

Ref: 10-365-L1
Date: 19th July 2021

Mr Gary Denham
Thomas Armstrong (Holdings) Ltd
Workington Road
Flimby
Maryport
Cumbria
CA15 8RY

BY Email

Dear Gary,

COAL MINING RISK ASSESSMENT JEFFERSON PARK, WHITEHAVEN

1. BACKGROUND AND OBJECTIVES

E3P has been instructed by Thomas Armstrong Ltd to undertake a Coal Mining Risk Assessment for a parcel of land at Jefferson Park, Whitehaven; herein referred to as the site.

The subject site is an irregular shaped parcel of land, located to the west of Low Road, approximately 1.6km south of Whitehaven town centre comprising grassed areas within a developed residential estate. A number of residential dwellings are located within the wider area to the north and south of the proposed development.

The site is affected by coal mining and is within the zone of influence for historic mine workings. A mine Adit and two shafts are located in close proximity to the site and it is believed shallow workings for which the coal authority has no knowledge are likely to be present.

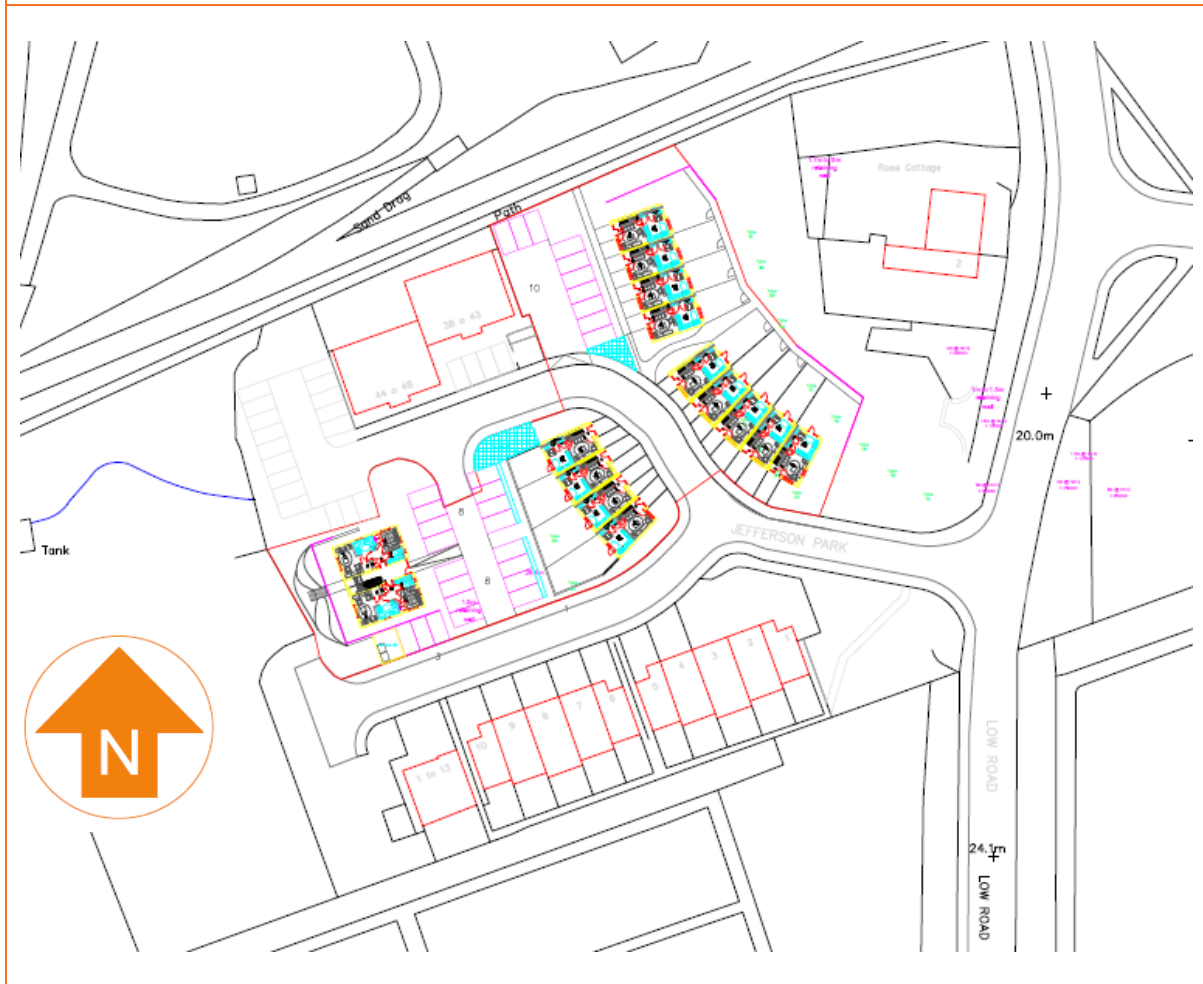
Based on this information it is considered that a full assessment in due consideration of the requirements of CIRIA 758D (Abandoned mine workings manual) and the Coal Authority Permissions Process was required to assess future stability issues.

E3P attended site on the 21st June 2021 to advance a series of three 50m deep rotary boreholes to investigate the presence of potential coal workings underlying the site and the coal mining risk assessment is presented within this letter.

The Proposed Development Layout is presented in Figure 1.1 overleaf.



FIGURE 1.1 PROPOSED DEVELOPMENT SCHEME



1.1. PREVIOUS REPORTS

E3P has completed a Phase I & II Environmental Site Assessment (Ref: 10-365-R1) dated January 2015, completed for R. G. Parkins & Partners. This report contains a review of an earlier Ground Investigation Report completed by Sub-Surface (NW) Ltd dated July 2007 (Ref: Report 4901) for a wider parcel of land which incorporates the application site. The pertinent points of both reports are summarised below:

- ✿ The Sub-Surface (NW) Ltd, Ground Investigation report, includes a Coal Authority Mining Report (Ref: 546188-03) dated Dec 2003 which states the Coal Authority have records of mine workings beneath the site at approximately 60m depth, the last date of working being 1907. The Coal Authority also indicate that ground movement from the above mentioned past coal workings should by now have ceased, however, their records may be incomplete and shallower mine workings are suspected to be present;
- ✿ In addition, within or within 20 metres of, the boundary of the property there are also two mine entries (No. 297516-004 & 297516-005) located to the northwest of the subject site;
- ✿ A Geological Survey review by Sub Surface indicates that the shallowest coal seams beneath the site are the 2.5m thick Bannock Coal, which crops out from north-north west to the south-south east through the centre of the site. The underlying 4.0m thick Main Coal crops out from the north-north west to south-south east immediately east south east of the site which is in turn overlying 2.0m thick Yard Coal which crops out approximately 70m to the east-north east of the site and underlies the site at relatively shallow depths;



- ✿ *E3P reviewed the 1:10,000 geological mapping for the site and in agreement with the Sub-Surface Ltd report identifies the presence of Bannock Coal underlying the western sector of the site at shallow depth, underlain by Main Coal which outcrops through the eastern profile of the site towards Low Road. This in turn is underlain by Yard Coal which outcrops east of the subject site. (A geological cross section is presented in Figure 2.1).*
- ✿ *The Sub-Surface Ltd report also details that rotary borehole investigation has found evidence of mine workings in the Bannock, Main and Yard Coal seams to a maximum depth of 24.80m bgl. In due consideration of the known presence of abandoned mine workings in the form of at least two vertical shafts within 20m of the site boundary and potential for shallower mine workings it was recommended, by Sub Surface (NW) Ltd, that shallow mined horizon be stabilised by drilling and grouting to 30m bgl beneath proposed buildings throughout the site.*
- ✿ *For the avoidance of doubt, a Coal Authority Mining Report (Ref: 51000721154001) dated Dec 2014 was obtained by E3P for the purpose of the proposed development area (within the wider site detailed by Sub-Surface Ltd); which states the site is in the likely zone of influence from workings in one seam of coal at 50m to 70m depth, and last worked in 1907. In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Furthermore, there are no known coal mine entries within, or within 20 metres of, the boundary of the property but records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.*
- ✿ *The Mine Abandonment Plans confirm the presence of coal workings beneath the site (NW1387), however, the plan only detailed the extent of the Whitehaven **Main Prior Coal** seam workings and did not specify a depth (Presented in Figure 2.3).*
- ✿ *The Mine Abandonments Plans also indicate the presence of workings in a shallow seam of coal at Howgill Head Mine to the east of the subject site, however, tunnels leading off from this mine show an abrupt abandonment indicating the mine could not be progressed beneath the subject site; and*
- ✿ *The Coal Authority have no records with respect to the two mine shafts identified within influencing distance of the subject site (as stated in the Sub-Surface report), however these workings may pre-date the mining regulations act of 1877 which required all coal workings to be recorded.*



2. COAL MINING INFORMATION

Prior to the enactment of the Coal Mines Regulation Act (1872), which came into force on the 1st January 1883, there was no statutory requirement to record the extent of abandoned mine workings and as such the CA has no knowledge of extensive workings throughout the UK Coal Fields where shallow workings are present at a depth that could result in a subsidence event in the future (through successive cavitation) associated with failure of support mechanism.

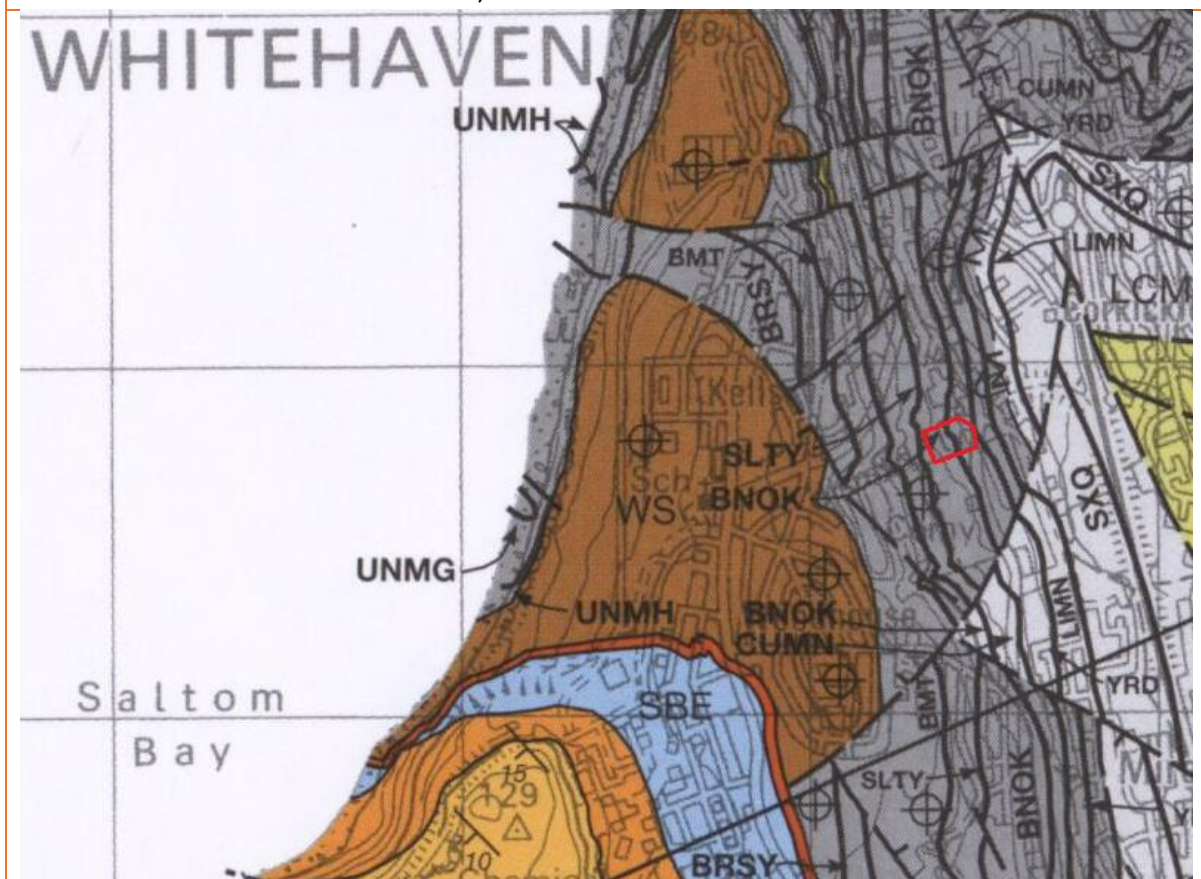
To determine if a site may have unrecorded or recorded coal mine workings requires the consideration of a wide range of information and E3P has completed a review of relevant information in relation to potential coal mining activities. The western portion of the site is located within a Development High Risk area, as defined by the Coal Authority Online Viewer.

E3P have consulted with the Coal Authority who have provided a Consultant Coal Mining Report for the site (Ref: 51000721154001) dated December 2014. The pertinent information is summarised herein.

2.1. COAL MINING GEOLOGY

Figure 2.1 is a excerpt of the 1:10,000 plan for the site which identifies the presence of Bannock Coal underlying the western sector of the site at shallow depth, underlain by Main Coal which outcrops through the eastern profile of the site towards Low Road. This in turn is underlain by Yard Coal which outcrops east of the subject site. The redline denotes the approximate site boundary.

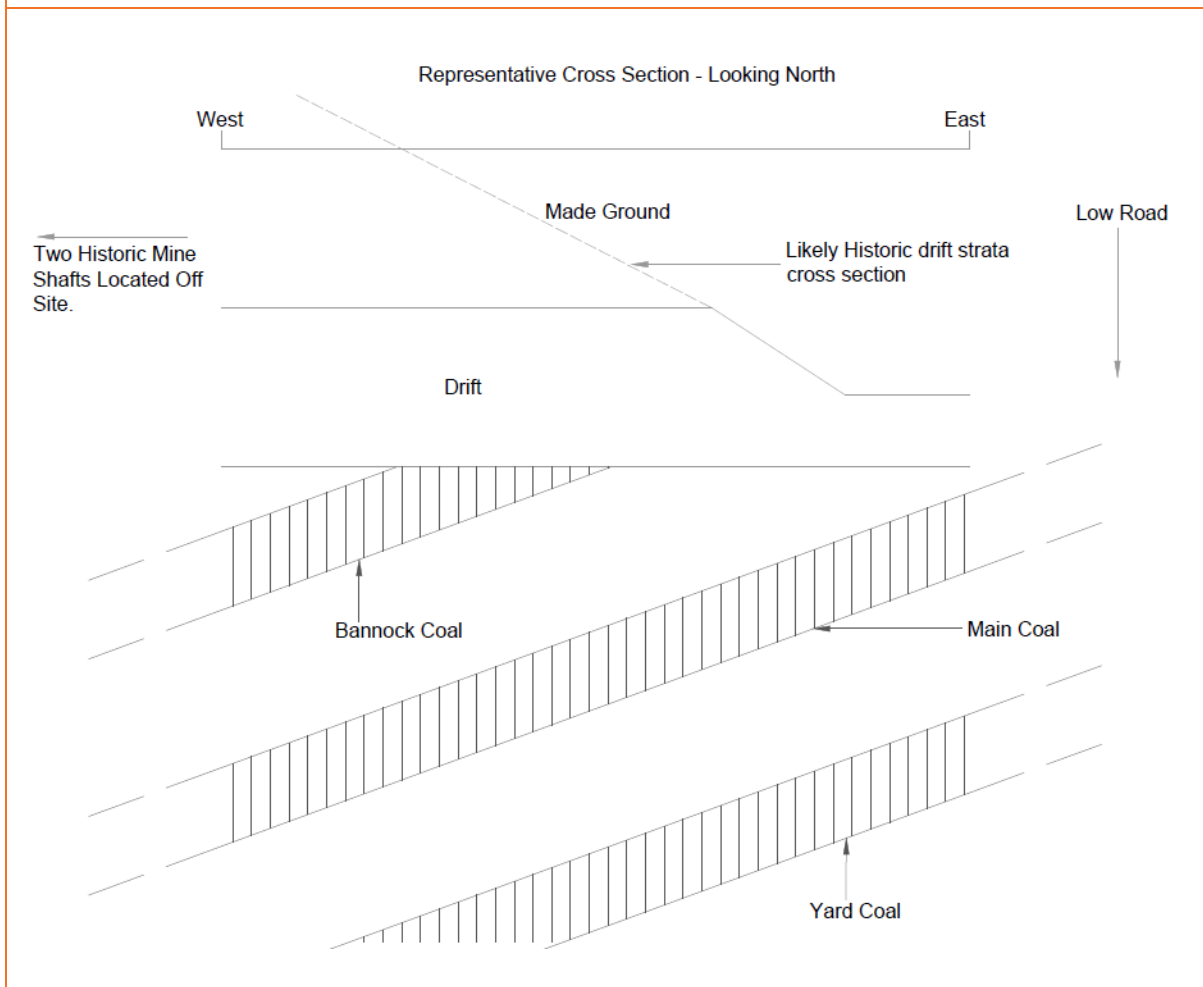
FIGURE 2.1 EXCERPT OF THE 1:10,000 PLAN FOR THE SITE



The geological cross section is presented in Figure 2.2 overleaf.



FIGURE 2.2 GEOLOGICAL MAPPING – CROSS SECTION



2.2. MINE ENTRIES

The land at mine entry No. 297516-004 (off-site) has been developed. The last known location of the entry appears to underlie a communal garden for the apartment building for plots 44 to 48 as per the Development Scheme presented in Figure 1.1.

The land at mine entry No. 297516-005 remains undeveloped scrub.

E3P are currently awaiting a response from the Coal Authority to confirm if either mine entry was identified and if so, the treatment details to grout and cap the shafts (if any).

E3P will provide an addendum to this letter upon receipt.



2.3. MINE ABANDONMENT PLANS

The mine abandonment plan (Ref: NW1387) show the extent of known workings below the site.

The blue denotes the area the area of which the Whitehaven Main Coal seam was either partially or fully extracted. The site lies at the outer extremity of the recorded extraction area.

FIGURE 2.3 – MINE ABANDONMENT PLAN (NW1387)



2.4. COAL MINING RISK ASSESSMENT

This risk assessment comprises a desk-based review of all available information on coal mining issues that are relevant to the application site deemed to be located within a high-risk area. This includes:

- ✿ Interpretation of information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of issues;
- ✿ Setting out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development; and
- ✿ Demonstrating to the local planning authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land.

The coal mining risk assessment is summarised in Table 2.1 overleaf.



TABLE 2.1 SUMMARY OF COAL MINING RISK ASSESSMENT

COAL MINING RISK ASSESSMENT	YES/NO	RISK ASSESSMENT
Recorded Underground Coal Mining at Shallow Depth (< 30 m)	Yes	High
Recorded Underground Coal Mining at Shallow Depth (> 30 m)	Yes	Low
Evidence of Unrecorded Surface Extraction of Coal Outcrop	No	Low
Unrecorded Underground Coal Mining at Shallow Depth (< 30 m)	Yes	High
Mine Entries (Shaft/Adits)	No	Low
Coal Mining Geology – Fractures/Fissures	No	Low
Recorded Gas Emissions	No	Low
Recorded Mining Surface Hazard	No	Low
Surface Mining (Opencast)	No	Very Low/Low

Based on the above, a high risk of unrecorded coal mining at shallow depth has been identified within the Bannock, Main and Yard coal seams. The Coal Authority, as a statutory consultee, therefore required a series of rotary open holes across the site to determine the presence of any coal on site and to understand the nature of any coal workings.



3. COAL MINING SITE INVESTIGATION

3.1. SCOPE OF INTRUSIVE GROUND INVESTIGATION

In due consideration of the potential presence of coal workings within the Bannock, Main and Yard coal seams, a series of rotary boreholes have been advanced in accordance with Coal Authority Permission Ref: 22188 to assess the potential presence of shallow workings within this seam and the potential for ground instability to induce a future subsidence event within the proposed development.

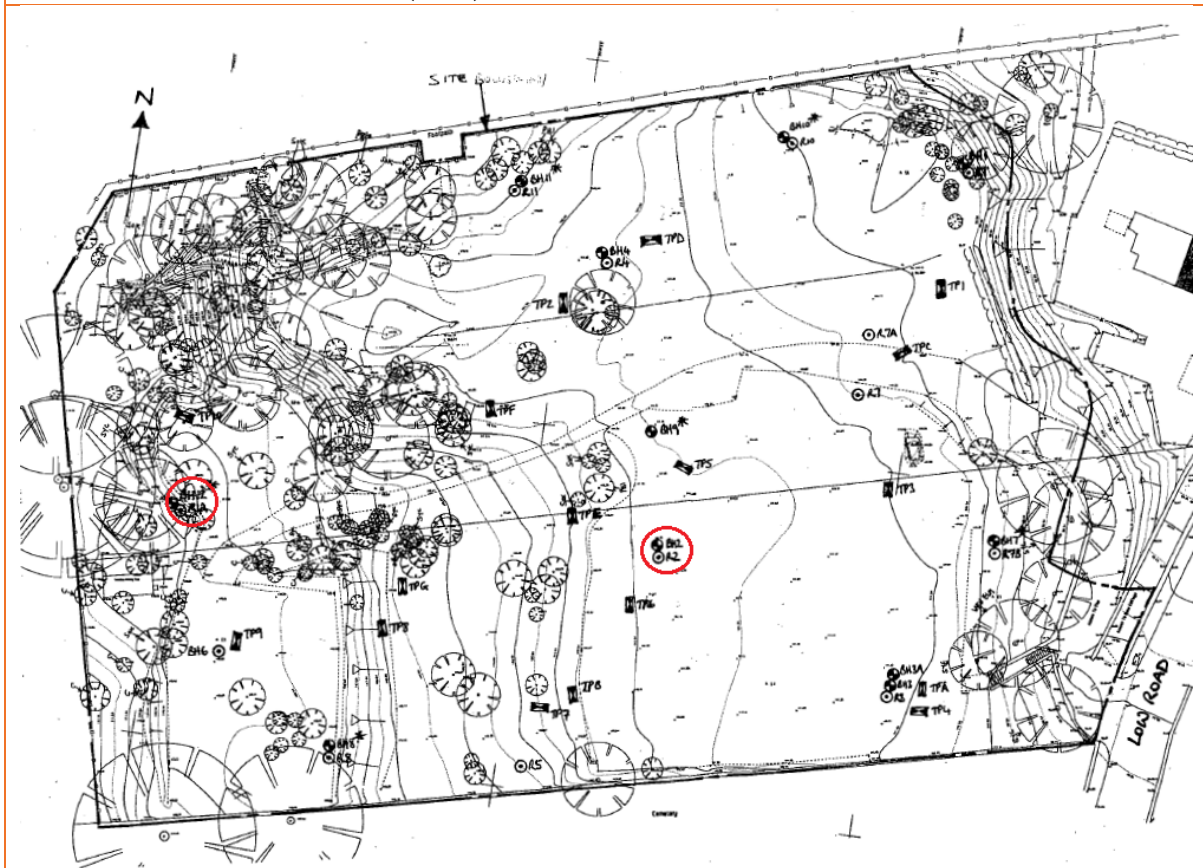
3.2. SUMMARY OF GROUND INVESTIGATION WORKS

The Sub Surface (NW) Ltd investigation recorded voids in boreholes R2 and R12. In R2, a 1.20m void was recorded at 22.00m bgl (with loss of flush from 20.80m bgl). R2 is located within the undeveloped grassed area within the central portion of the site. Treatment details for this void are currently awaited from the Coal Authority;

In R12, a 1.00m void was recorded at 18.50m bgl, overlying 1.50m of loose drilling and flush loss recorded from 16.00m bgl. R12 is located c. 30m west of the site boundary. It is unknown if any treatment has been undertaken in this portion of the site and E3P await confirmation from the Coal Authority.

The locations of R2 & R12 are denoted on the plan presented in Figure 3.1 below.

FIGURE 3.1 – SUB SURFACE NW (2007) – BOREHOLE LOCATION PLAN



3.2.1. ROTARY BOREHOLES TO INVESTIGATE WORKINGS IN COAL

Three rotary boreholes have been advanced at the locations detailed within the E3P exploratory borehole location plan at positions to intersect the potential coal seams and assess the potential for any workings.

TABLE 3.1 ROTARY BOREHOLES

ROTARY BOREHOLE	DEPTH TO ROCKHEAD (m bgl)	DEPTH TO COAL (m bgl)	EVIDENCE OF MINING ACTIVITY/SEAM	REMARKS
RB101	8.80	8.80 (0.60m) 10.90 (0.60m) 12.00 (1.80m) 19.10 (0.50m) 30.40 (0.70m)	None	Banock Upper Leaf (intact) Banock Middle Leaf (intact) Banock Lower Leaf (intact) Main (intact) Yard (intact)
RB102	4.90	4.90 (2.20m) 10.30 (0.40m) 20.00 (0.60m) 31.00 (1.10m)	None	Banock Upper Leaf (intact) Banock Middle Leaf (intact) Banock Lower Leaf (intact) Main (intact) Yard (intact)
RB103	10.10	11.00 (1.20m) 23.10 (0.60m)	None	Banock (intact) Main (intact)

There was evidence to suggest that some seams were being locally displaced by possible fault sub-inclusions of rock which may result in some seams being incorrectly named.

For the purposes of this assessment, the names of the coal seams are inferred as best as possible for the purposes of assessing the risk from mine workings – the names of the seams are not critical.

3.3. SUMMARY OF COAL MINING ISSUES

E3P has reviewed the historical Sub Surface (NW) Ltd *Ground Investigation*, BGS geological mapping and CA information, in addition to completing three 30 m rotary boreholes to investigate shallow mine workings. A summary of the findings follow.

- ✚ The E3P intrusive ground investigation comprised three 50m deep rotary boreholes and did identify the presence of shallow coal seams; and
- ✚ However, the seams were noted to be intact and during the drilling process the foreman driller did not record any evidence of voids, broken ground or loss of flush indicative of historic mine workings to the base of the boreholes.

Historic workings / voids are recorded in R2 and a process of proof drilling is required beneath areas of proposed structures and infrastructure with pressure grouting and stabilisation of any workings to ensure adequate consolidation in accordance with CIRIA 758 (subject to confirmation of previous treatment details from the Coal Authority).

Given the presence of thick shallow coal and insufficient rock cover, the site will need to be proof drilled on a 6m grid (beneath structures) and 10m grid beneath roads / infrastructure. Where workings are identified, they will need to be pressure grouted, with possible reduced spacing depending on grout takes.

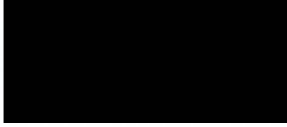
A full and detailed specification for the consolidation of abandoned mine workings is required.



I trust this information is satisfactory to your requirements, and should I be able to be of any further assistance, please do not hesitate to contact me.

Yours sincerely,

For and on behalf of E3P Ltd



Alex Smith
Associate Director



Enclosed

Appendix I Drawings

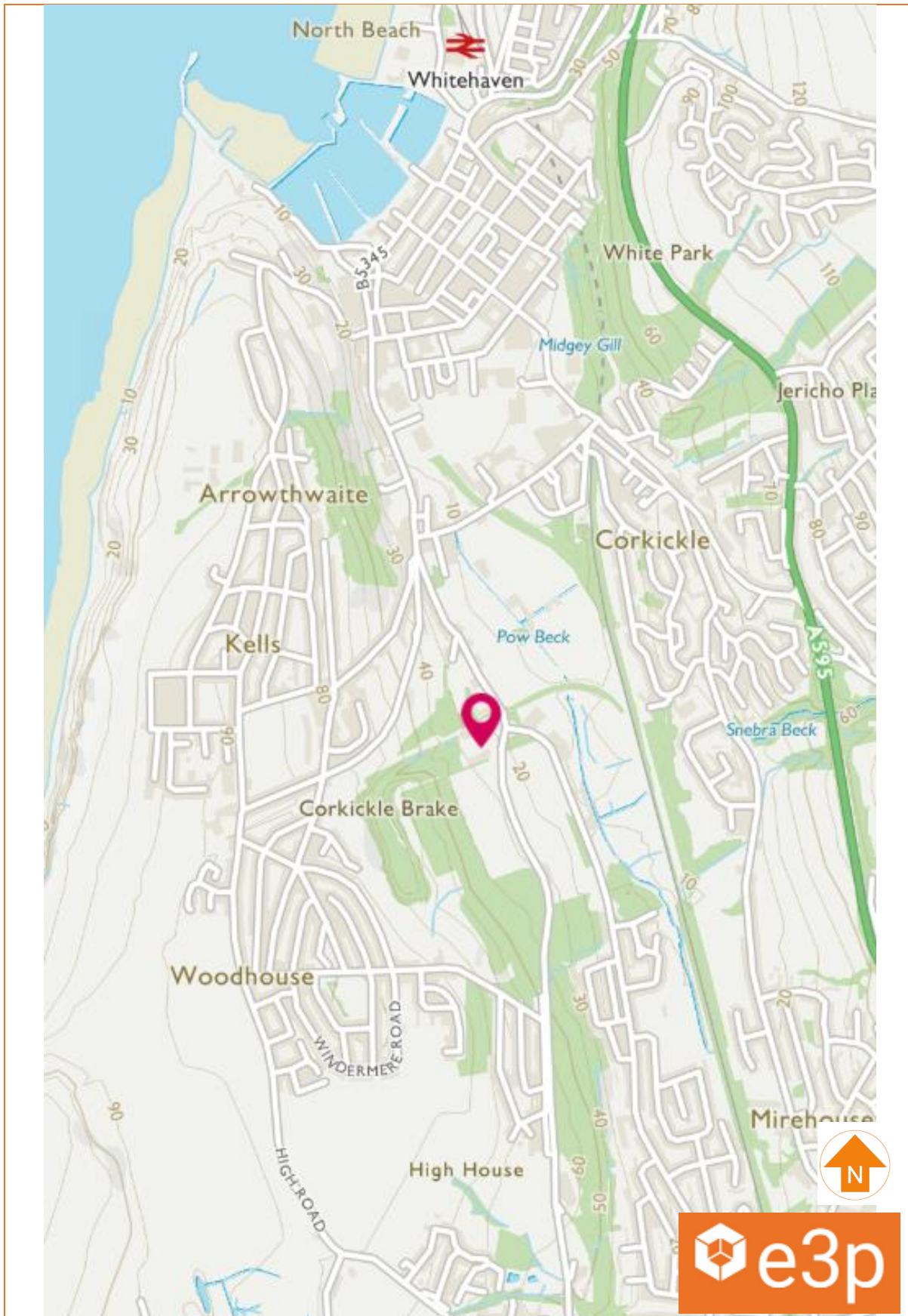
10-365-001 Site Location Plan
10-365-005 Exploratory Hole Plan

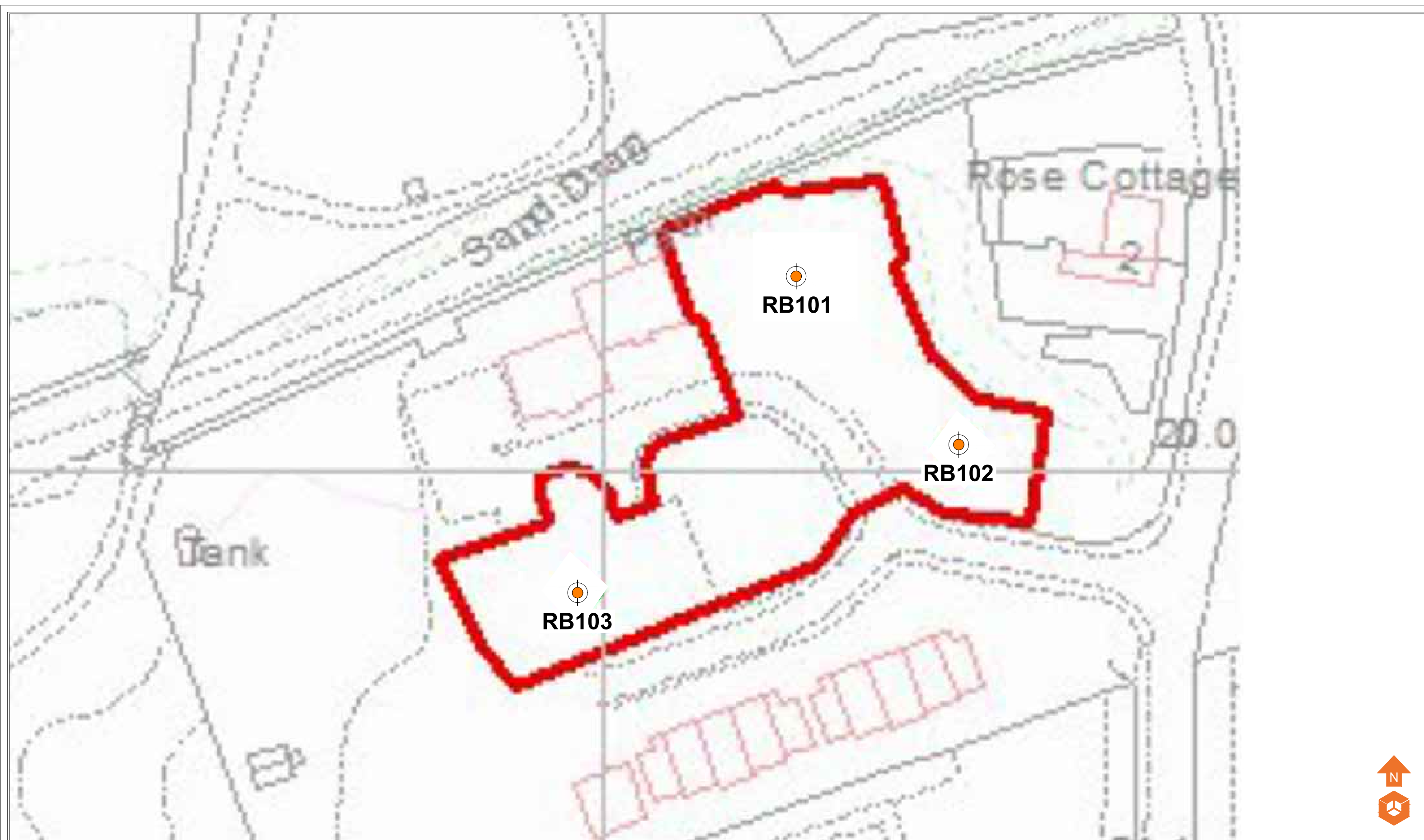
Appendix II Exploratory Logs




APPENDIX I DRAWINGS

DRAWING 10-365-001 – SITE LOCATION PLAN





Location Symbols
 Proposed Rotary Borehole Location

Notes:

Client:
Thomas Armstrong Construction

Job No:
10-365

Drawing No:
005

Date:
17.05.2021

Scale:
NTS

 Environmental Engineering Partnership Ltd
 Taylor Road, Trafford Park
 Urmston, Manchester, M41 7JQ
 Tel: 0161 707 9612
 E-mail: info@e3p.co.uk
 Website: www.e3p.co.uk

P1	REVA	17.05.2021	HM	AS
Phase	Issue	Date	Drawn	Checked

Job Title:
Jefferson Park

Drawing Title:
Proposed Rotary Borehole Location Plan

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.

APPENDIX II

EXPLORATORY LOGS



Rotary Core Log

Borehole No.

RB101

Sheet 1 of 2

Project Name: Jefferson Park

Project No.
10365

Co-ords: 297436.00 - 516837.00

Hole Type
BH

Location: Whitehaven

Level:

Scale
1:200

Client: R. G. Parkins

Dates: 21/06/2021 -

Logged By
DP Drilling

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										MADE GROUND: Brown sandy gravelly clay. Gravel is fine to coarse subangular to subrounded of brick, slate, mudstone, sandstone and concrete.	1
							6.10			Grey slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone.	2
							8.80			COAL with black shale.	3
							9.40			Grey SILTSTONE.	4
							10.90			COAL.	5
							11.50			Black shale.	6
							12.00			COAL.	7
							13.80			Dark grey SILTSTONE.	8
							16.10			Grey SANDSTONE.	9
							19.10			Black shale COAL.	10
							19.60			Grey MUDSTONE with sandstone bands.	11
							30.40			COAL.	12
							31.10			Black shale.	13
							31.70			Grey MUDSTONE.	14
							34.10			Grey SANDSTONE with siltstone bands.	15
										Continued on next sheet	16

Remarks
1. Complete.





Rotary Core Log

Borehole No.

RB101

Sheet 2 of 2

Project Name: Jefferson Park

Project No.
10365

Co-ords: 297436.00 - 516837.00

Hole Type
BH

Location: Whitehaven

Level:

Scale
1:200

Client: R. G. Parkins

Dates: 21/06/2021 -

Logged By
DP Drilling

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							50.00			41
											42
											43
											44
											45
											46
											47
											48
											49
									-----	End of borehole at 50.00 m	50
											51
											52
											53
											54
											55
											56
											57
											58
											59
											60
											61
											62
											63
											64
											65
											66
											67
											68
											69
											70
											71
											72
											73
											74
											75
											76
											77
											78
											79
											80

Remarks

1. Complete.





Rotary Core Log

Borehole No.

RB102

Sheet 1 of 2

Project Name: Jefferson Park

Project No.
10365

Co-ords: 297464.00 - 516802.00

Hole Type
BH

Location: Whitehaven

Level:

Scale
1:200

Client: R. G. Parkins

Dates: 22/06/2021 -

Logged By
DP Drilling

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							2.10		MADE GROUND: Black very gravelly clay. Gravel is fine to medium angular to subrounded of brick, concrete, slate, clinker, mudstone, sandstone and coal.	1	
							4.90		Grey slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone.	2	
							7.10		COAL shaley bands.	3	
							10.30		Grey SANDSTONE.	4	
							10.90		COAL.	5	
							11.40		Dark grey SILTSTONE.	6	
									Dark grey SANDSTONE.	7	
							20.00		COAL with shale.	8	
							20.60		Grey MUDSTONE with sandstone bands.	9	
							31.00		Black shale with COAL.	10	
							32.10		Grey MUDSTONE.	11	
							35.50		Grey SILTSTONE with sandstone bands.	12	
							39.90			13	
										14	
										15	
										16	
										17	
										18	
										19	
										20	
										21	
										22	
										23	
										24	
										25	
										26	
										27	
										28	
										29	
										30	
										31	
										32	
										33	
										34	
										35	
										36	
										37	
										38	
										39	
										40	

Continued on next sheet

Remarks

1. Complete.





Rotary Core Log

Borehole No.

RB102

Sheet 2 of 2

Project Name: Jefferson Park

Project No.
10365

Co-ords: 297464.00 - 516802.00

Hole Type
BH

Location: Whitehaven

Level:

Scale
1:200

Client: R. G. Parkins

Dates: 22/06/2021 -

Logged By
DP Drilling

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							50.00		Grey SANDSTONE with mudstone bands.	41
										42
										43
										44
										45
										46
										47
										48
										49
									End of borehole at 50.00 m	50
											51
											52
											53
											54
											55
											56
											57
											58
											59
											60
											61
											62
											63
											64
											65
											66
											67
											68
											69
											70
											71
											72
											73
											74
											75
											76
											77
											78
											79
											80

Remarks
1. Complete.



Rotary Core Log

Borehole No.

RB103

Sheet 1 of 2

Project Name: Jefferson Park

Project No.
10365

Co-ords: 297399.00 - 516786.00

Hole Type
BH

Location: Whitehaven

Level:

Scale
1:200

Client: R. G. Parkins

Dates: 23/06/2021 -

Logged By
DP Drilling

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.90			MADE GROUND: Brown sandy gravelly clay. Gravel is fine to coarse subangular to subrounded of brick, slate, mudstone, sandstone and concrete.	1
							2.80			Brown CLAY. Grey slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone.	2 3 4
							10.10			Grey SANDSTONE.	10
							11.00			COAL.	11
							11.90			Grey SHALE.	12
							12.10			COAL.	13
							12.40			Grey MUDSTONE.	13
							13.70			Dark grey SILTSTONE with sandstone bands.	14 15 16 17 18 19 20 21 22
							23.10			COAL.	23
							23.70			Grey MUDSTONE.	24
							25.00			Grey SANDSTONE with occasional siltstone bands.	25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

Continued on next sheet

Remarks
1. Complete.





Rotary Core Log

Borehole No.

RB103

Sheet 2 of 2

Project Name: Jefferson Park

Project No.
10365

Co-ords: 297399.00 - 516786.00

Hole Type
BH

Location: Whitehaven

Level:

Scale
1:200

Client: R. G. Parkins

Dates: 23/06/2021 -

Logged By
DP Drilling

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							50.00			41
											42
											43
											44
											45
											46
											47
											48
											49
									-----	End of borehole at 50.00 m	50
											51
											52
											53
											54
											55
											56
											57
											58
											59
											60
											61
											62
											63
											64
											65
											66
											67
											68
											69
											70
											71
											72
											73
											74
											75
											76
											77
											78
											79
											80

Remarks

1. Complete.



