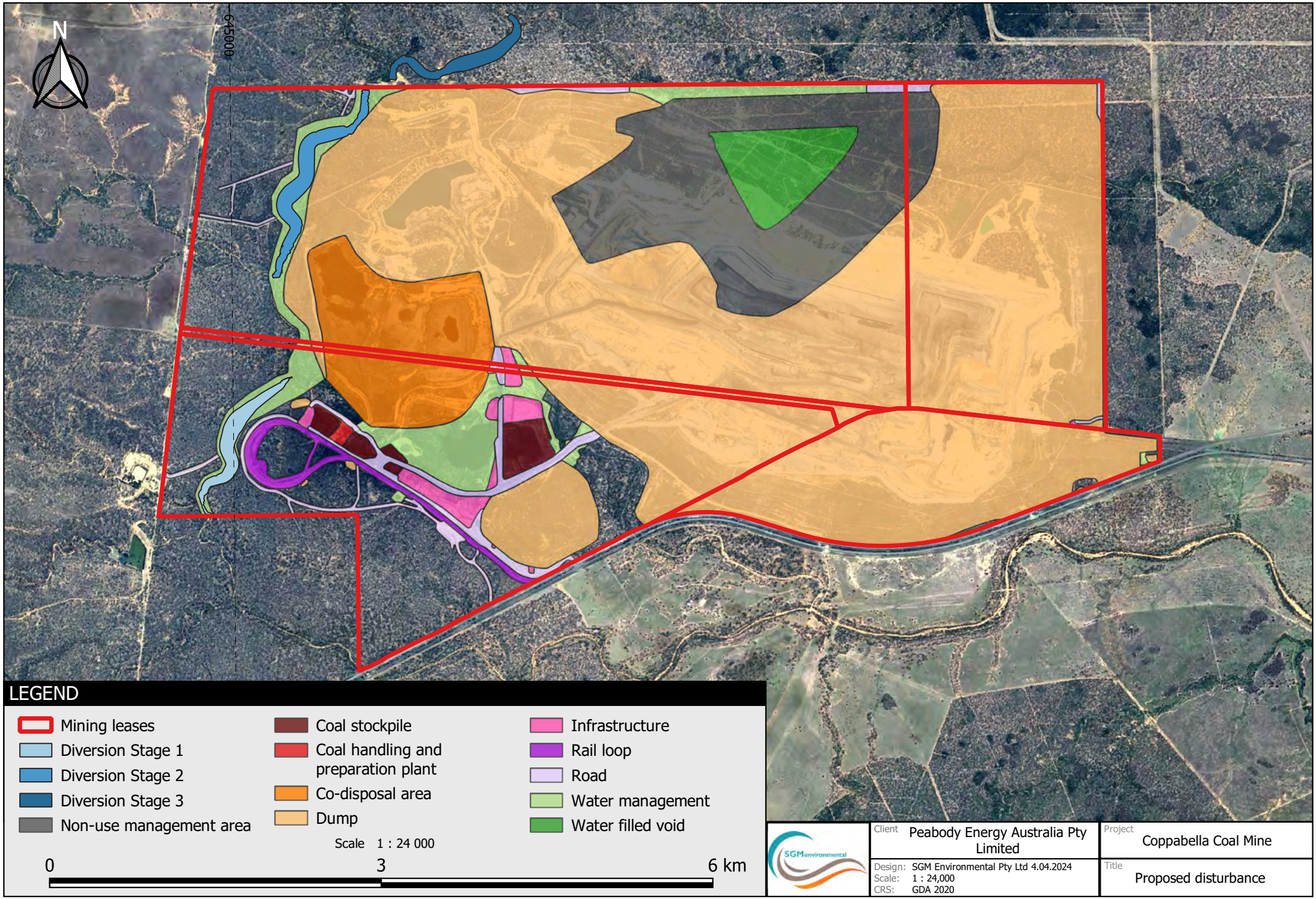
| Condition | Description | Proposed amendment | Comments / justification |
|---|---|---|---|
| C4 | Residual Void(s)<br>Residual void(s) must comply with the following outcomes:<br>1. Residual void(s) must not cause any serious environmental harm to land, surface waters or any recognised ground water aquifer, other than the environmental harm constituted by the existence of the residual void(s) itself, and subject to any other condition within this environmental authority; and<br>2. Residual void(s) must comply with *Table C3 – Residual void(s) design* (Table 5). | The residual void(s) will not exceed the aggregate void maximum surface area conditioned in *Table C3 – Residual void design*. | The residual void(s) will not be returned to a stable condition under Section 111A of the EP Act which requires the land to be able to sustain a PMLU. Notwithstanding, the residual void(s) will be safe and geotechnically stable, and will not cause any serious environmental harm in accordance with this condition. |

**Table 4** ***Table C1 - Final land use and rehabilitation approval schedule (EA EPML00579213)***

| Disturbance type | Projective surface area (ha) | Post mine land description | Post mine land suitability classification |
|---|---|---|---|
| Elevated landform (overburden) - upper slopes | 700 | Establish a landform and revegetate with native species with input from Aboriginal people, the objective being to develop a conservation area useful to Aboriginal people. | Class 4 |
| - lower slopes | 840 | Establish pasture species to control erosion initially and thereafter develop a self-sustaining native ecosystem. | Class 5 |
| - access tracks and haul roads | 250 | Establish a landform and revegetate with native species with input from Aboriginal people, the objective being to develop a conservation area useful to Aboriginal people. | Class 4 |
| Elevated landform (co-disposal) - upper surface | 150 | Establish a landform and revegetate with native species with input from Aboriginal people, the objective being to develop a conservation area useful to Aboriginal people. | Class 4 |
| - slopes | 70 | Establish pasture species to control erosion initially and thereafter develop a self-sustaining native ecosystem. | Class 5 |
| Residual Void | 80 | Water filled void complementary to the post-mine land use of the surround land. | Class 5 |
| Rail Loop | 30 | Establish a landform and revegetate with native species with input from Aboriginal people, the objective being to develop a conservation area useful to Aboriginal people. | Class 4 |
| CHPP General Area | 150 | Establish a landform and revegetate with native species with input from Aboriginal people, the objective being to develop a conservation area useful to Aboriginal people. | Class 4 |
| Water Management Structures | 120 | Establish a landform and revegetate with native species with input from Aboriginal people, the objective being to develop a conservation area useful to Aboriginal people. | Class 4 |
| Undisturbed | 1,753 | | |
| Total | 4,143 | | |

**Table 5** ***Table C3 – Residual void design (EA EPML0057921)***

| Void Identification | Void wall - competent rock slope highwall (%) | Void wall – low wall | Void maximum surface area (ha) |
|---|---|---|---|
| Creek Pit | 10V:1H | Between 1V:3H – 1V:4H | 20 |
| Johnson Pit | 10V:1H | Between 1V:3H – 1V:4H | 30 |
| South Pit | 10V:1H | Between 1V:3H – 1V:4H | 20 |
| East Pit | 10V:1H | Between 1V:3H – 1V:4H | 10 |




| | | |
|---|---|---|
| SGM environmental | Client: Peabody Energy Australia Pty Limited | Project: Coppabella Coal Mine |
| | Design: SGM Environmental Pty Ltd 4.04.2024<br>Scale: 1 : 24,000<br>CRS: GDA 2020 | Title: Proposed disturbance |

# 3.0 Landform design

## 3.1 Final landform

The landform design report has been attached in Appendix A.

Final landform was developed in the following three-dimensional (3D) CAD packages, depending upon software capability:

- SPRY for sequencing and bulk volume placement;
- 3D-Dig for reshaping / smoothing; and
- Vulcan for final drafting and presentation.

The mine plan that was used for development of this landform aims to maximise mining of coal resources contained within the Coppabella mining leases. Residual void(s) footprint is as small as practicable while balancing economic and technical expectations.

Consideration in landform design has been given to the following:

- The preferred option for the PRC plan maximises resource extraction within the bounds of the existing tenements and allows for underground access to coal resources in Johnson Extended Pit (JEP).
- Requirement for diversion of waterways on the western side.
- A water licence application for the western diversions is currently under assessment with approval prior to submission of the PRC plan.

The final landform has been developed to be generally water-shedding, with only areas in close proximity to the final void(s) being water-retaining. During construction of the landform, as part of operational management of water on-site, much of the surface runoff water will be retained. As rehabilitation objectives of the landform are achieved (Section 4.6), runoff from these areas will eventually be returned to natural receiving waterways.

Development of the landform design has relied on several assumptions including swell factor of the excavated and dumped material. Small variations can result in differences in the as-dumped profile including size and shape of the residual void(s).

Additionally, the mining sequence can change in response to market demands or operational challenges. Therefore, some variation in the current proposed final landform design can be expected as mining progresses. Relevant documents will be updated as required via the appropriate amendment processes.

## 3.2 Geotechnical stability

Cartledge Mining and Geotechnics (CG&M) was engaged by PEACM to assess geotechnical stability of the final void(s) (CG&M 2024) (Appendix B).

Based on available information, the final void(s) will be stable at the end of the LOM. While long-term stability requirements are achieved, the interim factor of safety (FoS) may be lower due to changes in the in-pit and subsurface water conditions. This may present as surficial expressions of instability such as tension cracking and volume change. These phenomena are due to transient conditions and are not expected to affect the long-term stability FoS. Modelling of the predicted long-term stability of the final landfom is detailed in Section 4.5.

## 3.3 Subsidence

There have been few studies on the impacts of subsidence / settling over time for design landforms at the Mine. However, much of the out-of-pit dump has been in place for several years and has experienced limited settlement. Internal assessments of regraded landform stability were done using light detection and ranging (LiDAR) data in 2021 which showed that minimal subsidence or settling of the dumped landform had occurred over a three-year period (less than (<) 0.4 metres (m) generally).

Settlement of dump areas will continue to be monitored post-placement to ensure rehabilitation is done when the areas are stable.

# 4.0 Residual void(s)

## 4.1 Inability to sustain a PMLU

### 4.1.1 Land suitability classification

A post -mining land suitability classification of Class 5 is conditioned for the residual void(s) in *Table C1* of the EA. Class 5 land is considered unsuitable for the specified land use as it has limitations that singly or in aggregate are so severe that the benefits would not justify the inputs required to initiate and maintain sustainable production in the long term.

### 4.1.2 Hydrology and water quality behaviour

SLR Consulting Australia Pty Limited (SLR) was engaged by PEACM to assess hydrology of residual void(s) and long-term water quality behaviour.

Void(s) are predicted to reach equilibrium and remain a sink with significant freeboard maintained under various climate scenarios (SLR 2024a) (Appendix C).

Salinity of the void(s) would continue to increase with time due to the effects of evaporation with hypersaline conditions being eventually reached (SLR 2024b) (Appendix D). This is incompatible with sustaining a land use consistent with native ecosystem.

This assessment is consistent with previous hydrological modelling (Hatch 2016) which showed that:

- in all cases, void water quality becomes hypersaline in the long-term; and
- pit lakes will remain below the pre-mining groundwater relative level (RL) of ~180 m Australian Height Datum (AHD) with the final void(s) acting as sinks.

Simulated water levels (mAHD) of the final void(s) are in Figure 2. Average salinity results for the shallow Alluvium / Tertiary aquifer and Permian (coal seam and overburden) aquifer are in Table 6.

As per the WMP, areas below original ground level (including the void(s), low walls and highwalls) do not have a defined land use and are considered equivalent to NUMAs.

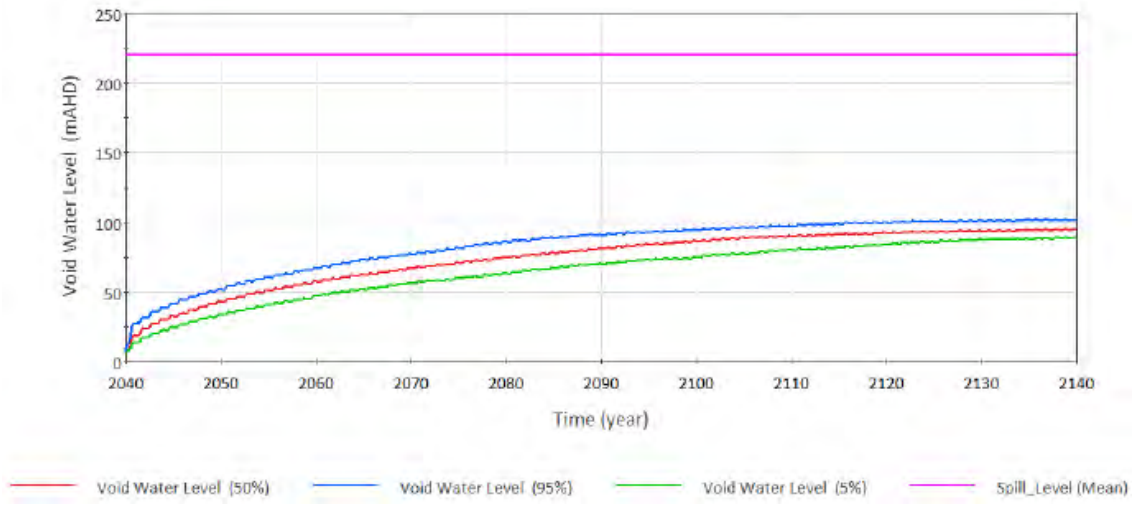



**Figure 2 Final void water levels**

**Table 6 Final void water average salinity value**

| Formation | Average salinity (microsiemens per centimetre (µS/cm)) | Australian and New Zealand (ANZG) (2023) salinity guideline value for beef cattle (µS/cm) | | |
|---|---|---|---|---|
| | | *No adverse effects expected* | *Livestock should adapt without loss of production* | *Livestock may tolerate for short periods if introduced gradually* |
| Permian aquifer (coal seam and interburden) | 13,494 | 0-5,970 | 5,970-7,462 | 7,462-14,925 |
| Shallow Cainozoic aquifer (Alluvium and Tertiary aquifer) | 12,710 | | | |
| Void Scenario 1[2] | 9,666 | | | |
| Void Scenario 2[2] | 20,895 | | | |

1. Adapted from SLR (2024a).
2. Simulated long-term median salinity values from SLR (2024b).

## 4.2 Location, size and extent unable to support a PMLU

Residual void size, defined by the water filled area at maximum long term pond depth, has been limited to 80 ha to comply with condition C1 and residual void(s) specifications in *Table C3* of the EA. For the mine plan under consideration, this has required some rehandling of emplaced spoil material and ensuring void catchment area is minimised. Spoil is preferentially placed in the lowest available dumps, ensuring that void(s) are backfilled as much as possible.

Post-mining final void(s) size is a function of depth of the final strips and establishment of safe slopes and appropriate ramps for spoil waste and coal haulage. The NUMA is the area of the residual void(s) that is unable to support a PMLU and includes the pit lake, low wall, end wall, highwall and abandonment bund with appropriate offset. Internal low wall slopes will be battered below the long-standing water level, and rehabilitated by profiling, application of topsoil layer, ripping and seeding.

Void modelling for predicted long-term water levels, volumes and surface area is in Table 7. The scenarios differ in assumptions around the establishment of vegetation within the final void(s). Analysis indicates that the proposed final landform design will be able to meet the current EA conditions in *Table C1*, with the residual void having a surface area ~80 ha. In all scenarios there is no risk of overtopping of the residual void(s).

**Table 7 Simulated size and permanence of the final void**

| Residual void | Volume (Gigalitres (GL)) | Water level (mAHD) | Elevation at the lowest point (mAHD) | Water surface area (ha) |
|---|---|---|---|---|
| Void Scenario 1 | 43.9 | 81 | 6.5 | 98 |
| Void Scenario 2 | 15.9 | 48.7 | 6.5 | 65 |

Adapted from SLR (2024a).

The final void(s) (Figure 1) will have the following key features:

- located on freehold land held by CMJV;
- size and extent of the residual void(s) is based on maximised mining of the coal resource;
- complies with residual void(s) design conditions in *Table C3 (Residual void design)*; and
- footprint is as small as practicable while balancing economic and technical expectations.

No land outcomes are specified (*Table C3*) apart from acknowledging these areas will contain a projected 80 ha of water filled void(s) (*Table C1*).

The residual void(s) is not located in a floodplain. There is no risk of flooding because the only stream order higher than 4 within the project area is Harrybrandt Creek which lies outside the void(s) catchment. Therefore, flood modelling was not done (SLR 2024b).

## 4.3 Community consultation

The extent to which the NUMA is consistent with the outcome of community consultation is:

- consultation has been undertaken with affected landholders (such as underlying and adjoining land holders, and holders of land necessary for access to land to which the proposed amendment relates); and
- it will not harm the surrounding environment.

## 4.4 Land use planning

### 4.4.1 Mackay, Isaac and Whitsunday Regional Plan

The *Mackay, Isaac and Whitsunday Regional Plan* (MIW Regional Plan) identifies and interprets the State's interests in land use planning and development that are described in the *State Planning Policy* (SPP). The MIW Regional Plan has been prepared for the Mackay Regional Council, Isaac Regional Council and Whitsunday Regional Council LGAs.

The *Regional Planning Interests Act 2014* (RPI Act) identifies and protects areas of regional interest in Queensland which are mapped in the MIW Regional Plan. The Mine is not located in areas of regional interest such as priority agricultural areas (PAAs), priority living areas (PLAs), strategic cropping areas (SCAs) or strategic environmental areas (SEAs).

The extent to which the MIW Regional Plan is consistent with the NUMA is:

- it does not impact environmental values of the surrounding region.

### 4.4.2 Isaac Regional Planning Scheme

The *Isaac Regional Planning Scheme* (Planning Scheme) describes the Isaac Regional Council's plan for the LGA. The extent to which the Planning Scheme is consistent with the NUMA is:

- it does not degrade environmental values of the surrounding region.

## 4.5 Rehabilitation and management practices

The residual void(s) will be left with an access road or ramp that is suitable for installing and maintaining pump and pipe infrastructure to recover water to natural ground level if required (Peabody 2023). Surface water runoff

from off-lease catchment to the north of the void(s) will be allowed to run into the pit via a drop structure integrated into landform design of the final highwall, to be constructed as part of the final void(s) establishment works. An alternative to this structure may be to develop a diversion drain around the northern and eastern lease boundaries (Section 3.1).

The angle of highwall slopes will be < 84 degrees (°) (10 vertical (V):1 horizontal (H)) (Peabody 2023, CG&M 2024) in compliance with the EA. The low wall will have a crest-to-toe angle of < 18.4° (1V:3H) as per the limit specified in the EA. Where applicable, low walls will be rehabilitated by profiling, applying topsoil, ripping and seeding. A bund and livestock fence will be placed around the perimeter of the final void(s) highwall as detailed in Section 4.5.1.

### 4.5.1 Relevant safety features

A safety bund will be constructed in accordance with the *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland* (DME 1995). These guidelines describe the minimum dimensions of a safety bund as being 2 m in height, 4 m in base width and 10 m beyond the area which may be affected by void(s) edge instability.

A strong wire mesh fence of at least 1.8 m in height will also be constructed around the perimeter of the NUMA to limit access by humans, wildlife and cattle. Safety signage will be placed strategically on this fence.

## 4.6 Completion criteria

Management practices and completion criteria for measuring whether the NUMA has achieved improvement are in Table 8. Notwithstanding, the proposal of completion criteria for the residual void(s) is not the purpose of the EA amendment and will be captured within the PRC plan.

Each of the following must be minimised to achieve improvement:

- risk of the area collapsing, eroding, or subsiding;
- the need to actively manage the area; and
- access to the area by an animal or person.

**Table 8 Proposed management milestones and milestone criteria**

| Milestone reference | Management milestone | Milestone criteria |
|---|---|---|
| MM1 | Highwall and low wall treatment | a) Highwall battered to a maximum slope of 10V:1H.<br>b) Low wall battered to a maximum slope of 1V:3H.<br>c) Factor of safety greater than or equal to (≥) 1.5. |
| MM2 | Achievement of surface requirements | a) 1.8 m high strong wire mesh fencing erected around the perimeter of the residual void(s).<br>b) Warning signage posted around the perimeter of the residual void(s).<br>c) Safety bund constructed around the perimeter of the residual void(s). |

| Milestone reference | Management milestone | Milestone criteria |
|---|---|---|
| MM3 | Achievement of sufficient improvement | a) Certification by an appropriately qualified person (AQP) that the residual void(s) will not cause environmental harm outside of the relevant tenure boundary.<br>b) Certification from an AQP that the residual void(s) are safe to humans and livestock. |

# 5.0 Humbug Gully Creek diversion

Peabody are planning alternate alignments of the Thirty Mile Creek North and South Arm diversions as part of mine rehabilitation and closure arrangements. As a part of this work, Humbug Gully Creek will be diverted upstream of the proposed mining footprint to the North Arm and South Arm diversions, to be eventually received into Harrybrandt Creek upstream of the existing confluences.

## 5.1 Design plan and stages

Humbug Gully Creek commences to the northwest of the mine and flows in a south easterly direction around the northern side of the mine. The diversions will be built in three stages from south to north, as follows:

- Stage 1 – South Arm to Harrybrandt diversion and take off landforms to be constructed;
- Stage 2 – North Arm to South Arm diversion, tributary tie in and take off landform to be constructed and tie into Stage 1; then
- Stage 3 – Humbug Gully to North Arm diversion, tributary tie in, gully remediation and take off plug to be constructed and tie into Stage 2 (all three diversions in place).

In addition to the *Coppabella Diversions Design Report* (Alluvium 2023) the diversions are designed with regard for the following ACARP guidelines:

- *Maintenance of Geomorphic Processes in Bowen Basin River Diversions* (ACARP 2000);
- *Monitoring and Evaluation Program for Bowen Basin River Diversions* (ACARP 2001); and
- *Bowen Basin River Diversions, Design and Rehabilitation Criteria* (ACARP 2002).

A water licence application for the western diversions has been submitted under the *Water Act 2000* and is currently under assessment by the Department of Regional Development, Manufacturing and Water (DRDMW). The water licence application provides further information regarding the diversion design details. These are outlined in the following sections.

### 5.1.1 Benefits associated with design stages

#### 5.1.1.1 Stage 1

Stage 1 diversion works will have the following benefits:

- eliminates requirement for remedial works on prior "short term' solutions of South Arm Culvert upgrades, Worked Water Dam embankment and spillway upgrades and 'Super Highway' culverts;
- eliminates the cost of repairing the prior South Arm diversion at mine closure; and
- demonstrates commitment to solving legacy issue of current 'temporary' creek diversions.

#### 5.1.1.2 Stage 2

Stage 2 diversion works will have the following benefits:

- eliminates legacy issue of current 'temporary' North Arm creek diversion which requires realignment;
- reduces watershed to current North Arm channel by 1,772 Ha and decreases overall lower Thirty Mile Creek watershed by 3,710 ha;
- delivers on requirement to improve water management for road and rail infrastructure; and
- enables mining of additional Johnson Pit West Resource Area (~2 Mt) currently under temporary diversion.

#### 5.1.1.3 Stage 3

Stage 3 diversion works will have the following benefits:

- enables mining of economic resource beyond the current Humbug Gully, with ~33.4Mt (ROM) at 10:1 ratio at an estimated yield of 75 % which provides opportunity for improved outcomes from current mining; and
- extends mine life by eight years.

### 5.1.2 Design constraints

Alignment of Humbug Gully, North Arm to South Arm and South Arm to Harrybrandt diversion is optimised to reduce the construction cut material by utilising existing gullies and following contours. Diversion channel grades are 0.03 %, 0.144 % and 0.002 % respectively. Inclusion of the hyporheic zone (an additional 1 m cut in the channel bed) will assist with accumulation of sediment for the systems high supply of both sand and finer sediment from the upstream catchment areas and provide for continuity of hyporheic flow (alluvial groundwater).

### 5.1.3 Diversion design details

#### 5.1.3.1 Diversion channel geometry

A summary of the diversion channel geometry for the three diversions is in Table 9. The proposed planform alignments and longitudinal geometry of the diversions are largely influenced by the existing topography and the requirement to divert around existing and proposed mining landforms and infrastructure. Lower and higher level benches within the channel will be constructed to replicate existing benches characteristic of incised alluvial streams within the Bowen Basin.

Features of the design include:

- batter slopes of 1V:3.5H from bed level up to the lower bench, and between the lower and upper benches;
- provision for a hyporheic zone below bed level which consists of an additional 1m depth of excavated channel below the proposed bed elevation with the purpose of allowing for long term bedload transport and sub-surface flow continuity within the system; and
- upper batter slopes of 1V:4H beyond the upper bench based on learnings from monitoring of diversion performance across the Bowen Basin.

The typical geometry is applied to the full length of each diversion. Initial hydraulic modelling results (Alluvium 2023) required some transitioning of the cross-section at the downstream end of the South Arm to Harrybrandt Creek diversion to achieve acceptable hydraulic parameter values. The transitioning undertaken for functional design involves gradually widening the diversion over a distance of approximately 300 m. Further transitioning work at the downstream end of both diversions will be required during detailed design.

**Table 9 Summary of proposed channel geometry**

| Diversion Geometry | Humbug Gully diversion | North Arm to South Arm diversion | South Arm to Harrybrandt Creek diversion |
|---|---|---|---|
| Channel length (m) | 1,560 | 2,290 | 1,798 |
| Average channel grade (%) | 0.03 % | 0.14 % | 0.002 % |
| Bed width (m) | 4 | - | 4 |

| Diversion Geometry | Humbug Gully diversion | North Arm to South Arm diversion | South Arm to Harrybrandt Creek diversion |
|---|---|---|---|
| Lower bench height above bed (m) | 1.9 | 1.9 | 2.5 |
| Upper bench height above lower bench (m) | 1 | 1 | 1.25 |
| Bench width (m) | 5 | 5 | 5 |
| Bench crossfall (%) | 5 | 5 | 5 |
| Batter slopes below upper bench | 1V:3.5H | 1V:3.5H | 1V:3.5H |
| Batter slopes above upper bench | 1V:4H | 1V:4H | 1V:4H |
| Hyporheic zone cut depth (m) | 1 | 1 | 1 |

### 5.1.3.2 Landform

Landforms direct flows from the tributaries into the main diversion channels for Humbug Gully, North Arm to South Arm and South Arm to Harrybrandt Creek diversion. The landforms will also ensure flood immunity protection to existing and proposed mining operations and infrastructure. The landforms have been included in the hydrologic modelling (Alluvium 2023) to ensure they are designed to at least the 0.1% AEP event. The landforms can be developed with the material excavated from the proposed diversion channels and tie into existing mining landforms.

A summary of the landform details is in Table 10.

**Table 10 Landform details**

| Diversion geometry | Humbug Gully diversion | North Arm to South Arm diversion | South Arm to Harrybrandt diversion |
|---|---|---|---|
| Design flood event (AEP) | 0.1% AEP | 0.1% AEP | 0.1% AEP |
| Minimum freeboard (m) | 0.5 | 0.5 | 0.5 |

### 5.1.3.3 Management practices

a Erosion and sediment control

Erosion and sediment control measures will be implemented during the construction phase of the diversions in accordance with leading best practice (ie IECA 2008). This can include:

- installation of temporary drainage structures and controls: including
  - drainage chutes;
  - check dams;
  - erosion control mats;
  - geotextile lining;

  - hard armouring and rock lining; and
- installation of sediment fencing and appropriate containment basins;
- erosion control measures, including
  - bonded fibre matrix;
  - compost blankets;
  - heavy and light mulching;
  - rock mulching;
  - soil binders;
  - dust control;
  - revegetation; and
- sediment control techniques, including:
  - fabric drop inlet protection;
  - gully bag sediment traps;
  - rock aggregate drop inlet protection; and
  - u-shaped (batwing) sediment traps.

b Batter drains chutes and hillside management

Two batter drain chutes, each of ~3 m height, are designed to direct overland flow to the diversions. The chute located in the gully erosion upstream of the North Arm tributary has a crest elevation 1 m above existing topography. This chute has the combined benefit of allowing controlled overland flow to enter the diversion to prevent diversion batter erosion and to assist with regrading the gully by allowing water and sediment to pool and settle in low flows. It is expected this in time will assist in regrading of the small gully.

Reshaping is required in areas between the landforms and the diversion to ensure flows do not sit for long periods of time against the landforms.

c Post-construction management

Following the earthworks and rehabilitation works (Section 5.1.2.4), the Mine will be responsible for ensuring the diversions perform to a standard which meets the expectations of industry, government and the broader community.

To assess performance and condition trajectory of the diversion, a monitoring program will be developed and implemented by appropriately qualified and experienced professionals.

As explained previously, the diversions have been designed and constructed to operate in 'dynamic equilibrium' with adjoining reaches such that it is self-sustaining and does not require any ongoing management intervention in the longer term. Management intervention should only be required if the rate of erosion and deposition is greater and on a trajectory that is considered unacceptable and outside design parameters. That assessment will be made and reported upon by experienced professionals as part of the ongoing monitoring program.

Where a diversion is performing within designed expectations there may still be some regular maintenance activities including:

- Maintenance of minor drainage channels and batter chutes (if any are required). If a minor drainage line or batter chute becomes excessively infilled with sediment it can divert flows out of channel resulting in erosion of the banks as an alternate flow path is created. Alternatively, if they become unstable they can degrade upstream landforms. Checking and maintaining minor drainage lines and batter chutes will be a priority action, particularly in early years of operation.
- Weed and pest animal control is a common issue that is required on most diversions, especially in the early stages of establishment. Pest animals can cause extensive damage to vegetation and cause direct disturbance of banks.
- Control of stock access to the diversion is required.

d Monitoring

A monitoring program is an essential component of the complete design, construction and operational performance evaluation process for creek diversions and is required as part of the regulatory process. The recommended monitoring program for the proposed diversions is based on the *Monitoring and Evaluation Program for Bowen Basin Diversions* (ACARP 2001). The monitoring schedule for the diversion from pre-construction to licence relinquishment comprises four components (Table 11).

It is a requirement in the approval's conditions that diversion monitoring be undertaken by experienced and appropriately qualified waterway management professionals (including an RPEQ). This allows for qualitative assessment over and above the quantitative assessment in the ACARP methodology that informs management of the diversion in the long term to ensure it is on a condition trajectory that will allow for timely relinquishment approvals.

**Table 11 Diversion monitoring components**

| Monitoring components | Objectives |
|---|---|
| Baseline monitoring | To establish a baseline data set that can be used for comparison when applying for the water licence renewal and relinquishment. |
| Construction monitoring | To demonstrate works have been undertaken to specification. |
| Operations monitoring | To maintain channel condition and reduce risk to mining infrastructure and the environment. Used in licence renewals. |
| Relinquishment monitoring | To demonstrate the diversion is operating as a waterway in equilibrium and not adversely impacting on adjoining reaches allowing for approvals relinquishment. |

### 5.1.3.4 Rehabilitation

a Revegetation

A revegetation plan (Verterra 2024) (Appendix E) has been developed for the proposed diversion detailing the requirements and strategies for land to be progressively rehabilitated to achieve completion criteria for a safe, stable and non-polluting landform able to sustain the post-mining land use. The revegetation plan includes:

- soil management, including:
  - soil analysis;
  - soil amelioration;
  - topsoil management;
  - subsoil management; and
- revegetation palette, including:
  - species mix;
  - tubestock demand and management;
  - direct seeding; and
- irrigation;
- monitoring and performance; and
- maintenance.

Revegetation aims to encourage the rapid establishment of a vegetation community that contributes to bank stability and is representative of the surrounding riparian community. Revegetation works, particularly topsoil placement and soil treatments, should proceed as soon as practical after civil works are completed.

b Habitat enhancement

Both fallen and standing timber that would be cleared as part of diversion construction will be considered for use in the diversion. Placement, location and the type and size of timber will be appropriate to channel scale and substrate such that adverse geomorphic outcomes are not induced. Placed timber will provide habitat to both aquatic and terrestrial organisms in this ephemeral waterway system.

c Gully rehabilitation area

Gully rehabilitation areas where localised gullies intersect the diversions will be filled to existing topography. Fill volumes will be estimated from existing contours.

# 6.0 Other disturbance domains

All land disturbed by mining, except for the proposed NUMA(s), will have a PMLU of native vegetation or a conservation area useful to Aboriginal people in accordance with *Table C1* of the EA (Table 4). The PMLUs of native vegetation and a conservation area useful to Aboriginal people are both considered a type of native ecosystem PMLU.

The proposed catchment area reporting to the void (~460 ha) is not able to support a PMLU due to average slope constraints (1V:3H). However, upon closure these areas will be rehabilitated as detailed in Section 4.5 and managed to be complementary with surrounding land use.

Existing rehabilitation has included pasture grasses in an effort to maximise slope stability. Condition C3 of the EA (Table 12) allows for initial establishment with exotic groundcover followed by a transition to native and naturalised species. The PMLUs (excluding void(s)) will not be amended; however, criteria must be compatible with existing rehabilitation.

Separate criteria will be proposed for previously established and new rehabilitation during PRC Plan development.

**Table 12** ***Condition C3 (EA EPML00579213)***

| Condition Number | Condition |
|---|---|
| C3 | Areas which are to be progressively rehabilitated to native ecosystem must comply with the following outcomes:<br>1. achievement of a self-sustaining native ecosystem with a species composition and distribution consisting of at least three Acacia species, one Eucalypt species and either a Melaleuca or Grevillea species as an upper story and three understorey species. An exotic groundcover initially established to control erosion will be replaced gradually in a plant succession with either native or naturalised species. Projective vegetative cover will be seventy percent (70%).<br>2. all areas significantly disturbed by mining activities must be rehabilitated to the landform design criteria defined in **Table C2 - Landform design**; and<br>3. landforms are stable and comply with the design criteria defined in **Table C2 - Landform design.** |

# 7.0 Environmental values

## 7.1 Surface water

An assessment of surface water associated with the final void(s) was done by SLR (2024b) to provide information for this EA amendment application supporting information document. The surface water assessment is used in conjunction with the receiving environment monitoring program (REMP) by Guage Industrial & Environmental Pty Limited (Guage) (2018) and WMP by PEACM (2019) to describe EVs of surface water in the following sections.

### 7.1.1 Existing environment

#### 7.1.1.1 Fluvial network

Isaac-Connors catchment is within Fitzroy Basin which spans ~14,200,000 ha of Central Queensland. Relevant waterbodies include Harrybrandt Creek, Humbug Gully and Thirty Mile Creek.

Harrybrandt Creek is an ephemeral watercourse at headwaters of Connors River catchment. It is located south of the MLs and flows in an easterly direction into Bee Creek, Funnel Creek, Connors River and eventually into Isaac River. Wildlife and cattle are typically present when the creek is flowing; however, this has likely contributed to erosion which is evident along creek banks.

Humbug Gully is an ephemeral watercourse at headwaters of Connors River catchment. It is located just north of the MLs and flows in an easterly direction to its confluence with Harrybrandt Creek just south of Peak Downs Highway. Water quality during flow events can be characterised by low dissolved oxygen levels, neutral pH, high turbidity and variable conductivity.

Thirty Mile Creek is split into two sections which are both ephemeral. Thirty Mile Creek North Arm flows in a southerly direction through the centre of the MLs, while Thirty Mile Creek South Arm flows in an easterly direction through the western side. There is a diversion which connects the northern and southern portions and directs flow into Harrybrandt Creek just south of Peak Downs Highway.

#### 7.1.1.2 Environmental values

The *Environmental Protection (Water) Policy 2009* (EPP (Water)) outlines EVs for Isaac River including:

- protecting:
  - aquatic ecosystems; and
  - cultural and spiritual values; and
- maintaining:
  - visual amenity;
  - suitability for irrigation;
  - suitability for stock watering;
  - suitability for primary recreation; and
  - suitability for human consumption.

### 7.1.2 Potential impacts to environmental values

Potential impacts to EVs are outlined in the following sections.

#### 7.1.2.1 Pit lake overtopping

There would be adverse impacts to EVs if the pit lake overtops. However, this is considered unlikely because equilibrium would be reached well below the point that it could spill to the surrounding environment.

#### 7.1.2.2 Inundation during extreme rainfall events

Inundation during extreme rainfall could cause transport of contaminants and / or water erosion. However, the probable maximum flood (PMF) model developed by Neilly Group Pty Limited (Neilly Group) (2019) indicated that Humbug Gully and Harrybrandt Creek are unlikely to experience flood ingress in such an event. The modelled PMF flow in Harrybrandt Creek has a maximum elevation of 209 mAHD; whereas, the crest of the void is 220 m AHD. Therefore, flood ingress would have negligible impacts to the final void.

Thirty Mile Creek is susceptible to significant inundation events. Therefore, measures to prevent inundation beyond the void crest will be implemented.

#### 7.1.2.3 Unsafe to humans and animals

Residual void(s) pose a safety risk to humans, wildlife and cattle. In order to minimise risk, the following safety measures will be implemented:

- an abandonment bund will be built;
- a 1.8 m high strong wire fence will be installed around the abandonment bund perimeter;
- highwalls, low walls and end walls will be certified as geotechnically stable; and
- safety signage will be installed.

### 7.1.3 Risk and magnitude of impacts

There are no potential impacts to the surface water EVs as a result of the proposed amendment.

## 7.2 Groundwater

An assessment of groundwater associated with the final void(s) was done by SLR (2024a) to provide information for this EA amendment application supporting information document. The groundwater assessment is used in conjunction with the REMP and WMP to describe EVs of groundwater in the following sections.

### 7.2.1 Existing environment

Groundwater occurrence is limited to Permian Rangal Coal Measures. The water table is typically > 45 m below ground level (bgl) (ie ~175 mAHD). Given that groundwater typically has elevated EC and high total dissolved solids (TDS), it is not suitable for irrigation, stock or domestic uses. The main regional groundwater use is industrial; however, users are minimal.

EVs for groundwater reflect those for surface water; that is:

- protecting:
  - aquatic ecosystems; and
  - cultural and spiritual values; and
- maintaining:
  - visual amenity;
  - suitability for irrigation;
  - suitability for stock watering;
  - suitability for primary recreation; and
  - suitability for human consumption.

### 7.2.2 Potential impacts to environmental values

Potential impacts to EVs are outlined in the following sections.

#### 7.2.2.1 Groundwater seepage to the open cut

Groundwater seepage to the open cut could negatively impact the residual void(s). However, reported seepage is negligible and is unlikely to affect the void(s) post-closure. This indicates that hydraulic connections are limited by low conductivities within coal seam aquifers and by presence of confining interburden sequences.

#### 7.2.2.2 Migration of groundwater to surrounding aquifers

Migration of groundwater to surrounding aquifers could negatively impact EVs due to transport of potential contaminants. However, there is a low risk of migration because modelling has shown that the residual void(s) would act as a groundwater sink, preventing migration to surrounding aquifers.

### 7.2.3 Risk and magnitude of impacts

There are no potential impacts to the groundwater EVs as a result of the proposed amendment.

## 7.3 Wetlands

### 7.3.1 Existing environment

There is a state-wide statutory map of Queensland wetland EVs under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2009* (EPP (Water and Wetland Biodiversity)) which identifies wetlands of high ecological significance (HES) and general ecological significance (GES). Wetland protection areas (WPAs) are policy trigger buffer areas that protect HES wetlands in the Great Barrier Reef catchments. The aim of the WPA buffer is to limit development near HES wetlands to provide for continual ecological protection.

A HES wetland has been identified ~5.4 km north-west of the north-western extent of the Mine. It corresponds with palustrine wetlands mapped as moderate potential terrestrial groundwater dependent ecosystems (GDEs) in the GDE atlas. The clay-rich substrates of these wetlands are likely to hold surface water runoff for extended periods, creating aboveground conditions for the wetland ecosystem.

However, the WPA area associated with the HES wetland remains outside of the footprint and, therefore, there are no expected impacts from mining.

### 7.3.2 Potential impacts to environmental values

Not applicable.

### 7.3.3 Risk and magnitude of impacts

Not applicable.

## 7.4 Land

### 7.4.1 Existing environment

The Mine consists of a range of land tenures (Table 13).

**Table 13 Land tenure**

| Mining lease | Underlying cadastre | Tenure |
|---|---|---|
| ML70161 | 9SP113033 | Lands Lease |
| ML70163 | Dedicated road | State Land / Road Reserve |
| ML70164 | 1SP107309 | Freehold |
| ML70236 | 1SP107309 | Freehold |
| ML70237 | 1SP144274 | Lands Lease |
| | 3SP144274 | State Land |
| | 21SP130065 | Lands Lease |
| | 22SP130064 | Lands Lease |

Undisturbed topography is gently undulating with maximum variation over the area of 36 m to the west. Locally, there are no dominant topographic features.

Principal economic coal seams of the Rangal Coal Measures in the region are, in ascending stratigraphic order the Vermont, Leichhardt and Phillips Seams. Pit floors are formed on the floor of the Leichhardt Seam.

Overburden removal and coal mining are done using conventional truck and excavator methods. The mining pits are currently four discrete voids as per *Table C3* of the EA (Table 4) which will likely form one continuous pit upon closure.

A detailed description of the environmental values of land is in the EMOS (APC 2002). In summary:

- pre-mining land use was cattle grazing on native and improved pastures, with limited carrying capacity;
- there are no Category A or Category B environmentally sensitive areas (ESA) and nature conservation areas (National or State Parks) in close proximity to the Mine;
- soil and spoil condition is generally considered poor, with:
  - texture contrast soils exhibiting high erosion potential,
  - highly sodic and dispersive Tertiary overburden; however
  - there is very low risk of acid generation, with generally high acid neutralising capacity in sampled overburden and waste, and no recorded acid mine drainage (AMD) in testing.

### 7.4.2 Potential impacts to environmental values

There are no potential impacts to EVs for land other than what has already been approved under condition C1 and *Table C3 (Residual void design)* of the EA which include provisions for the residual void(s). Namely:

> *Residual void(s) must comply with the following outcomes:*
>
> *1. Residual void(s) must not cause any serious environmental harm to land, surface waters or any recognised ground water aquifer, other than the environmental harm constituted by the existence of the residual void(s) itself, and subject to any other condition within this environmental authority.*

The residual void(s) will act as a sink, therefore no proposed impacts to the surrounding surface water or groundwater are anticipated.

### 7.4.3 Risk and magnitude of impacts

There are no potential impacts to the land's EVs as a result of the proposed amendment. As such, there are no offsets required for EVs of the land.

## 7.5 Land use

### 7.5.1 Existing environment

The dominant pre-mining land use was cattle grazing on native grasses with the site experiencing some collective clearing. The *Preliminary Environmental Assessment Report* (IEP 1998) determined that the pre-mining land capability classification for the area was Class VII (land not suitable for agricultural or grazing uses), and that the majority of the project area (88 %) was Class VIII (land not suitable for agricultural or grazing uses).

A roughly 5 km stretch (~4967 m) of Peak Downs Highway, located just south of the Mine, is an established stock route. The Mine is located on land with a Native Title claim determination.

### 7.5.2 Potential impacts to environmental values

The residual void(s) will be bunded and fenced to prevent access by humans and animals. The residual void(s) will not cause any environmental harm to the surrounding environment and will be safe and structurally stable. Proposed completion criteria are in Section 4.6.

### 7.5.3 Risk and magnitude of impacts

There are no potential impacts to the land use EVs as a result of the proposed amendment.

## 7.6 Air

### 7.6.1 Existing environment

Air quality components were assessed for the EMOS (APC 2002). EVs associated with air quality include an airshed that is typical of a rural area impacted by agricultural, mining and exploration activities on sealed and unsealed roads.

### 7.6.2 Potential impacts to environmental values

Potential adverse impacts on air quality are related to dust generation arising from mining. Particulate emissions may be emitted from the following operations:

- haulage on unsealed roads;
- mining;
- conveyors;
- infrequent blasting; and
- wind action on stockpiles prior to revegetation.

Coppabella township is ~10 km south-west of the MLs. Other sensitive receptors are:

- Harrybrandt residence located ~8 km east of the ML boundary;
- Wanella residence located ~5 km south of the wash plant; and
- Spring Creek residence located ~8 km north-west of Creek Pit.

Air quality is monitored for health and safety purposes on a regular basis, and air quality for environmental purposes has been monitored at nearby locations just off lease on a monthly basis since operations began (at time of writing, EMOS 2002).

During the life of the operation to date (EMOS 2002), no complaints regarding odour or air quality have been received, and air quality is not expected to be impacted on a local or regional level.

### 7.6.3 Risk and magnitude of impacts

There are no potential impacts to the air EVs as a result of the proposed amendment.

## 7.7 Acoustic

### 7.7.1 Existing environment

Noise and vibration levels were assessed as a part of the EMOS (APC 2002). EVs associated with noise levels are typical for a rural environment, and this describes the EV to be protected during mining.

### 7.7.2 Potential impacts to environmental values

The main sources of noise are:

- rock drill operation;
- haulage vehicles;
- earthmoving equipment;
- wash plant facility; and
- rail noise at load facility.

The highest ambient noise levels are from the rock drill for blasting operations. Rock drilling operations are infrequent and typically carried out during daylight hours. All haulage and plant equipment are likely to be significantly quieter. Wash plant and rail noise levels are detailed in the EMOS (2002). There will be no intrusive or unreasonable noise attributed to mining at the sensitive receptors listed in Section 7.6.2.

### 7.7.3 Risk and magnitude of impacts

There are no potential impacts to acoustic EVs as a result of the proposed amendment.

## 7.8 Waste

### 7.8.1 Existing environment

In relation to waste management, EVs are associated with health and well-being of the local community, and maintaining diversity of ecological processes. Potential sources of waste and land contamination include:

- vehicle and plant maintenance operations;
- refuelling and associated storage;
- tyres;
- waste disposal;
- putrescible waste; and
- sewage.

Management of waste is discussed in the EMOS (2002) and the *Waste Management Plan* (PEACM 2018).

### 7.8.2 Potential impacts to environmental values

Waste will be managed to avoid direct or indirect impacts on the community and the environment.

### 7.8.3 Risk and magnitude of impacts

There are no potential impacts to the air EVs as a result of the proposed amendment.

## 7.9 Ecology

### 7.9.1 NUMA and residual void(s)

#### 7.9.1.1 Existing environment

E2M Pty Limited (E2M) was engaged by Peabody to assess terrestrial ecological values for the area in the north-eastern extent of ML 70164 (E2M 2024a, Appendix F) which comprises sections of the proposed residual void(s) and NUMA (Figure 3). The assessments focussed on Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Matters of State Environmental Significance (MSES) defined under the Queensland *Environmental Offsets Regulation 2014*.

The study area consists mostly of remnant vegetation situated on gently undulating plains of various soil types (corresponding to Land Zone 5), together with alluvial channels associated with Humbug Gully (Land Zone 3). It is in the Isaac River sub-catchment and includes a section of Humbug Gully. The area consists of forest co-dominated by *Casuarina cristata* and *Acacia harpophylla,* together with eucalypt woodlands dominated by *Eucalyptus populnea*, *E. crebra* and / or *E. platyphylla*. Areas around Humbug Gully are riparian woodlands dominated by *E. tereticornis* and *E. camaldulensis*.

An overview of terrestrial ecological values present within the study area, as identified during desktop and field assessments, are provided in the following sections.

#### 7.9.1.2 MNES vegetation

Desktop assessment identified four threatened ecological communities (TECs) that have the potential to occur within the study area. Of these, the brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC) that is listed as endangered under the EPBC Act, has previously been identified within the Mine (McCollum Environmental Management Services 2011).

Field investigations confirmed the presence of the Brigalow TEC, covering a total area of 47.07 ha within the study site. This community is listed as endangered under the EPBC Act. The Brigalow TEC is characterised by the presence of *A. harpophylla* as dominant in the tree layer, or co-dominant with other species (notably *Casuarina cristata*, other species of *Acacia*, or species of *Eucalyptus*). Condition thresholds for the TEC relate to a minimum patch size of 0.5 ha and exotic perennial plants must comprise less than 50% of the total vegetation cover of the patch, as assessed over a minimum sample area of 0.5 ha (DCCEEW 2023).

The Brigalow TEC was consistent with RE 11.5.16 where *A. harpophylla* occurred as both a dominant and co-dominant species in the canopy with *C. cristata*. Often *Eucalyptus populnea* would occur in the canopy within the system. The extent of this vegetation community was conservatively mapped during the field survey (Figure 3; E2M 2024a). Further survey and habitat quality analysis may determine that the total extent of Brigalow TEC may be reduced to exclude areas where *Casuarina cristata* is dominant and *Acacia harpophylla* is absent.

### 7.9.1.3 MSES vegetation

Desktop assessment identified the following categories of MSES vegetation mapped within the study area:

- Category B regulated vegetation comprising endangered and of concern REs (*Vegetation Management Act 1999* status);
- essential habitat; and
- regulated vegetation within the defined distance of a watercourse.

The field survey confirmed the presence of Category B MSES regulated vegetation comprising endangered REs. However, as individual RE polygons could be mapped at a finer scale than the mixed RE polygons currently mapped by DESI, the ground-truthed extent of Category B MSES regulated vegetation is lower than that identified by the desktop assessment.

The field assessment ground-truthed a total of four remnant REs, totalling 119.10 ha across the study area. Of this, 14.86 ha did not comprise a RE and was mapped as non-remnant. Descriptions of the extent and condition of each ground-truthed RE is in Table 14. All vegetation communities showed varying levels of degradation associated with historic land use, namely the encroachment of non-native shrub and ground-cover species, impacts of grazing pressure and occasionally the clearing / thinning of canopy trees.

**Table 14 Ground-truthed regional ecosystems**

| RE | *Queensland Vegetation Management Act 1999* status | Description | Area (ha) |
|---|---|---|---|
| 11.3.25 | Least concern | Watercourse fringing woodland of Eucalyptus tereticornis and E. camaldulensis with occasional co-dominance of Melaleuca leucadendra and M. fluviatilis. Corymbia tessellaris is common. A midstory layer is sometimes present with high diversity. This vegetation community exists as a thin band along Humbug Gully and Harrybrandt Creek and occasionally on adjacent levees. Midstream islands can occur supporting Melaleuca spp. and Imperata cylindrica. There is occasionally a weedy influence of Chloris gayana, Hyparrhenia rufa and Parthenium hysterophorus. | 12.33 |
| 11.5.2 | Least concern | *Eucalyptus crebra* woodland on gently undulating plains. The canopy showed heavy dominance of *E. crebra* with occasional *C. dallachiana, E. platyphylla, C. clarksoniana* and *C. erythrophloia*. The subcanopy was generally sparse with a high diversity of species including *Petalostigma pubescens*, *Bursaria incana, Denhamia cunninghamii, Alphitonia excelsa* and *Acacia holosericea.* The ground layer was dominated by *Melinis repens*[2], *Themeda triandra, Stylosanthes scabra*[2] and *Heteropogon contortus*. | 15.71 |

| RE | *Queensland Vegetation Management Act 1999* status | Description | Area (ha) |
|---|---|---|---|
| 11.5.3 | Least concern | *Eucalyptus populnea* woodland on gently undulating plains. Other trees in the canopy included *E. crebra*, *Corymbia dallachiana*, *C. clarksoniana* and *E. platyphylla*. In the north of the Secondary Study Area some areas were dominated by *Corymbia clarksoniana*. The subcanopy consisted of a mixed diversity including canopy recruits, *Alphitonia excelsa*, *Grevillea parallela*, *Acacia salicina*, *Cassia brewsteri* and *Petalostigma pubescens*. The shrub layer consisted of *Carissa ovata*, *Alphitonia excelsa, Sida hackettiana, Grewia latifolia, Breynia oblongifolia* and occasionally *Lantana camara*[2].<br>The ground layer was dominated by *Cenchrus ciliaris*[2], *Stylosanthes viscosa*[2] and *Heteropogon contortus,* however also contained *Aristida spp., Melinis repens*[2]*, Panicum effusum, Eragrostis sororia* and *Capparis lasiantha.* | 43.79 |
| 11.5.16 | Endangered | *Acacia harpophylla* or *Casuarina cristata* open forest to woodland in depressions on Cainozoic sand plains. Variation occurred across the study area with both trees (*Acacia harpophylla* and *casuarina cristata*) occurring at varying dominance and density. Other trees in the canopy include *Eucalyptus populnea, Terminalia oblongata, Flindersia dissosperma and Lysiphyllum* hookeri. The subcanopy and shrub layer often included a scrub understory with dry rainforest influence including *Psydrax odorata, Erythroxylum australe, Geijera salicifolia, Denhamia cunninghamii, Carissa ovata, Cynanchum viminale, Leichhardtia viridiflora, Capparis lasiantha, C. mitchellii, Alectryon diversifolius, and Diospyros humilis.*<br>The ground layer was sparse and dominated by native grasses. Common species were *Paspalidium distans, Heteropogon contortus, Sporobolus caroli, Ancistrachne uncinulata, Cenchrus ciliaris*[2]*, Megathyrsus maximus*[2]*,* and *Cheilanthes distans.*<br>This vegetation community occurred in wetter areas around drainage lines and low points accumulating a higher clay content. This resulted in some areas with gilgai microrelief within the study area. | 47.27 |

1. Adapted from E2M 2024a.
2. Indicates a naturalised species.

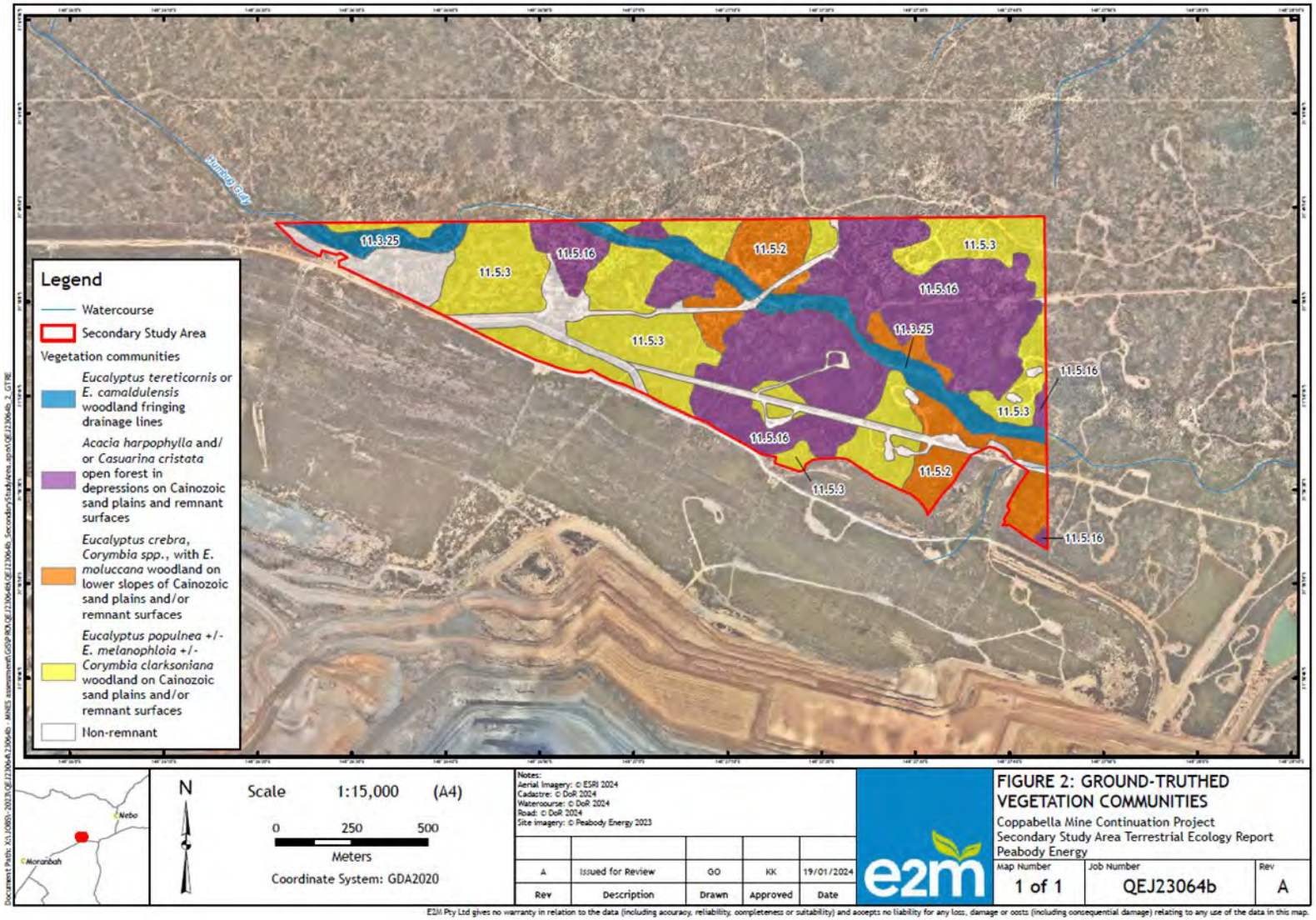



**Figure 3 Ground-truthed vegetation communities (E2M 2024a)**

### 7.9.1.4 Habitat for MNES and MSES species

The desktop assessment identified the following MNES and MSES flora and fauna species listed under the EPBC Act and NC Act as potentially occurring within, or in proximity to, the study area:

- 42 threatened flora and fauna species, including:
  - 10 flora species;
  - 21 birds;
  - seven mammals;
  - five reptiles; and
- 13 migratory fauna species.

MSES wildlife habitat has also been mapped within the study area (Appendix F), including essential habitat for the following species:

- greater glider (central) (*Petauroides armillatus*) – endangered under the EPBC Act and NC Act;
- koala (*Phascolarctos cinereus*) – endangered under the EPBC Act and NC Act;
- ornamental snake (*Denisonia maculata*) – vulnerable under the EPBC Act and NC Act; and
- squatter pigeon (southern) (*Geophaps scripta scripta*) – vulnerable under the EPBC Act and NC Act.

### 7.9.1.5 Likelihood of occurrence assessment

Information from desktop and field investigations completed identified one TEC that is known to occur within the study site as confirmed during field surveys, namely:

- brigalow (*Acacia harpophylla* dominant and co-dominant).

An additional eight MNES and MSES flora and fauna species are considered likely to occur within the study area:

- fork-tailed swift (*Apus pacificus*);
- glossy black cockatoo (northern) (*Calyptorhynchus lathami erebus*);
- greater glider (southern and central) (*Petauroides armillatus*/ *Petauroides volans*);
- koala (*Phascolarctos cinereus*);
- ornamental snake (*Denisonia maculata*);
- short-beaked echidna (*Tachyglossus aculeatus*);
- squatter pigeon (southern) (*Geophaps scripta scripta*); and
- white-throated needletail (*Hirundapus caudacutus*).

Of these species, koala, ornamental snake and squatter pigeon (southern) have previously been confirmed as present within the Mine (McCollum Environmental Management Services 2011, Wormington 2015).

The likelihood of occurrence assessment also identified four species as possibly occurring within the study area, including:

- *Macropteranthes leiocaulis*;
- oriental cuckoo *(Cuculus optatus);*
- rufous fantail (*Rhipidura rufifrons*)*;* and
- satin flycatcher (*Myiagra cyanoleuca*).

A full assessment for all potentially occurring species is in Appendix F.

### 7.9.1.6 MNES and MSES protected areas

No MNES protected areas or MSES conservation areas are mapped within the study area.

#### 7.9.1.7 MNES and MSES wetland areas

No MNES wetlands are mapped within, or in close proximity to, the study area. No MSES wetland values (other than the regulated vegetation watercourse mentioned above) are mapped within the study area.

#### 7.9.1.8 Ecological function

The study area is adjacent to land which is currently actively mined. While some disturbances were observed during the field survey (including access tracks, grazing, selecting thinning and infestation by pest species), the area supports remnant Eucalypt and Acacia woodlands and is connected to expansive tracts of similar vegetation communities to the north, east and west. Accordingly, the study area has a role in supporting biodiversity values at both local and regional scales, including the following ecological functions:

- supporting a diversity of flora and fauna populations;
- maintaining genetic diversity;
- providing breeding, shelter and foraging resources for a diversity of fauna including threatened species;
- providing of fauna movement opportunities across the landscape, particularly along the riparia corridor; and
- facilitating of plant reproductive processes including pollen and propagule dispersal.

#### 7.9.1.9 Potential impacts to ecological values

Mining within the proposed disturbance area has the potential to result in the following impacts:

- clearing of vegetation, including regulated vegetation (MSES) and Brigalow TEC (MNES);
- loss of habitat and resources, including habitat and resources for MSES and MNES species;
- habitat degradation;
- disruption of habitat connectivity along the riparian corridor, including connectivity for MNES and MSES species;
- injury or mortality of fauna, including MNES and MSES species;
- introduction or spread of pest species;
- disturbance from light, dust and noise;
- increased risk of fire incursion;
- increased sedimentation and erosion (including of watercourse banks);
- hydrological changes;
- changes in surface water and groundwater quality; and
- groundwater drawdown.

Potential impacts to ecological values are further detailed in Section 7.9.4 and in *Table 3* of Appendix F.

### 7.9.2 Humbug Gully Creek diversion

#### 7.9.2.1 Existing environment

E2M Pty Limited (E2M) was engaged by Peabody to assess terrestrial ecology values that are listed as MSES under the EPBC Act. This information (E2M 2024b) (Appendix G) will be submitted as supporting documentation for an EPBC Act Referral (the Referral).

Peabody has determined that land use within MLs 70164, ML 70161 and ML 70237 is permitted without further Commonwealth Government and Queensland State Government approval.

However, assessment of MNES, including water resources in relation to a coal mining development, are likely to be required for proposed disturbance areas within ML 70236. This includes Stage 3 diversion of Humbug Gully Creek, situated north of the Mine and partially located within Mineral Development License (MDL) 494. The proposed watercourse diversion comprises three stages (Section 5.0), utilising existing watercourses along

the western extent of the MLs to connect with an unnamed tributary of Harrybrandt Creek. Accordingly, these areas were the primary focus of this assessment.

The proposed disturbance footprint applicable to the Referral comprises:

- Stage 3 Humbug Gully diversion design plus a 100 m works buffer, located within MDL 494; and
- areas proposed for disturbance within ML 70236.

E2M (2024b) details the cumulative findings of a desktop assessment and field survey to assess the proposed impacts on MNES and whether they are likely to constitute a significant impact defined in the *Significant Impact Guidelines 1.1* (MNES Guidelines).

This will be used to inform consideration of ecological matters required for development and approvals associated with the diversion project, including:

- methods undertaken during the desktop assessment and field survey;
- ground-truthed REs and TECs, their condition, structure and composition, including a summary of the extent and area of each RE and TEC within the study area;
- the presence and condition of fauna habitat, including likelihood of occurrence of EPBC Act-listed flora and fauna species; and
- self-assessment against the MNES Guidelines for MNES that are known or likely to occur within the study area.

Peabody also engaged E2M to undertake a desktop assessment for prescribed environmental matters (PEMs) (as defined under Part 3 Item 10 of the Queensland *Environmental Offsets Act 2014*) known to occur or potentially occurring across the Mine (E2M 2024c) (Appendix H). This study was used to inform the EVs for Stage 1 and Stage 2 diversion works (Figure 4).

An overview of the MNES, MSES and Matters of Local Environmental Significance (MLES) PEMs within the proposed disturbance area, as identified during desktop assessment, are provided in the following sections.

#### 7.9.2.2 MNES

The Protected Matters Search Tool (PMST) identified the following MNES as known to occur or potentially occurring across the Mine:

- 4 listed TECs;
- 24 listed threatened species, and
- 9 listed migratory species.

Of these matters, three listed threated species are known to occur within the proposed diversion disturbance area, with another 4 threatened species possibly occurring. MNES known or likely to occur within the proposed disturbance area include the following matters prescribed under the *Environmental Offsets Act 2014*:

- Habitat for MNES threatened fauna species known to occur within the proposed disturbance area (Figure 2), including:
  - suitable foraging, shelter and dispersal habitat for the Endangered koala (*Phascolarctos cinereus*), comprising areas of remnant, regrowth and non-remnant vegetation containing food and / or shelter trees; and
  - suitable foraging, shelter and dispersal habitat for the Vulnerable ornamental snake (*Denisonia maculata*) comprising remnant REs 11.3.4, 11.3.25, 11.5.2 and 11.5.3, and suitable foraging, breeding and dispersal habitat for the Vulnerable squatter pigeon (southern) (*Geophaps scripta scripta*) comprising remnant RE 11.3.4, 11.3.25, 11.5.2, 11.5.3, 11.5.8, and 11.7.2 and nearby areas of regrowth and / or non-remnant habitat with low sparse ground cover suitable for foraging.

As well as to the abovementioned MNES species / communities, the desktop assessment identified the likely presence of water resources considered MNES in relation to actions involving large coal mining developments (pursuant to the *EPBC Amendment Act 2013*), including:

- minor riverine system drainage lines containing ephemeral water; and
- a lacustrine wetland (impoundment area) associated with the proposed creek diversion.

#### 7.9.2.3 MSES

MSES known to occur within the proposed disturbance area include the aforementioned threatened MNES flora and species as well as a number of MSES not considered MNES. These additional MSES include the following matters prescribed under the *Environmental Offsets Act 2014*:

- Regulated vegetation, including:
  - prescribed (Category B) regional ecosystems that are an Endangered RE including remnant RE 11.4.9 (*Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains) (Figure 4);
  - prescribed (Category B) REs that are an Of Concern including remnant RE 11.3.25 (*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines) and prescribed vegetation intersecting a wetland on the state vegetation management wetlands map (Figure 4);
  - mapped Essential Habitat for Endangered and Vulnerable wildlife, including the koala (*Phascolarctos cinereus*), squatter pigeon (southern) (*Geophaps scripta scripta*), and ornamental snake (*Denisonia maculata*); and
  - prescribed (Category B) vegetation within a defined distance of a water course.
- Protected Wildlife Habitat for Endangered, Vulnerable and non-migratory Special Least Concern animals known to occur on site, including koala, squatter pigeon (southern) and ornamental snake.
- Queensland waterways for waterway barrier works, including low, moderate, and high value waterways.

#### 7.9.2.4 MLES

No additional MLES considered PEMs under the *Environmental Offsets Act 2014* were identified in the Isaac Regional Council Planning Scheme 2021.

#### 7.9.2.5 Potential impacts to environmental values

Construction and operation of the Humbug Gully Creek diversion has the potential to impact on MNES both directly and indirectly.

Potential direct impacts on MNES include:

- vegetation clearance and associated habitat removal;
- habitat disturbance and degradation, including:
  - fragmentation and edge effects;
  - incursions by pest flora and fauna;
  - increased light, noise and dust levels;
  - fauna injury and / or mortality;
  - erosion, sedimentation and spills; and
  - increased risk of fire.

Potential indirect impacts on MNES include:

- hydrological impacts to ecosystems from watercourse diversion; including
  - changes in surface water and groundwater quality;
  - erosion and sedimentation; and
  - groundwater drawdown.

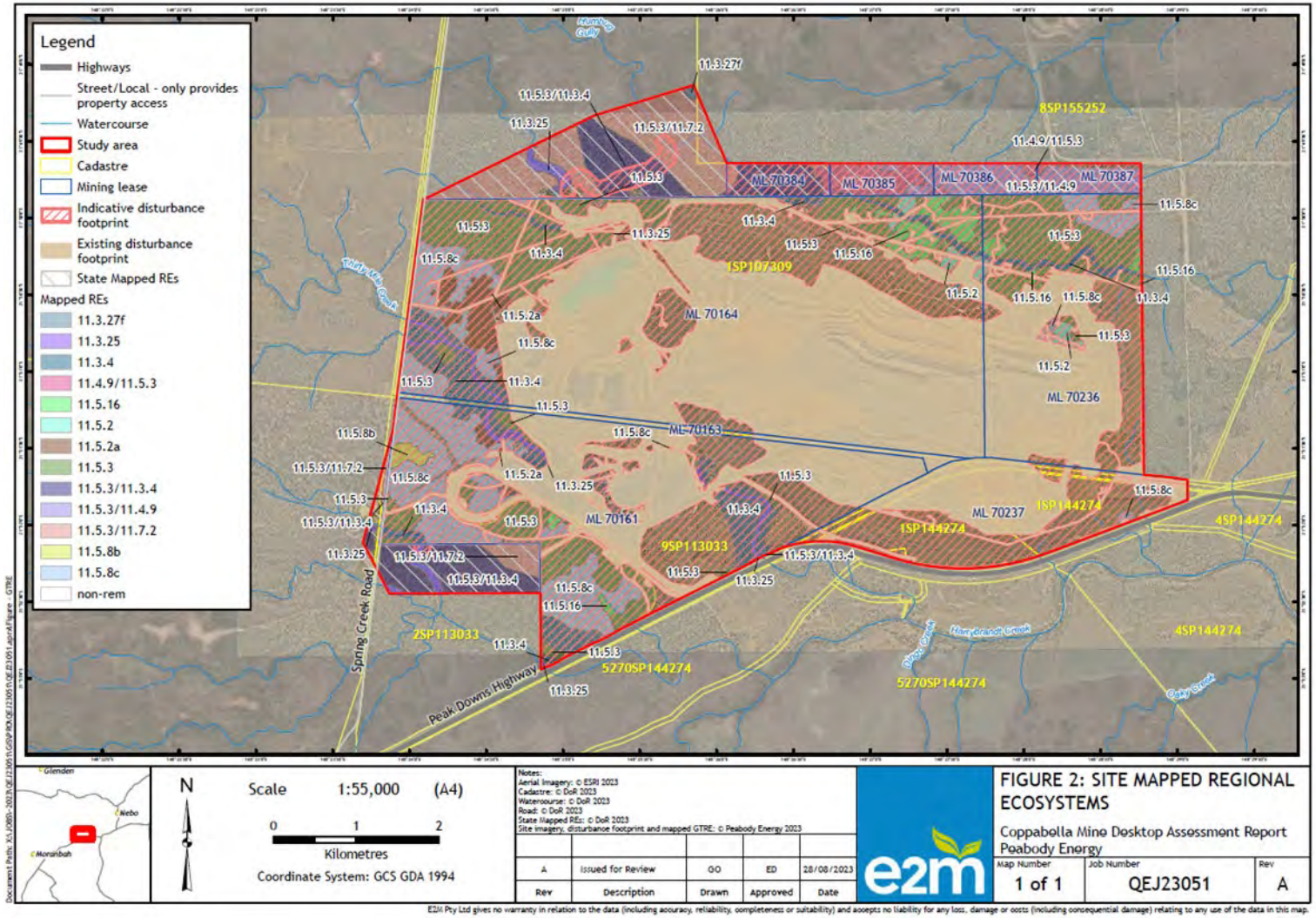



**Figure 4 Desktop site-mapped regional ecosystems (E2M 2024c)**

These impacts are discussed in the *MNES Terrestrial Ecology Report* (E2M 2024b) and summarised in the following sections.

a Vegetation clearing and habitat removal

Clearing and removal of native vegetation within the disturbance footprint has the potential to directly impact MNES flora and fauna species by:

- eliminating or reducing the extent / availability of nesting, denning and roosting / shelter habitat;
- fragmenting habitat;
- removing or reducing the availability of food and foraging habitat; and;
- increasing competition through reduced availability of resources.

Vegetation clearing can also exacerbate the impact of other threatening processes on threatened species / communities.

A total of 1,160 ha of remnant vegetation was ground-truthed with the disturbance footprint containing approximately 245 ha of remnant and 120 ha of non-remnant vegetation, including 10.69 ha of Brigalow TEC. A summary of direct impacts on vegetation communities within the disturbance footprint are in *Table 6* in Appendix G.

Vegetation clearing for the Project will also have direct impacts on potential terrestrial GDEs and fauna habitat (including habitat for MNES fauna specie), within the disturbance footprint. A summary of habitat for MNES species directly impacted by the Project is in *Table 7* in Appendix G.

b Habitat disturbance and degradation

*Fragmentation and edge effects*

The diversion site is comprised predominantly of remnant vegetation and large tracts of contiguous native vegetation. Clearing within the disturbance footprint is therefore likely to fragment habitat as well as resulting in edge effects in adjacent habitat areas.

Remnant and regrowth vegetation within and adjacent the Disturbance Footprint is likely important for fauna movement within the Study Area and wider surrounds. Riparian vegetation associated with Humbug Gully serves as a movement corridor for a number of fauna species, including koala and greater glider. Clearing is likely to fragment habitat and result in the loss of connectivity values associated with this riparian corridor.

Clearing and construction activities could also degrade areas of adjoining habitat as a result of edge effects. This can include reduced quality and suitability of habitat due to changes in vegetation cover along ecotones and adjacent disturbance areas.

*Pest flora and fauna*

Vegetation clearing and other activities associated with the Project have the potential to impact native flora and fauna within the disturbance area and surrounds (including MNES species) through the introduction and spread of pest plant and animal species.

Introduced flora species disrupt ecosystems by outcompeting and replacing native species, resulting in altered ecosystem diversity and function. Proliferation and spread of environmental weeds and pests may occur with vegetation clearing, soil disturbance and increased movement of heavy machinery and vehicles. Weed seeds can be transported in contaminated landfill, seed and material on machinery, vehicles or personnel.

Construction activities have the potential to spread or introduce weeds throughout adjacent environs, resulting in the reduction in vegetation / habitat quality and native species assemblages. Pest flora incursions have the potential to impact MNES through the degradation of vegetation community structure and composition. Resulting changes in vegetation structure and composition can also result in increased fuel loads and more

frequent and intense fires. This may potentially provide favourable conditions for pest fauna to proliferate and facilitate movement of pest fauna.

*Increased light, noise and dust levels*

Construction and operational activities can disrupt local fauna roosting, breeding and foraging activities as a result of increased exposure to artificial lighting, noise / vibration and dust. Fauna will generally move away from noise and light sources as these may be perceived as a threat. Acclimatisation by some species is likely to occur over the medium to long term and many of the species identified in the project area are known to occur in areas subject to noise, light and human activity.

*Fauna injury and / or mortality*

Clearing and earth works within the project area have the potential result in the injury and / or mortality of MNES fauna present within the Disturbance Footprint. Open excavation areas also pose a risk to fauna with animals falling into open pits or trenches potentially succumbing to injury and / or becoming trapped and subsequently dying (due to lack of cover, water and / or foraging resources and or drowning following heavy rain). Animals moving through the disturbance area may also be susceptible to vehicle strike during construction and operational phases of the project.

*Erosion, sedimentation and spills*

Erosion and contamination of soils and water may occur as a result of construction and operational activities, such as vegetation clearing, unexpected releases and operation of heavy machinery. Soil erosion may occur in areas disturbed by activities associated with the project, particularly in relation to the diversion of Humbug Gully Creek. Erosion can remove the most productive part of the soil profile, the topsoil, resulting in a greatly reduced opportunity for natural regeneration of vegetation communities (unless stockpiled). Where these activities occur on dispersive soils and / or on slopes, sedimentation of watercourses can occur. Impacts to aquatic ecosystems can include build-up of sediment in waterholes with a resultant reduction in available microhabitat and smothering of aquatic plants and substrate.

Inappropriate disposal of liquid and solid wastes, including spills and leaks from transfers (fuel, chemicals) and inadequate storage may also result in point-source contamination of surrounding land, including habitats of threatened and migratory species. Direct adverse impacts include toxic impacts on vegetation (resulting in degradation or loss), direct toxic impacts on fauna (from contact, inhalation or ingestion) or indirect impacts on threatened species from habitat loss. Direct adverse impacts on surface and groundwater quality are also possible.

*Increased risk of fire*

Increased risk of fire incursion is more likely to be associated with the construction phase of the project. Construction activities have the potential to increase the risk of fire, causing injury or loss of human life, loss of flora and vegetation, fauna and habitat and impacting surface water quality. Aspects of the project that could lead to more frequent or intense fires include:

- introduction of ignition sources including vehicles and machinery and equipment such as generators;
- welding, grinding and other hot works; and
- introduction or spread of weed species which can increase fuel load.

Depending on the extent, severity and frequency of increased fire incursion, impacts may be either short-term or long-term. These risks are considered low with the implementation of on-site controls and adherence to local bushfire restrictions, particularly during the dry conditions.

#### 7.9.2.6 Changes in surface water and groundwater quality

The project has the potential to alter existing hydrological conditions within the project area and surrounds, including surface water flows and groundwater levels. The proposed diversion of surface flows on Humbug Gully

Creek may have a downstream influence on surface flow volumes to the east, where fringing riparian habitats are identified as potential Terrestrial GDEs and supporting habitat for MNES threatened fauna. Further assessment of surface flow impacts resulting from the project, particularly on Humbug Gully where a diversion is proposed, will be required to adequately assess impacts to Terrestrial GDEs and downstream environs.

Additional impacts on surface water quality may arise from leakage or accidental spills of fuel or other chemicals stored onsite used during construction or operation entering drainage lines and waterways. Potential sources of waterway contamination include:

- chemical and fuel spills from temporary refuelling facilities;
- temporary chemical storage facilities (including oil and waste oil); and
- construction / commissioning of permanent fuel and chemical storage facilities.

Without appropriate mitigation measures, contaminated runoff generated through these activities could enter drainage lines, altering the physical and chemical characteristics of receiving waters. This in turn may result in acute and / or chronic toxicity effects on aquatic plants and animals as well as terrestrial fauna accessing contaminated water to drink.

The significance of potential impacts on surface and ground waters will depend on the quantity and nature of contaminants as well as whether the contaminants are directly released to surface waters. If spills or leaks occur in construction areas, contaminants will either soak into soils or be captured by sediment containment devices and / or permanent stormwater systems.

a Erosion and sedimentation

Changes in surface water quality may also impact terrestrial ecosystems downstream of disturbance associated with the project due to increased erosion and sedimentation of receiving surface waters and mobilisation of other contaminants in runoff from construction and disturbance areas. These changes in water quality have the potential to impact vegetation and habitat fringing the proposed Humbug Gully diversion as well as communities located downstream including Humbug Gully and Harrybrandt Creek.

The potential impacts of the diversions on the connected reaches of existing creek have, at a broad temporal and spatial scale, been mitigated by designing the diversion according to the principles stated in Section 5.1.3.3a and through incorporation of outcomes of the latest ACARP research.

There is a recognised risk associated with constructed waterway diversions that, should large flow events occur early in operation, there is potential for greater erosional adjustments to occur than would otherwise if riparian vegetation were more established. This will be mitigated to the extent practicable by design and the revegetation program.

*Humbug Gully Upstream Reach*

Hydrological modelling by Alluvium (2023) shows the existing upstream reach of Humbug Gully to have minimal change. Some backwater effects could occur in large flood events, with similar effect to the existing conditions.

*North Arm Thirty Mile Creek Upstream Reach*

There is expected to be minimal change in the hydrologic and geomorphic regime of the North Arm Thirty Mile Creek upstream reach other than some deposition potential due to backwater influence in large to extreme flood events. This will be less of an influence than the backwater influence of the current impoundments on the waterway.

*South Arm Thirty Mile Creek Reach (between the two proposed diversions)*

The majority of this reach is likely to be a backwater depositional zone created by the relative confinement of the proposed South Arm to Harrybrandt Creek diversion also passing through hillslope. This is unlikely to change

the conditions of extreme aggradation already occurring in the reach due to high sediment inputs from upstream agricultural land uses.

*Harrybrandt Creek Reaches*

The diversion of North and South Arm Thirty Mile Creek into Harrybrandt Creek will alter the physical processes occurring in Harrybrandt Creek through to the existing confluence with Thirty Mile Creek due to an increase in catchment area, total runoff volumes and sediment sources, transport and fate. Despite this, assessment of the geomorphic character and behaviour of Harrybrandt Creek and post diversion conditions hydraulic modelling suggests physical impacts to Harrybrandt Creek will be minimal and threats to existing stream health and environmental values is low.

Existing dams on Harrybrandt Creek upstream of the mine lease are providing a discontinuity in bedload sediment supply to the existing system. The diversion of Humbug Gully, North and South Arm Thirty Mile Creek will provide bedload sediment inputs and replace that removed by the dams. The relative transport capacities of the post diversion reaches suggests that Harrybrandt Creek will have the ability to transport sediment inputs from Thirty Mile Creek through the system without creating substantial reach-wide deposition.

Prior to establishment of mature riparian vegetation in the proposed diversions there is a potential risk of increased fine sediment loads being generated from the materials through which the diversion will be excavated. As the modelled reaches of Harrybrandt Creek are capable of transporting substantial volumes of fine sediment the potential impact is expected to be minimal. However, the sediments would be deposited somewhere further downstream. This potential risk has been mitigated as much as practicable through design in accordance with current best practice, and upon implementation of the revegetation program.

b Groundwater drawdown

The project will likely require dewatering to lower groundwater levels to the base of the proposed workings for safe and efficient mining activities within ML 70236 (in addition to approved development areas within ML 70164). Groundwater levels within the project area may also be impacted by changes in groundwater infiltration and groundwater aquifer as a result of the proposed watercourse diversion and excavation of the pit area. As a result, groundwater levels will likely be lowered during the construction and operational phases.

Lowering of groundwater levels could potentially have an adverse impact on terrestrial GDEs and associated habitat for MNES fauna within the project area. Further detailed assessment of impacts to groundwater and associated Terrestrial GDEs, particularly along Humbug Gully and associated floodplains, will be required to adequately assess impacts on Terrestrial GDEs and associated habitat for MNES fauna species (in particular greater glider and koala).

# 8.0 Assessment level decision

SGME believes the assessment level decision to be a **minor amendment** to amend conditions C1 and C4.

An explanation is given below against the minor amendment requirements in section 223 of the EP Act.

A minor amendment (threshold) for an EA is an amendment that the administering authority is satisfied that:

*(a) is not a change to a condition identified in the authority as a standard condition other than — (i) a change that is a condition conversion; or (ii) a change that is not a condition conversion but that replaces a standard condition of the authority with a standard condition for the environmentally relevant activity to which the authority relates; and*

The Mine operates under a site-specific EA that does not contain any standard conditions.

*(b) does not significantly increase the level of environmental harm caused by the relevant activity; and*

The proposed amendment does not significantly increase the level of environmental harm caused by the relevant activity because the residual void(s):

- would act as a groundwater sink in perpetuity preventing migration into adjacent aquifers;
- reached equilibrium well below the point at which it could spill to the surrounding environment;
- is not located in a floodplain; and
- would be bunded and fenced to prevent access.

*(c) does not change any rehabilitation objectives stated in the authority in a way to result in significantly different impacts on environmental values than the impacts previously permitted under the authority; and*

As per the WMP, areas below original ground level (including the void(s), low walls and highwalls), do not have a defined land use and are therefore considered equivalent to NUMAs.

A post mine land suitability classification of Class 5 is conditioned for the residual void(s) in *Table C1*. Class 5 land is considered unsuitable for the specified land use, as it has limitations that singly or in aggregate are so severe that the benefits would not justify the inputs required to initiate and maintain sustainable production in the long term.

Notwithstanding, the residual void(s) approved in the EA would have no mechanism for salt removal and the ability of hypersaline residual void(s) to support a PMLU is not well understood.

*(d) does not significantly increase the scale or intensity of the relevant activity; and*

The proposed amendment does not significantly increase the scale or intensity of the relevant activity.

*(e) does not relate to a new relevant resource tenure for the authority that is — (i) a new mining lease; or (ii) a new petroleum lease; or (iii) a new geothermal lease under the Geothermal Energy Act; or (iv) a new GHG injection and storage lease under the GHG storage Act; and*

Not applicable.

*(f) involves an addition to the surface area for the relevant activity of no more than 10% of the existing area; and*

The proposed amendment does not involve an addition to the surface area for a relevant activity.

*(g) for an environmental authority for a petroleum activity — (i) if the amendment involves constructing a new pipeline — the new pipeline does not exceed 150 km; and ii) if the amendment involves extending an existing pipeline — the extension does not exceed 10% of the existing length of the pipeline; and*

Not applicable.

*(h) if the amendment relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit — seeks, in the amendment application under section 224, an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit.*

Not applicable.

# 8.1 Public notification

An application for a major amendment of an EA may trigger public notification if the amendment is for a resource activity and the administering authority decides:

- the amendment is likely to lead to a substantial increase in the risk of environmental harm under the amended EA; and
- the risk is the result of a substantial change in:
  - the quantity or quality of contaminant permitted to be released to the environment; or
  - the results of release of a quantity or quality of contaminant permitted to be released into the environment.

SGME believes that the amendment should not trigger public notification because:

- the amendment will not lead to a substantial increase in the risk of environmental harm than previously approved; and
- the amendment does not result in substantial change in the quantity or quality of contaminant permitted to be released to the environment.

# 9.0 Conclusions

PEACM is seeking to amend conditions C1 and C4 of the EA to reflect that the residual void(s) is not able to sustain a PMLU of native ecosystem and will form a NUMA.

An EA amendment is needed to:

- modernise *Table C1,* which:
  - includes residual void(s) for which no post-mining land use is proposed; and
  - should clearly reflect that the low walls, end walls and highwalls are part of the non-use management area (NUMA);
- update *Table C1*, which contains projective surface areas that are not consistent with current disturbance or the life of mine (LOM) plan; and
- update *Table C3*, which authorises four discrete final voids that are not consistent with the final landform.

# References


Alluvium 2023, *Coppabella Diversion Design – Detail Design Report*, prepared for Peabody Energy Australia PCI (C&M Management) Pty Ltd by Alluvium Consulting Australia Pty Limited.

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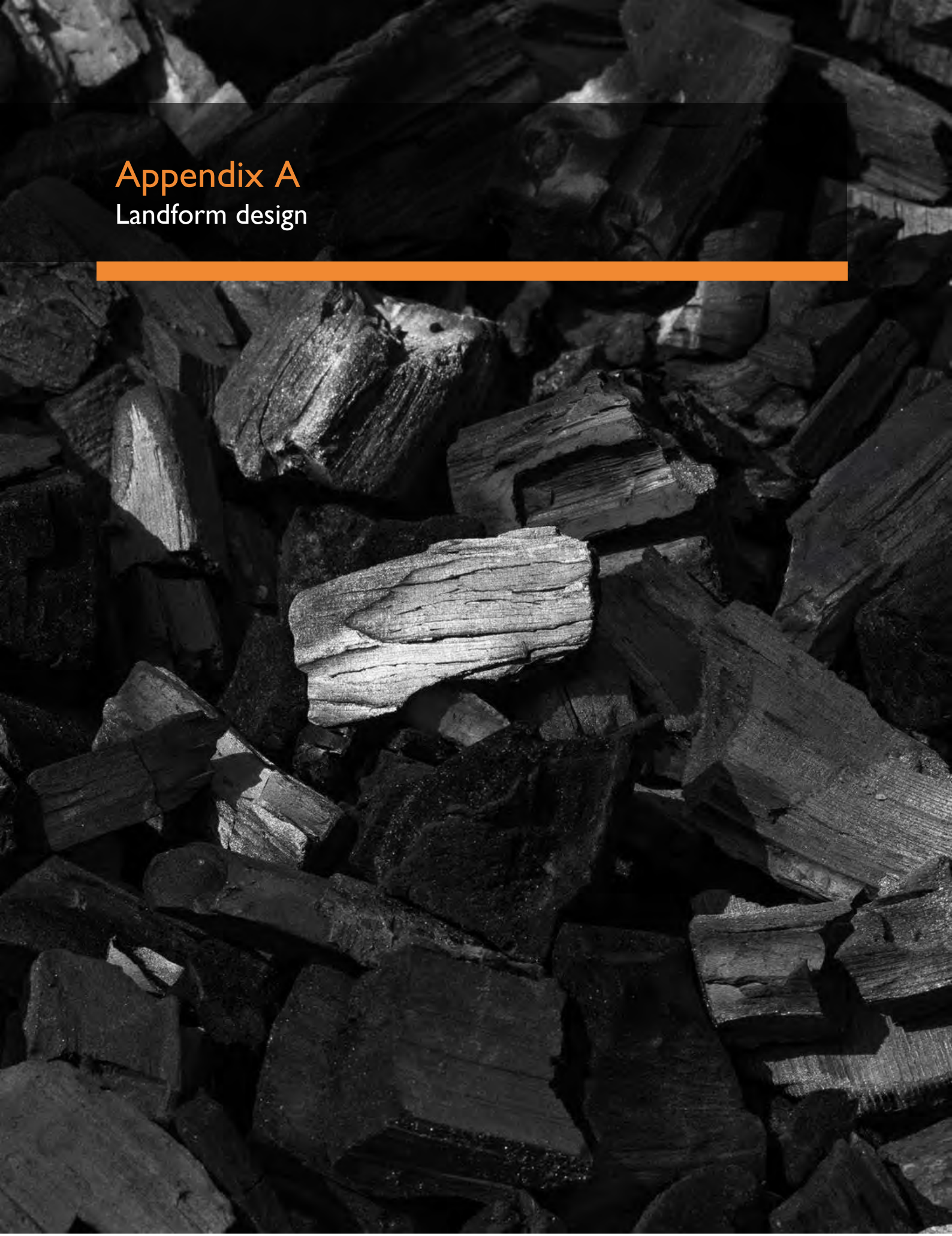

# Appendix A
## Landform design

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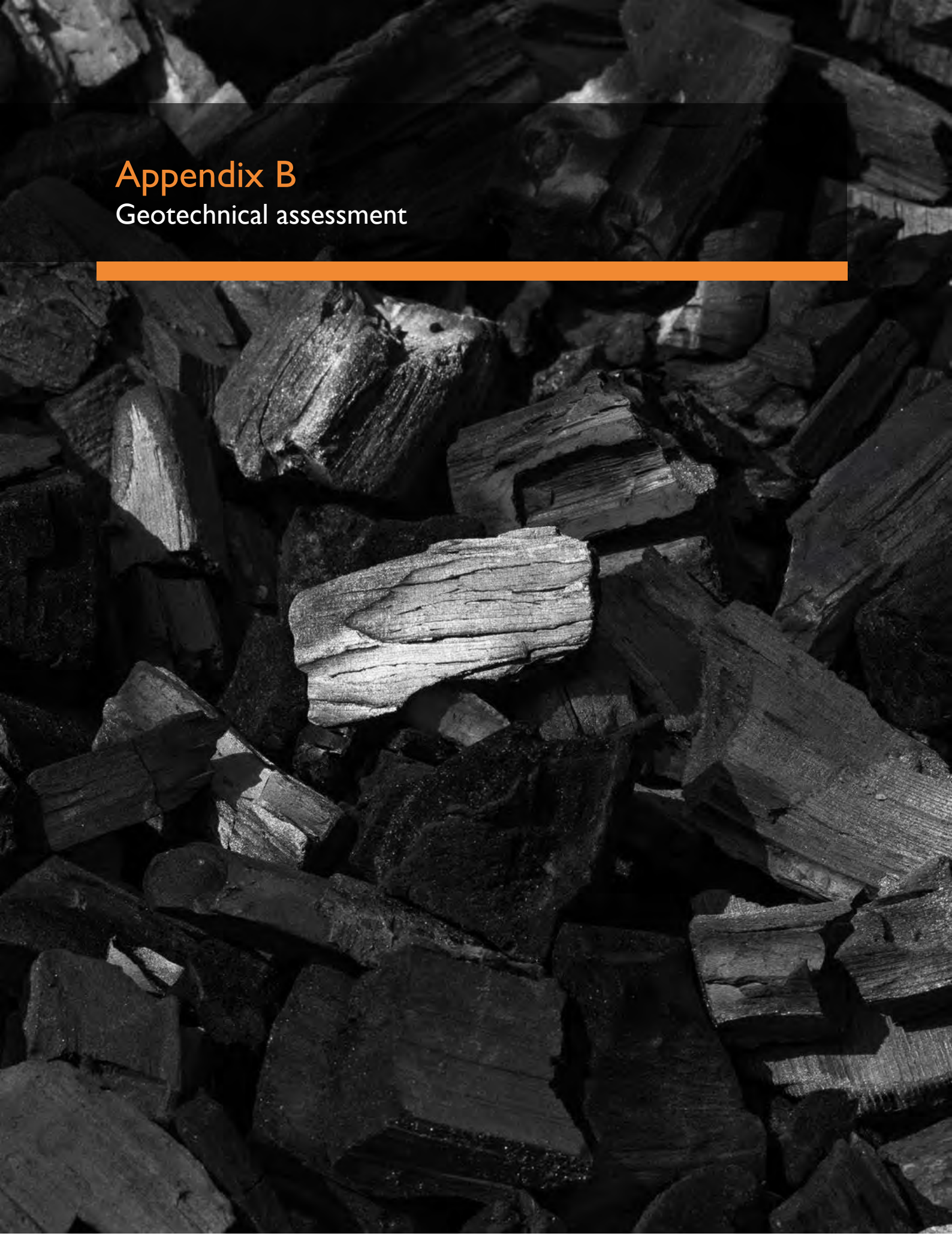

# Appendix B
## Geotechnical assessment

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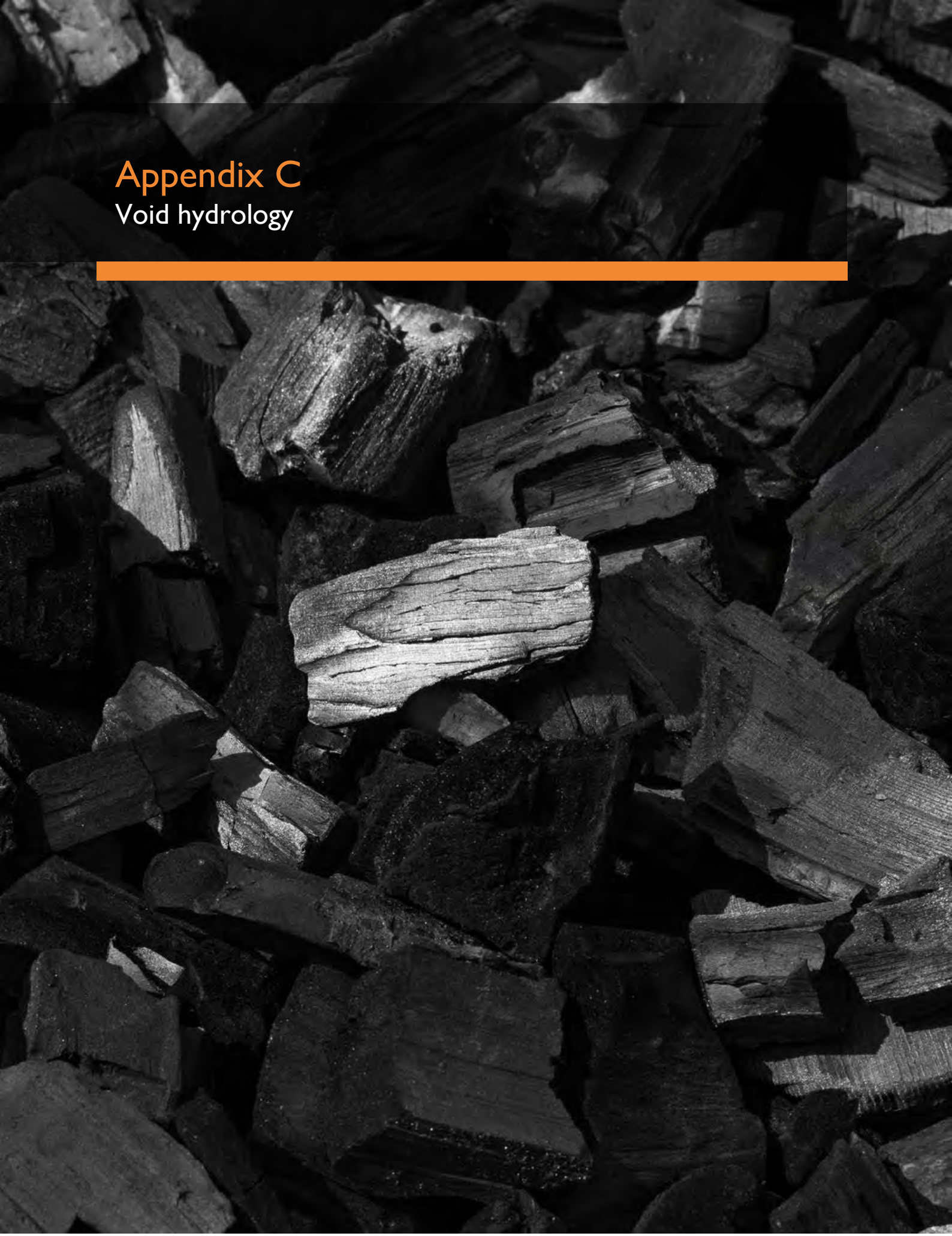

# Appendix C
## Void hydrology

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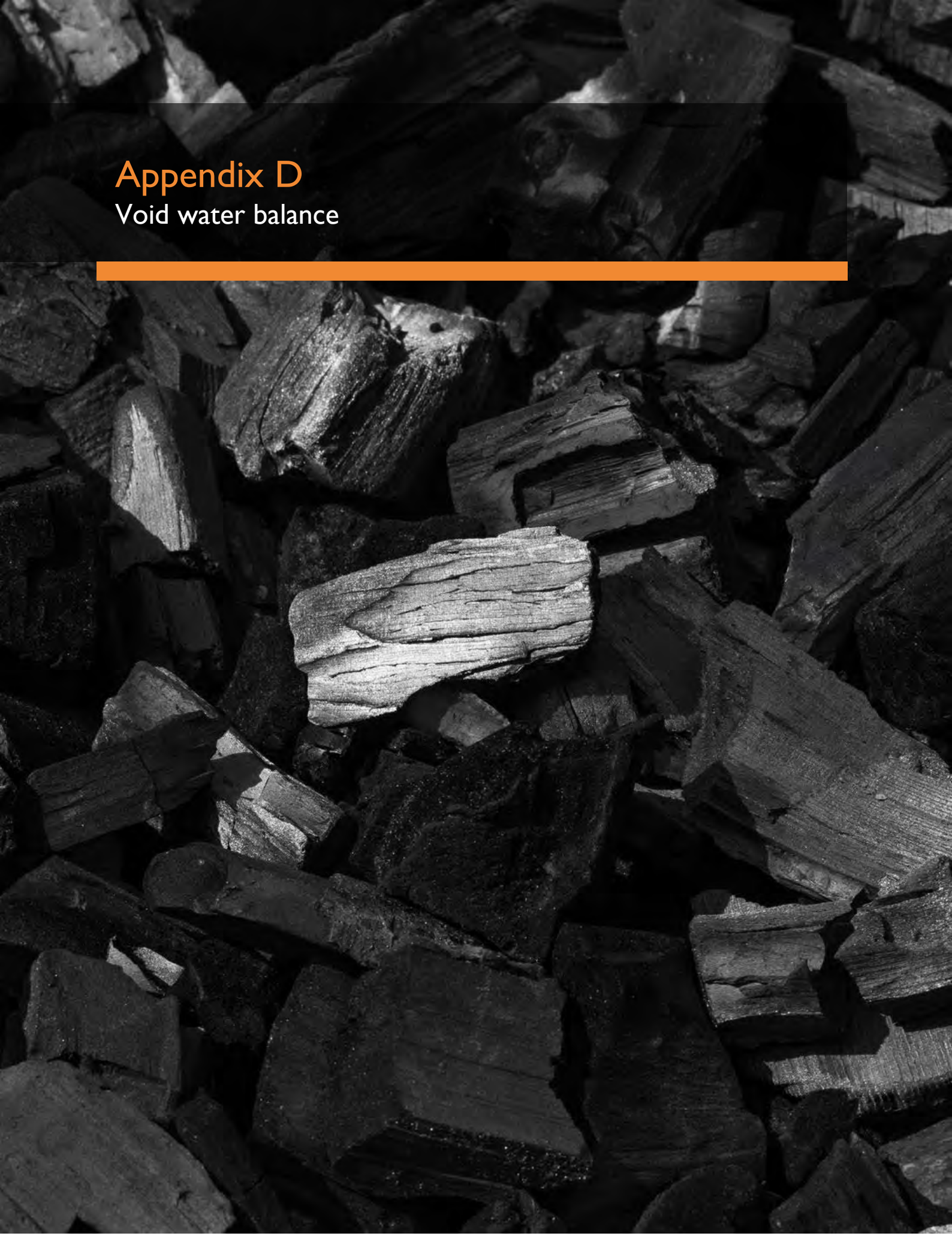

# Appendix D
## Void water balance

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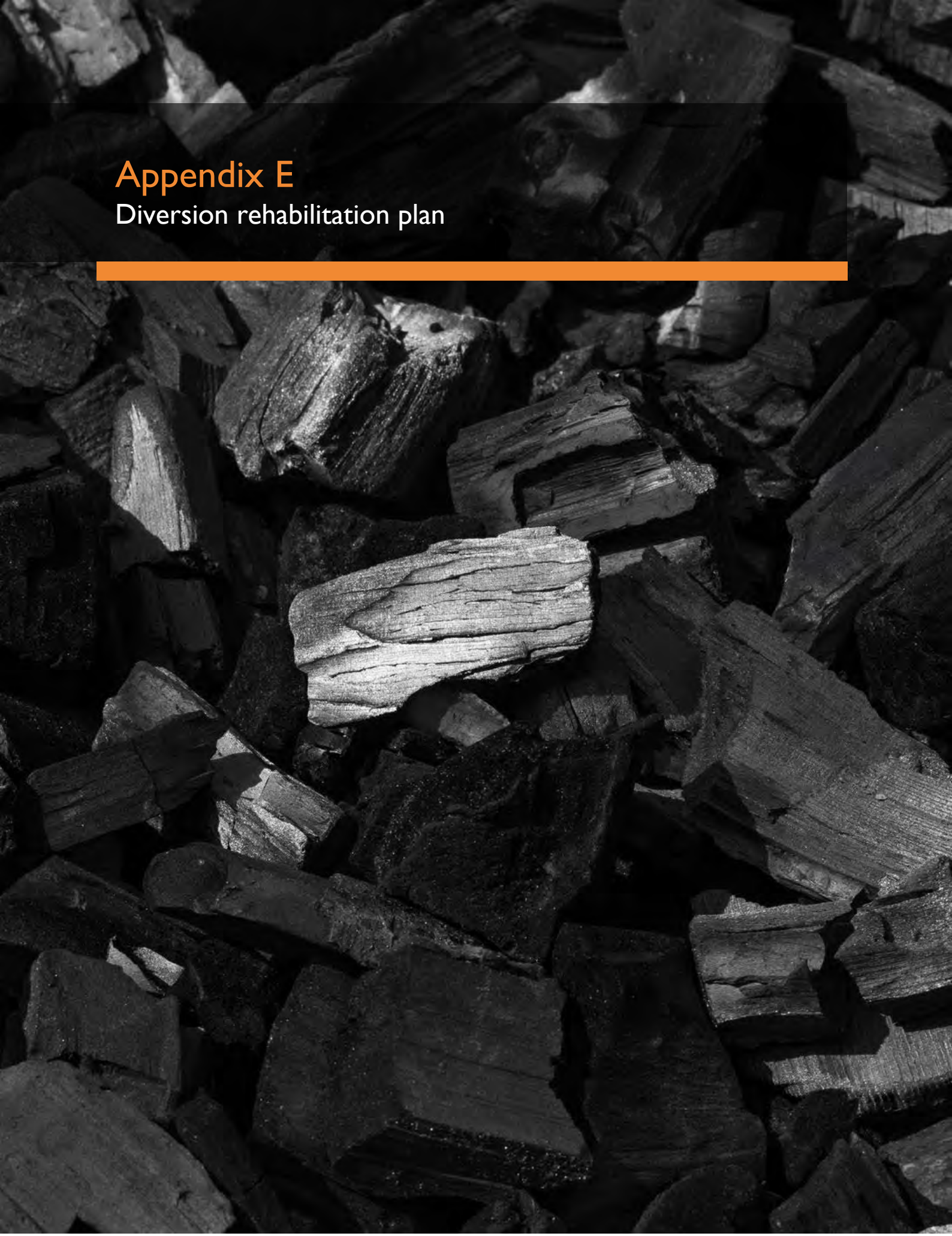
# Appendix E
## Diversion rehabilitation plan



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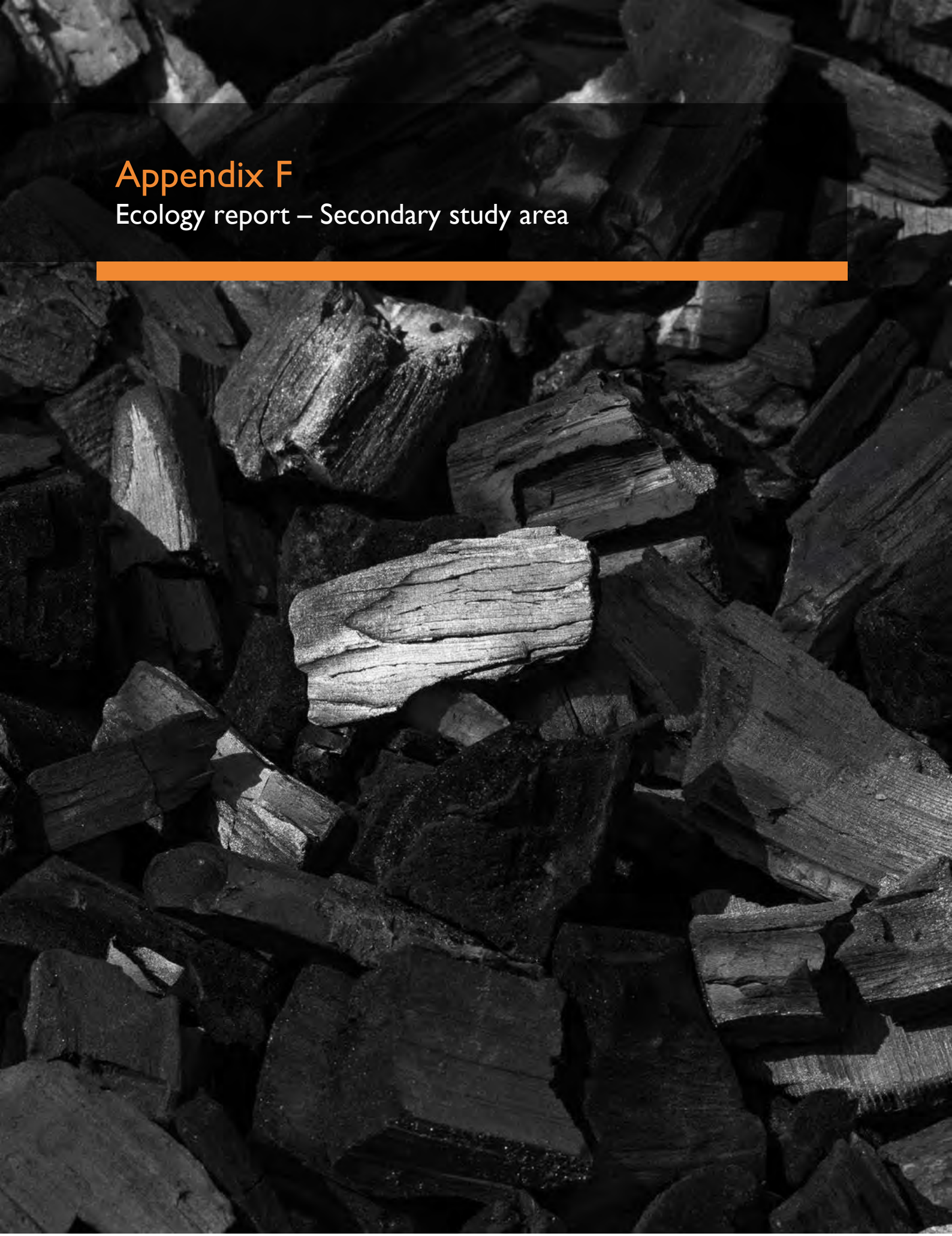
# Appendix F

## Ecology report – Secondary study area



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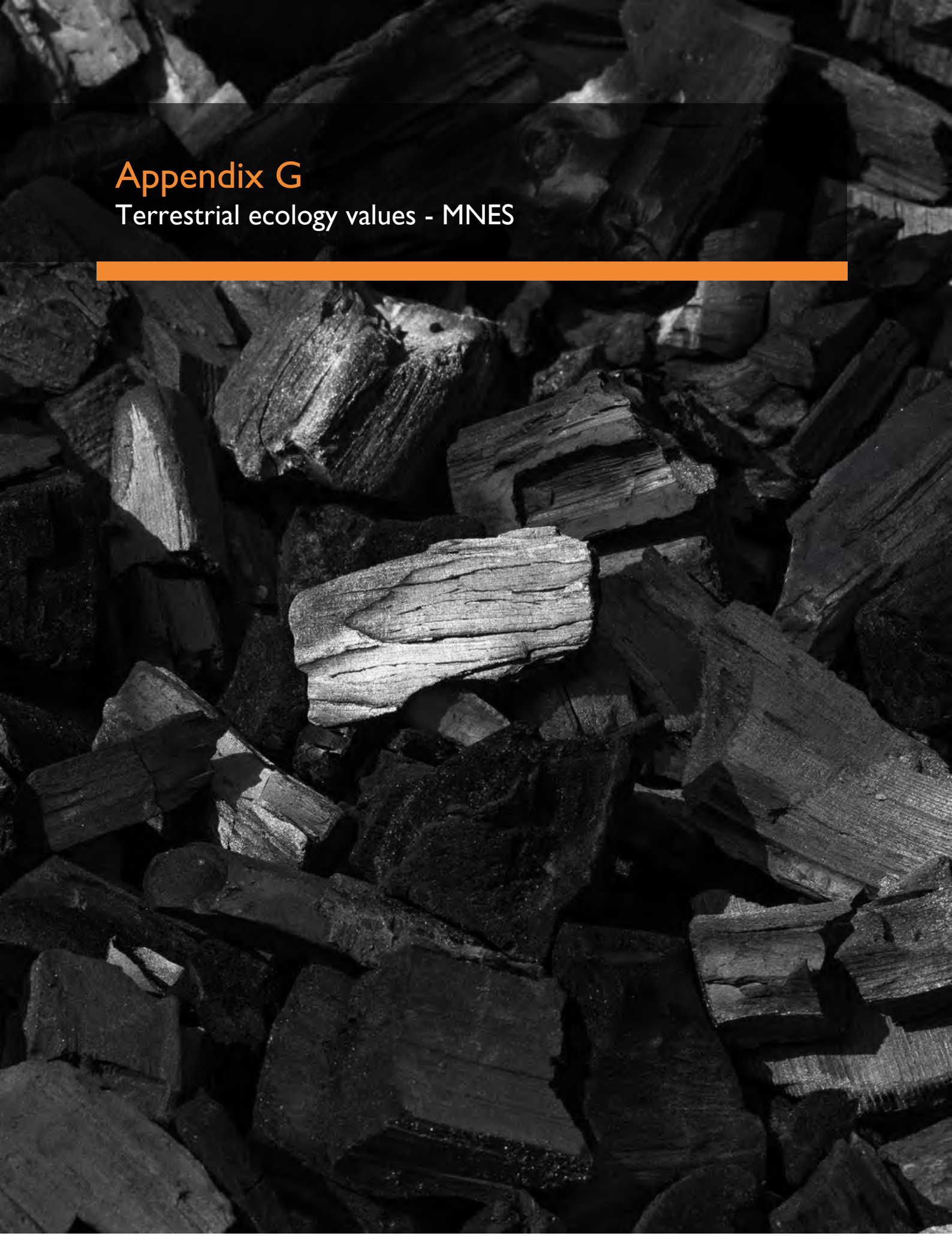

# Appendix G
## Terrestrial ecology values - MNES

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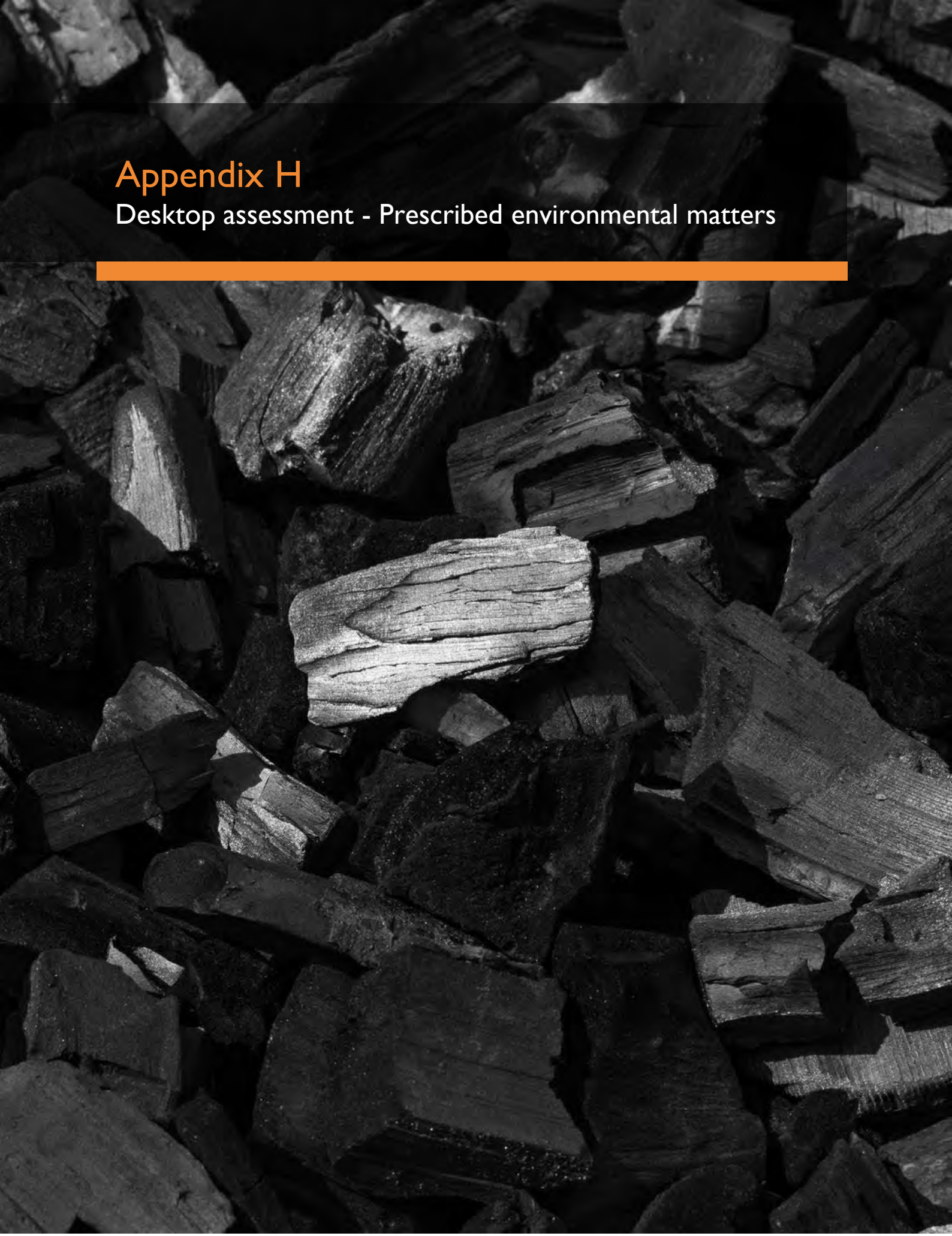

# Appendix H

## Desktop assessment - Prescribed environmental matters

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SGME was established to provide services in soil science, geochemistry, mine closure and Environmental management, planning & approvals cost efficiently. When you engage SGME you engage a partner to your business, priding themselves on:

**Honest** – Straight-up and no nonsense.

**Trust** – We say what we mean and we will deliver on our promises. We will advocate strongly for you.

**Innovation** – We will always look for new ways to help and create enduring value because that is what friends do when they work together.

**Safety** – We do it right so we all go home safely.


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