DETAILED ASSESSMENT OF AIR QUALITY (PM10)

SCOUT HILL A644 HUDDERSFIELD RD DEWSBURY

CONTENTS

INTRODUCTION

Previous reports on air quality in the Scout Hill area have identified a need for a detailed assessment of particulates smaller than 10 micrometers in size (PM10).

There are two Air Quality Objectives for PM10

	Averaging period	AQO
24-hour average AQO	24 hours	50 µg/m³ PM_{10}, ***note**
Annual average AQO	Calendar year	40 µg/m³ PM_{10}

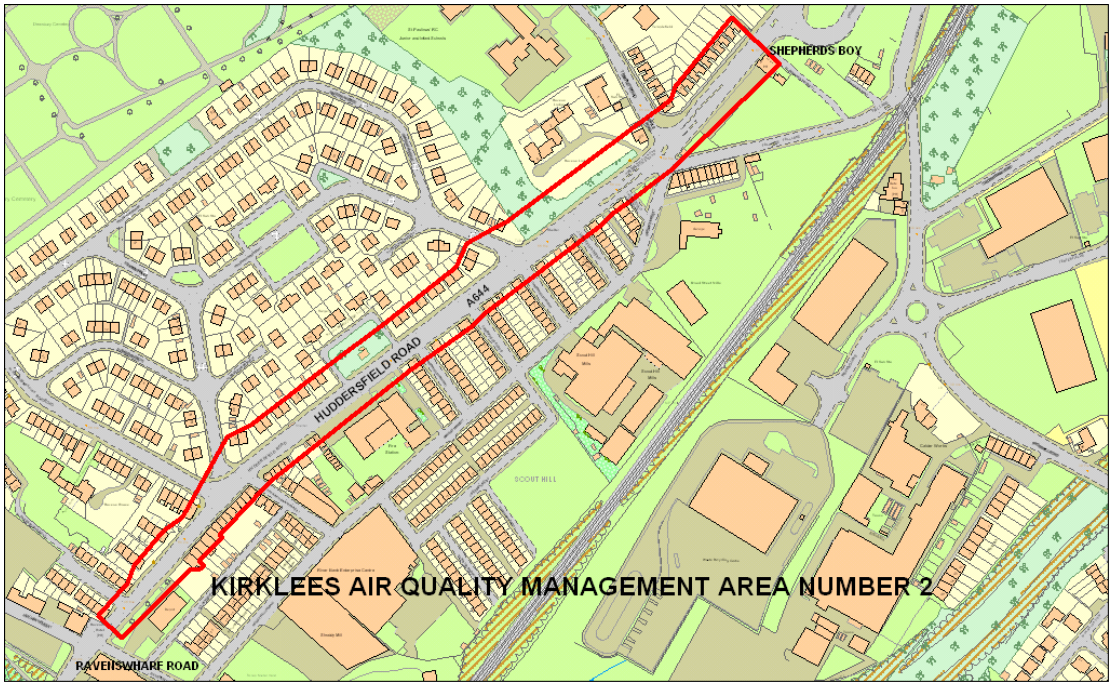
***note**: the 24 hour AQO is exceeded if there more than 35 daily averages over the 50 µg/m³ level per year.

This report assesses the excedences of the 24 hour AQO.

The annual average AQO for PM10 is complied with.

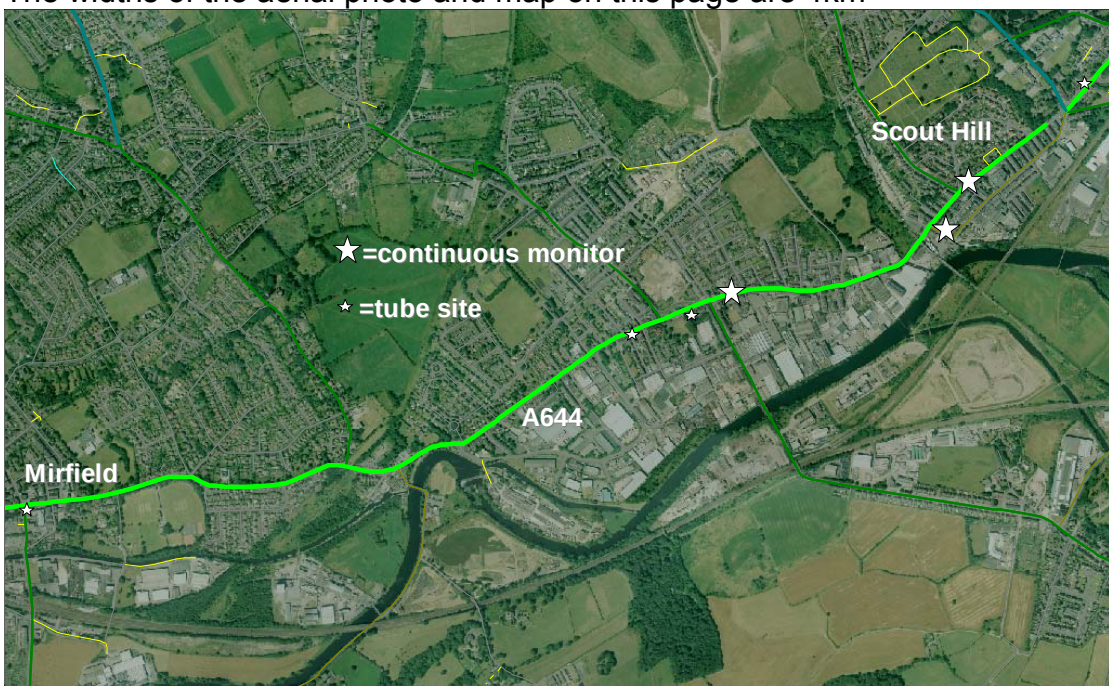
EXECUTIVE SUMMARY

The assessment concludes that an Air Quality Management Area should be declared in the Scout Hill area, and that the boundary of that area will include 61 properties. This will be known as Kirklees Air Quality Management Area Number 2, and is shown in the map below:

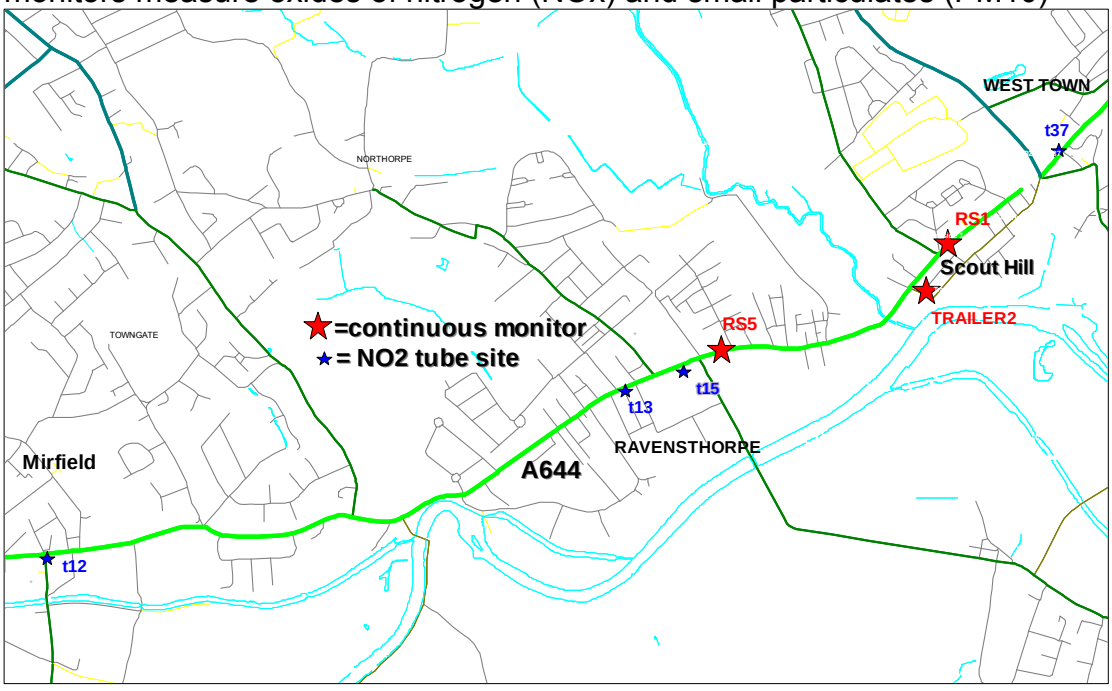


AREA OF STUDY

The area of study is the A644 road corridor to the west of Dewsbury running to Mirfield. The particular area of concern is Scout Hill.
The widths of the aerial photo and map on this page are 4km



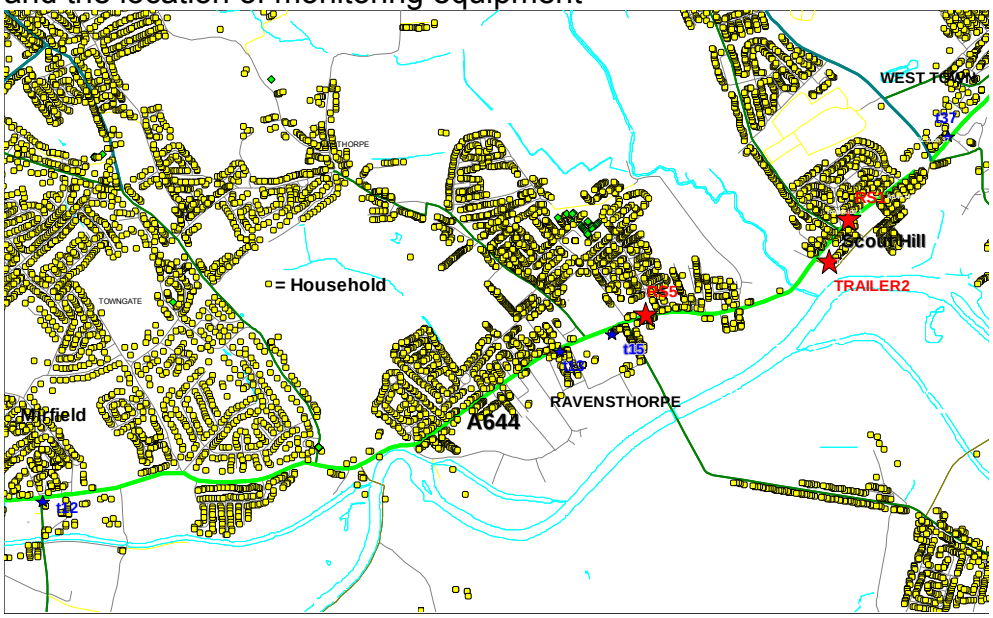
The location of the air monitoring equipment is shown below. The continuous monitors measure oxides of nitrogen (NOx) and small particulates (PM10)



CHARACTERISTICS OF THE AREA OF STUDY

The A644 follows the path of the River Calder and connects Dewsbury to the A62 Huddersfield – Leeds road taking in the localities of Ravensthorpe and Mirfield. Previous reports and assessments of air quality have identified the Scout Hill area between Ravensthorpe and Dewsbury as being an area that may exceed the daily average Air Quality Objective (AQO) for PM10.

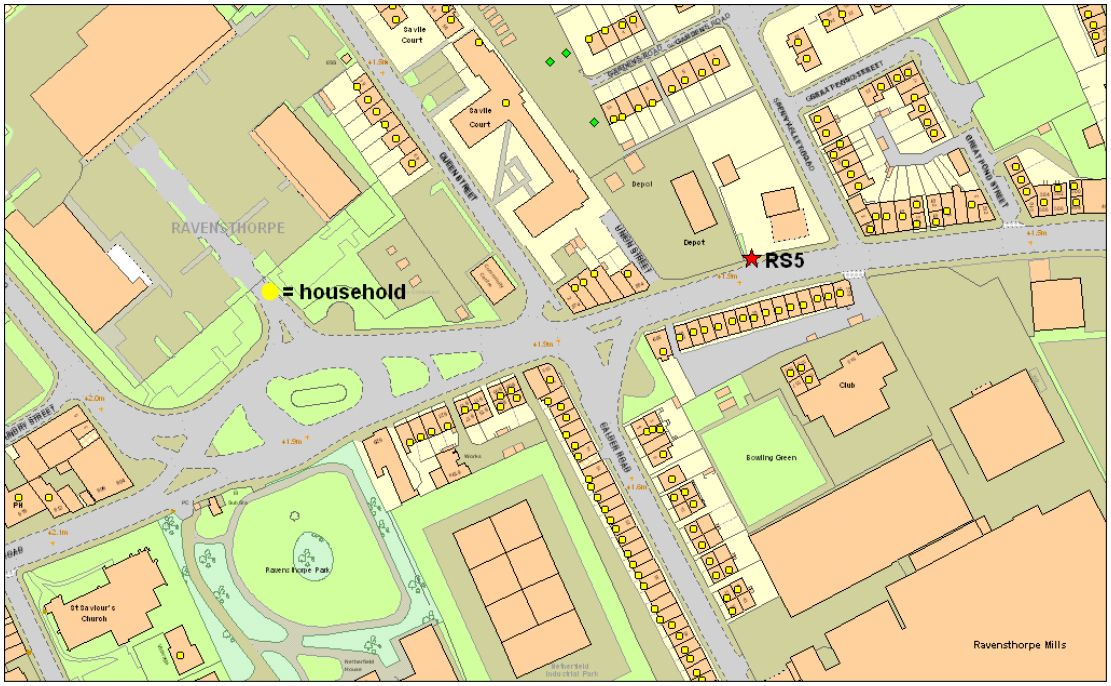
The map below shows the location of households along and in the corridor and the location of monitoring equipment



The housing in this area is a mix of terraces, semi-detached and detached properties. In the Scout Hill area there are mainly semi- detached properties to the north of the road and terraces to the south of the road which are arranged at right angles to the A644 (i.e. the gable end of a terrace faces on the A644) as shown below.

This map also shows the locations of the RS1 and T2 monitoring stations.

The monitoring station RS5 is located 850m to the south-west of the Scout Hill monitoring stationRS1, and it is situated roadside outside a Council building near to the Ravensthorpe Gyratory System. It is the same distance from the road centre line as the households 38m away on the north side of the road. The arrangement is shown in the map below:



The orientation of the road here is similar to that at Scout Hill, with the road here being 20 degrees more to the E-W axis and it has the same traffic characteristics as Scout Hill.

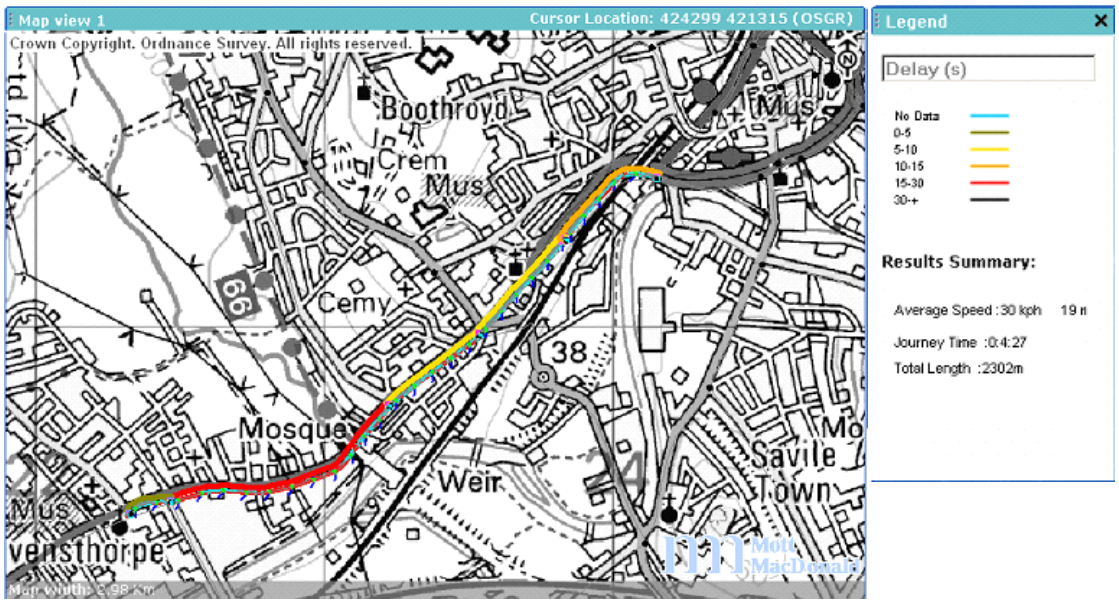
ROAD TRAFFIC AND CONGESTION

The traffic flow on the A644 in the area of study will essentially be of the same total vehicle numbers, and composition. There are congestion points on the route at peak hours, notably at the Ravensthorpe Gyratory and also at the Scout Hill A644 junction with Ravenshouse Rd (where RS1 monitoring station is situated). The speed along the road is variable at most times of day, and it is usual for there to be standing traffic in the vicinity of RS1 and RS5 at peak hours. The terrain along the route is level with the exception of a 250m West to East section going steadily uphill to RS1 where the road levels out again- hence the name of the area being Scout Hill.

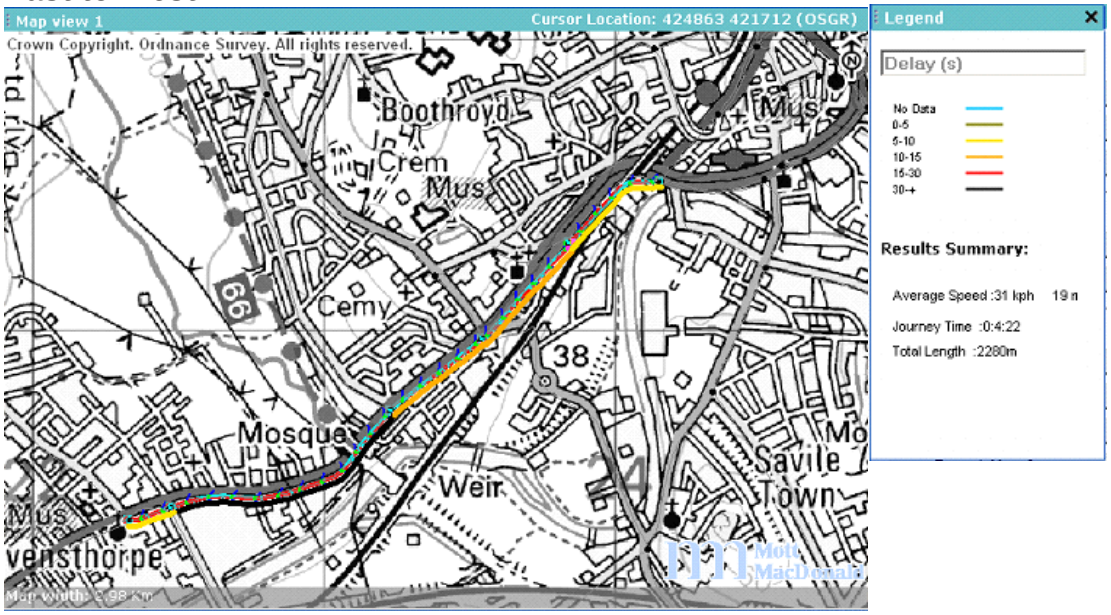
Average speed 24hr data

(These figures are derived from data collected from vehicles fitted with GPS and using a programme called CJAMS.). The following maps represent the average speed over 24hrs for all days:

West to East

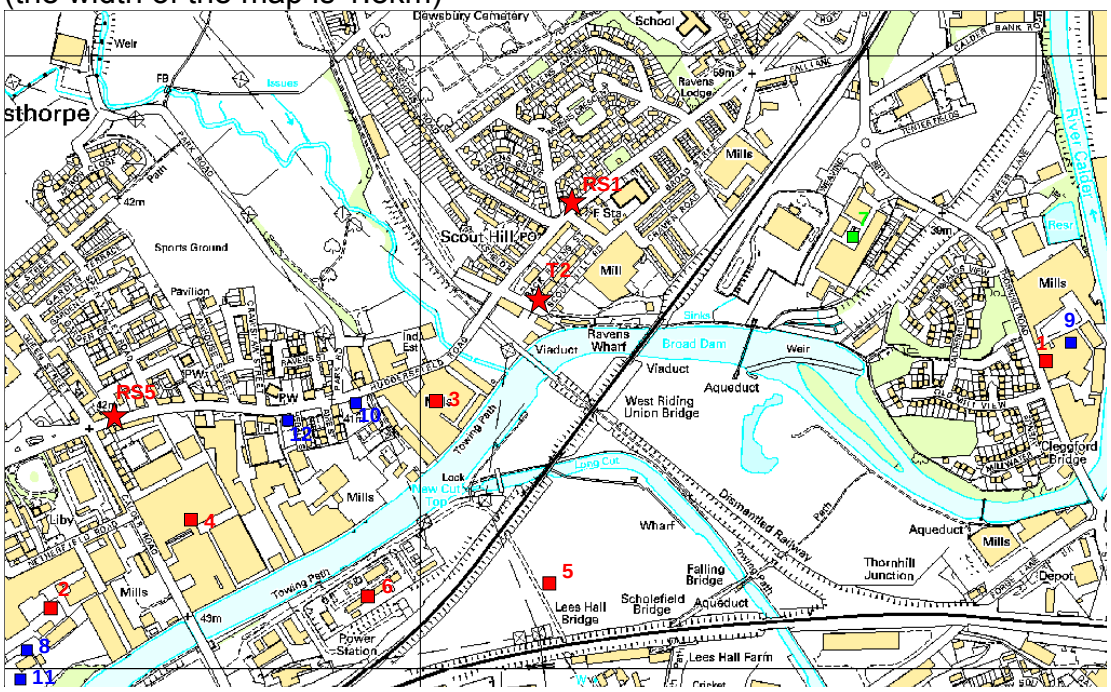


East to West



INDUSTRIAL EMISSIONS

The location of industrial sites in the study area which are regulated by the Environment Agency and Kirklees are shown on the map below:
(the width of the map is 1.8km)



Key to map:

	A1 installations		
1	Calder Textiles Ltd	WF12 9QE	Textile Treatment
2	Dewsbury Dyeing Co. Ltd	WF13 3JY	Textile Treatment
3	William S Graham Ltd	WF13 3JE	Textile Treatment
4	Ulster Yarns Ltd	WF13 3NA	Textile Treatment
5	Thornhill Quarry (Demex)		Landfill
6	Thornhill Power Station (EON)	WF12 9EX	50MW CCGT Power Station
	A2 installations		
7	British Millerain Co.	WF12 9QQ	Fabric Coating
	Part B processes		
8	A Brook (Heckmondwike) Ltd	WF13 3LN	Recovery of Non-Ferrous Metals from Scrap
9	Jay-Be Limited	WF12 9QE	Powder Coating
10	Mr Sabir Patel	WF13 3JE	Petrol Vapour Recovery
11	W G Commercial Services Ltd	WF13 3LN	Waste Oil Burner <0.4 MW
12	Johnson Cleaners UK Ltd	WF13 3JJ	Dry Cleaners

MONITORING RESULTS FOR PM10

PM10 annual averages 2007

Roadside 1 Scout Hill 31 μgm^{-3}

Trailer 2 Scout Hill 27 μgm^{-3}

Roadside 5 Ravensthorpe ` 26 μgm^{-3}

PM10 exceedences of daily average AQO in 2007

Roadside 1	Scout Hill	43
Trailer 2	Scout Hill	21
Roadside 5	Ravensthorpe	26

Permitted number of exceedences of the daily average AQO is 35 per year.

Comparison of days of exceedences of daily average PM10 - Roadside 1 and Trailer 2 at Scout Hill

Roadside 1

Date	Daily Average μgm^{-3}	wind speed(m/s)	wind direction
05/02/07	51	0.2	244
06/02/07	56	0.3	223
07/02/07	55	0.4	297
08/02/07	65	0.3	221
20/02/07	59	1.7	127
21/02/07	74	0.7	151
03/03/07	56	0.8	219
26/03/07	66	1.3	57
27/03/07	80	0.8	82
28/03/07	114	0.5	87
29/03/07	116	0.7	202
31/03/07	100	1.1	43
03/04/07	62	0.9	61
05/04/07	64	0.8	234
13/04/07	55	0.6	145
14/04/07	73	0.4	106
15/04/07	53	0.4	124
17/04/07	54	0.8	261
16/05/07	51	0.5	120
12/06/07	51	0.4	107
06/10/07	57	0.4	151
09/10/07	60	0.3	93
11/10/07	68	0.3	87
20/10/07	59	0.1	119
23/10/07	109	0.2	120
24/10/07	72	0.4	83
25/10/07	56	0.1	133
26/10/07	59	0.2	54

Date	Daily Average μgm^{-3}	wind speed(m/s)	wind direction
04/11/07	56	1.4	280
05/11/07	119	0.1	197
06/11/07	51	2.2	275
15/11/07	50	0.2	197
16/11/07	70	0.2	233
17/11/07	51	0.3	218
27/11/07	66	0.2	137
28/11/07	65	0.2	189
12/12/07	63	0.3	219
13/12/07	80	0.2	71
14/12/07	66	0.6	150
15/12/07	78	0.1	140
16/12/07	56	0.2	97
18/12/07	51	0.4	76
01/01/08	55	0.1	126

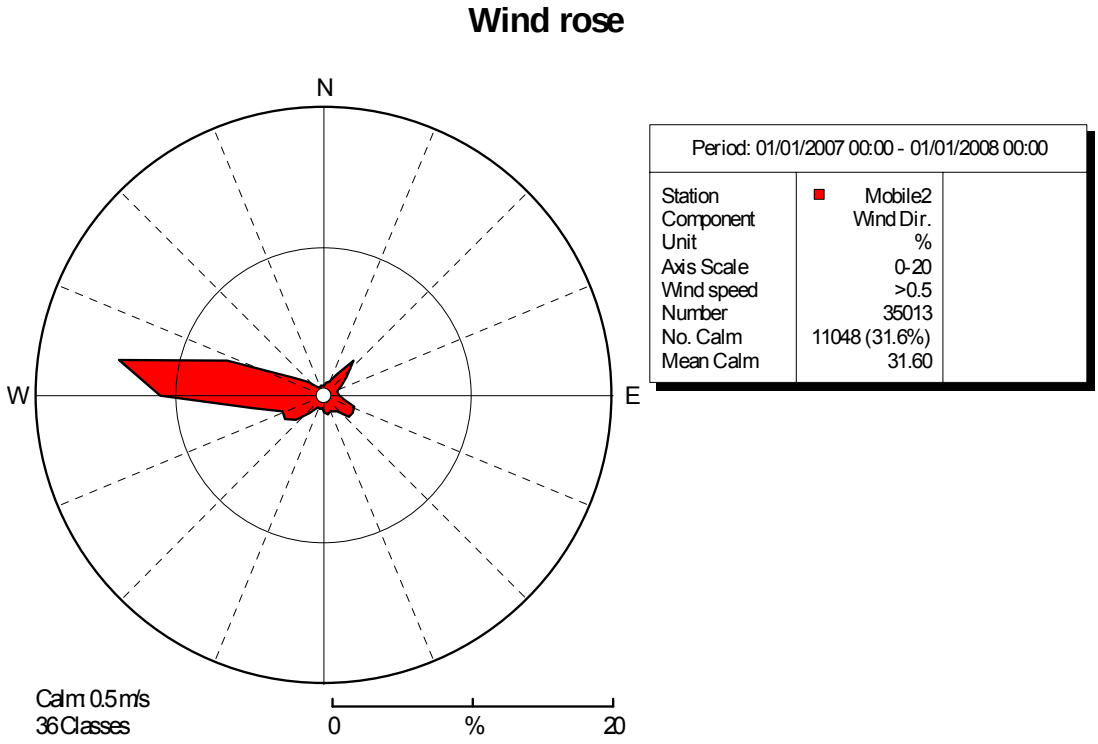
Only 4 out of 43 daily average wind speeds exceeded 1m/s, and all were 1.7 m/s or under.

Trailer 2

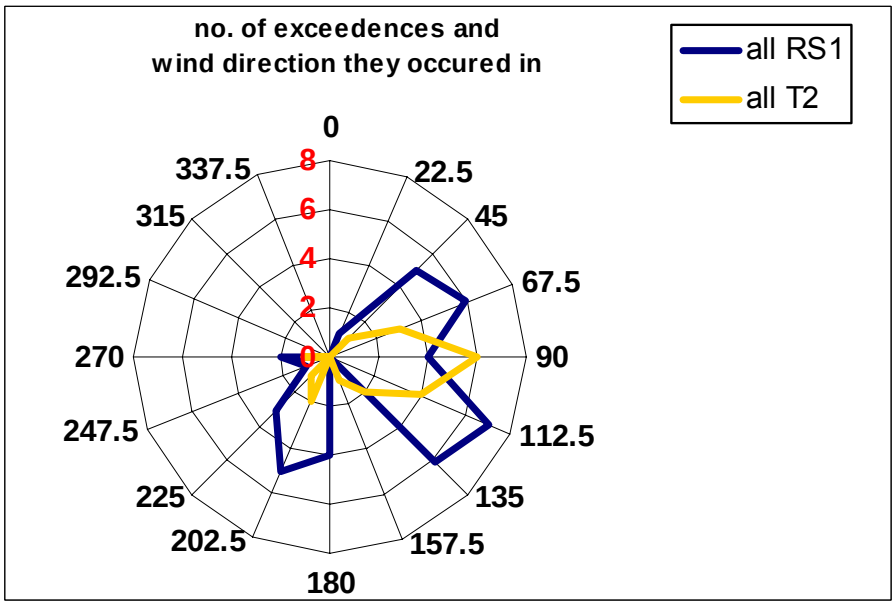
Date	Daily average μgm^{-3}	wind speed(m/s)	wind direction
26/03/07	70	1.3	57
27/03/07	77	0.8	82
28/03/07	94	0.5	87
29/03/07	80	0.7	202
31/03/07	61	1.1	43
03/04/07	53	0.9	61
13/04/07	73	0.6	145
14/04/07	78	0.4	106
15/04/07	56	0.4	124
21/04/07	72	1.7	112
01/05/07	64	1.3	96
02/05/07	66	1.2	91
02/06/07	51	0.6	93
12/06/07	51	0.4	107
20/07/07	56	0.7	163
23/10/07	72	0.2	120
24/10/07	66	0.4	83
04/11/07	66	1.4	280
05/11/07	112	0.1	197
12/12/07	52	0.3	219
13/12/07	57	0.2	71

Only 6 out of 21 wind speeds exceeded 1m/s, and all were 1.7 m/s or under

The wind rose for the year shows the prevailing wind direction



However the daily average wind directions for the days of exceedence give a clear picture of how the wind directions correlate with exceedences. It is noteworthy that **only** 2 of the daily exceedences at RS1 are when the wind direction is approximately in the direction of the prevailing wind.



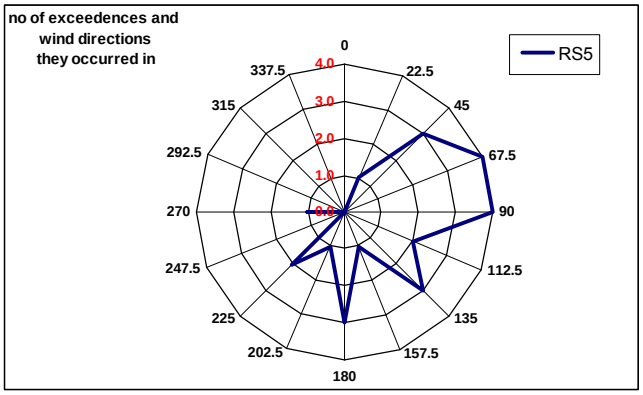
The wind directions are the centre directions of one sixteenth sections of the compass circle and are show by the black figures around the "web". The red figures represent the scale for the number of exceedences in each direction.

There are no exceedences measured when the wind direction is the compass "quadrant" W – NE. For the RS1 station that is exactly the wind direction sector that would take the traffic source pollution away from the station. For the Trailer 2 station one would expect the road traffic contribution to cause exceedences from this quadrant. However Trailer 2 has a minimum distance to the A644 road centreline of 47m whereas for RS1 it is 7m and it is highly probable that this accounts for the seeming anomaly.

The results for the RS5 station which is situated 850m to the west of RS1 on the A644 are shown below. The results show a similar likelihood of exceedence of the daily average AQO when there is low wind speed or calm conditions.

RS5 daily exceedences	daily average	wind speed m/s	direction
7/2/07	50	0.3	221
15/2/07	50	2.8	148
19/2/07	51	1.7	127
25/3/07	57	1.3	57
26/3/07	67	0.8	82
27/3/07	88	0.5	87
28/3/07	91	0.7	202
30/3/07	68	1.1	43
13/4/07	51	0.4	106
30/5/07	71	1.5	202
20/6/07	51	1.5	173
22/6/07	53	0.3	103
2/10/07	52	0.1	58
5/10/07	62	0.4	151
8/10/07	53	0.3	93
10/10/07	51	0.3	87
18/10/07	51	0.1	239
22/10/07	73	0.2	120
23/10/07	88	0.4	83
24/10/07	67	0.1	133
25/10/07	60	0.2	54
3/11/07	62	1.4	280
4/11/07	122	0.1	197
14/12/2007	56	0.1	140
15/11/07	51	0.2	233

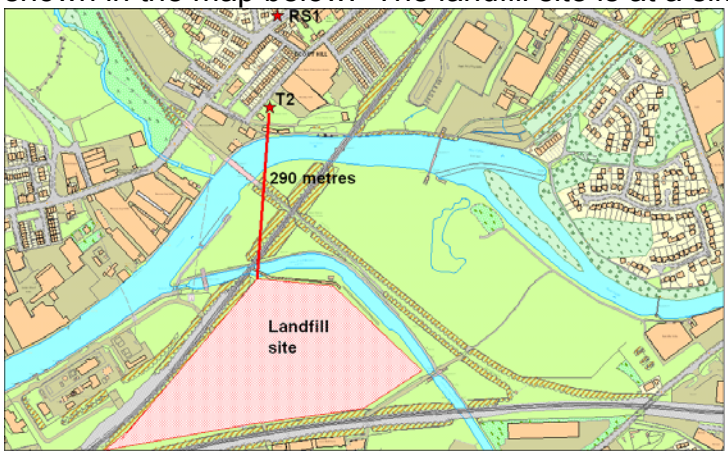
A similar radar graph for the RS5 station can be constructed and shows a similar pattern of exceedence in relation to wind direction



INTERPRETATION OF THE MONITORING RESULTS

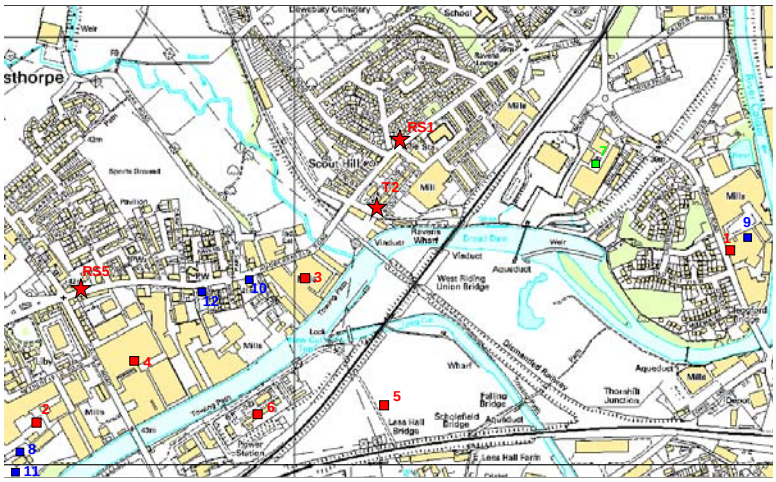
Industrial contribution to PM10

One of the reasons that Trailer 2 was placed in its present location is that directly to the south of the stations lies a landfill site with open cover. This is shown in the map below. The landfill site is at a similar elevation to T2.



When the prevailing wind was in the southern sector then it would be reasonable to assume that Trailer 2 would experience greater or similar levels of exceedence. This is not the case as RS1 experienced 12 days of exceedence compared with T2's 3 days when the wind was in this quadrant. This is strong evidence that the landfill site is not a significant contributor to the exceedences at Scout Hill.

The same interpretation and reasoning can be applied to the nearby industrial stack sources. The installation with the greatest PM10 emission is Thornhill power station and this lays SW of RS1 and T2, and all but three of the installations lie in the S to W quadrant which is not associated with days of exceedence. Of the three installations which lie to the east of RS1 and T2, British Millerain has not been processing since 2006 and Calder Textiles and Jay-Be Ltd operate gas powered boilers. Jay Be Ltd stack monitoring indicates that particulate emissions in normal operation are at 10% of their permitted emission limit.



Therefore the conclusion is drawn that industrial stack emissions are not significant in contributing to the exceedences of the PM10 daily average AQO.

Road traffic contribution to PM10

The following observations can be made about traffic flow along this section of the A644 corridor, particularly in comparing the locations of RS1 and RS5:

1. The traffic flows along the corridor vary between 24000 and 31000 vehicles per day. Observation has indicated that the ratio of heavy duty vehicles to light duty vehicles in the area of Scout Hill is higher than 1:9

2. There are peak hour queues over extended periods at both RS5 and RS1.

3. The results from RS5 monitoring station show a similar pattern of exceedence to RS1 but at a lower level.

4. The average speeds (kph) at RS5 and RS1 are shown in the following table:

	RS5	RS1
Eastbound	**15 to 30**	**5 to 10**
Westbound	**plus 30**	**10 to 15**

5. The topography of the road along the corridor is similar except for the incline to the west of RS1.

CONCLUSIONS

RS1 and RS5 are in very comparable locations in that they are exposed to the same traffic levels and are located roadside to the north of the east-west A644. The comparison of monitoring results between RS5 and RS1 indicate that RS1 has an annual average PM10 concentration that is 19% higher than RS5, and that it experiences 65% greater number of exceedences of the daily average PM10 AQO level.

RS1 and T2 are located in the same locality 150m apart with T2 downwind of the prevailing wind in an urban background location and RS2 upwind of a roadside location. A comparison of the results between RS1 and T2 indicate that RS1 has an annual average PM10 concentration that is 15% higher than T2, and that it experiences 105% greater number of exceedences of the daily average PM10 AQO level. The results from RS1 and T2 indicate that the exceedences of the daily average PM10 AQO level are far greater roadside than a short distance away from the road.

Exceedences of the daily average PM10 AQO level only occur when there are calm or low wind speed conditions. The conclusion is therefore drawn that the exceedence of the PM10 daily average AQO is very localised to the area of Scout Hill, and focussed on those areas very close to the side of the road where there is significantly lower average daily vehicle speed.

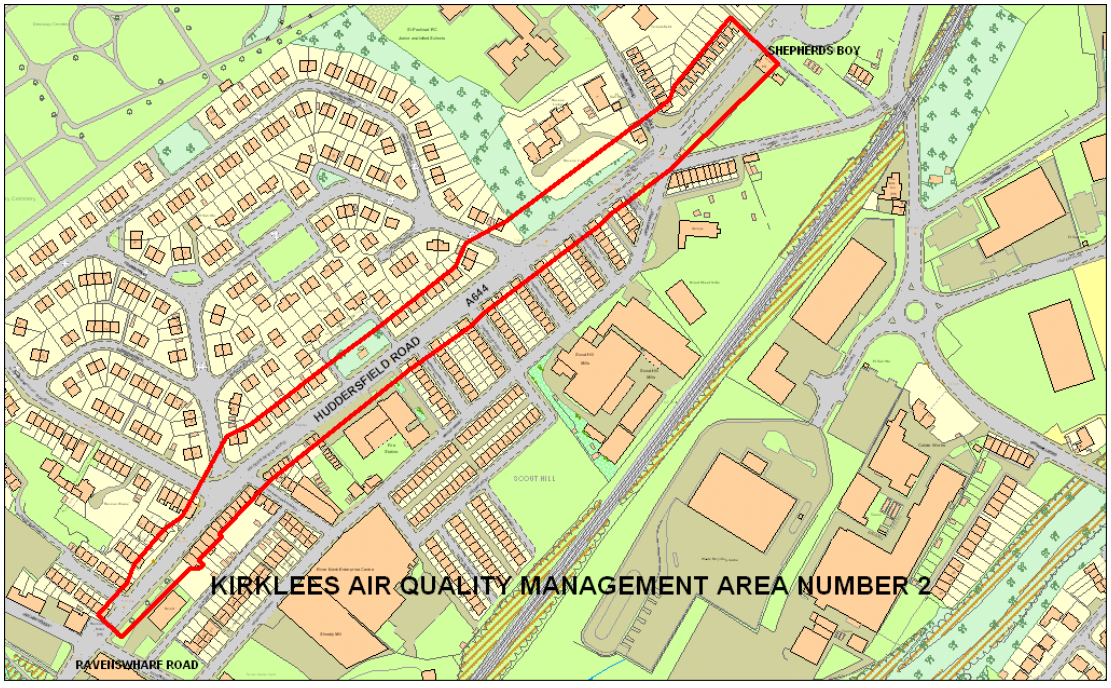
PROPOSED AQMA

It is proposed to declare an Air Quality Management Area that includes the properties that are adjacent to the A644 road, or have gardens adjacent to the road, between the Huddersfield Road - Ravenswharf Road junction and Huddersfield Road at the Shepherd's Boy public house. This includes the following addresses:

1&2 Ravens Croft 1&2 Ravensfield Road 2 Ravens Crescent
2 to 20(even numbers) and 42 to 60(even numbers) Ravens Lodge Terrace
1 Ravenshouse Road 2 Temple Road 1&2 Thornville Terrace
1&2 Thornville Mount 1&2 Thornville Place 1&2 Thornville Walk
157, 251 & 273 to 297(odd numbers) Huddersfield Road
180 to 200(even numbers) Huddersfield Road

These properties are close to roadside along the section of road that has significantly lower daily average traffic speeds than the adjacent roadlinks on the A644

This area would have the following geographical boundary:



APPENDIX I
MONITORING: EQUIPMENT METHODS AND QUALITY CONTROL

Automatic continuous monitoring for PM10.

The equipment is supplied by Horiba and specifications are:

RS1 &RS2 - Thermo Electron Corporation FH62 I-R particulate monitor
Trailer 2 – Thermo Scientific TEOM 1400AB

Results from all 3 units are subject to the 1.3 adjustment factor.

The equipment is maintained under a service contract with the equipment supplier Horiba and is operated by council officers trained by Horiba in all aspects of the monitoring process including routine site operations, field calibration and data ratification.

The quality control/quality assurance procedures have been subject to a comprehensive audit as by external auditors as part of this Council's EMAS accreditation and ISO9001 quality assurance accreditation.

Data is downloaded twice daily from each station via modem connection to the central computer at Environmental Services Headquarters
All data is filtered and ratified prior to acceptance in the ratified database.

In normal circumstances each station is visited at least once per week for on site equipment checks. All site visits, manual adjustments and maintenance operations are recorded.