

Mining Services Ltd  
Colliery Division



# MIDLOTHIAN COALFIELD MINEWATER CONTROL

**The Coal Authority**

THIS REPORT WAS SENT  
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# MIDLOTHIAN COALFIELD

## MINEWATER MANAGEMENT

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## 1. Introduction

- 1.1 Monktonhall Colliery, the last deep mine working within the Lothian Coalfield, was situated in the northern part of the Coalfield, about 8 km South of the City of Edinburgh and some 2km from the A1 trunk road in the heart of the oldest mining district in Scotland. The River Esk is approximately 2.5km to the East and the coast at Joppa some 3km to the North. Mining operations have been undertaken in this locality since the beginning of the 13th Century.
- 1.2 The Colliery surface is some 45 metres above Ordnance Datum with the land rising to the West and South and dipping towards the coast some 3km to the North and Easterly to the valleys of the River Esk and its' tributary the South Esk before rising again.
- 1.3 The coalfield consists of a large synclinal basin extending from Rosewell to Musselburgh and Northwards under the Firth of Forth. This northern part of the basin is limited by outcrops to the East and West and truncated to the South by the Sheriffhall Fault. The coal seams dip almost vertically from the western outcrops. Thereafter they level out in the centre for approximately 3km before rising at an even gradient to the Eastern outcrop.

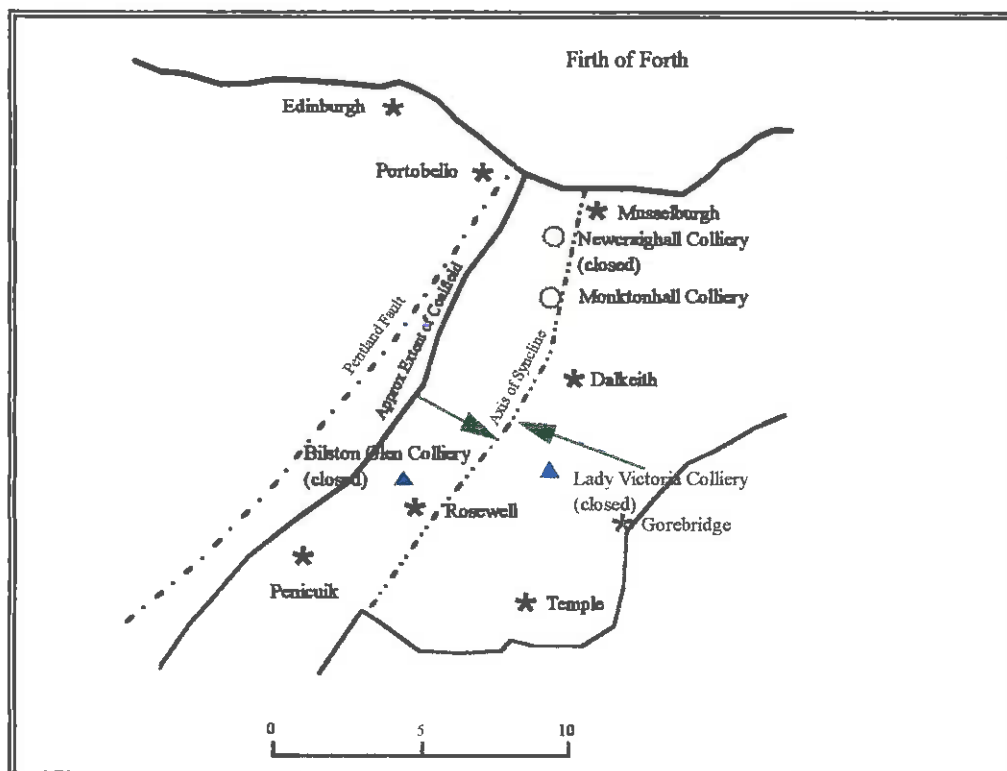


Figure 1

Basic Geological Structure

- 1.4 The Limestone Coal Group comprises of mudstones, siltstones and sandstones which can achieve a thickness in excess of 20 metres. The coal seams worked all have a low sulphur content of about 1%.

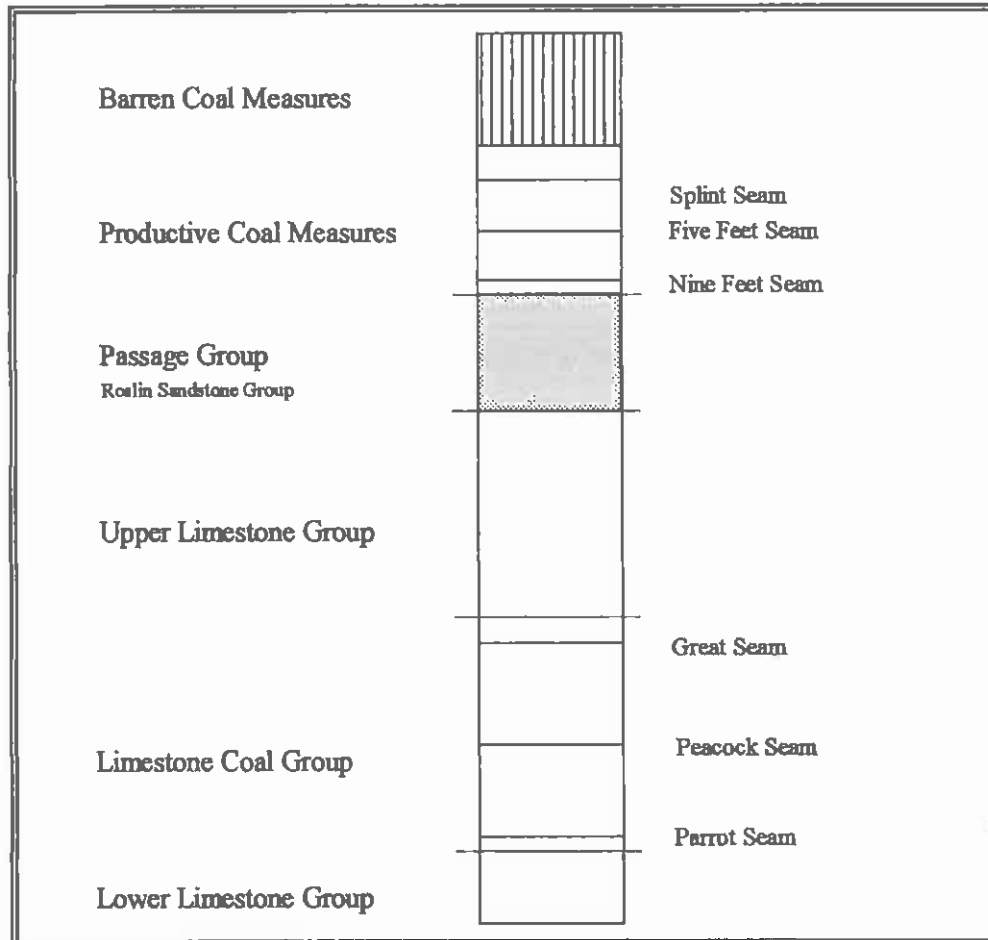


Figure 2 Stratigraphic Sequence

- 1.5 The overlying Passage Group, Millstone Grit, is predominantly comprised of sandstones which, from experience, have been proven to be water bearing.
- The Productive Coal Measures comprise of mudstones, siltstones, seatearths and sandstones in addition to the numerous coal seams.
- The superficial deposits vary between Boulder Clay to Sand and Gravel and Alluvium.

## 2 Historic Groundwater Control

- 2.1 At the time of sinking Monktonhall Colliery minewater in the Productive Coal Measures was being controlled by pumping (3350gpm) from four neighbouring Collieries which all closed by 1979.

Colliery	Year Pumping Ceased	Quantity Pumped (gpm)
Gilmerton	1961	750
Woolmet	1966	450
Newcraighall	1972	1700
Dalkeith	1979	450
<b>Total</b>		<b>3350</b>

Figure 3 Control of Minewater in Midlothian Coalfield North of Sheriffhall Fault

- 2.2 Examination of mine plans for Monktonhall Colliery indicate that there are no direct underground connections to adjacent Collieries within the Limestone Coal Group. However in the sinking of the two mine shafts 8 old wastes from the overlying Productive Coal Measures were encountered. The interconnections to Newcraighall, Woolmet and Dalkeith are the sinking of the shafts through old wastes.

Seam	Depth from Surface (metres)
Clayknowles	26
Splint	43
Rough	59
Beefie	72
Jewel	110
Cowpits Five Feet	192
Salters	252
Nine Feet	272

Figure 4 Old Wastes Encountered During Shaft Sinking

- 2.3 Woolmet is interconnected to Gilmerton from the Five Feet seam to a roadway in the Millstone Grit. In turn Gilmerton is interconnected within the Limestone Coal group through Niddrie Collieries to an old day level which comes to the surface at the coast at Joppa.

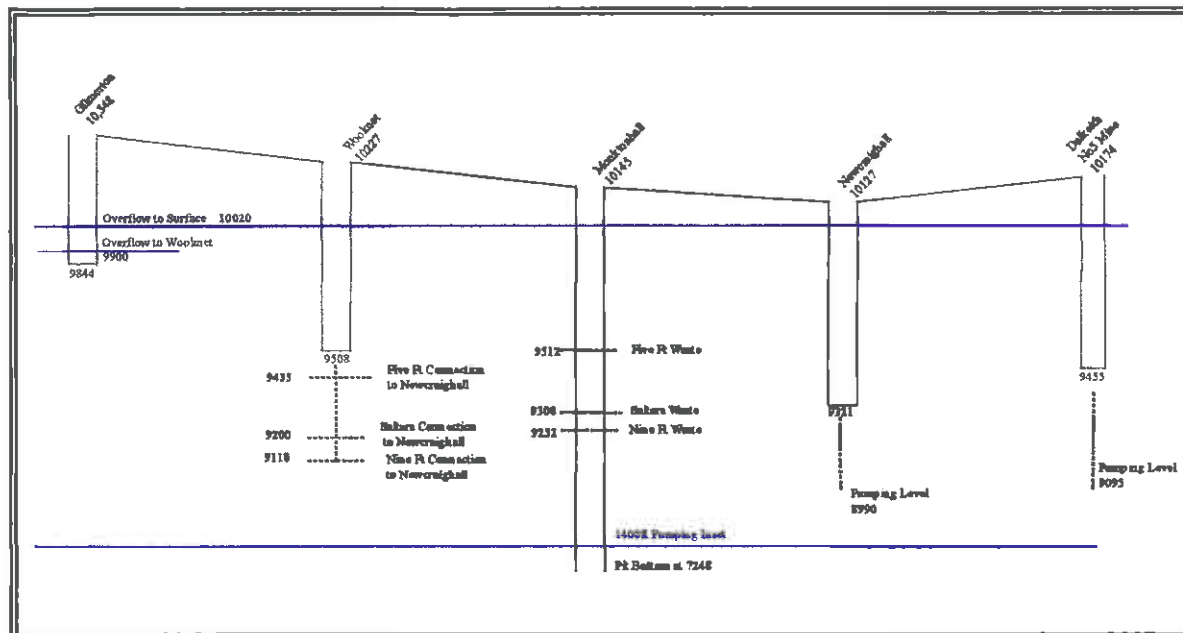


Figure 5 Plan showing Interconnections around Monktonhall Colliery

- 2.4 From completion until 1972 little water was apparent in either shaft above the 1400 feet pumping level. After 1975 there was a steady increase in the water entering the two shafts above the 1400 feet level coinciding with the rising water level in Newcraighall shaft. When the water reached the Five Feet waste level, the maximum inflow of water in the Monktonhall Shafts was recorded, indicating that the Five Feet waste level is the critical connection in the area.

Year	No1 Shaft (gpm)	No2 Shaft (gpm)
1975	40	45
1976	40	50
1977	30	50
1978	30	50
1979	40	50
1980	45	50
1981	50	60
1982	114	105
1983	112	100
1984	114	105
1985 (1st half)	105	448
1985 (2nd half)	365	340
1986	397	545

Figure 6 Table Showing Ingress of Water into Monktonhall Shafts from the Productive Coal Measures 1975 - 1986

- 2.5 The current water level in the Productive Coal Measures, which have been worked extensively from the 17th Century, is some 4metres A.O.D., as measured at Newcraighall, although it has been as high as 13m A.O.D.

Date	Depth (metres) + / - O.D.	Date	Depth (metres) + / - O.D.
Nov 1971	-204	Jan 1987	-18
Nov 1973	-162	Jan 1989	-12
Dec 1974	-150	Jan 1992	8.6
Dec 1975	-141	Jan 1993	9.2
Dec 1976	-132	Jan 1994	11.1
Dec 1977	-125	May 1994	13.3
Nov 1978	-119	Jan 1995	11.8
May 1979 *	-114	Jan 1996	10.5
Nov 1979	-110	Jan 1997	5.7
Oct 1980	-100	May 1997	5.9
Jan 1982	-82		
Dec 1982	-71		
Jan 1984	-53	Oct 1998	3.2
Jan 1985	-39	Dec 1998	3.5
Jan 1986	-27	Feb 1999	4.2

\* Dalkeith pumps switched off

Figure 7 Table Showing Rising Water Levels at Newcraighall Shaft 1971 - 1999

- 2.6 At the time of cessation of underground pumping operations at Monktonhall Colliery an estimate of the water make was 2,000gpm made up of 1000gpm flowing into the shafts and 1,000gpm from the inbye workings. It is estimated that the flow from the Millstone Grit strata into the mine shafts accounted for some 300gpm of the total make.



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### 3. Current Minewater Control

- 3.1 Upon the cessation of mining at Monktonhall Colliery a submersible pumping station to control groundwater rebound within the Midlothian Coalfield was established in the the No2 shaft. This pumping system was set up to maintain the water level in the Monktonhall shafts at a level of 192 metres from the surface.
- 3.2 A programme was also established to both monitor the water levels and qualities within the coalfield by regular measurements at Newcraighall and Gilmerton Shafts and regularly inspect the condition of the outflow of the day level at the intersection with the public sewerage system at Joppa Park.
- 3.3 In order to augment the water monitoring regime a further location was established by construction of a borehole on the site of the former Dalkeith Mines (Drifts from surface to underground) some 3.5km south east of Monktonhall Colliery. These mines were abandoned by British Coal in 1979 with concrete stoppings being erected at rockhead and the mines backfilled to the surface. In addition to providing information on the underground waters this borehole is in near proximity to the valley of the River Esk.
- 3.4 Access to the proposed site is by a metalled road from the A6094 highway which now leads to a permanent residence for travelling people. There is a locked barrier, approximately 2m above ground, to prevent unauthorised access and further height restriction barriers, 4.9 m above ground, in respect of the overhead power cables. At the entrance to the former Colliery site there are locked gates to prevent vehicular access.
- 3.5 Whilst the borehole was constructed into the underground roadways in the Five Foot Seam from the base of No 5 Mine the interconnections between Newcraighall and Dalkeith are in the Salters and Nine Foot Seams to Dalkeith Six Foot Seam. There are small, unworked 22 metre blocks of coal between Dalkeith and both Newcraighall and Woolmet Collieries in the Five Foot Seam. These seams are connected underground at Dalkeith by interseam drivages. The static head on these unworked blocks of coal is some 300p.s.i.. Newcraighall and Woolmet Collieries are interconnected in the Five Foot, Salters and Nine Foot Seams.
- 3.6 As Dalkeith pumped to maintain the water levels within the Productive Coal Measures the degree of interconnection with the main body of water is sufficient and no perched watertable is envisaged. The interconnections between Newcraighall and the Dalkeith Mines will allow a direct comparison to be made of water levels within the Productive Coal Measures

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- 3.7 Works to upgrade the treatment of waters discharged from the Monktonhall site have recently been completed, including additional lagoon capacity, and the pumping returned to some 6 hours per day to maximise the aeration and settlement capacity of the system ensuring compliance with consent conditions. These conditions have not been amended from those granted in 1980 i.e. iron 5mg/l, suspended solids 60mg/l
- 3.8 Therefore with the benefit of groundwater pumping facilities to control waters within the coalfield and establishment of monitoring facilities by the Coal Authority, a programme should be established, subject to agreement with S.E.P.A., to progressively amend pumping levels to achieve the most effective level for control of waters to prevent uncontrolled discharges to the surface.

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#### **4. Monitoring Results**

- 4.1 In the initial phase it has been agreed to raise the upper level of the existing pumping range from 192 metres from the surface to 170 metres and maintain this upper level until a sufficient period has elapsed to fully consider the data obtained from the monitoring stations. The monitoring to be carried out at the most sensitive site, Dalkeith Borehole, on a daily basis. In any event waters, as measured at the Dalkeith site, should not be allowed to exceed a value of 13 metres above Ordnance Datum.
- 4.2 The results of the monitoring at Dalkeith, Newcraighall and Gilmerton may be found in Appendix 1.
- 4.3 The results of water samples taken to ensure compliance with the discharge consent may be found in Appendix 2.
- 4.4 The results of the monitoring at Dalkeith are such that it is recommended that the upper level of the existing pumping range is raised to 150 metres from the surface, as agreed with the Coal Authority, and maintained until a sufficient period has elapsed to fully consider data obtained from the monitoring stations. Thereafter progressively amend pumping levels to achieve the most effective level for control of waters to prevent uncontrolled discharges to the surface.

## **APPENDIX 1**

# MIDLOTHIAN COALFIELD

## WATER MONITORING DATA

[illegible]

## **APPENDIX 2**



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### MONKTONHALL WATER SAMPLE ANALYSIS

Date	pH	Solids ppm	Iron ppm
23/12/98	7.1	22	3.9
30/12/98	7.0	30	2.9

A handwritten signature in black ink, appearing to read "T. Morman", with a horizontal line extending to the right.

T Morman  
Field Scientist  
01501 734488

## **APPENDIX 3**



MONTHLY WEATHER SUMMARY

PORTOBELLO, MILTON RD WEST

JANUARY 1999

Nat Grid Ref 3296E 672BN, 30m above MSL

Date	RAIN mm
Fri 01	0.8
Sat 02	0.8
Sun 03	3.2
Mon 04	6.2
Tue 05	16.3
Wed 06	2.1
Thu 07	2.0
Fri 08	0.9
Sat 09	trace
Sun 10	trace
Mon 11	0.4
Tue 12	---
Wed 13	0.3
Thu 14	---
Fri 15	14.9
Sat 16	trace
Sun 17	0.3
Mon 18	2.6
Tue 19	13.5
Wed 20	0.8
Thu 21	---
Fri 22	---
Sat 23	---
Sun 24	---
Mon 25	30.2>
Tue 26	trace
Wed 27	0.1
Thu 28	0.9
Fri 29	1.1
Sat 30	trace
Sun 31	trace
Month sum	97.4
Monthly mean	
1961-90 mean	52.0
Departure from mean	187.3%
" ">"/"<"=Highest/Lowest value for month	
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