The COAL AUTHORITY

White Young Green

Report on Options for Mine Water Control

in the

Area Connected to Elginhaugh Discharge

IMC

Engineering & Environmental

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FIGURES

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1 INTRODUCTION

This report has been prepared by White Young Green (WYG) at the request of the Coal Authority under the Term Consultancy Contract (C1105). The report details the mining and hydrogeological background relating to the discharge fro the Eldin Day Level at Elginhaugh (S344) and assesses the options for the control and treatment of the mine water in the interconnected mining area.

The Elginhaugh discharge is currently ranked No. 2 on the Coal Authority/SEPA list of mine water discharges requiring treatment in Scotland. The discharge has a flow of around 30 L/sec (400 gpm) with a Total Iron content that is currently around 40 mg/L and a pH of just over 6.

The earliest mine workings in the Elginhaugh area probably date from the late 17th or early 18th centuries and would have most likely been overseen by Sir John Clerk of Eldin who wrote a Dissertation on Coal in 1740 explaining the use of day levels, fire (steam) engines, and both wind and water mills for the draining of coal mines. His seventh son, also called John purchased the mineral rights at Pendrich or Pittendriech near Lasswade in 1762 for 2000 guineas and presumably extended the earlier day level giving rise to the alternative names for the day level of the Eldin or Pentrich Day Level.

The report assesses the degree of interconnection of the Eldin Day Level with the mine workings in both the Lower Coal Measures and the Lower Limestone Coal Group and makes recommendations regarding other possible mine water discharge sites in the Midlothian Coalfield.

2 PREVIOUS REPORTS

There have been three previous reports on the Elginhaugh discharge carried out on behalf of the Coal Authority. The first preliminary scoping study was carried out by Scott Wilson Kirkpatrick in 1995 (Ref. 1) followed by a more detailed study into the potential areas for mine water treatment adjacent to the discharge by R H Cuthbertson and partners in 1997/8 (Ref. 2). The third and most comprehensive report on the Elginhaugh discharge was prepared by S M Foster Associates (Ref. 3) in January 1999.

In addition to the three detailed studies on the Elginhaugh discharge, a general report on the Midlothian coalfield south of the Sherrifhall Fault was prepared for the Coal Authority by IMC. (Report on Bilston Glen Rising Mine Water July 1998).

3 BACKGROUND DATA

3.1. Site

The Elginhaugh discharge (S344) is sited at river level, 45.09 m AOD (Ref. 3), on the south bank of the North Esk. (NGR E 331793 N 667029). The site is coincident with the known surface position of the Eldin or Pendrich Day Level (See Figure 1). An open shaft (S429) to the day level 260 metres south of the mouth of the day level is monitored by the Coal Authority.

The North Esk Shaft (S429) has a mine water level of about 51 metres AOD based on an estimated surface level of 75 metres AOD.

In addition to the main mine water discharge, there are two other ochreous discharges, one approximately 60 metres upstream on the north bank and a second 120 metres upstream on the south bank (Ref. 3). Both discharges are low flow and emerge from the river terrace deposits adjacent to the river bank. (See Figure 2). Site details of these discharges can be found in S M Foster (1999).

3.2. Geology and Hydrogeology

The Midlothian Coalfield is in the form of a NNE to SSW trending syncline with two distinct coal bearing sequences, the upper sequence in the Productive Coal Measures and the lower sequence in the Lower Limestone Coal Group. The strata on the western limb of the synclinal basin are generally much steeper than the eastern limb. The principal faults trend approximately east to west. The Sherrifhall Fault just to the north of Dalkeith divides the coalfield into two distinct mining blocks.

The Elginhaugh discharge is situated on the western limb of the syncline south of the Sherrifhall Fault in the Lower Coal Measures section of the Productive Coal Measures. The dip of the strata is approximately 1 in 6 to the east south east. The extent of the recorded mine workings in the Midlothian Coalfield is shown in Figure 3 and the generalised vertical section of strata from Polton Colliery is in Figure 4.

The detailed geology and hydrogeology of the area are described in S M Foster (1999).

4 CURRENT SITUATION

4.2 Known Mine Water Discharges

There are currently five recorded mine water discharges from mine working south of the Sherrifhall Fault. Two of the sites, Elginhaugh (S364) and Old Fordell or Junkies Level (S345) are monitored by the Coal Authority. (See Figure 1). Elginhaugh discharges into the South Esk. Vogrie No. 1 (S140071) discharges into Gore Water, and up until recently was not monitored by the Coal Authority. It is now Coal Authority monitoring site S689.

There are two other reported discharges in the area of Blinkbonny OCCS (S140072 and S140063). Neither of these sites is monitored by the Coal Authority.

4.1.1 Elginhaugh (S344)

The flow of mine water at Elginhaugh was originally estimated at 80 L/sec in 1996. However, since that date, the flow has generally been estimated to be in the 10 – 30 L/sec range. All the previous analysis available shows the mine water to be slightly net acidic with a pH in the range of 5.7 to 6.5. The total iron has been decreasing slightly over the years that the discharge has been monitored, falling from around 70 mg/L in 1996 to the current level of about 40 mg/L. There has been a corresponding fall in sulphates from around 1250 mg/L to 1000 mg/L. Chloride levels have remained low at around 25 mg/L.

The mine water quality at Elginhaugh was also monitored in the period 1981 to 1995 by Forth River Purification Board (FRPB) and reported in S.M. Foster. This confirms that there has been a gradual reduction in Total Iron from a maximum of around 100 mg/L in the 1980's. The results of the Coal Authority analysis for the last 9 years are shown in Table 1 and Figure 5. The improvement in mine water quality at Elginhaugh has resulted in mine water that is now circum-neutral. This could allow the possibility of a passive treatment using aeration and settlement if the discharge water could be intercepted without any significant deterioration in quality. However, at this stage in the investigations it would be prudent to assume that the addition of some chemicals would be required at least in the initial stages of mine water treatment.

There are two other small discharges of ochreous water in the vicinity of the Elginhaugh discharge. The discharge on the north bank of the North Esk was checked for conductivity and pH by S.M. Foster

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Date of test	Total Iron (mg/l)	pH	Chloride (mg/l)	Sulphates (mg/l)	Alkalinity (mg/l as CaCO3)	Acidity (mg/l as CaCO3)	Conducitivity (us/cm)	Magnesium (mg/l)	Calcium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Sus Solids (mg/l)	Ammonia (N) (mg/l)	Laboratory
29-Jul-96	70	5.9	27	1400	182	0	2300	196	276	15	9	32	0.8	TES
04-Jul-98	57.6	6.5	30	1280	196	0	1580	177	251	19	9.46	21	0.4	TES
16-Feb-99	64.2	6.3	18	1220	194	0	1660	171	255	15.8	8.92	52	0.5	TES
02-Sep-99	67.6	5.9	26	1170	212	0	1950	167	236	16.2	9.2	18	1.7	TES
24-Sep-00	66.2	6.1	27	1230	183	0	1880	172	234	14.9	9.44	30	0.4	TES
19-Feb-01	49	5.9	25	1160	164	0	1860	166	227	14.2	8.94	31	0.4	TES
06-Sep-01	52.6	6.0	24	1180	135	0	2360	158	221	22.6	8.82	42	0.6	TES
07-Mar-02	41.6	6.1	24	1050	183	9.4	1740	168	219	18	10	33	0.5	STL
04-Sep-02	52.5*	6.3	24	1110	148	0	2060	153	232	15.3	8.42	30	0.4	TES
01-Mar-03	40.9*	5.9	24	1060	127	0	1960	151	216	16.9	8.8	38	0.7	TES
01-Sep-03	23.6	6.0	23	1030	151	0	1920	142	200	13.6	8.83	64	0.4	TES
08-Mar-04	48.1	6.05	27.8	942	150	<10	1720	160	226	26.3	9.94	91.6	0.53	Alcontrol
03-Sep-04	31.8	6.2	24	1050	135	0	1880	154	225	17.4	8.66	40	0.5	TES

Table 1. Laboratory Analyses of Mine Water from Elginhaugh Day Level.

and found to be similar to the main Elginhaugh discharge. (pH 6.3, EC 1357 ms/cm @ 6.5°c). This would infer that the other discharges at Elginhaugh are also the result of mine water recovery.

It has been agreed that a 'V' notch will be constructed to monitor the flow from the Eldin Day Level and that on site analysis will be undertaken to confirm the current mine water chemistry. The results of these investigations will be submitted as an addendum to this report once the data is available.

4.1.2 Old Fordell (S345)

The flow of mine water at Old Fordell or Junkies Day Level is estimated to be in the range of 25 – 50 L/sec with a Total Iron concentration of between 5 and 10 mg/L and a pH of between 6.5 and 6.8. There has been a slight increase in the quality of the discharge, the iron decreasing from around 20 mg/L in 1986 to currently around 5mg/L. Sulphates have shown a similar reduction from around 1250 mg/L in 1986 to under 400 since 1998. The discharge at Old Fordell is from a day level that probably connects with both the Limestone Coal Group workings and the Lower Coal Measure workings. The source of mine water may be from either set of workings as a combination of both. However, the quality is typical of shallow mine workings and could be treatment by aeration and settlement.

4.1.3 Vogrie No.1 Discharge (S140071 now S689)

This discharge is similar in composition to the Old Fordell discharge with a total iron of about 6 mg/L and a pH of 6.4. This discharge is believed to control mine water levels in the Limestone Coal Group of workings from Arniston Colliery. (IMC July 1998). This site has recently been added to the Coal Authority monitoring list to allow mine water flows and quality to be checked.

4.1.3 Blinkbonny Wood (S140063) and Mossend (S140063)

These discharges into Vogrie Burn are believed to be low flow and are not monitored by the Coal Authority.

4.2 Mining Background

The coal mine workings in the Lower Coal Measures south of the Sherrifhall Fault began at a very early date. The outcrops of the coal seams in the steeply incised valleys in this location would allow easy access and drainage of the coal by level tunnels, day levels or soughs driven from the banks of the river. John Clerk of Eldin in his Dissertation on Coal in 1740 (Ref. 5) describes how the use of

underground levels to drain areas of coal was a well established method. The tunnels were generally 5½ feet high by 2½ feet wide with air shafts every 50 or 60 fathoms (300 – 360ft). By 1740 old levels that had been taken "a great length by open casts from the surface" were being replaced by deeper, longer soughs. Also at this time, fire (steam) engines, windmills and water mills were used to power pumps to lift mine water to surface or to the level of an underground sough. It is likely that much of the work described in the paper by John Clerk will based the early mining undertaken in this area.

The Eldin and Pendrich Day Level as it is recorded on current plans is believed to be a later extension of one of the earlier levels. The day level in the Rough Coal was probably chosen because its massive sandstone roof would provide a good stable working horizon. The short earlier day levels in the other seams outcropping in the North East were probably not maintained following construction of the extended Eldin Day Level. Water from the adjacent workings in the Splint and Jewel seams would have been drained to the Eldin Day Level by lateral roadways linked to drainage levels at the same horizon as the Eldin Day Level.

4.2.2 Mine Workings Connected to the Eldin Day Level

Although there are no recorded coal workings, the seams on either side of the North Esk will have been worked. Incidental coal mined during the construction of the cutting for the A7 in 1990 proved unrecorded workings in the Rough, Jewel, Parrot Rough and Splint seams (Abs 17674). The mining of these seams would most probably have been by a combination of shallow shafts with drainage soughs at the level of the North Esk River. To the south at Bonnyrigg these horizons are recorded as day levels on an old Eldin estate plan (Abstraction Plan S2427), that is itself a copy of an old plan dated 1806 (possibly S3129). It is considered likely that the low flow discharges to the west of the main Elginhaugh discharge are in fact discharges from old day levels or shallow mine workings. The low flows are probably due to the limited areas of workings or poor hydraulic connectivity.

The southward extension of the Eldin Day Level is not known in detail. Abstraction Plan S3121 shows the position of a day level connected to the Eldin Day Level just to the north of the modern Polton Colliery near the centre of Bonnyrigg.(See Figure 6). The estimated limit of the unrecorded workings in the Rough Coal is also shown. Therefore, it would appear that the old shallow workings in the Polton area are connected with the Eldin Day Level at the Rough Coal horizon. There are also a series of deeper levels that would probably have been used to drain water that was then pumped up to the level of the Eldin Day Level for discharge. The day level in the Rough Coal would have been chosen as the main day level because of the massive sandstone that lies immediately above the Rough Coal. This

would normally provide a stable roadway assuming the floor of the coal is not very weak or susceptible to water.

Polton Collery has connections with Whitehill Colliery to the south both at depth in the Rough Coal and in the shallow outcrop workings in the Rough Coal. Therefore, it would appear that the mine water discharge at Elginhaugh is interconnected with all the mine workings in the Lower Coal Measures on the western limb of the syncline and the deep workings in the centre of the syncline.

One area of coal that may not be connected with the Eldin Day Level is the shallow workings in the Under Dalkeith Coal from Glenesk Colliery just to the west of Dalkeith. There is a recorded day level shown on Abstraction S2532 that presumably drained these workings. This day level has been checked and there is currently no mine water discharge from the adit or in the vicinity of the adit. This would infer either a connection between the Glenesk workings and Elginhaugh or that the day level is blocked and the mine water has recovered to a level above the mouth of the adit. At some stage it would be prudent to check the mine water level in the Glenesk workings.

The interconnection between the shallow Lower Coal Measure workings on the eastern limb of the syncline and the Elginhaugh discharge is uncertain. There are generally fewer workings on the eastern side of the basin and there are two day levels that intersect the Lower Coal Measure coals that could be controlling mine water levels. The Junkies Day Level at Old Fordell (S345) is at a level of about 45 metres AOD and currently discharges mine water into the South Esk. Bryans Day Level to the south and again intercepts both Limestone Coal Group workings and Lower Coal Measure seams. The surface level at the mouth of Bryans Day Level by Ochre Burn is at a slightly higher surface level and was not discharging when checked in 1999.

The shallow Limestone Coal Group workings on the western side of the syncline should not be connected with the Lower Coal Measure workings draining to Elginhaugh. However, currently there are no recorded mine water discharges from these workings. This suggests either drainage of mine water to the deeper mine workings accessed by Bilston Glen (S432) where mine water levels are still recovering and currently at 445 metre depth (290 m BOD), or there is an unrecorded mine water discharge in the area. Two potential mine water discharge sites have been identified, one from a day level that discharged into Bilston Burn near Burghlee and one from a day level at Mavisbank. Both sites should be checked for potential discharges.

5.0 OPTIONS FOR THE CONTROL AND TREATMENT OF THE MINE WATER DISCHARGE FROM ELDIN DAY LEVEL.

The main options for the control and treatment of the mine water currently discharging from the Eldin Day Level at Elginhaugh are either to capture and treat the mine water close to the point of discharge, or to pump and treat the mine water at a point remote from the current discharges. The option to leave the discharge untreated has not been considered.

5.1 Capture and Treatment at or Near the Mouth of the Eldin Day Level

The option to capture and treat the mine water discharge at or near the mouth of the Eldin Day Level has been addressed in detail in the reports compiled by Scott Wilsons in 1996 and Cuthbertson and Partners in 1996.

Apart from the difficulty in accessing the mouth of the day level and physically capturing the mine water there are inherent risks in adopting an end of pipe treatment option such as those previously proposed at Elginhaugh.

There is already evidence of a restricted flow within the day level in the short distance between the ventilation shaft in the field above the discharge and the mouth of the discharge (See Figure 2). The water level in the ventilation shaft is some 6 metres higher than the level of the discharge. This pressure is probably already affecting the unrecorded workings and day levels adjacent to the North Esk resulting in the flows of mine water upstream from the main discharge. Any further increase in pressure could result in an outburst of mine water from one of the unrecorded day levels adjacent to the North Esk and a potential change in the flow path.

There is currently no information on the hydraulic gradients in the rest of the coalfield interconnected with the Eldin Day Level. However, it can be assumed that the water levels in the south of the coalfield will be several metres higher that the level of the Eldin Day Level. Based on a typical hydraulic gradient for mine workings of 1 in 500 (.002) the water levels in the Whitehill area could be 15 to 20 metres higher than at Elginhaugh that discharges at 45 metres AOD or the ventilation shaft (S429) where the water level is currently at 51 metres AOD. It is considered that there is already a significant risk of other surface discharges in the southern section of the coalfield if any further restrictions in flow occur.

Given the risks associated with an end of pipe treatment at Elginhaugh, it is recommended that the better option would be to pump and treat mine water from a central position where water levels could be controlled over the whole coalfield. If correctly sited and designed, a pump borehole should be capable of stopping the current discharges and if necessary lowering mine water levels to prevent future surface discharges if the hydraulic gradient changed.

5.2 Sites for Mine Water Pumping and Treatment

The lack of any water level monitoring boreholes in the Midlothian Coalfield south of the Sherrifhall Fault means that the to site a proposed pumping borehole has to be based on an assumed hydraulic gradient. To give the best chance of good hydraulic connection, one of the deeper, more recent collieries in the centre of the coalfield would be recommended. Given that there is probably a gradient from Whitehill Colliery in the south to Elginhaugh in the north, the optimum site for a pump borehole is considered to be at the former Polton Colliery situated just south of Bonnyrigg. (See Figure 7). The surface level at Polton is approximately 100 metres AOD and the workings in the Rough Coal (Figure 8), the horizon of the Eldin Day Level, are at approximately 100 metres depth, or about 45metres lower than the level of the Eldin Day Level. The Eldin Day Level was identified on the mine plans for Polton, therefore there it can be assumed that there is good connection to the day level and there are known recorded connections with the Whitehill Colliery workings to the south.

The interval between the Rough Coal and the Great Seam at Polton Colliery is a single bed of sandstone, some 29ft (8.8m) thick. This sandstone should have good hydraulic connections with the mine workings and the strata should allow a long section of slotted casing to be inserted above the workings. It is assumed at this stage that all the shafts at Polton have been filled and capped and a large diameter borehole will be required to pump from the workings. Due to the age of the workings, a probe hole to prove the position of the target roadway will probably be required. Alternative sites for a large diameter borehole at Polton are shown in Figures 7,8 & 9. The exact site for the large diameter borehole is best determined once the mine water level has been established. It is recommended that a monitoring borehole is drilled as soon as possible at the site of one of the large diameter options to allow mine water levels to be monitored over a period of time. A second monitoring borehole at the southern end of the coalfield in the Whitehill workings will be required to ensure that any pumping undertaken at Polton controlled the water level in all the interconnected mine workings. Again, this borehole would be better if sited once the current water level at Polton has been established.

The area of land required for treatment and the type of treatment will be dependant on the quantities of mine water pumped and the quality. Assuming the quality of the mine water is similar to that at

Elginhaugh, then a passive mine water treatment system incorporating reed beds, possible with some chemical dosing, will be required. The abstraction rate required can only be determined by pumping. However, it is considered that between 50 and 100 L/sec will be required initially to draw down the water levels to stop the Elginhaugh discharge. The abstraction rate required to control the mine water level after drawdown is likely to be in the order of 50 L/sec, depending on the final mine water level that is required.

A mine water treatment scheme to handle to handle a flow of up to 100 L/sec with a total iron content of about 40 mg/L and a final discharge of 2 mg/L of total iron would require and area of land of up to 49,000 m^3. Using aeration cascades, twin settlement lagoons operating in parallel and wetlands would require 23,000 m^3. Using an aeration cascade and wetlands with deeper areas for the influent would require about 49,000m^3. During the initial drawdown phase of pumping the use of caustic soda and a temporary dosing system would be recommended. (Estimated cost of dosing plant £20 – £25,000 plus £150/day for chemicals). An area of 49,000 m^3 is shown in Figure 7 adjacent to the proposed site of the large diameter borehole at the former Polton Colliery.

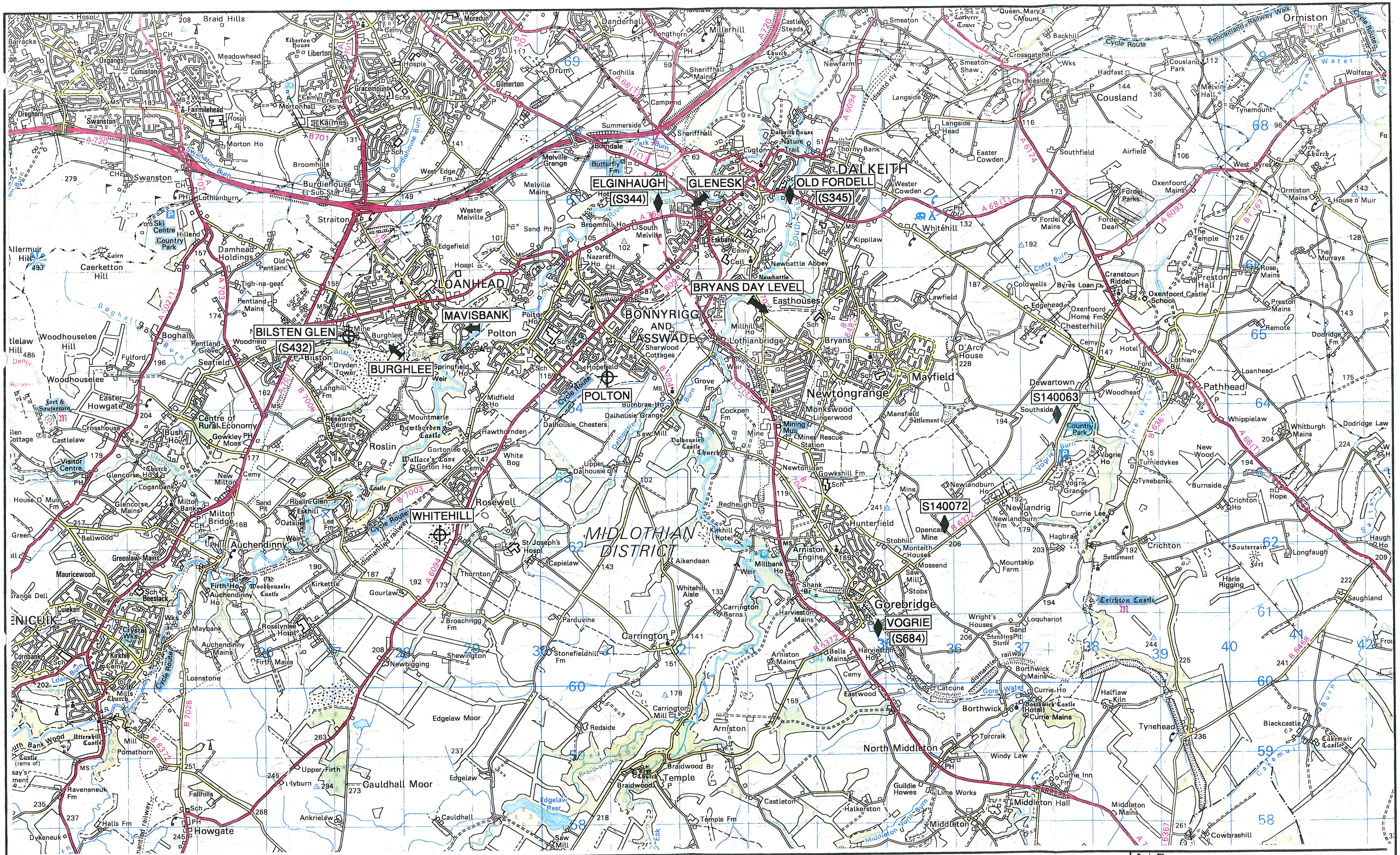
Discharge of the treated mine water at Polton could be either to Pittendreich Burn or Dalhousie Burn. The choice will probably be dependant on the abstraction rate required and the conditions associated with the SEPA discharge consent. (See Figure 6).

6 CONCLUSIONS AND RECOMMENDATIONS

- The Eldin or Pendrich Day Level is interconnected with all the Lower Coal Measure workings on the western side of the Midlothian Coalfield south of the Sherrifhall Fault. These workings include the collieries of Polton and Whitehill. The mine workings from Glenesk Colliery may not be interconnected
- The optimum, low risk method of capturing and treating the mine water currently discharging from the Eldin Day Level at Elginhaugh is considered to be a purposed drilled large diameter borehole and a passive treatment system on the site of the former Polton Colliery, south of Bonnyrigg. An initial water level monitoring borehole will be required.
- The volume of mine water to be pumped at Polton to control mine water levels and prevent future discharges will be about 50 L/sec. The initial pumping rate required to lower mine water levels is likely to be around 100 L/sec.
- The area required to treat 100 L/sec of mine water with a total iron of 40mg/L to give a total iron in the discharge of 2 mg/L would be up to 49,000 m^3, depending on the method of treatment used.
- The treated mine water from Polton could be discharged to either Pittendreich Burn or Dalhousie Burn, depending on the abstraction required and the requirements of the SEPA discharge consent.
- A borehole should be drilled into the Whitehill workings south of Polton to confirm the hydraulic gradient in the interconnected mine workings and monitor the effects of the proposed mine water abstraction.
- An additional borehole into the Glenesk Colliery workings would help to determine any interconnection between Glenesk and other Lower Coal Measure workings south of the Sherrifhall Fault.
- The day levels connecting the Limestone Coal Group workings in the area of Bilston and Burglee to Biston Burn and Mavisbank should be checked for any mine water discharges.

Figure 1

Location Plan of Midlothian Coalfield



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Civil Electrical Environmental Health & Safety Highways Management Services Mechanical Rail Structural Town Planning Transportation

Client: The Coal Authority

Project: Elginhaugh Day Level

Drawing Title: Location Plan of Midlothian Coalfield Scale 1 : 50,000

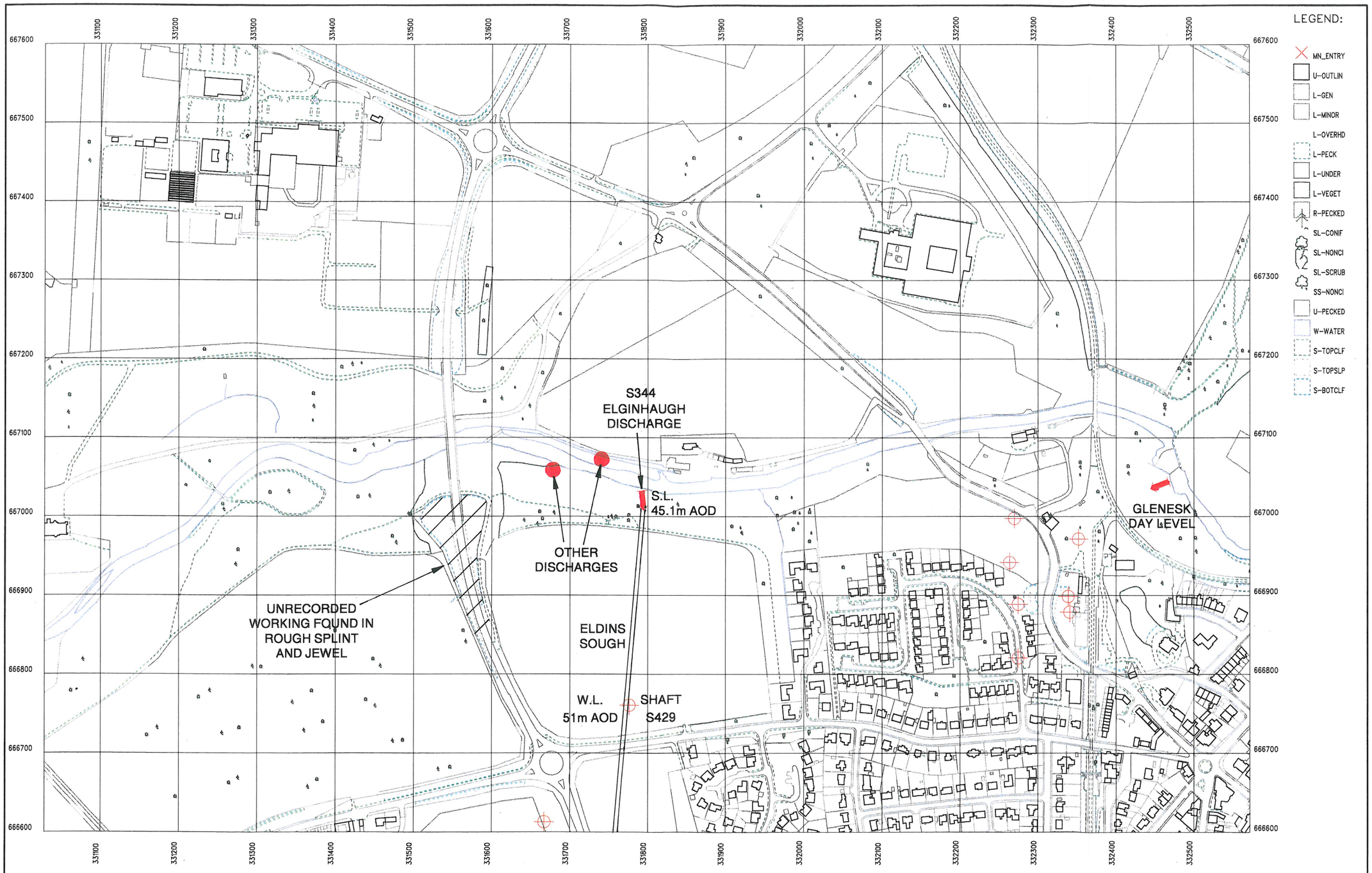
Scale at A3	Drawn By	Date	Checked By	Date	Approved By	Date

Project No.	Office	Type	Drawing No.	Revision
D900708			Figure 1	

APPROVAL ☐ INFORMATION ☐ TENDER ☐ CONTRACT ☐ CONSTRUCTION ☐

Figure 2

Detailed Plan of the Elginhaugh Discharge



COAL AUTHORITY MINING FEATURES CHECK PLOT

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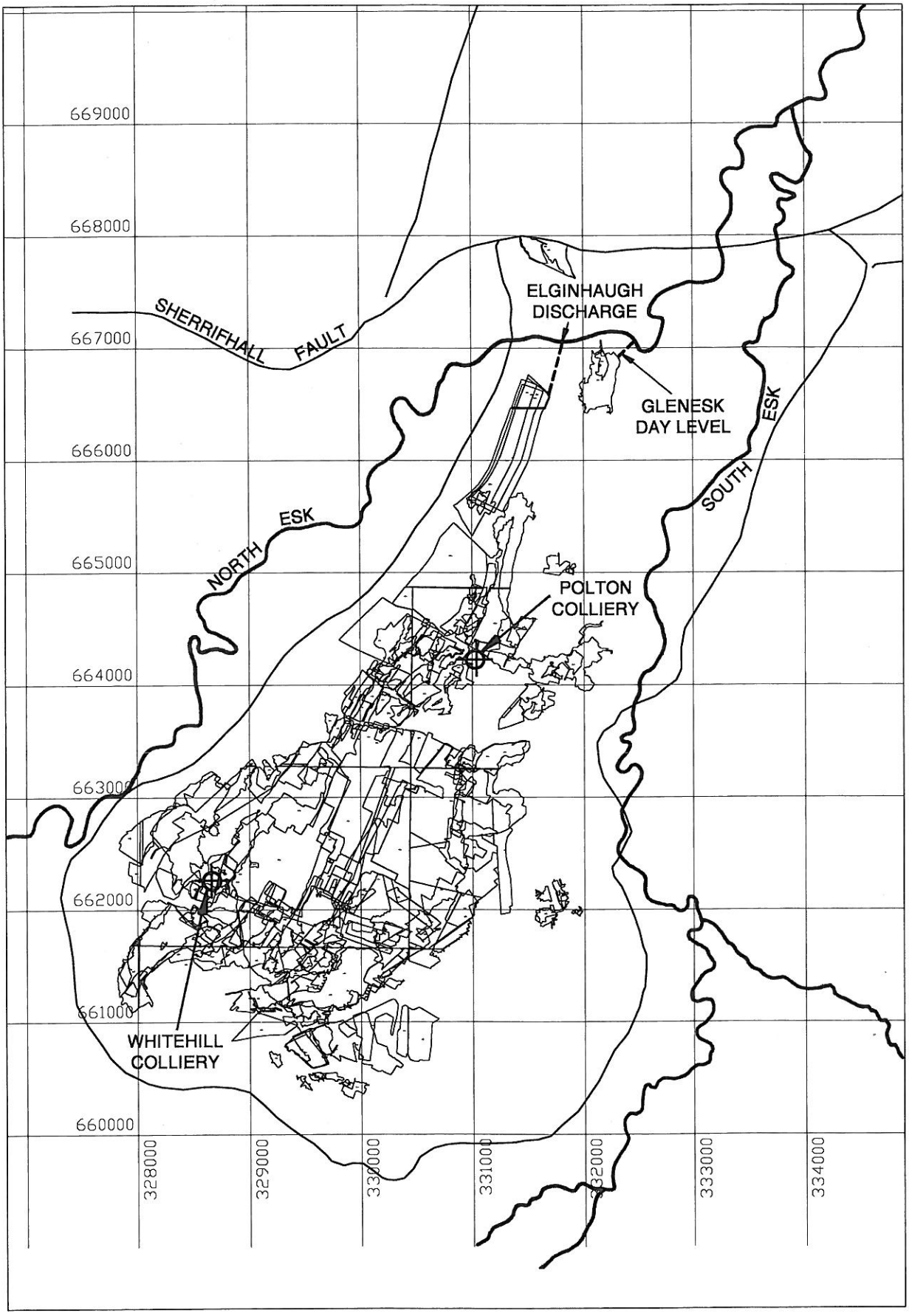
Detailed Plan of the Elginhaugh Discharge

Figure 3

Extent of Recorded Coal Measures Mine Working in the Midlothian Coalfield



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Client: The Coal Authority

Project: Elginhaugh Day Level

Drawing Title: Extent of Recorded Coal Measures Mine Working in the Midlothian Coalfield

Scale at A4	Drawn By	Date	Checked By	Date	Approved By	Date

Project No.	Office	Type	Drawing No.	Revision
D900708			Figure 3	

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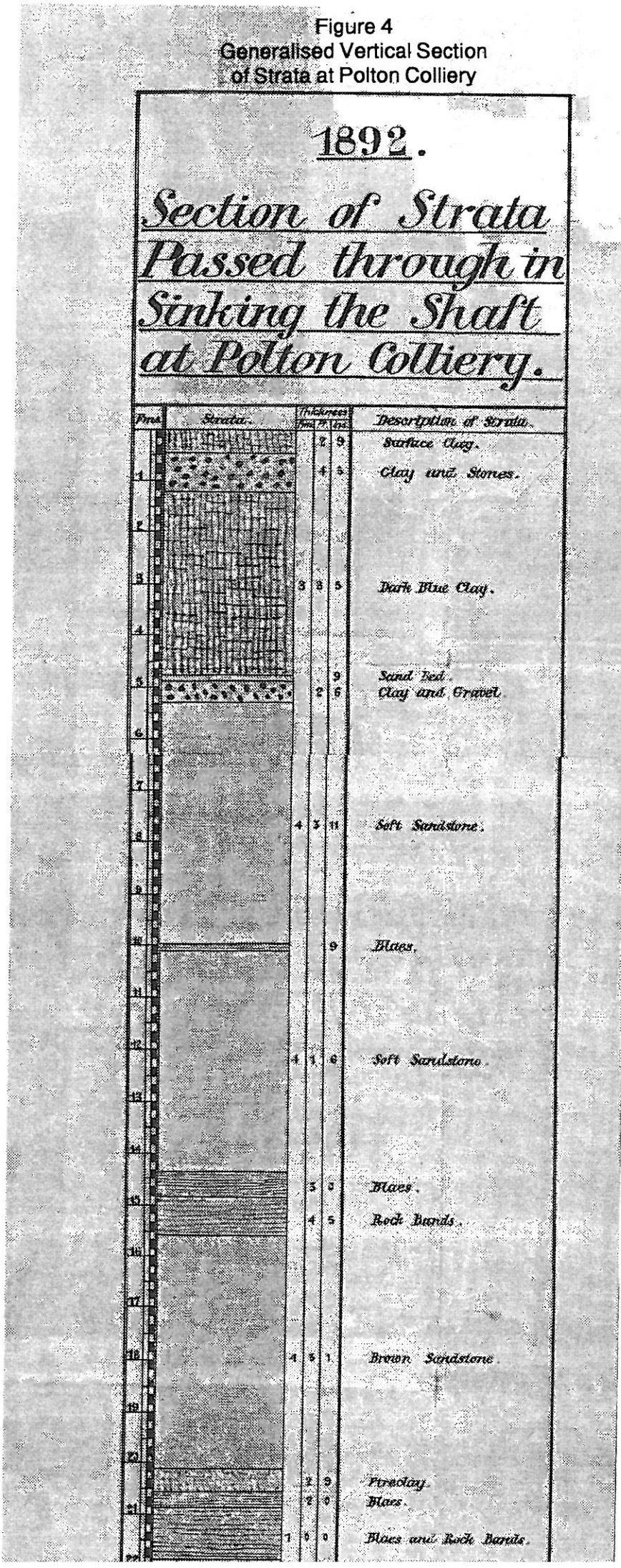
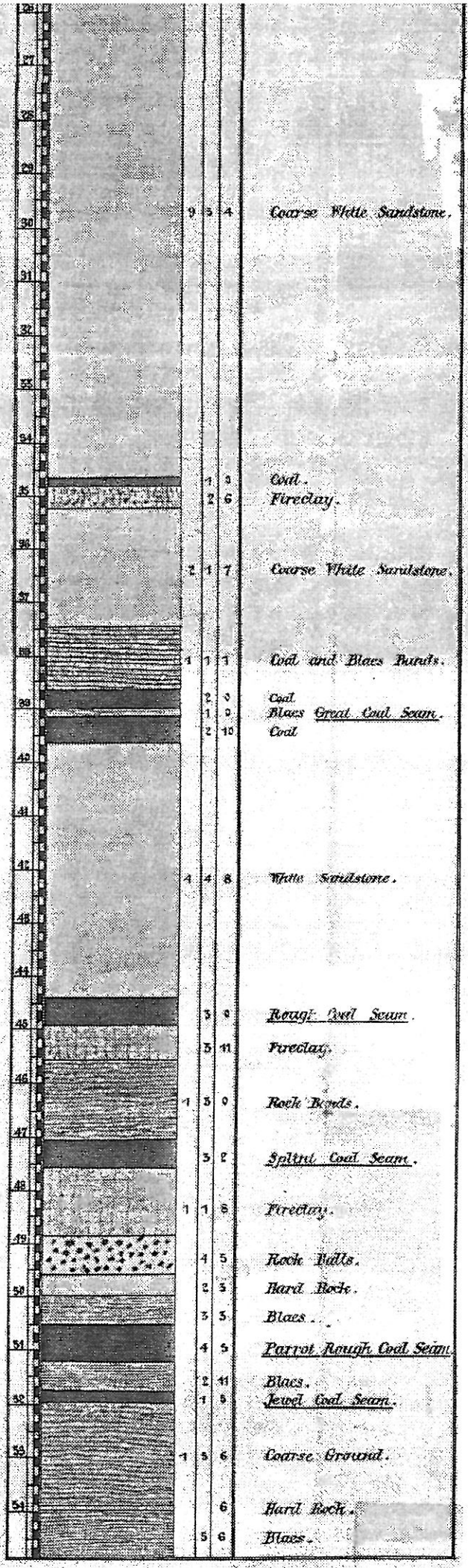
Figure 4

Generalised Vertical Section of Strata at Polton Colliery

Figure 4
Generalised Vertical Section
of Strata at Polton Colliery

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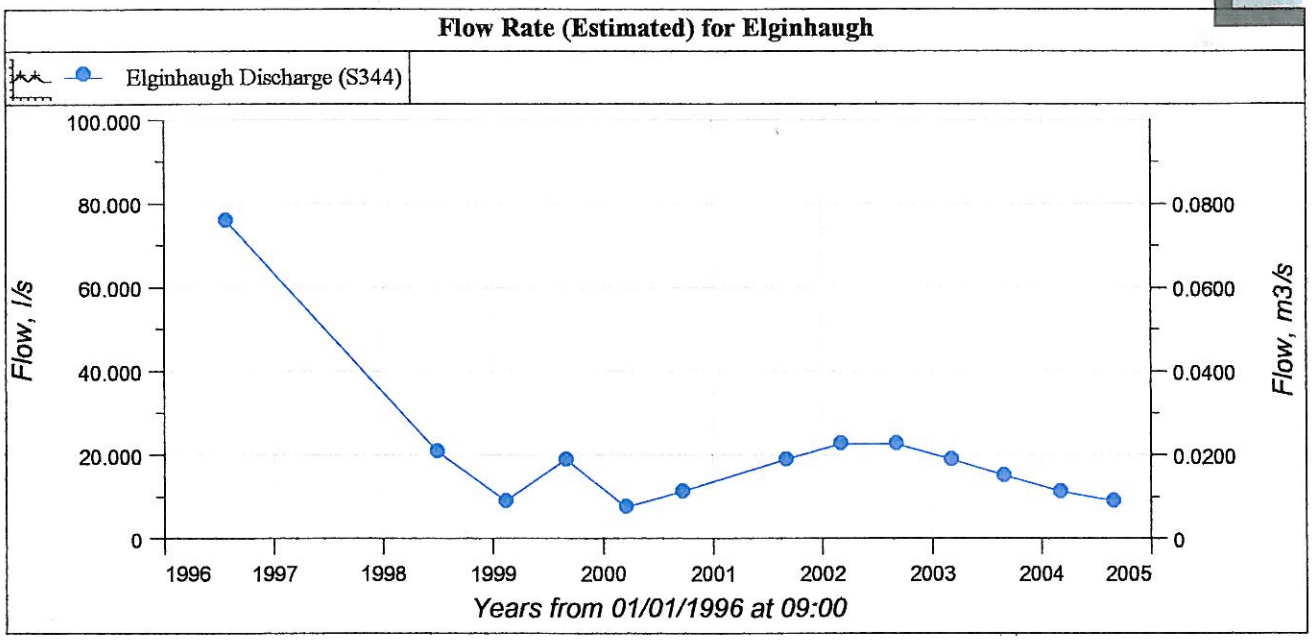
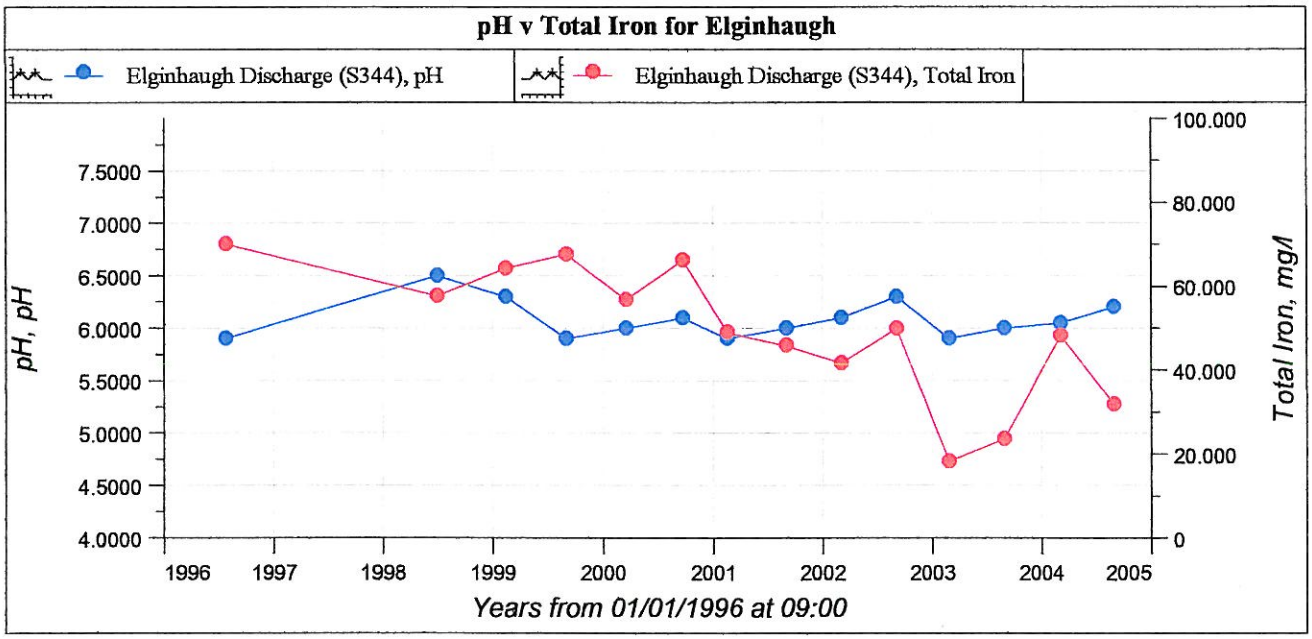
9 3 4 Coarse White Sandstone.
1 3 Coal.
2 6 Fireclay.
2 1 7 Coarse White Sandstone.
1 1 1 Coal and Blaes Bands.
2 0 Coal
1 0 Blaes Great Coal Seam.
2 10 Coal
4 4 8 White Sandstone.
3 0 Rough Coal Seam.
3 11 Fireclay.
1 3 0 Rock Bands.
3 2 Splint Coal Seam.
1 1 6 Fireclay.
4 5 Rock Balls.
2 3 Hard Rock.
3 3 Blaes.
4 5 Parrot Rough Coal Seam
2 11 Blaes.
1 9 Jewel Coal Seam.
1 3 6 Coarse Ground.
6 Hard Rock.
5 6 Blaes.

Figure 5

Mine Water Quality and Estimated Flow Rates at Elginhaugh Discharge since 1996





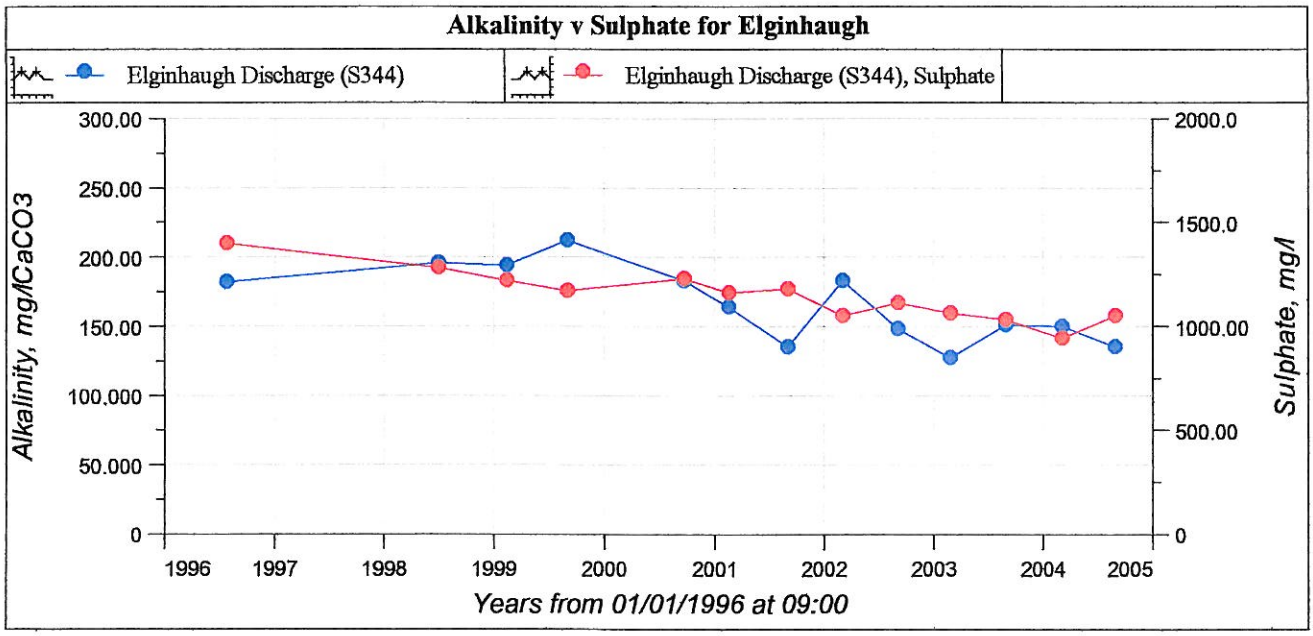
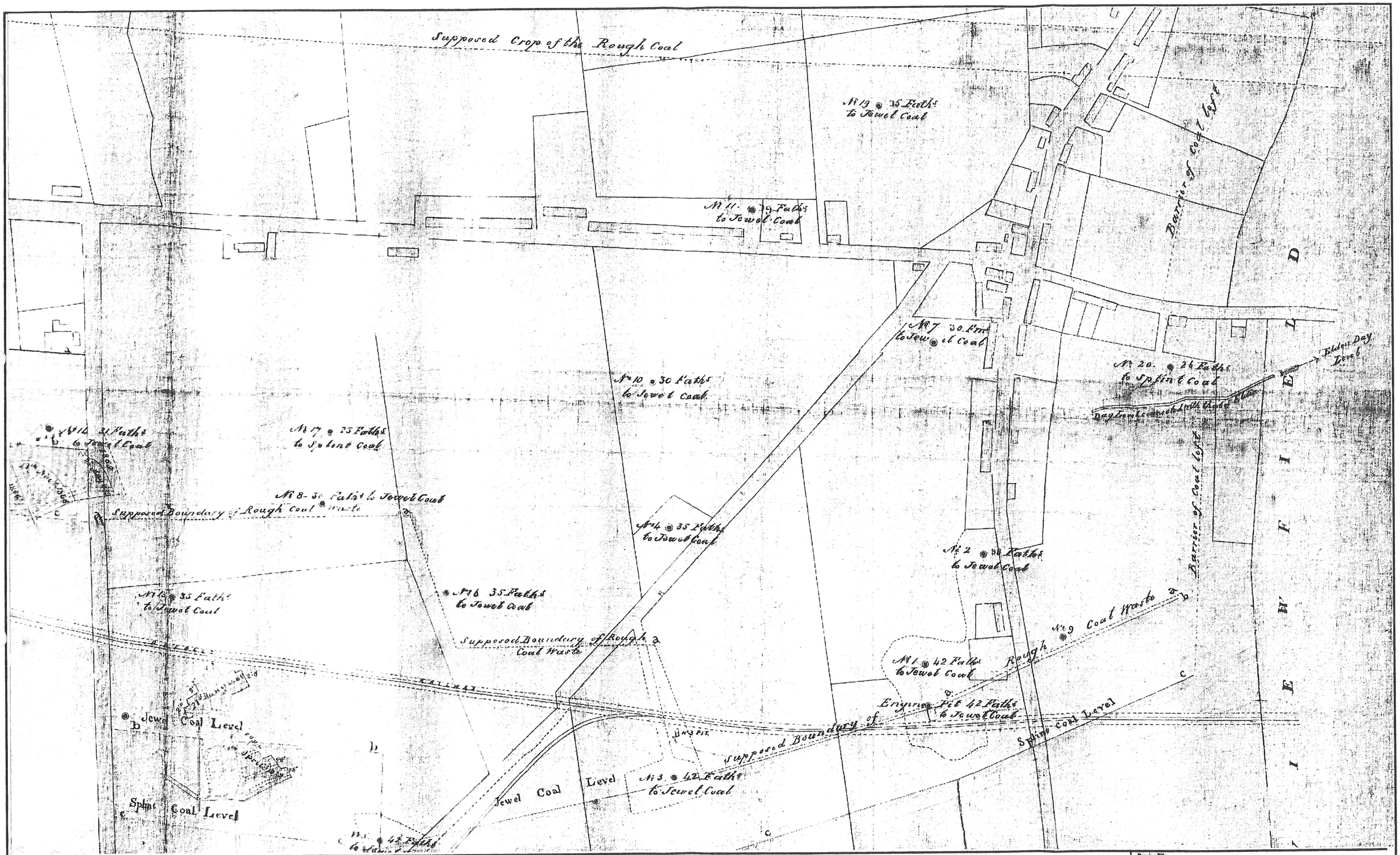


Figure 5
Mine Water Quality and Estimated Flow Rates at Elginhaugh Discharge since 1996

Figure 6

Part of Abstraction Plan S3121



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Client: The Coal Authority

Project: Elginhaugh Day Level

Drawing Title: Part of Abstraction Plan S3121

Scale at A3	Drawn By	Date	Checked By	Date	Approved By	Date

Project No.	Office	Type	Drawing No.	Revision
D900708			Figure 6	

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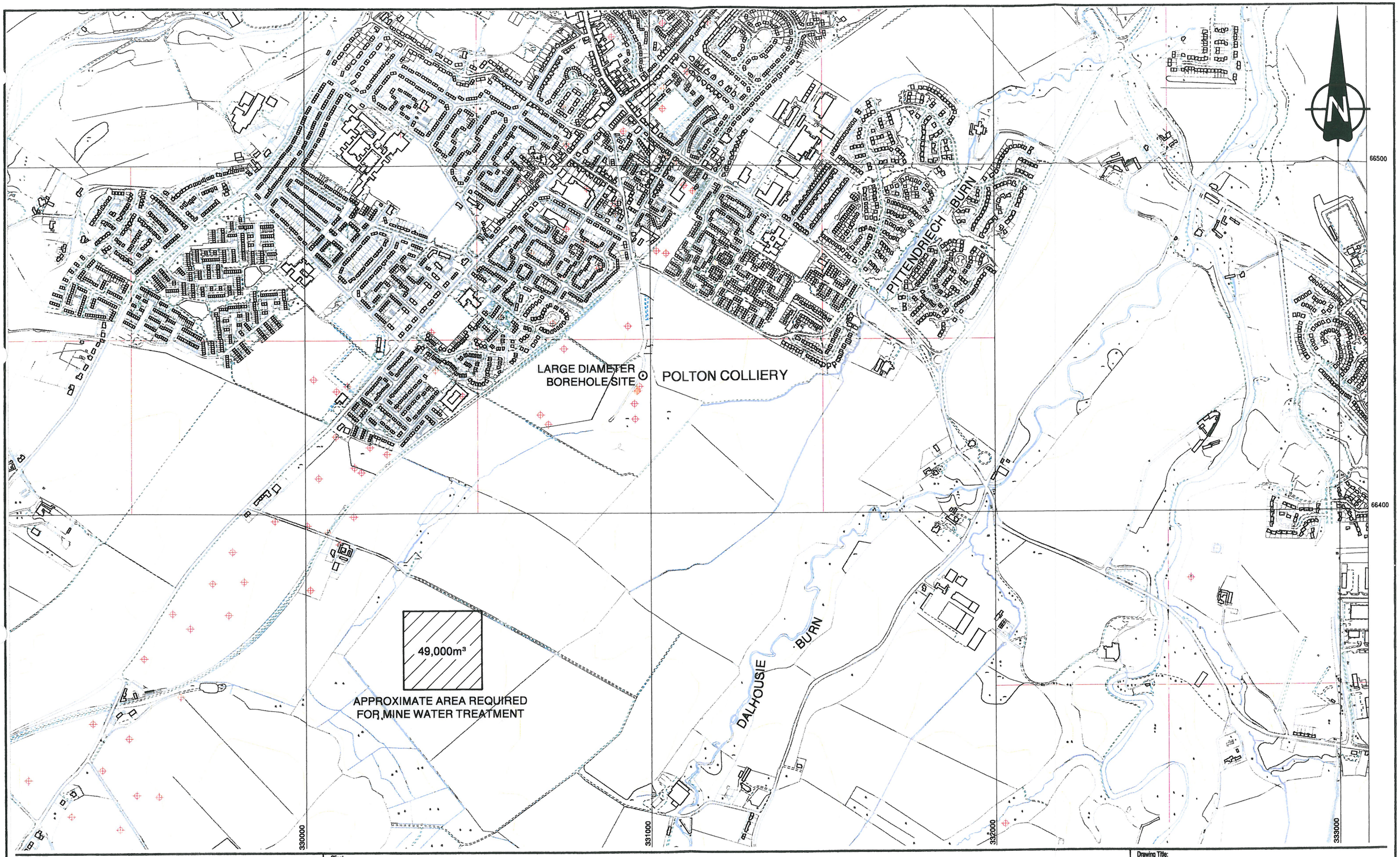
Figure 7

Surface Plan of the Polton Area (1/10,000)



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Drawing Title:

Surface Plan of the Polton Area
Scale 1:10,000

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Figure 8

1/2,500 Plan of Polton Workings in the Rough Coal (Abs. 11284)

SHEET - EDINBURGH-SHIRE VIII-10.

Magnetic Meridian

True Meridian

JEWEL COAL

Polton Colliery

Air Shaft.
Depth 290 Feet.

Surface Level 152·28.
Winding Shafts.
Depth 327 Feet.

Pumping Shaft.
Depth 300 Feet.

REFERENCE - ORDNANCE 1/2500
SHEET - EDINBURGH-SHIRE VIII-14.

KEY ⊙ Alternative Sites for Large Diameter Borehole

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Project: Elginhaugh Day Level

Drawing Title: 1 : 2500 Plan of Polton Workings in the Rough Coal (Abs 11284)

Scale at A3	Drawn By	Date	Checked By	Date	Approved By	Date

Project No.	Office	Type	Drawing No.	Revision
D900708			Figure 8	

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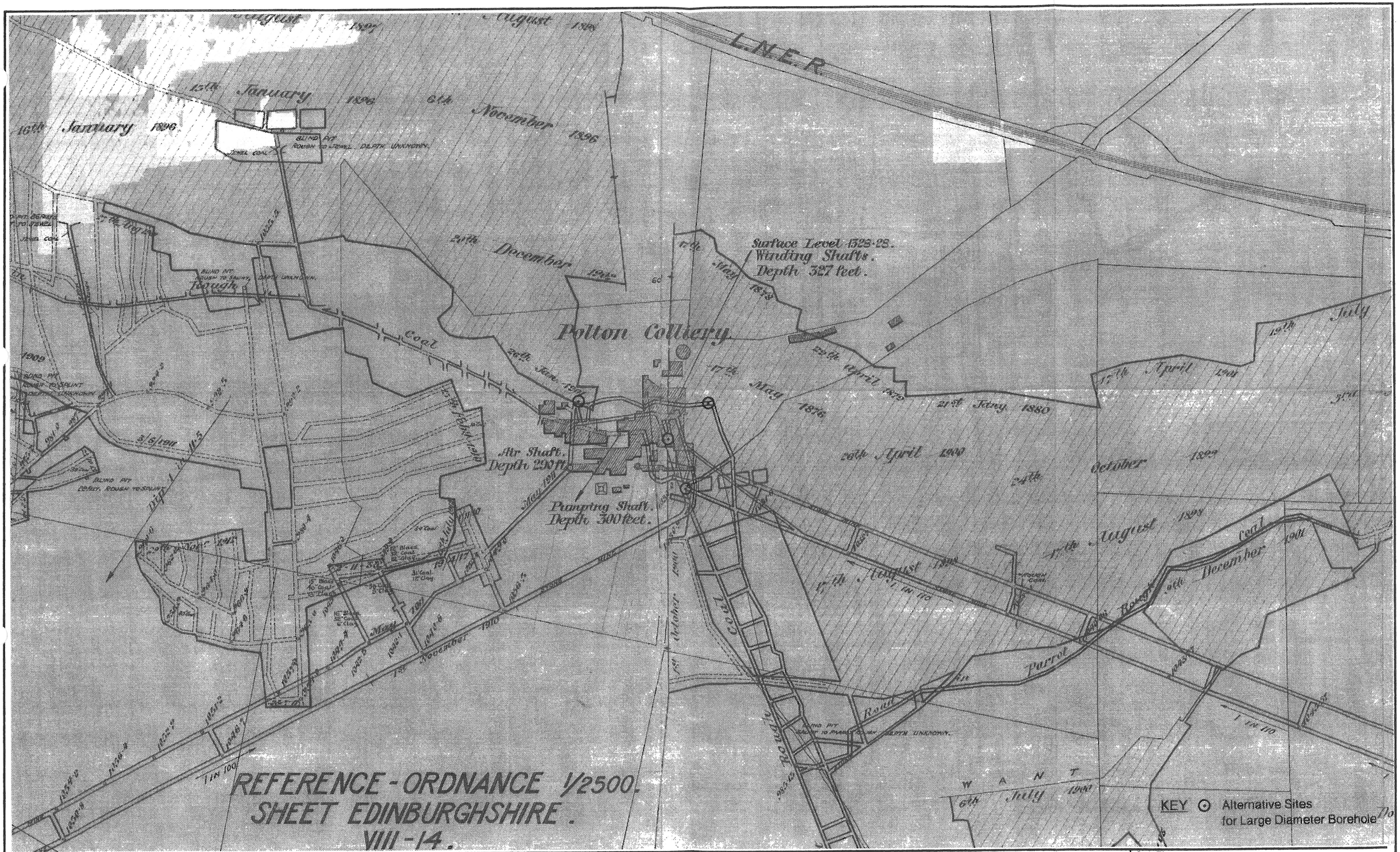
Figure 9

1/2,500 Plan of Polton Workings in the Splint, Parrot Rough and Great Seams (Abs. 11284)



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Client: The Coal Authority

Project: Elginhaugh Day Level

Drawing Title: 1 : 2500 Plan of Polton Workings in the Splint Coal (Abs 11284)

Scale at A3	Drawn By	Date	Checked By	Date	Approved By	Date

Project No.	Office	Type	Drawing No.	Revision
D900708			Figure 9	

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