ENGENY

WHITEHAVEN COAL

PRCP Concept Design Report

Taurus Creek Diversion

BBNE04877_0045-REP-003-0

14 NOVEMBER 2025

DISCLAIMER

This Report has been prepared on behalf of and for the exclusive use of Whitehaven coal and is subject to and issued in accordance with Whitehaven coal instruction to Engeny Australia Pty Ltd (Engeny). The content of this Report was based on previous information and studies supplied by Whitehaven coal.

Engeny accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this Report by any third party. Copying this Report without the permission of Whitehaven coal or Engeny is not permitted.

Rev	Date	Description	Author	Reviewer	Project Mgr.	Approver
0	14/11/2025	Final Issue	Sumaiya Sifa	Ben Kiernan	Louis North	Ben Kiernan
Signatures:					p.p Louis North 	

CONTENTS

1. INTRODUCTION 1

1.1 Context 1

1.2 Purpose 1

1.3 Design Process 1

1.3.1 Concept Design Considerations 1

2. OVERVIEW 2

2.1 Location 2

2.2 Natural Reaches 3

2.3 Diversion Reach 4

3. BASIS FOR CONCEPT DESIGN 5

3.1 DNRME Guideline 5

3.1.1 Diversion Design Outcome Requirements (Permanent Watercourse Diversions) 5

3.1.2 Design Criteria 5

3.2 ACARP Guidelines 6

3.3 Environmental Authority EPML00717813 7

4. CONCEPT DESIGN 8

4.1 Diversion Alignment 8

4.2 Channel Geometry and Grade 9

4.3 Hydrology 10

4.3.1 Frequent Events 11

4.3.2 Rare Events 11

4.4 Hydraulics 11

4.5 Additional Design and Construction Considerations 12

4.5.1 Soils 12

4.5.2 Revegetation 12

4.5.3 Monitoring and Maintenance 12

4.5.4 Closure Landform and Considerations 13

4.6 Risks and Mitigation Measures 13

5. CONCLUSION 14

6. QUALIFICATIONS 15

7. REFERENCES 16

Appendices

Appendix A: Hydraulic Parameter Modelling Results 17

Appendix B: Preferred Option 21

Tables

Table 3.1: DNRME 2019 Hydraulic Design Criteria 6
Table 3.2: ACARP 2014 Alluvial Channel Design Parameters 6
Table 3.3: ACARP 2014 Recommended Vegetation Shear Stress Thresholds 6
Table 4.1: Taurus Creek Diversion Design Flows 11
Table 4.2: Diversion Design Criteria Compared to DNRME (2019) Guideline Parameters 11
Table 4.3: Diversion Risks and Mitigation Measures 13

Figures

Figure 2.1: Location of the Taurus Creek Diversion at Blackwater Mine 2
Figure 2.2: Upstream, Downstream and Diversion Reaches of the Taurus Creek Diversion 3
Figure 3.1: Blackwater Mine EA EPML00717213 Rehabilitation Requirements for Watercourses 7
Figure 4.1: Taurus Creek Alignment General Arrangement 8
Figure 4.2: Typical Upstream Channel Cross Section 9
Figure 4.3: Typical Downstream Channel Cross Section 9
Figure 4.4: Map of Catchments 10
Figure A.1: Stream Power HEC-RAS Model Results 18
Figure A.2: Velocity HEC-RAS Model Results 19
Figure A.3: Shear Stress HEC-RAS Model Results 20

1. INTRODUCTION

1.1 Context

The purpose of this report is to detail the concept design developed for the closure and ultimate relinquishment of the Taurus Creek Diversion which satisfies the conditions under Environmental Authority (EA) EPML00717813. The watercourse diversion is required to achieve a state of dynamic equilibrium enabling its relinquishment in the post closure landform of the Blackwater Mine (BWM).

The long-term performance of the diversion under both operating and closure scenarios is assessed within the following objectives, based on requirements from relevant licences and approvals:

- The diversion demonstrates to be in a safe, stable, non-polluting, and self-sustaining state (As per EA requirements outlined in Section 3.3).
- Rehabilitation requirements (acceptance criteria) include goals, objectives and acceptance criteria for the post mining land use of the 'Watercourse' which is applicable for the watercourse diversion.
- Achieves the key outcomes identified in the Department of Natural Resources, Mines and Energy (DNRME) *Guideline: Works that interfere with water in a watercourse for a resource activity – watercourse diversions authorised under the Water Act 2000 (DNRME, 2019).*

This report details the design requirements for the rehabilitation of the diversion for incorporation into the Progressive Rehabilitation and Closure Plan (PRCP) for BWM as described in the Queensland Department of Environment and Science (DES) *Guideline: Progressive rehabilitation and closure plans (ESR/2019/4964, Version 3- 4 April 2023).*

1.2 Purpose

The purpose of this document is to outline the concept design developed for the diversion remediation option to achieve a state of dynamic equilibrium to achieve a relinquishable state for the diversion. The following methodology was conducted:

- A desktop geomorphic assessment of Taurus Creek was undertaken using historical aerial imagery and survey to identify the preferred option for the closure alignment.
- Application of ACARP (2002) flows to determine peak flow rates for design flow events to assess hydraulic performance.
- Hydraulic assessment of the diversion option against the criteria in the *DNRME 2019 Guideline: Works that interfere with water in a watercourse for a resource activity – watercourse diversions authorised under the Water Act 2000 (DNRME, 2019)*.
- Develop concept design sketches and watercourse diversion spatial polygons for presentation in the PRCP.
- Develop concept design report summarising the design and key information required for inclusion in the PRCP.

1.3 Design Process

1.3.1 Concept Design Considerations

The design is concept only, and not at functional level which would be required for approval and construction. The concept design is developed exclusively for PRCP purposes within the limitations of the PRCP, with only permanent design options considered.

To progress the concept design to a functional design level, detailed site-specific information is required including:

- Soil surveys and geotechnical studies.
- Material characterisation for use in erosion protection cover (i.e. rock sizing and composition).
- Site specific revegetation studies.

2. OVERVIEW

2.1 Location

Taurus Creek is an ephemeral tributary of Blackwater Creek, which ultimately flows into the Mackenzie River, a major tributary in the Fitzroy River catchment. Taurus Creek flows north-east across the Blackwater Mine lease through a diversion within an access corridor between the Ramp 40 pit and the Ramp 42 pit and joins Two Mile Creek before continuing northwards to the confluence with Blackwater Creek. The diversion is thought to have been constructed in the late 1980s to early 1990s (Alluvium, 2010), at a length of approximately 2.7 km and diverted again in 2001 at a length of 2.2 km (Hatch, 2001) including a licensed diversion reach of approximately 470 m. The diversion was constructed to allow mining in Taurus Creek Pit and Stewarton Pit.

The current catchment area for Taurus Creek upstream of the diversion channel is approximately 23.4 km^2 excluding the Emu Creek Diversion Catchment. Due to the Emu Creek diversion being constructed in early 2020 through to early 2021, the Emu Creek catchment contributes to the Taurus Creek catchment, increasing it to 42 km^2. Refer to Figure 2.1 for the location of the Taurus Creek Diversion.

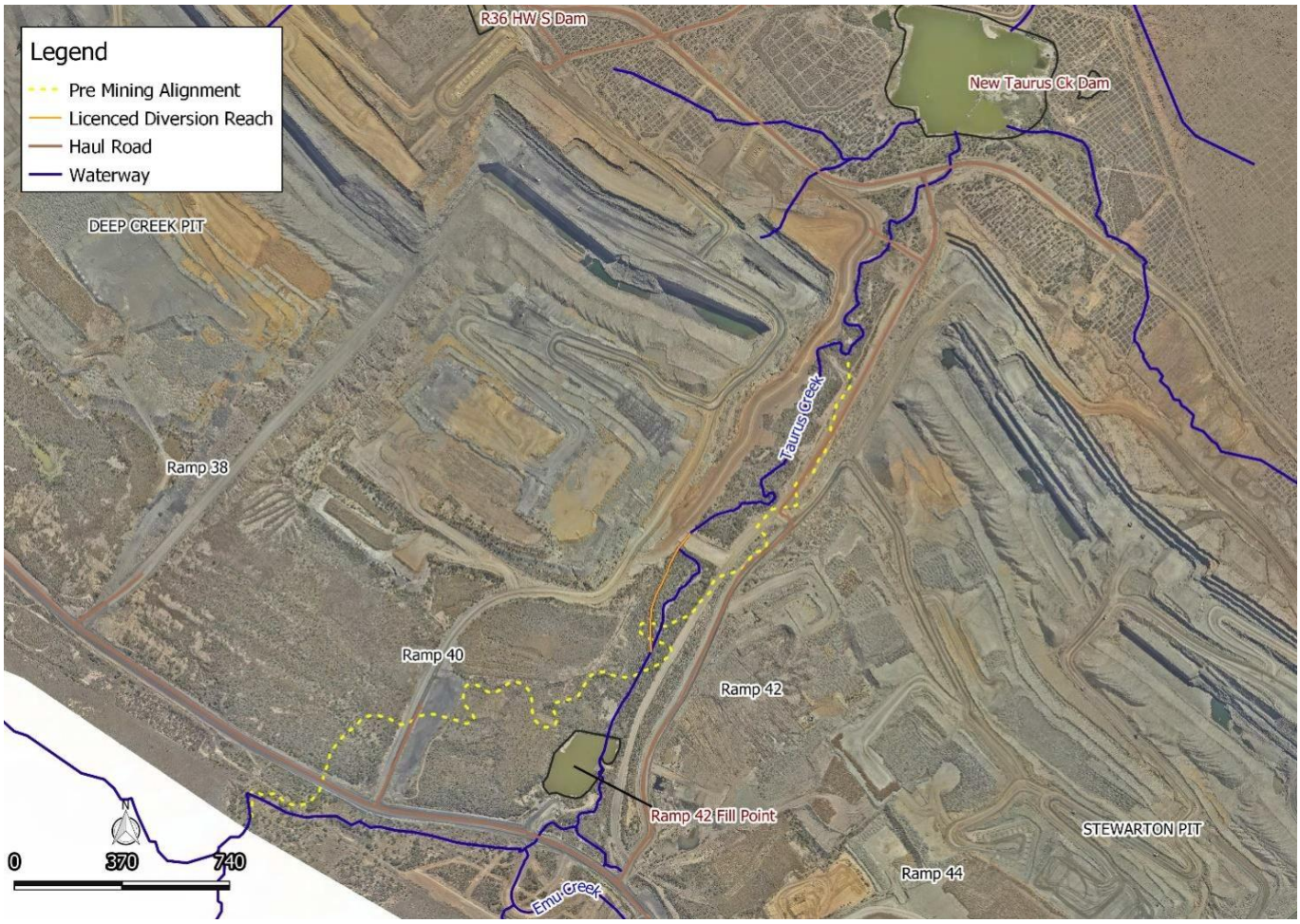


Figure 2.1: Location of the Taurus Creek Diversion at Blackwater Mine

2.2 Natural Reaches

The upstream, downstream and diversion reaches of Taurus Creek have been described as follows (Alluvium, 2010):

- **Upstream reach –** The majority of the upstream reach is located through grazing and some open woodland outside of the mine lease. It is generally of moderate sinuosity with low capacity of <1m depth and 5m top width. Sediment supply to the upstream reach is high due to clearing and grazing activities in the upstream catchment. The upstream channel consists of a single continuous alluvial channel within a broad floodplain (>100m). Riparian vegetation of the upstream channel consists of a continuous overstorey and poor groundcover due to grazing pressure.
- **Emu Creek Diversion Reach –** The Emu Creek diversion reach flows through catchments modified and impacted by vegetation clearing, grazing and mining activities. As described in the functional design report (Engeny, 2019) the Emu Creek diversion channel consists of a moderate sinuosity low flow channel with 2m base width and 2m depth, 1V:3H batter slopes and 0.44% channel bed slope designed to achieve a stable, non-polluting diversion channel in accordance with DNRM and ACARP guideline values.
- **Downstream reach –** The downstream channel of the Taurus Creek diversion comprises of a moderate sinuosity, low-capacity single alluvial channel (8-14m top width, 3m depth), set within a broad floodplain (>100m width). The downstream reach channel bed consists of exposed bedrock in several locations.
- **Diversion reach (pre-mining)** - The Taurus Creek diversion reach (pre-mining) was approximately 2.7 km long, meandering through what is now Ramp 38 and Ramp 40.

The upstream, downstream and diversion reaches of the Taurus Creek diversion at Blackwater Mine are shown in Figure 2.2.

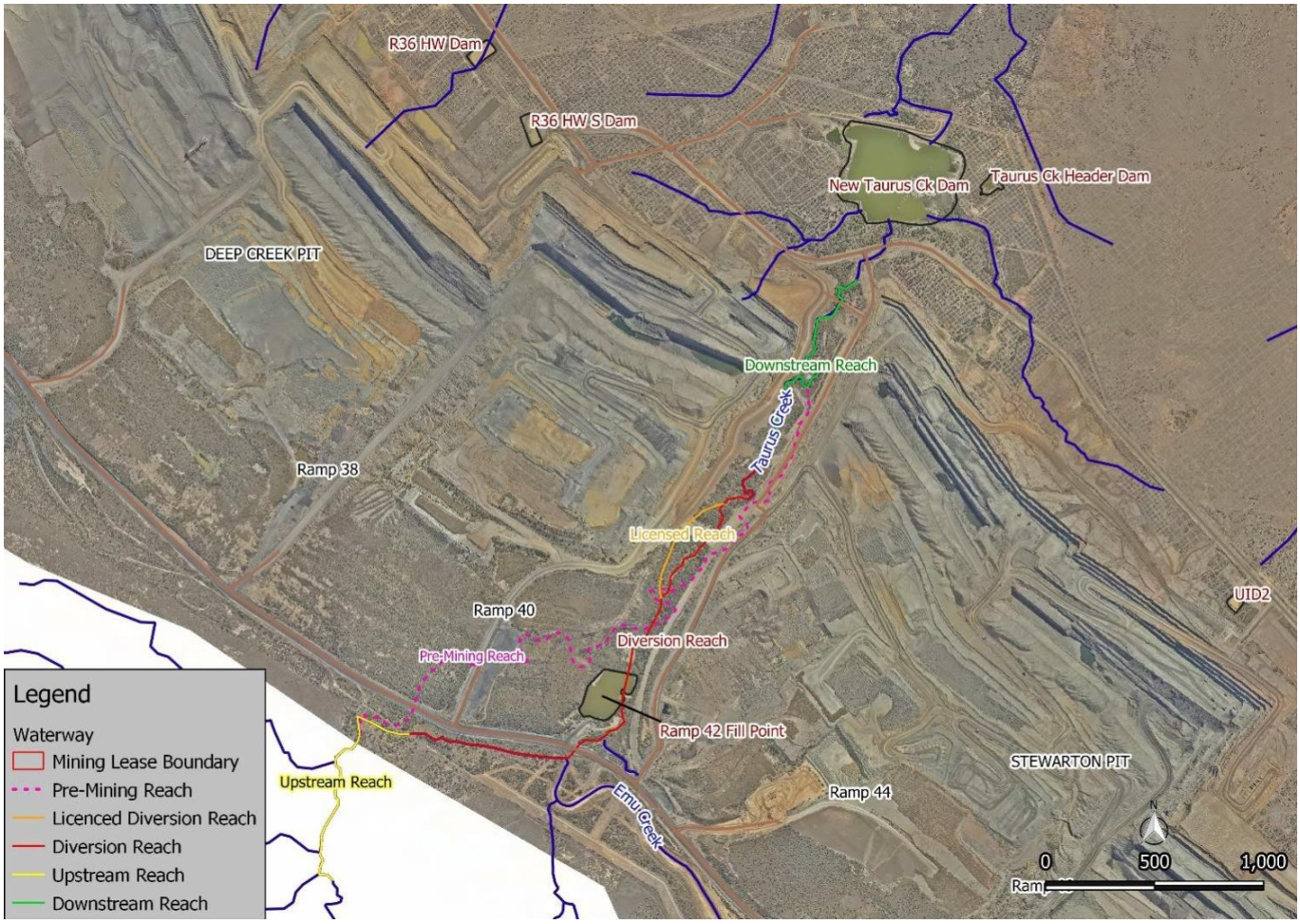


Figure 2.2: Upstream, Downstream and Diversion Reaches of the Taurus Creek Diversion

2.3 Diversion Reach

Monitoring of Taurus Creek diversion has been undertaken since 2010 and was last completed in 2019. As part of the major monitoring, the latest condition of the Taurus Creek diversion has been described as follows (Engeny, 2017a):

- Clearing work, realignment of the creek, Ramp 42 Fillpoint Dam as well as spoil runoff are the main contributors to excess sediment supply and erosion within the creek. Culvert crossings under haul roads and dragline crossings as well as dams online of the diversion prohibit continuous sediment transport through the system and contribute to sediment build up within the diversion reach.

The above monitoring assessment outcomes have been addressed as part of the Ramp 47 Execution Support project (Engeny, 2020) which resulted in three distinct issues remaining with the diversion:

- Vertical grade of the diversion is much steeper than the pre-mining channel grade, resulting in erosion issues.
- A drop structure north of the haul road crossing which requires ongoing maintenance.
- Ramp 48 Fill Point dam located within Taurus Creek impeding sediment transport.

Based on the current condition of the Taurus Creek diversion, it is highly unlikely that the diversion will achieve the water license relinquishment criteria prior to mine closure without intervention.

3. BASIS FOR CONCEPT DESIGN

There are currently two recognised guidelines for design of watercourse diversions within Queensland. These guidelines have been developed by DNRME and the Australian Coal Association Research Program (ACARP):

- Guideline: Works that interfere with water in a watercourse for a resource activity – watercourse diversions authorised under the Water Act 2000 (DNRME, 2019).
- Criteria for functioning river landscape units in mining and post mining landscapes (ACARP, 2014).

Both the DNRME and ACARP Guidelines were developed based on previous research completed by ACARP in the early 2000s which included assessment of existing diversion performance and the development of design and rehabilitation criteria for watercourse diversions. Details of the guidelines that have been used to design the Taurus Creek diversion are summarised below.

3.1 DNRME Guideline

3.1.1 Diversion Design Outcome Requirements (Permanent Watercourse Diversions)

The diversion design outcome requirements are nominated by DNRME for permanent watercourse diversions and have been used to develop the design for Taurus Creek diversion:

- Outcome 1 - The permanent watercourse diversion incorporates natural features (including geomorphic and vegetation) present in the landscape and in local watercourses.
- Outcome 2 - The permanent watercourse diversion maintains the existing hydrologic characteristics of surface water and groundwater systems.
- Outcome 3 - The hydraulic characteristics of the permanent watercourse diversion are comparable with other local watercourses and suitable for the region in which the watercourse diversion is located.
- Outcome 4 - The permanent watercourse diversion maintains sediment transport and water quality regimes that allow the watercourse diversion to be self-sustaining, while minimising any impacts on upstream and downstream reaches.
- Outcome 5 - The permanent watercourse diversion and associated structures maintain equilibrium and functionality and are appropriate for all substrate conditions they encounter.

3.1.2 Design Criteria

DNRME recommend the following design criteria in development of permanent watercourse diversions and have been considered in development of the Taurus Creek diversion:

- The watercourse diversion should tie-in with the existing or receiving watercourse within the resource tenure boundary.
- The stability and performance of a watercourse diversion is assisted by vegetation within the watercourse diversion and adjoining floodplain and does not include artificial structures for grade control that requires ongoing maintenance.
- The channel capacity must be at least equivalent to the natural stream channel capacity existing in that vicinity.
- The length of the channel should be equivalent to the length of the watercourse it replaces.
- Bed grade/slope should be equivalent to the existing watercourse.
- Batter slopes should be designed to maintain stability through different substrates.

The DNRME Guideline also nominates a set of hydraulic design criteria which have been adapted from the original ACARP research. These hydraulic design criteria were developed based on assessment of existing Bowen Basin streams and watercourse diversions and are considered reflective of stable hydraulic conditions for ephemeral systems in central Queensland. The hydraulic design criteria are summarised in Table 3.1 and include the following:

- Shear stress which is a function of discharge, flow depth and hydraulic gradient and represents the tractive force acting on sediment particles and is used to determine the threshold of motion for sediment. High shear stress provides an indication of potential erosion in cohesive sediments or movement of non-cohesive sediments. It also provides a measure of the ability of vegetation to withstand flow.

- Stream power which is a function of hydraulic gradient, flow width and flow rate and represents the energy available to do work on the channel. High stream power values generally result in elevated erosion potential.
- Velocity which is a function of flow rate and cross-sectional area and is a simplified measure of erosion potential. Generally higher velocities result in higher erosion potential however stream power and shear stress are more reliable indicators of erosion and sediment transport potential.

TABLE 3.1: DNRME 2019 HYDRAULIC DESIGN CRITERIA

Design Flow Event	Stream Power (W/m²)	Velocity (m/s)	Shear Stress (N/m²)
2-year ARI (no vegetation)	<35	<1.0	<40
2-year ARI (vegetated)	<60	<1.5	<40
50-year ARI	<150	<2.5	<80[1]

[1] DNRME values are extracted from ACARP 2002, however the value reported for the 2% AEP shear stress (<50 N/m2) in the DNRME 2014 is incorrect. The ACARP value of <80 N/m² has been adopted.

3.2 ACARP Guidelines

ACARP (2014) outlined several approaches to the design of diversion channel dimensions, which included an analogous approach, where channel dimensions are selected from a reference reach; a hydraulic geometry approach where dimensions are determined from regression relationships; and an analytical approach, where equations are used to calculate continuity, hydraulic resistance, and sediment transport and channel characteristics are determined from field inspection of a reference reach.

In addition to the analogous approach, ACARP (2014) also provides guidance on alluvial channel design parameters which were adapted from ACARP (2002). These hydraulic parameters are intended to be represented of stable watercourses within the Bowen Basin and are summarised in Table 3.2: .

TABLE 3.2: ACARP 2014 ALLUVIAL CHANNEL DESIGN PARAMETERS

Stream Type	Stream Power (W/m²)	Stream Power 2-year ARI (W/m²)	Stream Power 50-year ARI (W/m²)
Alluvial	Supply limited	15-35	50-100
	Transport limited	35-60	80-150
Bedrock controlled	n/a	50-100	100-350

ACARP (2014) also provides recommendations on shear stress thresholds for vegetation used as part of rehabilitation activities. These thresholds are summarised in Table 3.3: .

TABLE 3.3: ACARP 2014 RECOMMENDED VEGETATION SHEAR STRESS THRESHOLDS

Vegetation Type	Design Shear Stress (N/m²)
Buffel grass	40
Structurally diverse suite of established native vegetation	120

The long-term performance of the diversion under both operating and closure scenarios is assessed with the following objectives, based on industry standard closure objectives:

- The diversion demonstrates to be in a safe, stable, non-polluting and self-sustaining state (as per PRCP Closure Criteria and Environmental Authority requirements as per Section 3.3).
- Reference rehabilitation requirements (acceptance criteria) include goals, objectives and acceptance criteria for the post mining landuse of the 'Watercourses' which is applicable for the watercourse diversion.
- Existing water licence diversion objectives generally align with the objectives under the DNRME Guidelines (2019).

3.3 Environmental Authority EPML00717813

The land schedule within the Blackwater Mine EA (EPML00717813) requires that all areas significantly disturbed by mining activities must be rehabilitated in accordance with specified Rehabilitation Requirements. The EA provides the rehabilitation landform criteria for the post mining land use of watercourses (refer to Figure 3.1). Some indicators reference the Index of Diversion Condition (IDC) method, which is a component of ongoing diversion monitoring.

Table E1 (Rehabilitation Requirements)

Post Mining Land Use	Goal	Objective	Indicator	Acceptance Criteria
Watercourse	Safe to humans and wildlife	Safety hazards are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference
	Stable	Rehabilitation is erosionally stable	Geomorphic index (IDC method)	Greater or equal to upstream or downstream values.
	Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	pH EC Turbidity	Not significantly different to upstream values
	Able to sustain the agreed post-mining land use	Riparian vegetation	Riparian vegetation index (IDC method)	Greater or equal to upstream or downstream values.

Figure 3.1: Blackwater Mine EA EPML00717213 Rehabilitation Requirements for Watercourses

4. CONCEPT DESIGN

4.1 Diversion Alignment

Figure 4.1 shows the permanent diversion alignment design of Taurus Creek. The alignment was selected to achieve a similar pre-mining channel grade, while also aligning with the most recent final landform (Landform 3.6.1). The full concept drawing package is included in Appendix B.

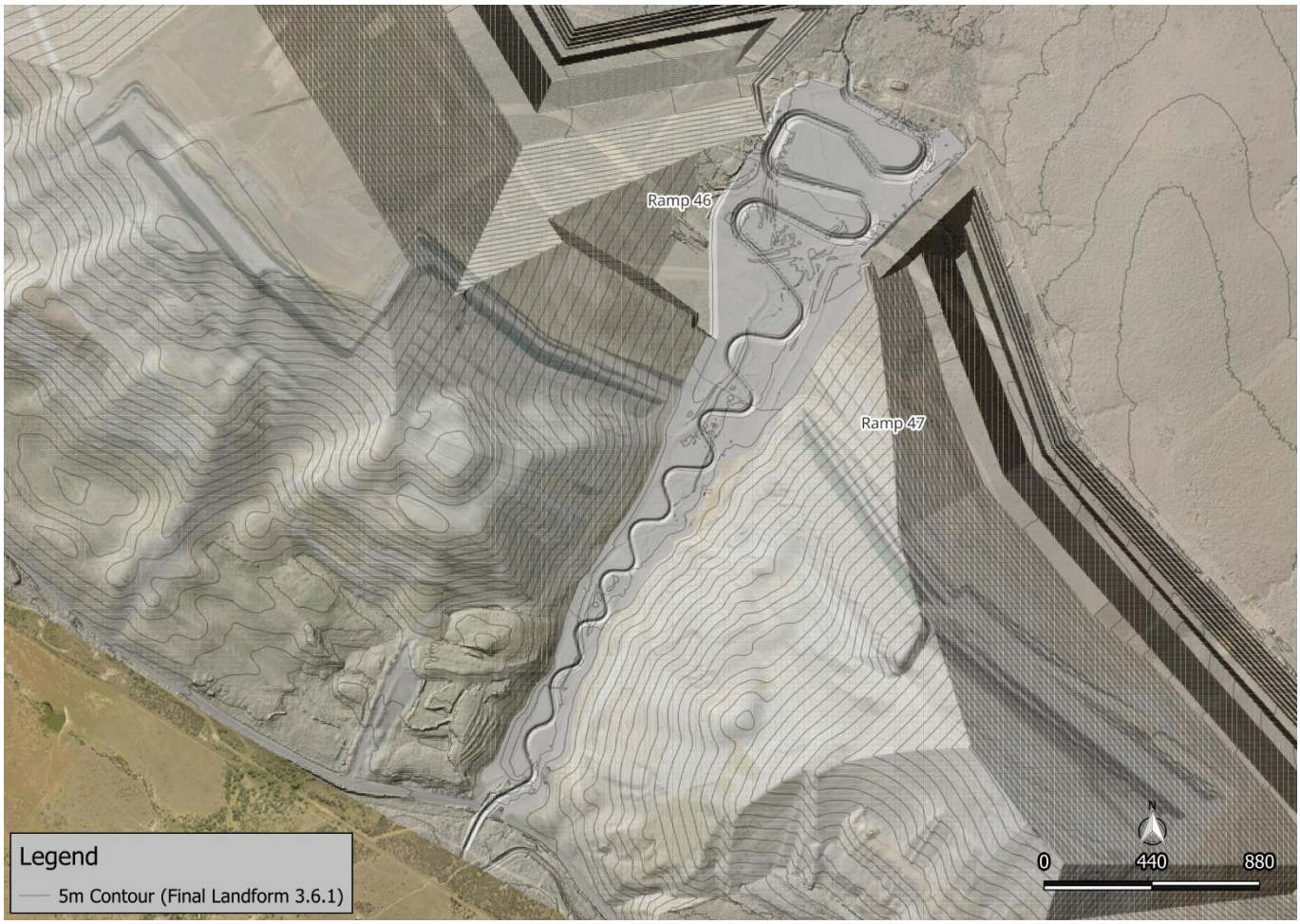


Figure 4.1: Taurus Creek Alignment General Arrangement

4.2 Channel Geometry and Grade

The typical upstream and downstream channel geometries are presented in Figure 4.2 and Figure 4.3. The concept diversion design dimensions were based on the average natural upstream and downstream channel geometry topographic data and aerial imagery were used to evaluate the planform and cross section parameters of multiple reference reaches of Taurus Creek.

The concept design drawings in Appendix B show the typical cross sections, longitudinal profile, and footprint of the proposed channel works.

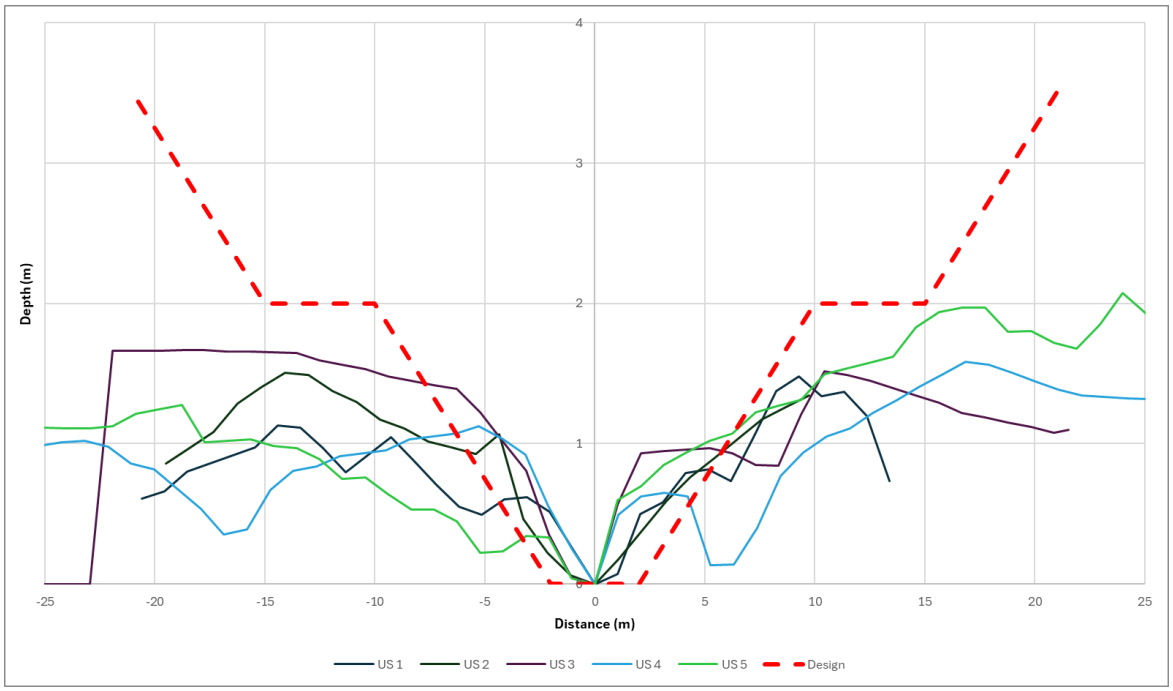


Figure 4.2: Typical Upstream Channel Cross Section

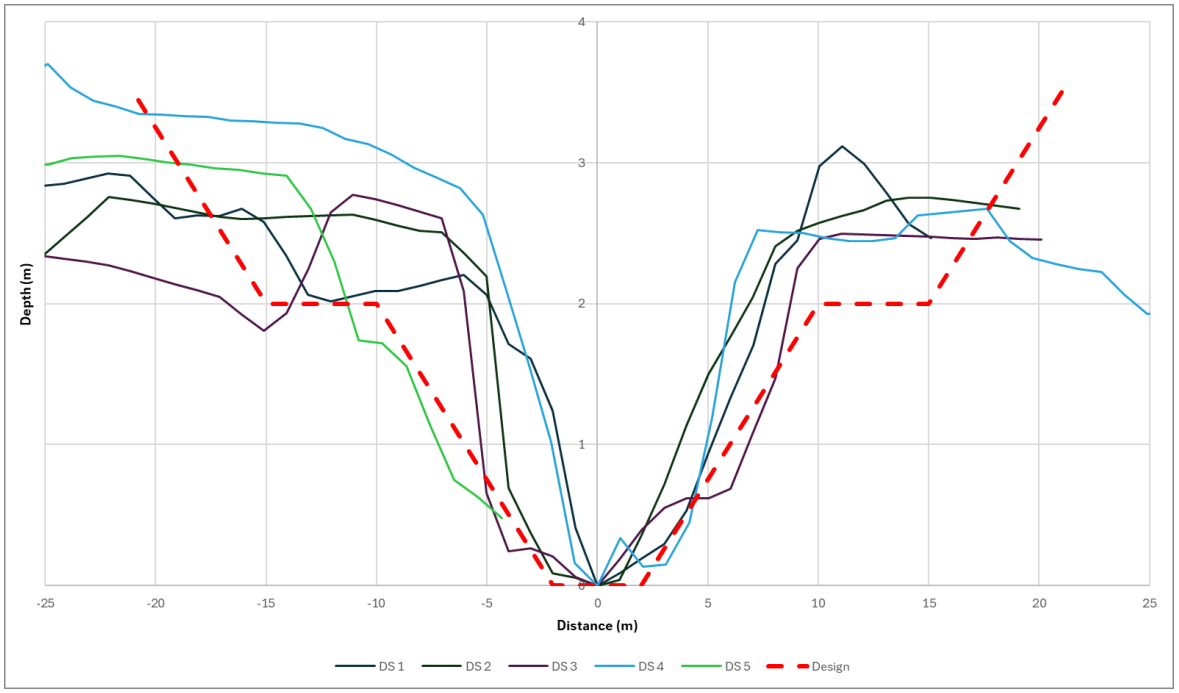


Figure 4.3: Typical Downstream Channel Cross Section

4.3 Hydrology

Peak flows for frequent events (39% AEP and2% AEP) for the Taurus Creek diversion remediation were estimated using the ACARP (2002) methods and are presented in Table 4.1. The current catchment area of Taurus Creek is approximately 42 km², which is projected to increase to 57.2 km² under the final landform (Landform 3.6.1) (refer to Figure 4.4). The catchment boundary based on the final landform was adopted for the ACARP flow estimations.

As described in Section 3, The hydraulic outcomes for diversion designs are only prescribed for frequent events (39% AEP and 2% AEP). As such, hydraulic modelling of rare event (1% and 0.1% AEP) has not been undertaken as part of the diversion concept design. The Rehabilitation Flood Assessments undertaken separately as part of the PRCP should be referred to for the hydrologic and hydraulic modelling for the 1% AEP and 0.1% AEP flood events of Sirius Creek.

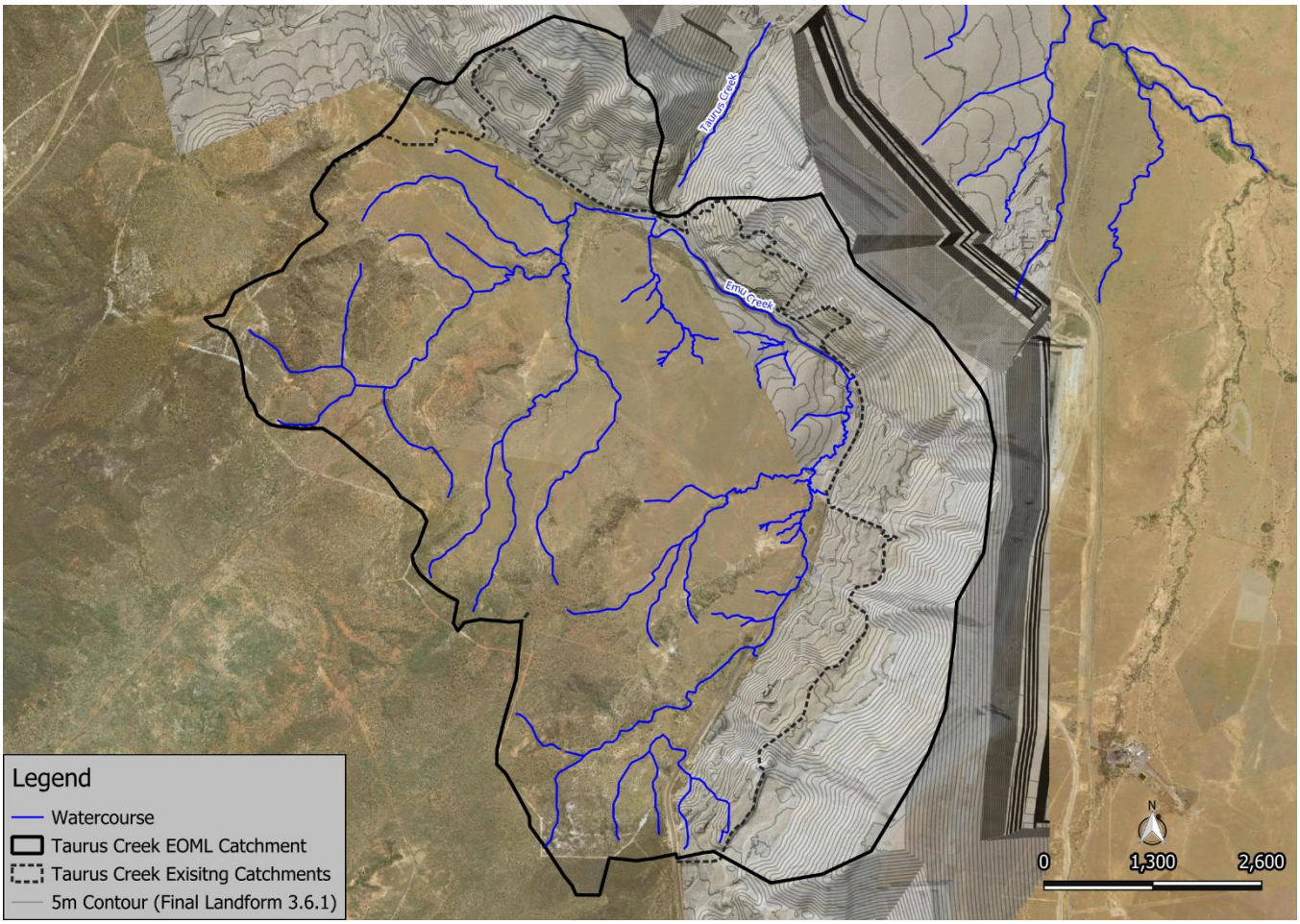


Figure 4.4: Map of Catchments

4.3.1 Frequent Events

The hydrologic model was used to estimate flows through the diversion for the 2 year ARI and 50 year ARI flow events (refer to Table 4.1). The flows have been compared to the ACARP (2014) diversion channel design parameters. A steady flow analysis was undertaken to assess the diversion design against guideline criteria.

TABLE 4.1: TAURUS CREEK DIVERSION DESIGN FLOWS

Rainfall Event	Diversion Channel Design Flows (ACARP, 2002) m^3/s
2 year ARI	83.6
50 year ARI	41.1

4.3.2 Rare Events

The interaction of a 0.1% AEP flood event and the PRCP closure landform will be summarized within the Rehabilitation Flood Assessments undertaken as part of the PRCP.

4.4 Hydraulics

Stream power is the product of channel slope and discharge. It represents the excess energy available to do work in and on the channel. If there is too much excess energy, then channel erosion may occur. Stream velocity is calculated by dividing flow by cross-sectional area. The higher the velocity, the greater the erosive force of a stream. Shear stress is an indication of the size of granular material that will begin to move at a particular flow within the diversion reach.

Threshold values for velocity, stream power and shear stress listed in the ACARP Guidelines (Table 13 of the DNRME Guideline) were determined using a 1D HEC-RAS model. HEC-RAS (1D) calculates hydraulic conditions on a cross-sectional basis, outputting results as a cross-sectional mean. Due to this, the threshold values listed in the ACARP and DNRME guideline should be considered as cross-sectional average values. As such, modelling has been conducted utilising the 1D HEC-RAS software. (refer to Table 4.2). The proposed diversion values have been compared to the DNRME (2019) diversion channel design parameters.

TABLE 4.2: DIVERSION DESIGN CRITERIA COMPARED TO DNRME (2019) GUIDELINE PARAMETERS

	2-year ARI		50-year ARI	
Design Criteria	**Diversion**	**DNRME Design Parameter (2019)**	**Diversion**	**DNRME Design Parameter (2019)**
Stream Power (W/m^2)	60	<60	70.1	<150
Stream Velocity (m/s)	1.4	<1.5	1.5	<2.5
Shear Stress (N/m^2)	43.4	<40	47.2	<80[1]

[1] *DNRME values are extracted from ACARP 2002, however the value reported for the 2% AEP shear stress (<50 N/m2) in the DNRME 2014 is incorrect. The ACARP value of <80 N/m^2 has been adopted.*

It can be seen from Table 4.2 that the shear stress for the 39% AEP (2yr ARI) exceeds the guideline value. All other parameters are within acceptable limits.

Even though the shear stress is exceeding guideline values, it still falls below the threshold of 120 N/m^2 at which a channel with established native vegetation is considered stable, as per Table 3.3. The design of the diversion will be able to be refined in future phases to ensure shear stresses are within guideline values.

It is noted that the 39% AEP (2yr ARI) stream power and velocities exceed the DNRME design criteria for stability if the channel remains unvegetated, as per Table 3.1. It is expected that the channel achieves stability during a flood of this magnitude when the vegetation is fully established.

Appendix A illustrates the variability along the diversion channel for each design parameter.

4.5 Additional Design and Construction Considerations

4.5.1 Soils

The channel bed and banks are expected to be comprised largely of the surrounding soils, which potentially include dispersive sandy to loamy duplex soils. Erosion of the diversion channel is a key risk to the diversion not achieving a state of dynamic equilibrium. Key actions which should be undertaken in detailed design and construction to further quantify and mitigate this risk include:

- A detailed soil survey should be conducted in the functional design stage to determine characteristics of topsoil and subsoil within the diversion alignment.
- The detailed engineering in functional design should specify requirements for cover materials, including rock and rock mulch, to protect diversion batters from erosion.
- Temporary erosion sediment controls should be designed to minimise risk of erosion until vegetation establishment. This plan should be developed and approved by an appropriately qualified person informed by site specific soils data.
- An appropriately qualified person to assess the growth media for the diversion banks and recommend required ameliorants, fertilisers and surface treatments. Excess supply of sediment from upstream and adjacent mining activities (spoil dumps, haul roads, coal stockpiles etc.) can impact vegetation establishment within the new diversion. Controls should be established to reduce sediment influx from surrounding landforms during the establishment of the diversion channel.

4.5.2 Revegetation

Effective revegetation will be crucial for the long-term stability of the diversion reach. A detailed revegetation plan should be developed as part of the function design for Taurus Creek as it will be critical to prevent uncontrolled erosion in the early years following construction.

The revegetation for the diversion should be done in accordance with the revegetation plan informed by baseline vegetation surveys. The plan should:

- Specify the method for revegetation considering direct seeding, mulch blanket, direct planting etc. and be informed by the erosion potential, expected velocities of flows and the cover material in selecting the appropriate method.

The watercourse revegetation species should be based on selecting key framework trees, woody understory and groundcover species associated with the predominant natural watercourse regional ecosystems occurring upstream and/or downstream of the site as prescribed in the BWM Progressive Rehabilitation and Closure Plan (PRCP).

- Revegetation design should focus on re-establishing riparian vegetation for upper banks, mid banks and lower bank (including bank toe) revegetation zones.
- Include geomorphic and vegetation features like those in the local landscape.
- Consider irrigation and other controls required to promote vegetation establishment in response to changing climatic conditions.
- Achieve sufficient ground cover to mitigate erosion risk on beds and banks.
- Maintain a sediment transport regime that does not directly impact on upstream and downstream reaches.
- Not require ongoing maintenance.

Further, hydraulic modelling has demonstrated that 2yr ARI stream power and velocities exceed the DNRME design criteria for stability if the channel remains unvegetated, as per Table 3.1. To ensure vegetation has sufficient time for establishment it is suggested to keep the diversion offline for 1 to 2 wet seasons. The concept design could be optimised in detailed design to further reduce the stream power and velocity in conjunction with a planned diversion revegetation strategy.

4.5.3 Monitoring and Maintenance

Monitoring and maintenance of the diversion during the operational phase should be conducted in accordance with Whitehaven's watercourse diversion monitoring program and following construction and rehabilitation of the new diversion alignment, it will be required to be conducted in accordance with the PRCP. The monitoring and maintenance of the diversion during the establishment phase should be done routinely and consider the following (at least):

- Identifying introduced species and weeds for control.

- Success of vegetation establishment and identifying the need for subsequent seeding or planting.
- Climatic conditions which may impact the success of vegetation establishment (i.e., drought).
- Unplanned events which may impact the success of vegetation establishment (i.e., bushfire).
- Monitoring for erosion of beds and banks.
- Sediment transport under low flow conditions to ensure no excess sedimentation.
- Success of temporary erosion and sediment control measures.

The frequency of inspections should be aligned to risk (i.e. increase where control implementation is not suitable),and following periods of high flow in the diversion.

4.5.4 Closure Landform and Considerations

The PRCP landform can be reconfigured if the diversion is in close proximity to it and its alignment and re-instatement of the floodplain is inhibited by the closure landform. The concept design is required to inform the PRCP closure landform and will be offset to final voids by at least 100 m so seepage to or from voids is not expected.

4.6 Risks and Mitigation Measures

Table 4.3 below summarises the main risks for the diversion remediation design and construction.

TABLE 4.3: DIVERSION RISKS AND MITIGATION MEASURES

Risks	Likelihood	Consequences	Risk Rating and Score	Mitigation Measures	Residual Likelihood	Residual Consequences	Residual Risk Rating and Score
Vegetation establishment and erosion potential	Probable	2	9	Channel taken offline during construction and vegetation establishment phase, vegetation type and seed-mix selected based on local environment	Unlikely	1	1
Damage to new diversion channel due to extreme flood event	Probable	2	9	Diversion channel constructed during dry season	Unlikely	1	1
Constructability of diversion channel – encountering bedrock, material availability and access	Probable	2	9	Geotechnical investigation as part of functional design, topsoil availability on site and construction during dry season (low chance of flood)	Unlikely	1	1

5. CONCLUSION

To develop a PRCP Chapter for the Taurus Creek diversion, a concept design for remediation of the Taurus Creek diversion will be developed. This report illustrates the concept design details and has been prepared in accordance with the requirements of the Department of Natural Resources, Mines and Energy (DNRME) Guideline: *Works that interfere with water in a watercourse for a resource activity – watercourse diversions authorised under the Water Act 2000* (DNRME,2019).

The concept design was developed based on three guidelines, two of which are currently recognised guidelines for design of watercourse diversions within Queensland. These guidelines have been developed by DNRME and the Australian Coal Association Research Program (ACARP):

- Guideline: Works that interfere with water in a watercourse for a resource activity – watercourse diversions authorised under the Water Act 2000 (DNRME, 2019).
- Criteria for functioning river landscape units in mining and post mining landscapes (ACARP, 2014).
- EA condition for specified rehabilitation requirements.

The final concept option design was selected to achieve a similar pre-mining channel grade, while also aligning with the most recent final landform (Landform 3.6.1). The final concept option design, typical cross sections and longitudinal section are presented in Appendix B.

The concept design demonstrates that the watercourse diversion will satisfy the closure objectives identified in the guidelines, for PRCP purposes.

6. QUALIFICATIONS

(a) In preparing this document, including all relevant calculation and modelling, Engeny Australia Pty Ltd (Engeny) has exercised the degree of skill, care and diligence normally exercised by members of the engineering profession and has acted in accordance with accepted practices of engineering principles.

(b) Engeny has used reasonable endeavours to inform itself of the parameters and requirements of the project and has taken reasonable steps to ensure that the works and document is as accurate and comprehensive as possible given the information upon which it has been based including information that may have been provided or obtained by any third party or external sources which has not been independently verified.

(c) Engeny reserves the right to review and amend any aspect of the works performed including any opinions and recommendations from the works included or referred to in the works if:

  (i) Additional sources of information not presently available (for whatever reason) are provided or become known to Engeny; or

  (ii) Engeny considers it prudent to revise any aspect of the works in light of any information which becomes known to it after the date of submission.

(d) Engeny does not give any warranty nor accept any liability in relation to the completeness or accuracy of the works, which may be inherently reliant upon the completeness and accuracy of the input data and the agreed scope of works. All limitations of liability shall apply for the benefit of the employees, agents and representatives of Engeny to the same extent that they apply for the benefit of Engeny.

(e) This document is for the use of the party to whom it is addressed and for no other persons. No responsibility is accepted to any third party for the whole or part of the contents of this Report.

(f) If any claim or demand is made by any person against Engeny on the basis of detriment sustained or alleged to have been sustained as a result of reliance upon the Report or information therein, Engeny will rely upon this provision as a defence to any such claim or demand.

(g) This Report does not provide legal advice.

7. REFERENCES

ACARP (Australian Coal Association Research Program). (2002). Bowen Basin River Diversions – Design and Rehabilitation Criteria

ACARP (Australian Coal Association Research Program). (2014). Criteria for functioning river landscape units in mining and post mining landscapes, ACARP Project C20017, prepared by Alluvium Consulting.

Alluvium. (2010). Taurus Creek Diversion Baseline Monitoring 2010, Blackwater Mine.

DES (Department of Environment and Science). (2019). 'Environmental Authority EPML00717813'.

DNRME. (2019). Guideline: Works that interfere with water in a watercourse for a resource activity - watercourse diversions authorised under the Water Act 2000.

Engeny. (2017a). Taurus Creek Diversion Major Monitoring Assessment.

Engeny. (2019). Emu Creek Diversion Functional Design Report - Ramp 47 Pit Development SPS/DPS.

Engeny. (2020). Ramp 47 Pit Development - Execution Support.

Hatch. (2001). Design Report for Taurus Creek Diversion.

APPENDIX A: HYDRAULIC PARAMETER MODELLING RESULTS

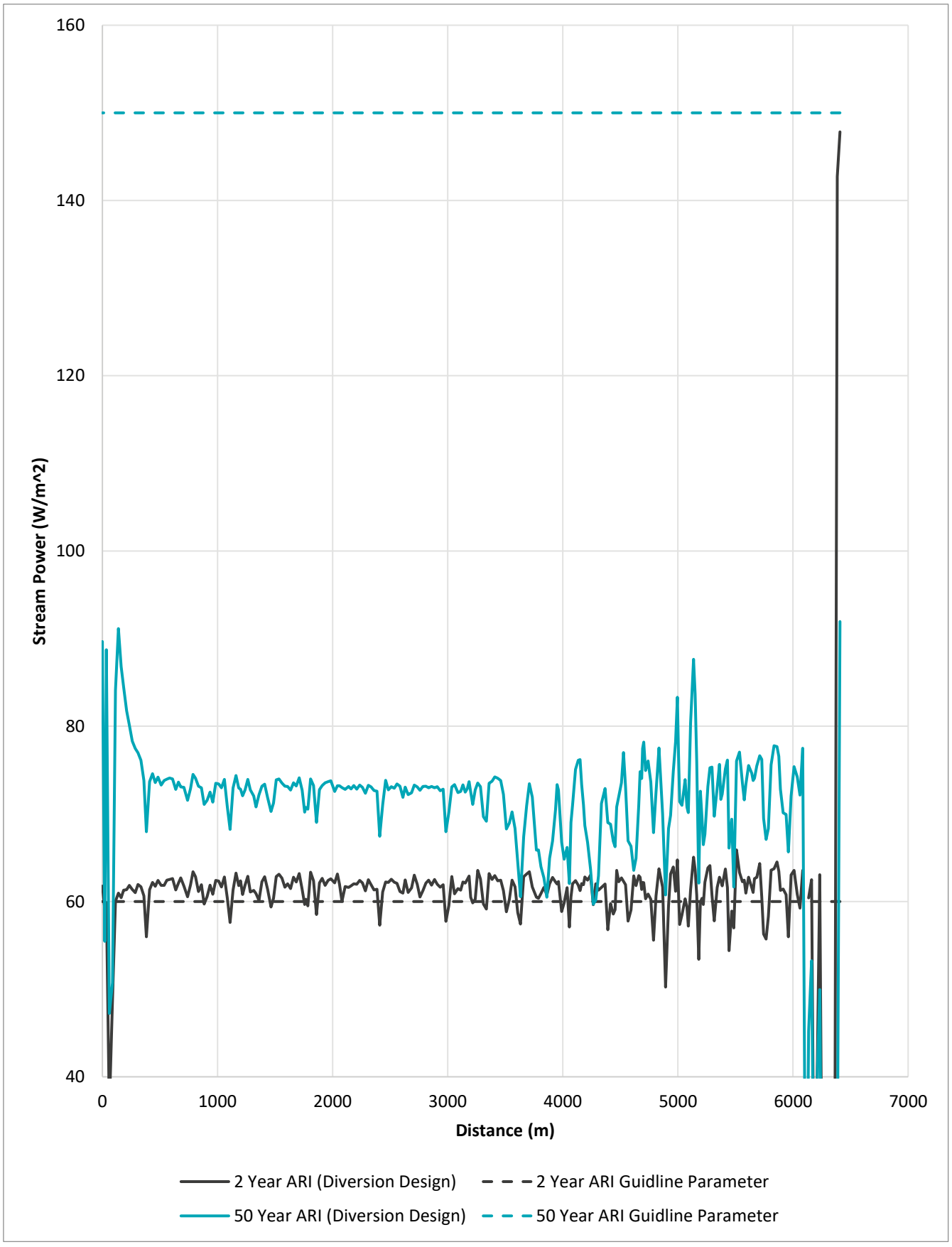


FIGURE A.1**: STREAM POWER HEC-RAS MODEL RESULTS**

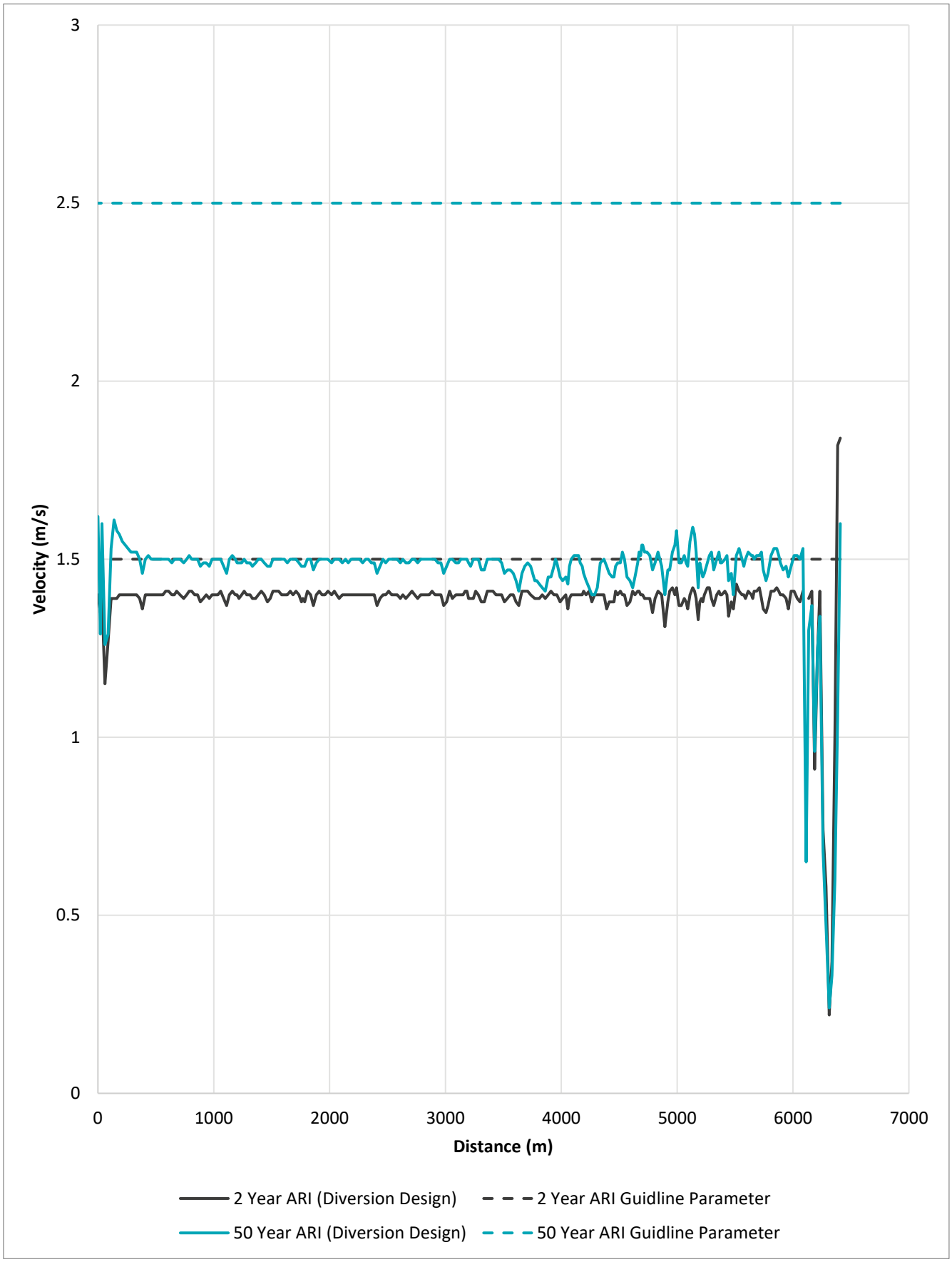


FIGURE A.2: VELOCITY HEC-RAS MODEL RESULTS

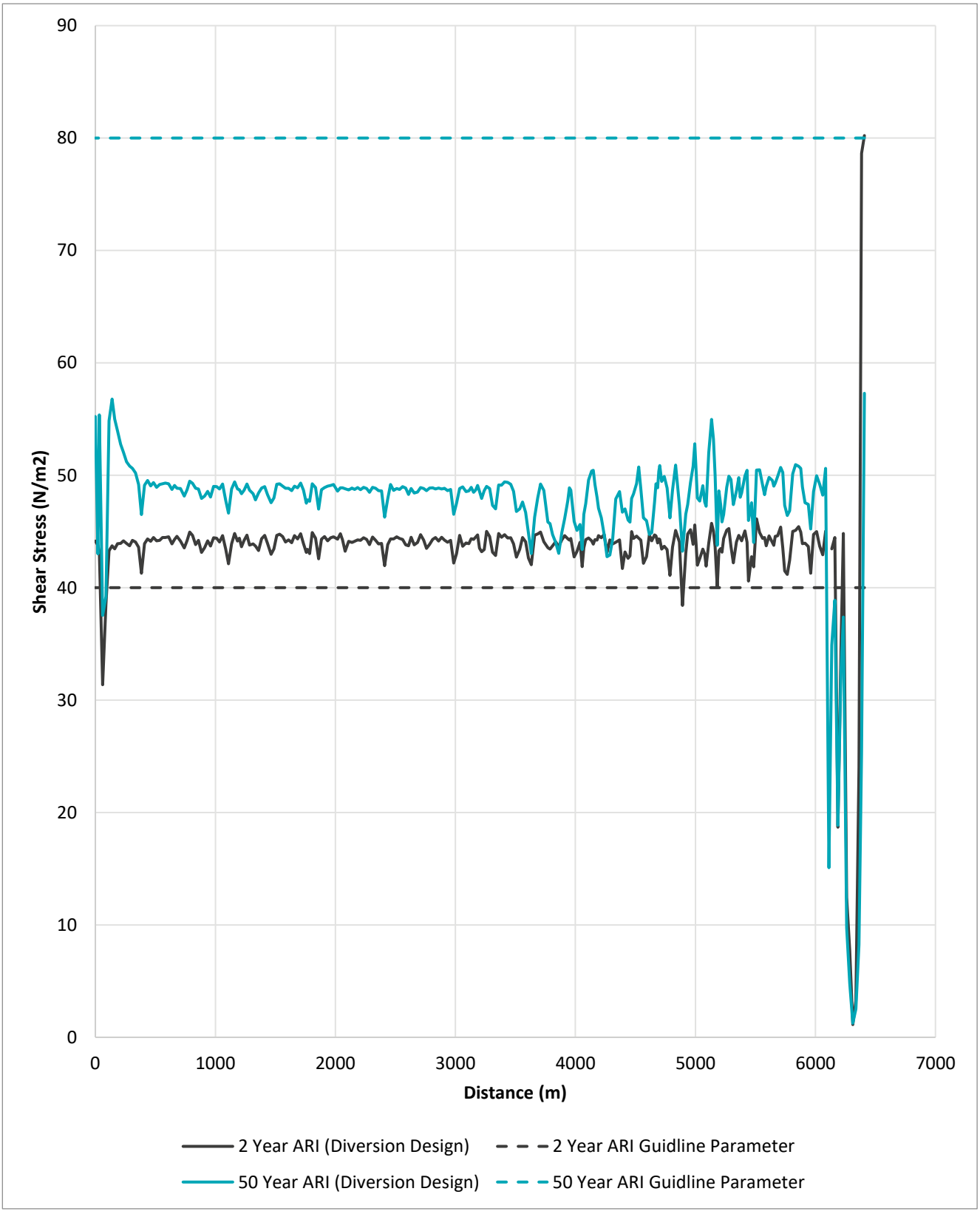
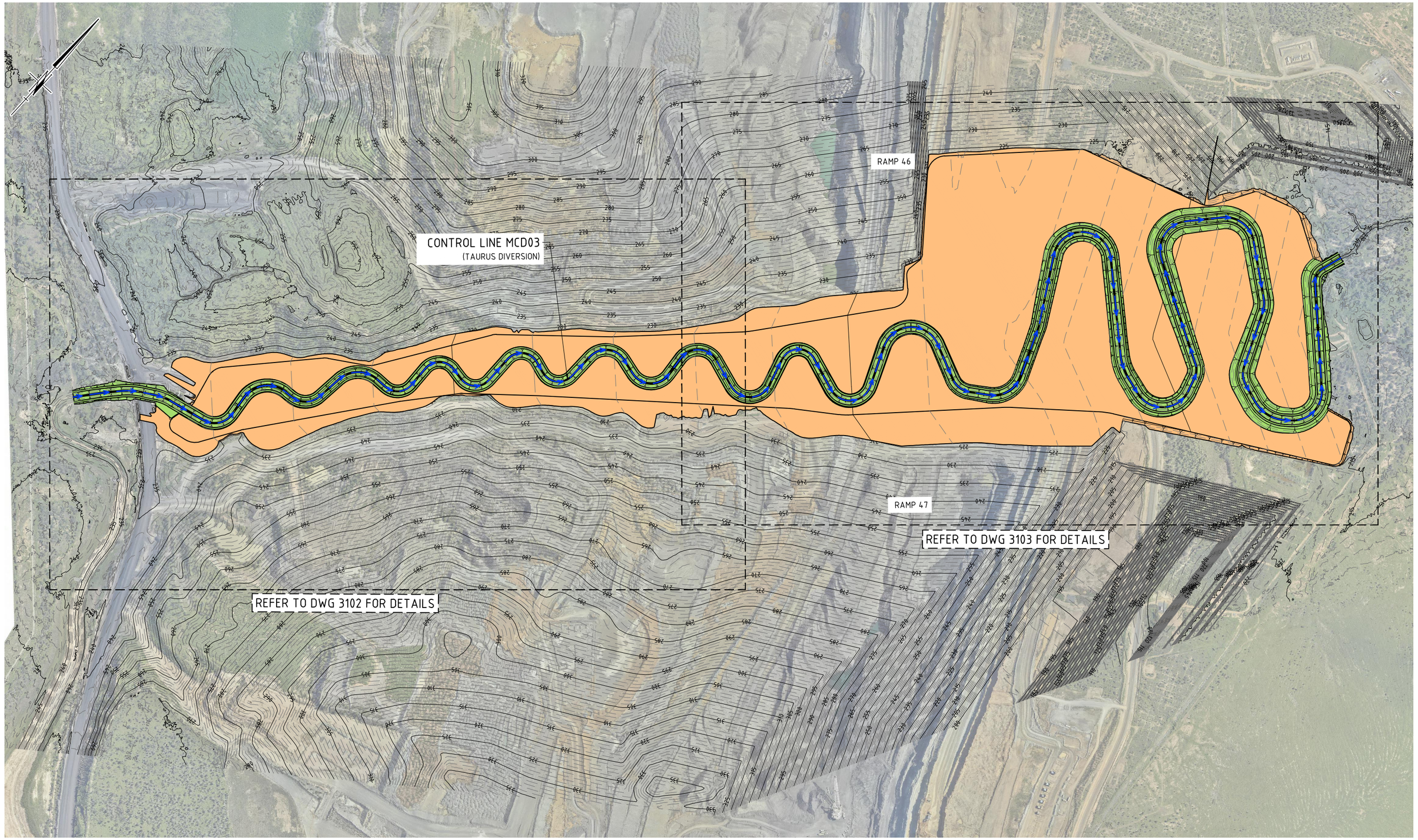


FIGURE A.3: SHEAR STRESS HEC-RAS MODEL RESULTS

APPENDIX B: PREFERRED OPTION



KEY PLAN
SCALE 1:5000

0 50 100 150 200 250m
SCALE 1:5000 (A1)
SCALE BEFORE REDUCTION

VENDOR DRG NUMBER
BNE04877-0045-DWG-3101

VENDOR LOGO
ENGENY

REV	DATE	DESCRIPTION	DRN	ENG	APP
A	07.11.25	ISSUED FOR REVIEW	ON		

REVISION

DRAWING No.	TITLE

REFERENCE DRAWINGS

UNCONTROLLED IF PRINTED OR DOWNLOADED

WHITEHAVEN

BLACKWATER MINE
A.B.N. 89 672 151 941
Phone: +61 7 4980 5666

Ardurad Road
Blackwater Qld 4717

VENDOR APPROVALS	SIGNATURE	DATE
DRAWN	ON	07.11.25
DRN. CHK	TD	07.11.25
ENGINEER	LN	07.11.25
ENG. CHK (QA)	BK	07.11.25
APPROVED		

RPEQ APPROVAL
RPEQ ENGINEER
RPEQ No. DATE
PROJECT No.
EQUIPMENT TAG

WHC REVIEW
SIGNATURE
DATE

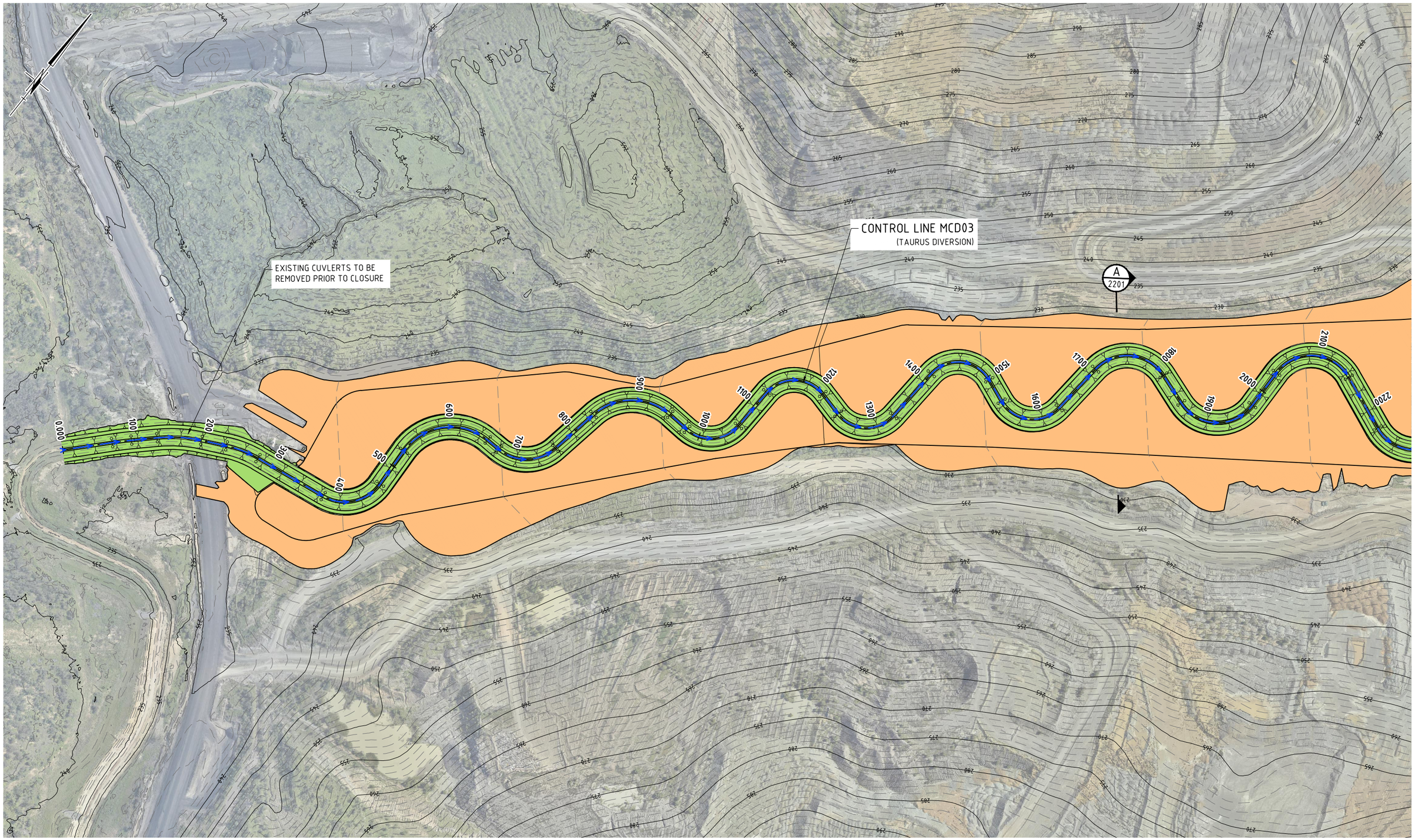
BLACKWATER MINE
DIVERSION RFI
TAURUS DIVERSION
KEY PLAN

DRG. No.
LEGACY DRG No.
STATUS: FOR REVIEW
DISCIPLINE:

Sht
Sht Size A1
Scale –
Rev. No. A

CAD FILE: BNE04877-0045-DWG-3101.dwg

COPYRIGHT. THE DESIGN AND ENGINEERING CONTENT SHOWN ON THIS DRAWING REMAINS THE PROPERTY OF WHITEHAVEN COAL , AND MAY NOT BE COPIED IN ANY WAY WITHOUT PRIOR WRITTEN APPROVAL FROM THE COMPANY.



GENERAL ARRANGEMENT PLAN

SCALE 1:2500

0 25 50 75 100 125m

SCALE 1:2500 (A1)
SCALE BEFORE REDUCTION

VENDOR DRG NUMBER
BNE04877-0045-DWG-3102

VENDOR LOGO

ENGENY

REV	DATE	DESCRIPTION	DRN	ENG	APP
A	07.11.25	ISSUED FOR REVIEW	ON		

REVISION

DRAWING No. | TITLE

REFERENCE DRAWINGS

UNCONTROLLED IF PRINTED OR DOWNLOADED

WHITEHAVEN

BLACKWATER MINE
A.B.N. 89 672 151 941
Phone: +61 7 4980 5666

Ardurad Road
Blackwater Qld 4717

VENDOR APPROVALS	SIGNATURE	DATE
DRAWN	ON	07.11.25
DRN. CHK	TD	07.11.25
ENGINEER	LN	07.11.25
ENG. CHK (QA)	BK	07.11.25
APPROVED		

RPEQ APPROVAL
RPEQ ENGINEER
RPEQ No. DATE
PROJECT No.
EQUIPMENT TAG

WHC REVIEW
SIGNATURE
DATE

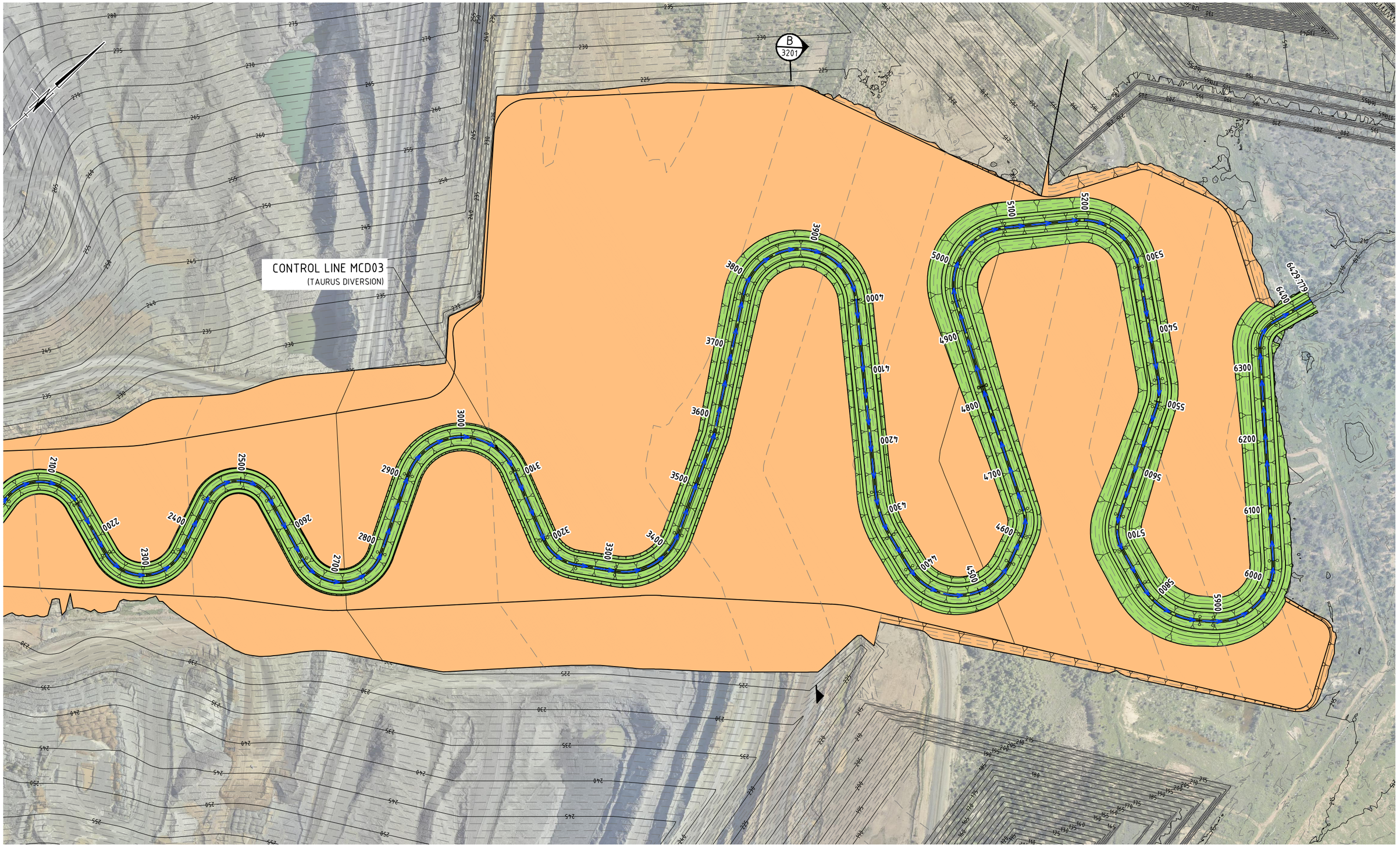
BLACKWATER MINE
DIVERSION RFI
TAURUS DIVERSION
GENERAL ARRANGEMENT PLAN

DRG. No.
LEGACY DRG No.
STATUS: FOR REVIEW
DISCIPLINE:

Sht 1 OF 2
Sht Size A1
Scale –
Rev. No. A

CAD FILE: BNE04877-0045-DWG-3102.dwg

COPYRIGHT. THE DESIGN AND ENGINEERING CONTENT SHOWN ON THIS DRAWING REMAINS THE PROPERTY OF WHITEHAVEN COAL , AND MAY NOT BE COPIED IN ANY WAY WITHOUT PRIOR WRITTEN APPROVAL FROM THE COMPANY.



GENERAL ARRANGEMENT PLAN
SCALE 1:2500

0 50 100 150 200 250m
SCALE 1:5000 (A1)
SCALE BEFORE REDUCTION

VENDOR DRG NUMBER
BNE04877-0045-DWG-3103

VENDOR LOGO
ENGENY

REV	DATE	DESCRIPTION	DRN	ENG	APP
A	07.11.25	ISSUED FOR REVIEW	ON		

REVISION

DRAWING No.	TITLE

REFERENCE DRAWINGS

UNCONTROLLED IF PRINTED OR DOWNLOADED

WHITEHAVEN

BLACKWATER MINE
A.B.N. 89 672 151 941
Phone: +61 7 4980 5666

Ardurad Road
Blackwater Qld 4717

VENDOR APPROVALS	SIGNATURE	DATE
DRAWN	ON	07.11.25
DRN. CHK	TD	07.11.25
ENGINEER	LN	07.11.25
ENG. CHK (QA)	BK	07.11.25
APPROVED		

RPEQ APPROVAL
RPEQ ENGINEER
RPEQ No. DATE
PROJECT No.
EQUIPMENT TAG

WHC REVIEW
SIGNATURE
DATE

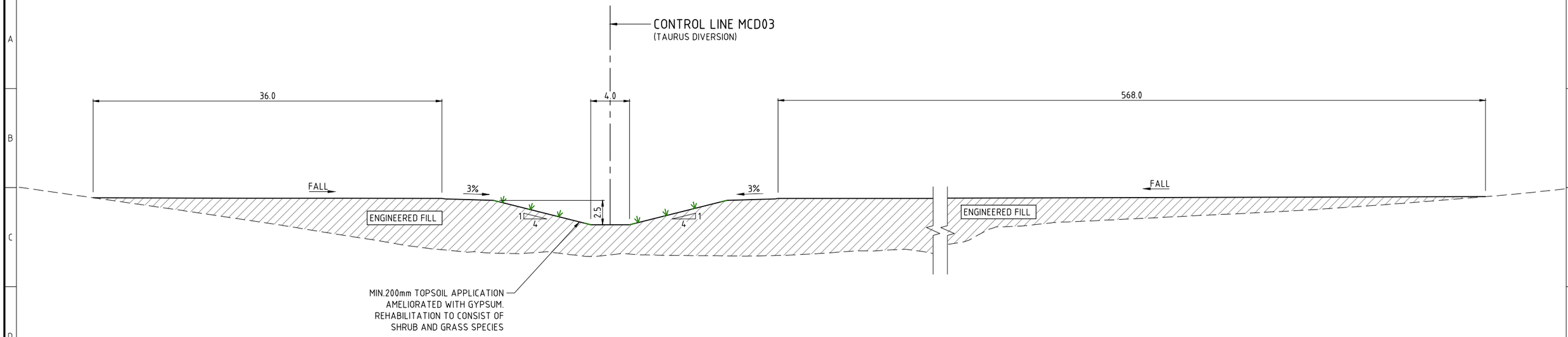
BLACKWATER MINE
DIVERSION RFI
TAURUS DIVERSION
GENERAL ARRANGEMENT PLAN

DRG. No.
LEGACY DRG No.
STATUS: FOR REVIEW
DISCIPLINE:

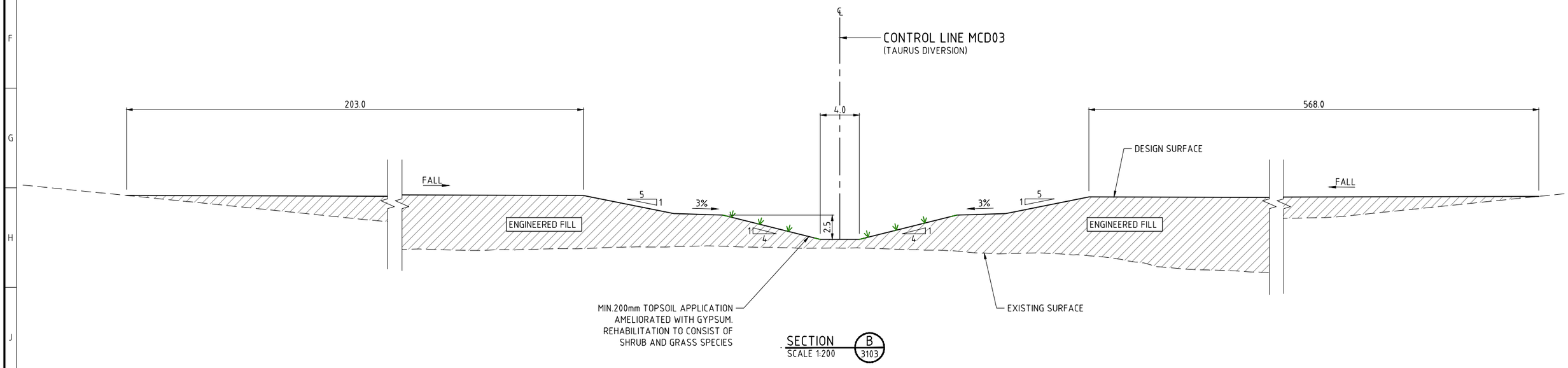
Sht 2 OF 2
Sht Size A1
Scale –
Rev. No. A

CAD FILE: BNE04877-0045-DWG-3103.dwg

COPYRIGHT. THE DESIGN AND ENGINEERING CONTENT SHOWN ON THIS DRAWING REMAINS THE PROPERTY OF WHITEHAVEN COAL , AND MAY NOT BE COPIED IN ANY WAY WITHOUT PRIOR WRITTEN APPROVAL FROM THE COMPANY.



SECTION A
SCALE 1:200
3102



SECTION B
SCALE 1:200
3103

LEGEND

EXISTING SURFACE

DESIGN SURFACE

0 2 4 6 8 10m
SCALE 1:200 (A1)
SCALE BEFORE REDUCTION

VENDOR DRG NUMBER
BNE04877-0045-DWG-3201

VENDOR LOGO
ENGENY

REV	DATE	DESCRIPTION	DRN	ENG	APP
A	07.11.25	ISSUED FOR REVIEW	ON		

REVISION

DRAWING No. | TITLE

REFERENCE DRAWINGS

UNCONTROLLED IF PRINTED OR DOWNLOADED

WHITEHAVEN
BLACKWATER MINE
A.B.N. 89 672 151 941
Phone: +61 7 4980 5666
Ardurad Road
Blackwater Qld 4717

VENDOR APPROVALS	SIGNATURE	DATE
DRAWN	ON	07.11.25
DRN. CHK	TD	07.11.25
ENGINEER	LN	07.11.25
ENG. CHK (QA)	BK	07.11.25
APPROVED		

RPEQ APPROVAL
RPEQ ENGINEER
RPEQ No. DATE
PROJECT No.
EQUIPMENT TAG

WHC REVIEW
SIGNATURE
DATE

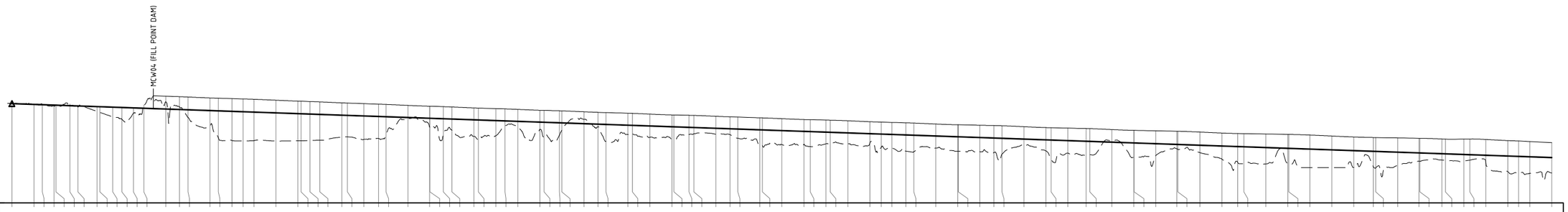
BLACKWATER MINE
DIVERSION RFI
TAURUS DIVERSION
TYPICAL SECTIONS AND DETAILS

DRG. No.
LEGACY DRG No.
STATUS: FOR REVIEW
DISCIPLINE:

Sht
Sht Size A1
Scale –
Rev. No. A

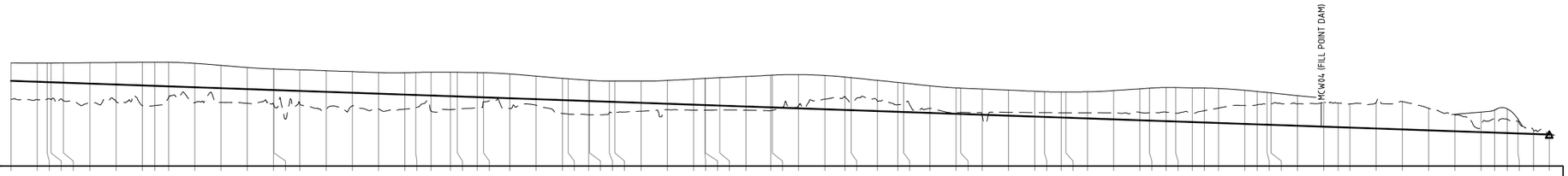
CAD FILE: BNE04877-0045-DWG-3201.dwg

COPYRIGHT. THE DESIGN AND ENGINEERING CONTENT SHOWN ON THIS DRAWING REMAINS THE PROPERTY OF WHITEHAVEN COAL , AND MAY NOT BE COPIED IN ANY WAY WITHOUT PRIOR WRITTEN APPROVAL FROM THE COMPANY.



DATUM 209.0

| | | |



DATUM 203.0

| | | |