

Plate 1a: Culvert C1 – outlet / downstream face



Brick arch

Smaller rectangular frame
(steel) acting as an orifice at
each end

1.05m high / 0.92m wide

Stream exits culvert at a right-
angled bend

Plate 1b: Culvert C1 – inside view towards inlet



Plate 2a: Culvert C2 – inlet / upstream face



Brick arch
Good condition

1.00m high / 1.08m wide

Culvert was repaired after
breaking in of roof roughly
halfway between inflow and
outlet

A 0.5m wide tributary / drain
joins the burn from the south a
short distance upstream of C2

Plate 2b: Culvert C2 – outlet / downstream face



Brick arch
Good condition

0.80m high / 1.07m wide

It appears that a base was added
to the downstream end of the
culvert, perhaps as part of
repair or scour protection. No
flow through culvert on day of
survey.



Plate 3a: Culvert C3 – inlet / upstream face



Finished stone sided rectangle

Concrete slab roof and concrete base

0.87m high / 1.75m wide

Right angled turn of burn into culvert

Left hand side of burn armoured with low dry stone wall to 1m high

Plate 3b: Culvert C3 – outlet / downstream face



Brick arch

Cemented stone bed finish

1.05m high / 1.20m wide

Culvert shape and direction changes in between

Stream exits culvert at a right-angled bend

Plate 4: Section 90



Upstream view of wetland
above culvert C2

Plate 5: Section between C2 and C3



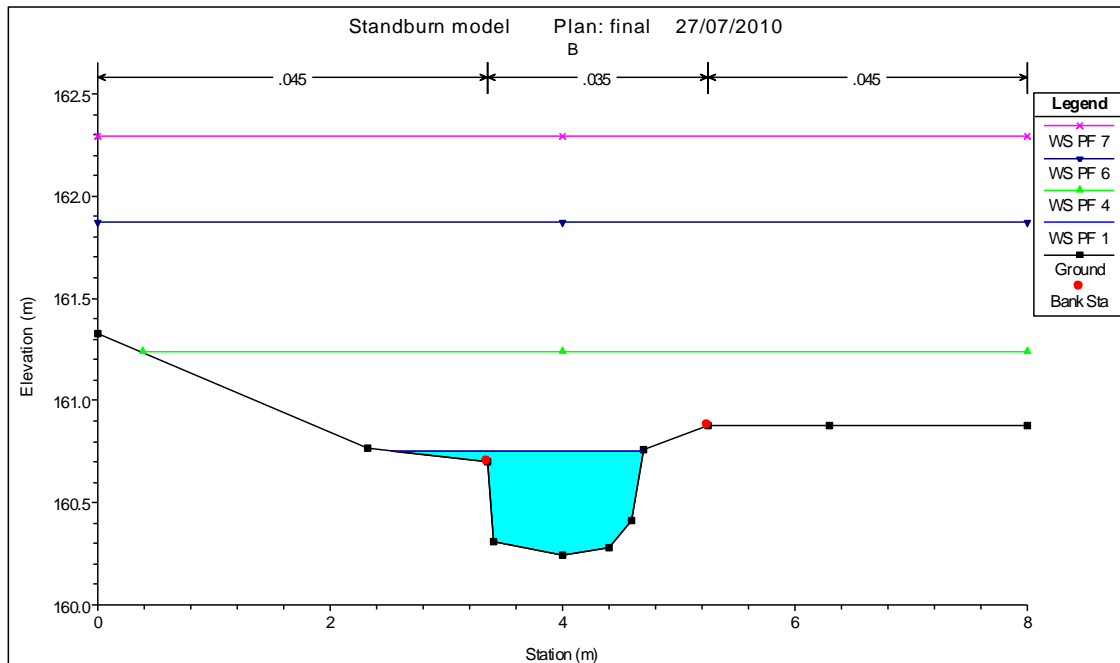
Wall adjacent to B825 road

Appendix D: Model sections

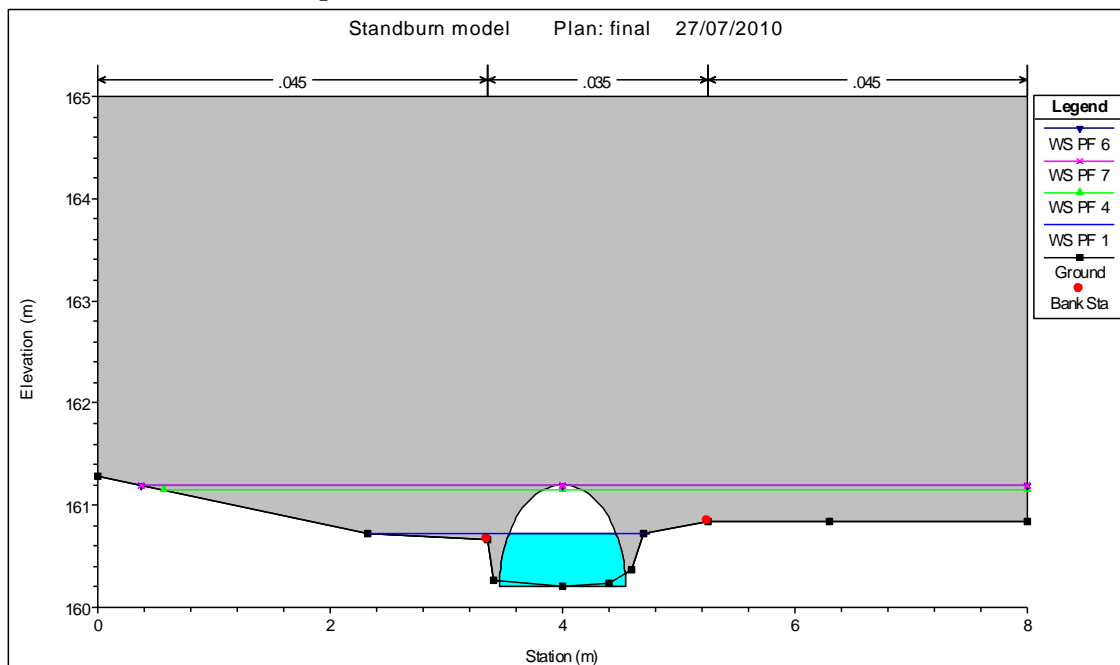
Legend:

WS PF 7 – water surface elevation of 200 year + climate change event (1.5m³/s)
 WS PF 6 – water surface elevation of 200 year event (1.3m³/s)
 WS PF 4 – water surface elevation of 50 year event (0.9m³/s)
 WS PF 1 – water surface elevation of 2 year event (0.4m³/s)

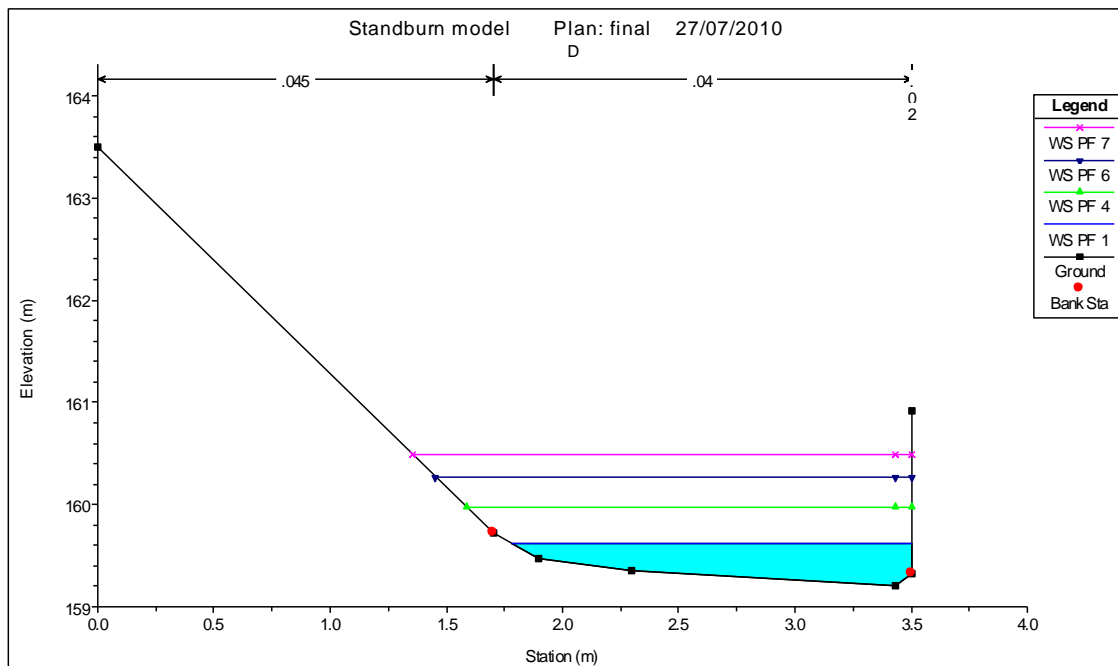
Section 90 – section upstream of culvert C2



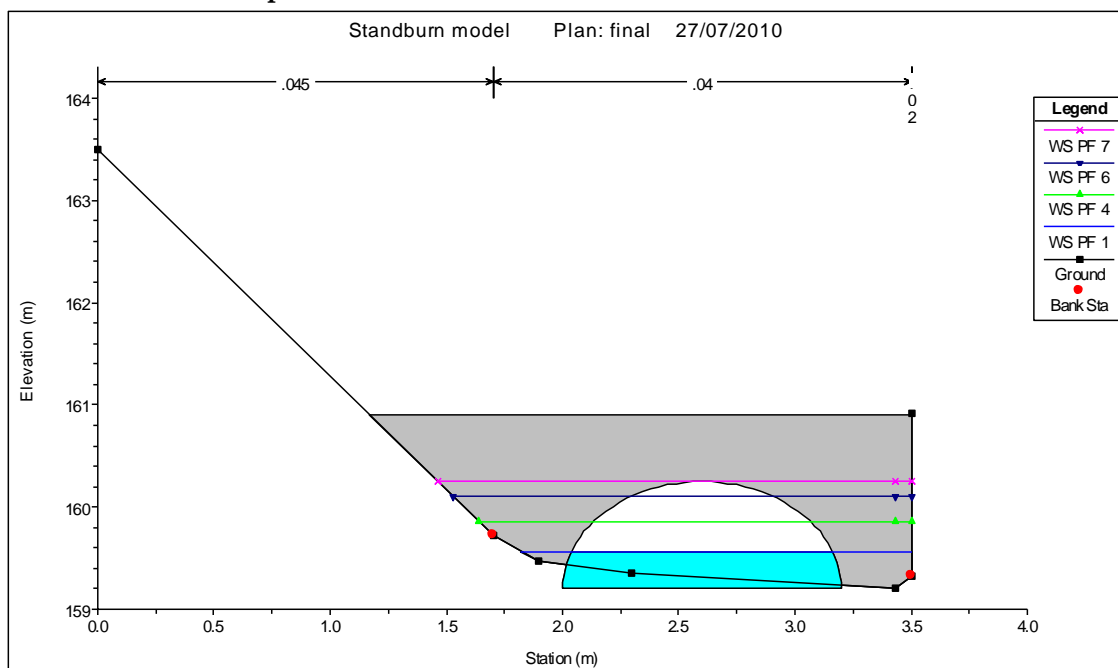
Section 75 – Culvert C2, upstream face



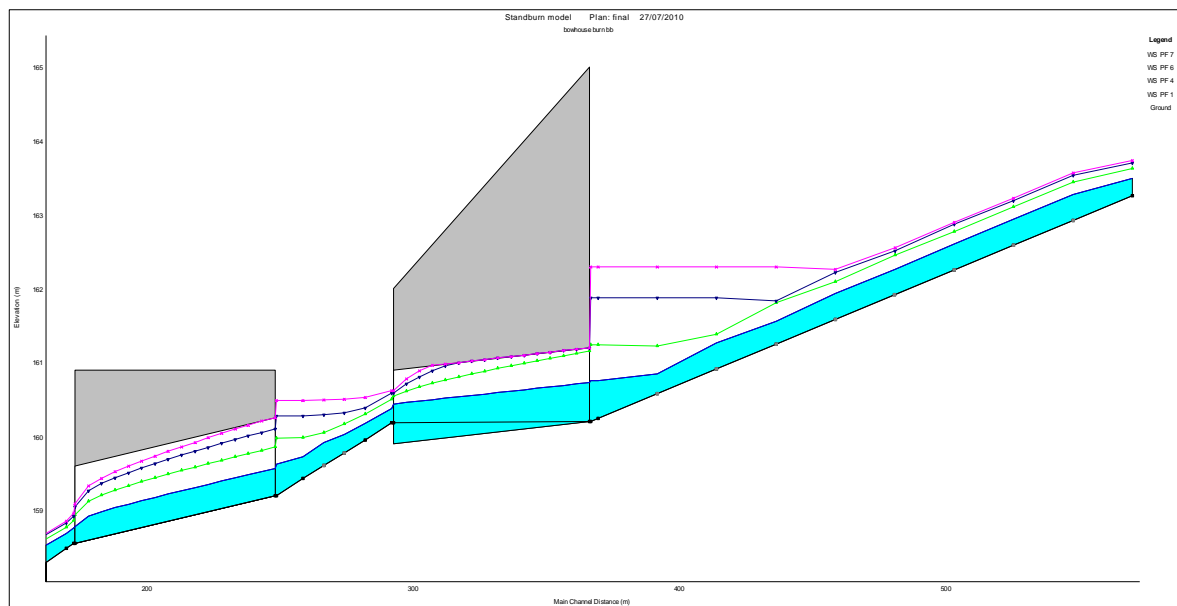
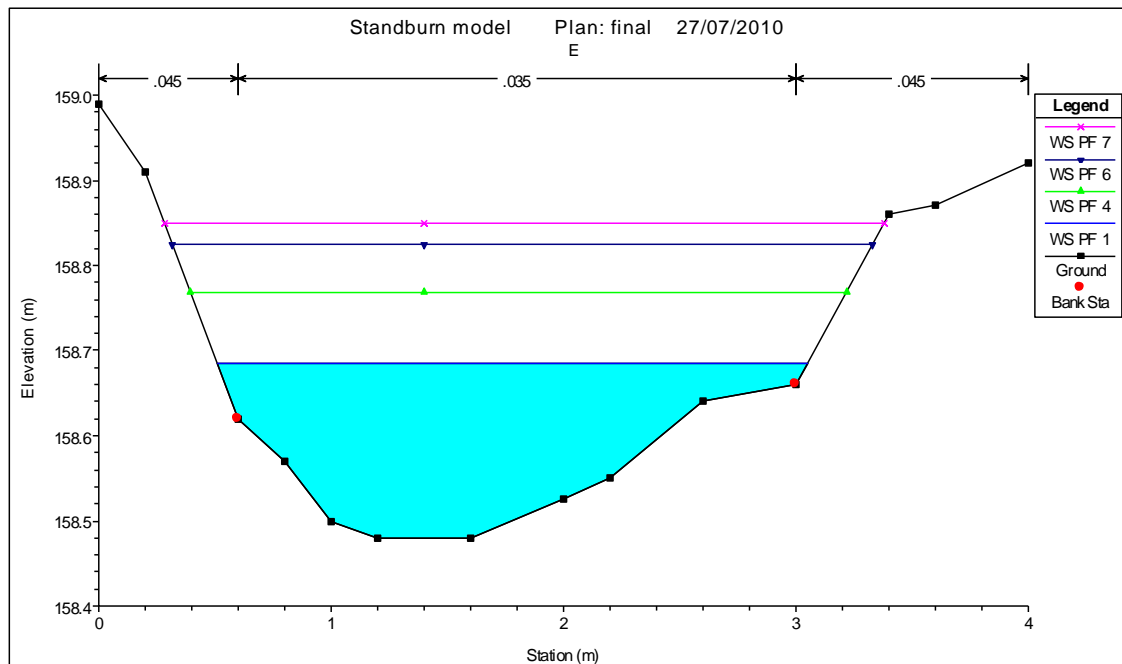
Section 40 – section upstream of culvert C3



Section 35 – section upstream of culvert C3

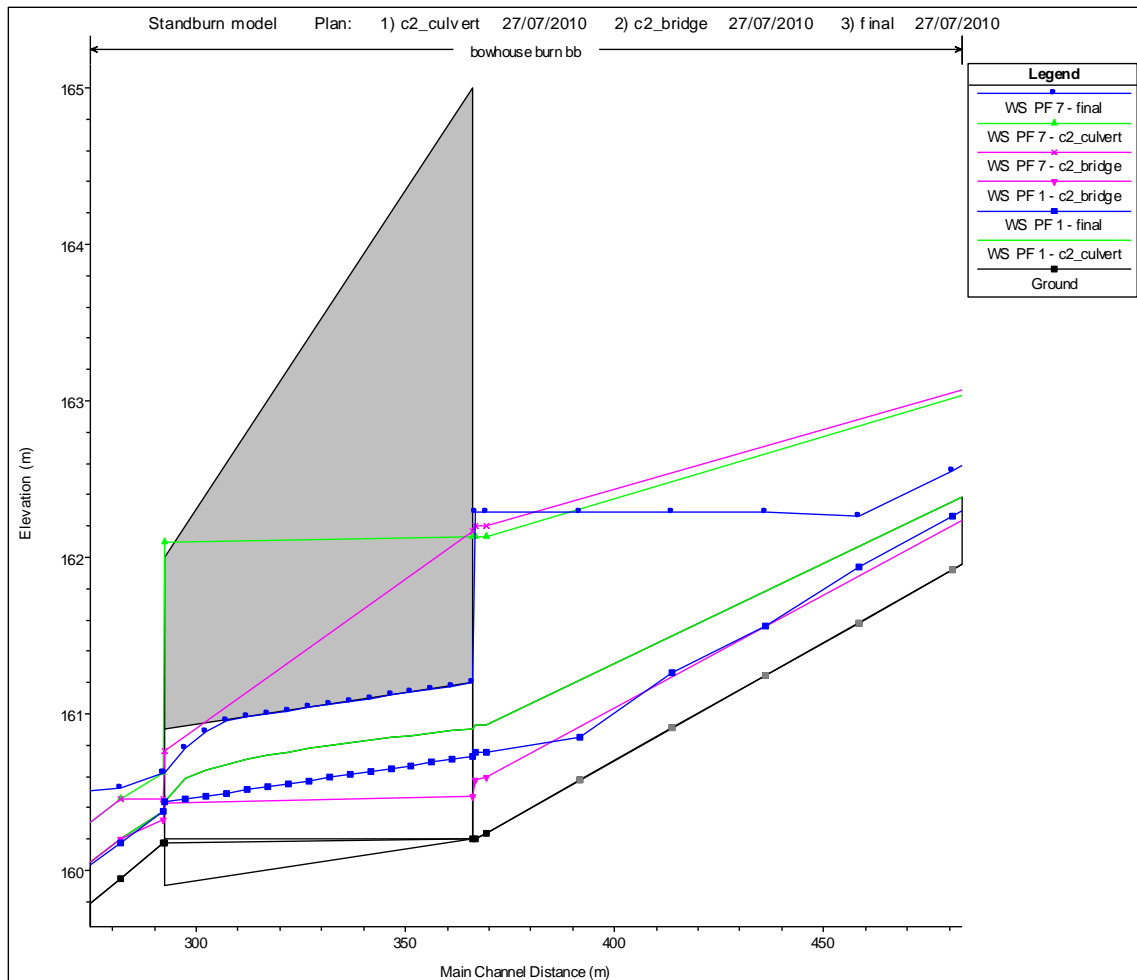


Section 20 – section downstream of culvert C3



Appendix E: Sensitivity analyses

Representation of culvert C2



WS PF 7 – water surface elevation of 200 year + climate change event ($1.5\text{m}^3/\text{s}$)

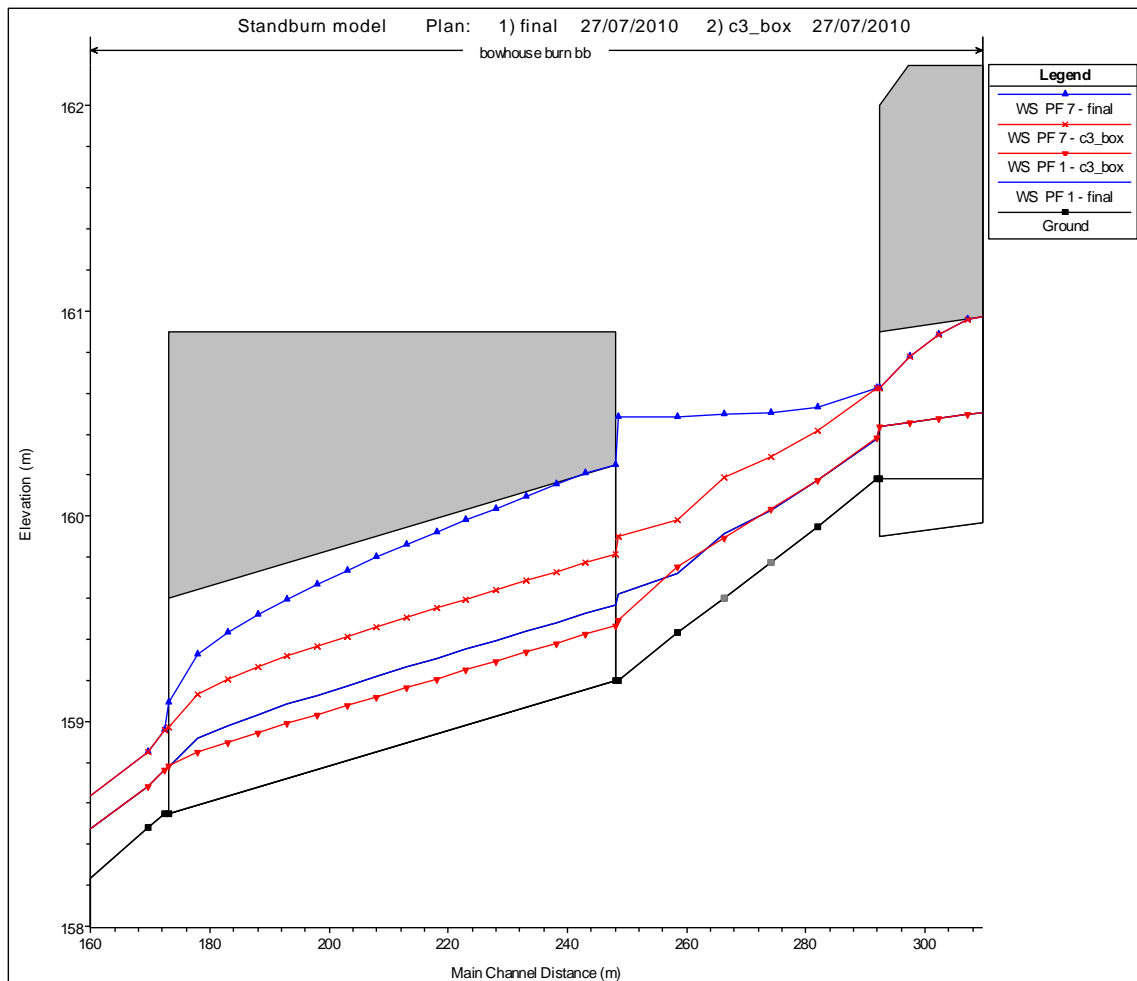
WS PF 1 – water surface elevation of 2 year event ($0.4\text{m}^3/\text{s}$)

C2_bridge – C2 modelled as a bridge unit with different size openings at inlet and outlet

C2_culvert – C2 modelled as a culvert unit, with a height of 0.8m

final – C2 modelled as a culvert unit, with a height of 1.0m, the invert at the outlet is set 0.2m below the invert of the river bed

Representation of culvert C3



WS PF 7 - water surface elevation of 200 year + climate change event ($1.5\text{m}^3/\text{s}$)

WS PF 1 - water surface elevation of 2 year event ($0.4\text{m}^3/\text{s}$)

C3_box - C2 modelled as a box culvert unit with dimensions as measured at the inlet throughout
final - C2 modelled as an arch culvert unit with dimensions as measured at the outlet throughout

Appendix F: **Potential extreme flood flow pathways**

[illegible]

SIMPSON MINING AND GEOTECHNICAL LTD

CONSULTING MINING & GEOTECHNICAL ENGINEER'S

Tel/Fax: 01786 833562

55 Westerlea Drive
Bridge of Allan
FK9 4DQ

Report No. 1664/S

Client: W.M.A
Station Masters Office
Dalmeny Station
Station Road
South Queensferry
EH30 9JP

SITE AT STANDBURN

MINING STABILITY REPORT

Directors: W. SIMPSON. BSc MSc CEng MICE MIHT FGS

M. SIMPSON.

Reg Office: 55 Westerlea Drive, Bridge of Allan

Company Reg. No. 113447

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Report No 1664/S

28 January 2009

W.M.A
Station Masters Office
Dalmeny Station
Station Road
South Queensferry
EH30 9JP

Dear Sirs,

MINING STABILITY OF SITE AT STANDBURN

We have pleasure in submitting our report on the mining stability of the above site. Our report has been based on a desk study.

1. DESK STUDY

The desk study comprised an examination and study of the following maps, mine abandonment plans and publications:

1. Geology for Land Use Planning, Bathgate, British Geological Survey, Sheets NS 97 SW, 1 : 10,000, 1988.
2. The Geological Survey of Great Britain, Stirlingshire, 35 NE, 1 : 10,560, 1922.
3. The Economic Geology of the Central Coalfield of Scotland, Area 2, HMSO, 1917.
4. Abandonment Plan No. 2907, Muiravonside Colliery, No. 4 Pit, Upper Drumgray and Lower Drumgray Coals.
5. Abandonment Plan No. 9020, Muiravonside Colliery, No. 4 Pit, Upper Drumgray Coal, 1927.

2. GEOLOGY

The desk study revealed the site to be underlain by natural deposits of boulder clay which vary in thickness from approximately 5 metres along the northern boundary, to 17 metres along the southern boundary. These superficial deposits are underlain by rock strata of the Lower Coal Measures. The strata dip to the north at approximately 1 in 9.

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3. MINING

The Lower Coal Measures beneath the site contain several coals that were worked from No.4 Muiravonside during the last decade of the nineteenth century and into the first quarter of the twentieth century.

The general sequence of strata beneath Point A, which is critical with reference to the Upper Drumgray Coal is approximately as given below:

BOULDER CLAY	5.00
STRATA	9.50
UPPER DRUMGRAY COAL (0.60)	10.10
STRATA	16.60
MID DRUMGRAY COAL (0.56)	17.16

(All measurements in metres)

The general sequence of strata beneath Point B, which is critical with reference to the Mid Drumgray Coal is approximately as given below:

BOULDER CLAY	17.00
STRATA	19.00
MID DRUMGRAY COAL (0.56)	19.56
STRATA	33.26
LOWER DRUMGRAY COAL (0.51)	33.77

(All measurements in metres)

The abandonment plans already referred to show the Upper, Middle and Lower Drumgray Coals to have been worked beneath the site by the Longwall Method, (see appendix), working in all coals having ceased by the 1890's.

From mining considerations the site may be conveniently divided into two areas. Area A between the outcrop of the Upper Drumgray and the northern site boundary and Area B between the outcrop of the Mid Drumgray and Upper Drumgray.

Area A

The Lower and Mid Drumgray Coals are deep enough in this area to ensure mining stability with regard to these coals.

The abandonment plan shows that the Upper Drumgray has not been worked beneath most of this area. This is probably due to the fact that the area was occupied by miners rows. There exists an area adjacent to Point A where we consider that a reinforced concrete raft should be used. Although all subsidence due to the extraction of the coal will have long since ceased, some main roads may still be standing open which could partially collapse in the future. The reinforced concrete raft should be capable of safely taking up any settlements associated with such collapses. The foundations for the remainder of this area may consist of normal strip footings.

Area B

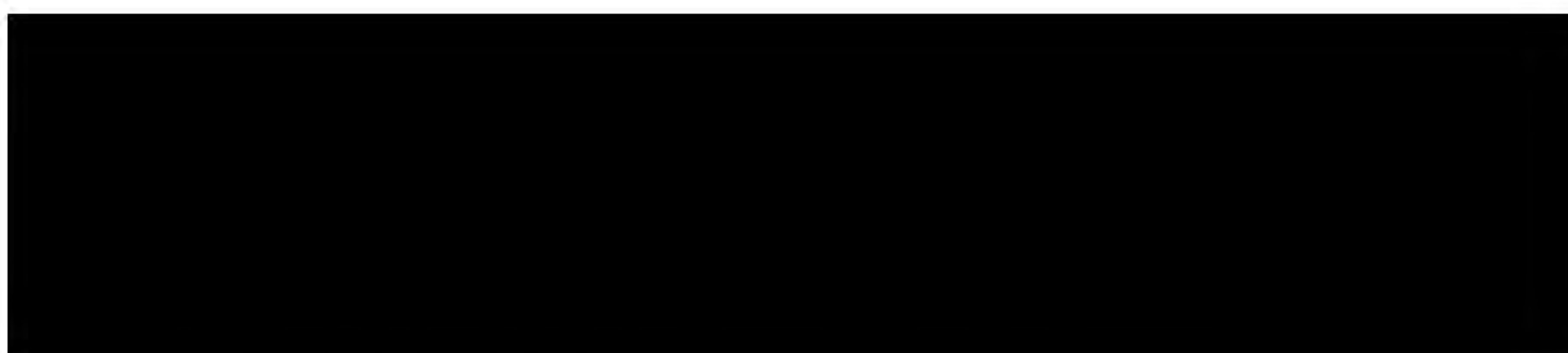
The Lower Drumgray Coal is deep enough below this area to ensure stability.

The abandonment plans indicate that the Mid Drumgray has only been worked adjacent to the western site boundary. Sufficient boulder clay and rock cover exists in this area to ensure stability. Foundations in this area may consist of normal reinforced concrete strips.

4. SHAFTS AND ADITS

There are no known shafts or adits within the site boundaries.

Three old shafts exist close to, but outwith, the site boundaries. In the event of any future collapse of any of these shafts, the collapse should not affect the stability of the site, particularly so since the superficial deposits consist of boulder clay.

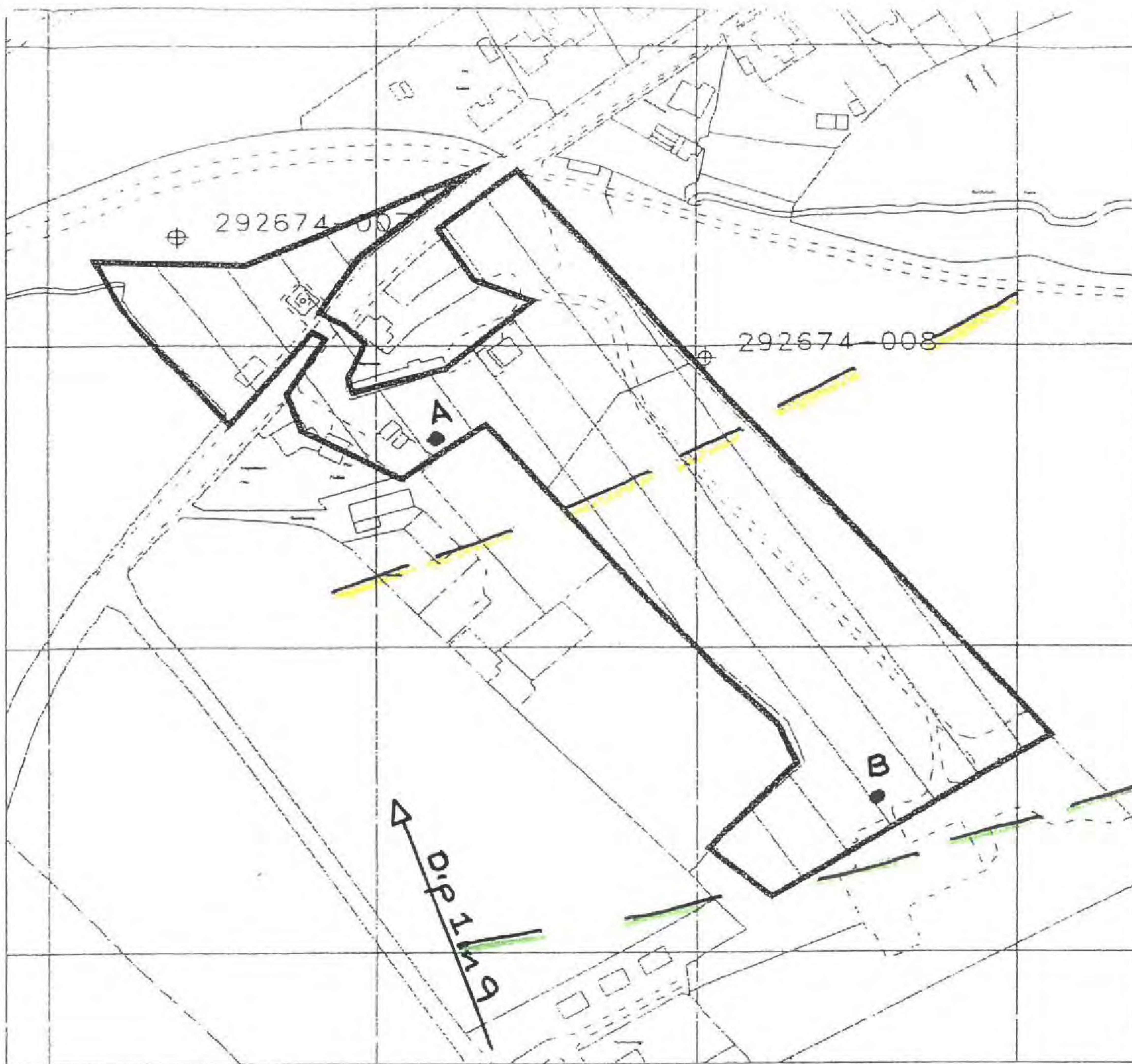


W. SIMPSON. BSc (Mining), MSc, CEng, MICE, MIHT, FGS

APPENDIX

APPENDIX 1

PLAN SHOWING SOLID GEOLOGY OF SITE AREA

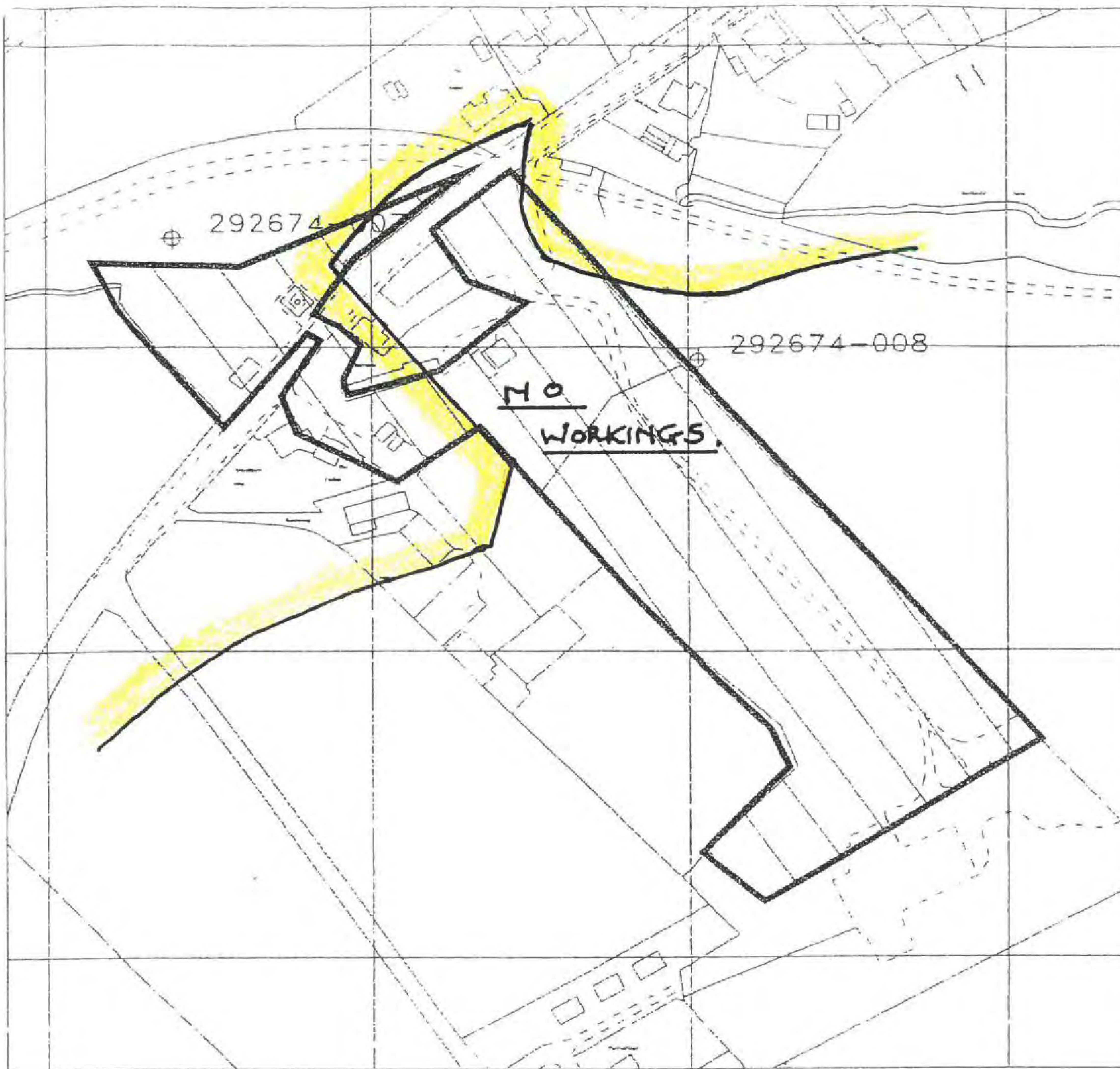


Conjectural outcrop of
Upper Drumgray.

Conjectural outcrop of
Mid Drumgray.

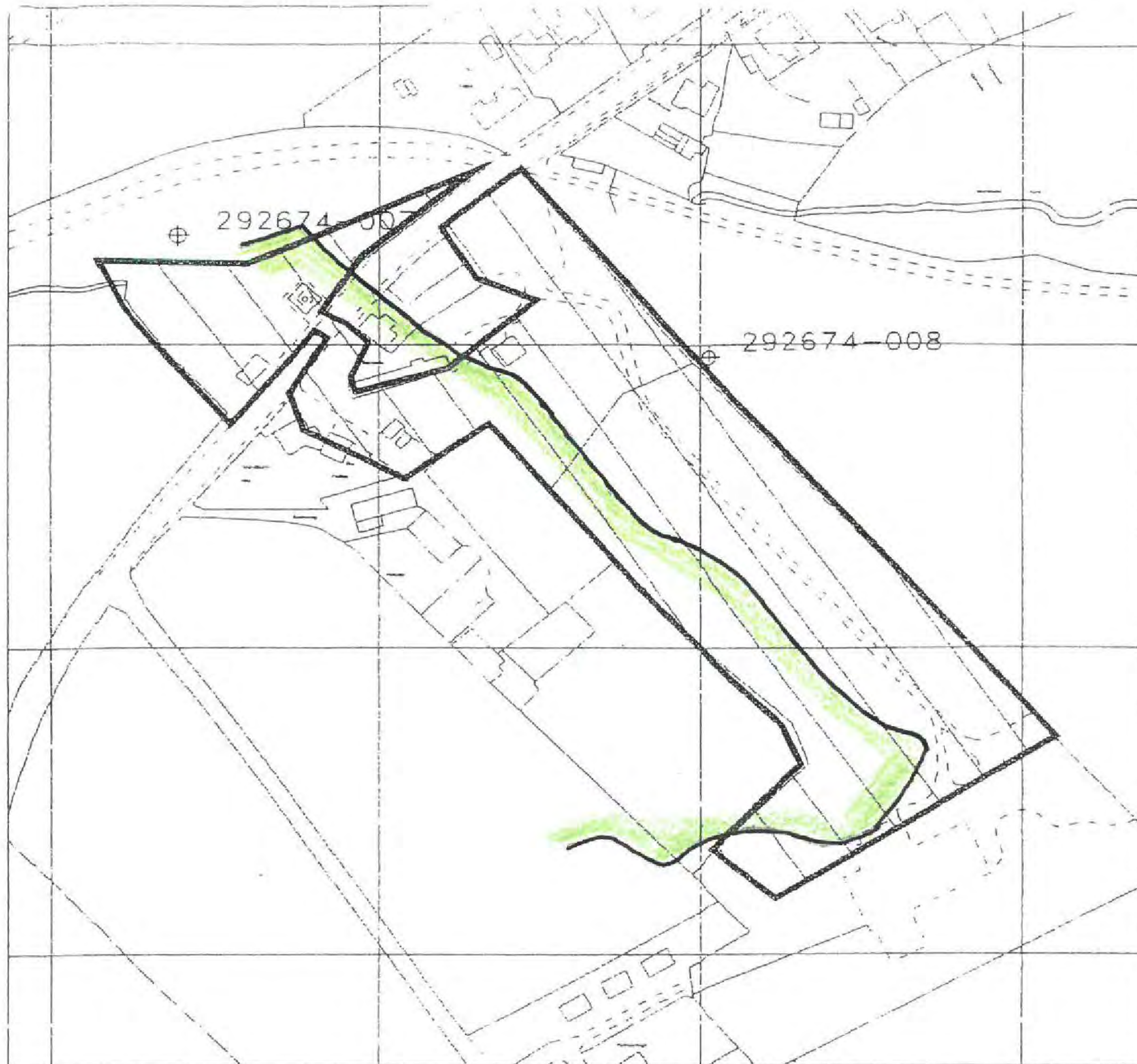
APPENDIX 2

PLAN SHOWING AREA OF LONGWALL WORKINGS IN UPPER DRUMGRAY COAL



APPENDIX 3

PLAN SHOWING AREA OF WORKINGS IN MID DRUMGRAY COAL



GEORGE PATERSON,
CALZIEVEG,
STANDBURN,
FALKIRK,
STIRLINGSHIRE,
FK1 2HS

This matter is being dealt with by Louise Tipper

Our Ref: **00015119-06**

Your Ref:

Electronic Ref:

RRUID: 007.00012189300001

Date: 02 June 2006

Dear Sir,

Coal Mining Report

SITE AT, STANDBURN, FALKIRK

I refer to the enquiry dated 30th May 2006, received 31st May 2006, in connection with the above.

This report is based on and limited to the records in the possession of The Coal Authority at the time the search is answered.

Ordnance Survey (O.S.) is undertaking a Positional Accuracy Improvement Programme of its mapping data. The Coal Authority (CA) has no control over the timing of issue of Positionally Improved mapping data by O.S. or over users of that data. In some instances the relative position between surface features and coal mining features may alter as a consequence of this programme. The CA will ensure that the integrity of its database is maintained by replotting some mining information to sustain the relationship between that mining information and the improved O.S. surface positions, some of which are now being released. However, mining reports are currently being produced against pre improved O.S. mapping whilst the Authority updates its database in line with the O.S. changes.

Past Underground Mining

The property is within the likely zone of influence on the surface from workings in 5 seams of coal at shallow to 100m depth, the last date of working being 1942.

Present Underground Mining

The property is not within the zone of likely physical influence on the surface from any present underground coal workings.

Future Underground Mining

The property is not within a geographical area for which a licence to extract coal by underground methods is awaiting determination by the Coal Authority.

The property is not within a geographical area for which a licence to extract coal by underground methods has been granted.

Working Facilities Orders

The property is not within a geographical area that is the subject of an Order made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to Owners of Former Copyhold Land

The property is not within an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Additional Remarks

In view of the mining circumstances a prudent developer would seek appropriate technical advice before works are undertaken on site. All proposals should have regard to good engineering practice in mining areas as identified in authoritative publications on mining stability problems. In any event, no activities should be undertaken that intersect, disturb, or interfere with any coal or mines of coal without permission of the Coal Authority.

These replies are prepared in accordance with the 2003 editions of the Coal Authority's Terms and Conditions, User Guide and the Law Society's Guidance Notes.

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We acknowledge the receipt of your remittance in payment of our fee.

Yours faithfully



Stephen Pennell

Director of Mining Information and Services

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