

A Review of Waste Disposal and quarrying at Turner's Hill, Oldbury, West Midlands

by
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Introduction

This report reviews the operation of waste disposal and quarrying facilities at Turner's Hill, Warley. These facilities have been causing offence to nearby residents for some time, and the purpose of this report is to consider the wider environmental and legal issues surrounding the operation of the site. The report has been produced at the preliminary stages of the investigation to give a general indication as to the hazards this site presents, and the prospects for improving conditions around the site.

The site, although now one quarry, was one two quarries separated by a road. The wall of rock between the quarries has now been removed, and the two quarries, in separate ownership, now form one large void. There are four main operations carried out on this site...

* **Quarrying**: The quarrying operations are currently owned/worked by ARC. Dolerite rock is quarried for aggregate, and for coating. As part of the quarrying operations, the rock is crushed and stored on the site;

* **Stone coating**: There are tar coating plants at either end of the site;

* **Batching**: Tarmac currently run a concrete/mortar batching plant on the site;

* **Waste disposal**: At the western end of the site is a licensed waste disposal site for household and hazardous wastes, currently run by Greenways Landfill - a division of ARC Ltd.

Of these operations, the disposal of hazardous wastes, and the crushing, storage and coating

of stone, appear to have the potential to cause the greatest environmental impact.

currently, there seems to be little emphasis by Sandwell Metropolitan Council to set up an effective monitoring regime for this site, or structure their own records to allow the public greater access to information that they currently have a right to. This can be demonstrated by three main problems that exist at the present...

1. Monitoring of prescribed processes: The batching plant and coating plants have Local Authority Air Pollution Control (LAAPC) authorisations, issued by Sandwell Borough Council. These authorisations require minimum standards of operation, and that the operator provide air pollution monitoring information. The coating plant which is run by Tarmac was issued with an authorisation in 1992. However, no monitoring data was provided between February 1992 and August 1994, when Sandwell Borough Environmental Health Department finally took actions. That two years should elapse before the Sandwell took actions raises deep concerns about their general competence to administrate the site effectively, and I would certainly advise that this matter be pursued with Sandwell, and possible the Commissioner for Local Administration (Ombudsman).

Another example is the provision of monitoring information for inspection by the general public. Department of the Environment Circular 11/94, which implemented the new waste management licensing system in England and Wales, requires that the records kept by the Waste Regulation authority are copied to all district/boroughs within that area to enable the public to have access to it. This has not been done, and anyone wishing to inspect monitoring data on waste sites in the Sandwell area must travel to the offices of the West Midlands Hazardous Waste Unit in Walsall. This again is a matter I believe should be pursued by a complaint to the Ombudsman.

2. Planning consents: As part of the collection of information on the site, I visited Sandwell's Planning Department. It was not possible for the planning officers to indicate how many permissions are currently active on the site, and their extent. This, in terms of access to information on public registers, is not acceptable. Again, this matter should be pursued with the planning authority, and a complaint made if no further progress can be made.

3. Air monitoring: Sandwell conducts air pollution monitoring as part of its general 'public health protection' responsibilities. However, from the information available it would appear that the monitoring stations are concentrated along the motorway corridors in the Borough. This is a problem because it will not register the effects of other air pollution sources in this area, and thus may lead to a 'false sense of security' on the part of the authority.

Having visited the site, and Sandwell's offices, I believe that there is cause for concern.

Quarrying operations

The quarrying, crushing and coating of stone at this site presents certain risks to public health. These operations cause dust and pollutants from tar coating to be spread over a wide area - the elevation of the site will greatly assist this.

The effects of dust and particulate emissions from the site cannot be quantified since there has been no monitoring carried out. There is also evidence that the conditions on the planning consents for the stone crushing and grading plant, specifically intended to reduce the emissions of dust, have been breached. Another worrying problem is the storage of aggregate near dwellings. Conditions on the planning consent limit the height of these stacks to three metres. It is obvious from observation of the site that the heaps of stone exceed three metres in height, and may present a risk to nearby houses should they subside.

The effects of coating operations, even though they are a scheduled process under LAAPC, are not quantifiable either. Tarmac have not submitted the emissions data for their coating plant for two years, and although the link cannot be proven, it appears that the only reason Sandwell Borough are taking action now to get this data is because of the complaints from local residents.

The coating plant itself, as well as giving odour and pollution problems from the tar itself, is fired with waste oil. This in itself presents a pollution problem since the quality and composition of the waste oil cannot be properly assured without continual testing. It is possible that waste oil, especially from cars/lorries, can become contaminated with heavy metals, and this contamination is then transferred to the air during combustion.

Another cause for concern on this site is the blasting of the quarry walls only a few hundred yards from where a waste disposal site operating with lined cells is operating. It is possible that the shock from blasting could damage the liners, and speed the leakage of leachate from the cells.

Finally, it seems abhorrent that quarrying operations, with all the dust and noise it generates, could be carried on in such a highly populated area. At the same time as allowing these works to continue, Sandwell Borough Council has also allowed permission for new housing developments right up to the edge of the site. This seems to make nonsense of the idea of keeping 'bad neighbour' developments apart, so as to lessen the nuisance to nearby residents.

Waste disposal

The license to deposit waste in 'Rowley Regis Quarries' was granted in October 1989 by Sandwell Metropolitan Borough Council - license no. SL604. Since that date the license has been modified five times....

1. Appending a gas control scheme for the site;
2. Conditions on filling of lined cells;
3. Requirement to display notice at site gate;
4. Amendments to types of waste permitted on site;
5. New restoration, working and gas control systems.

The license for this site, as it currently stands, is very much a 'standard' license for hazardous solid and sludge waste. It does not give consent for the disposal of liquid wastes - which of course present the greatest hazard for the pollution of groundwater.

A large number of waste types are listed in the license. some of the more significant ones are listed on the following pages, together with their daily/weekly limits and calculated annual disposal rates. These figures illustrate the **potential** for the dumping of toxic waste on this site. In particular...

* *Incinerator ash*: This material can be highly toxic, containing a number of highly soluble chemical compounds, together with other dangerous contaminants such as dioxins. Currently, 130,000 tonnes of ash may be dumped at this site every year;

* *Industrial effluent treatment sludge*: Treatment sludge, produced from the cleaning of industrial effluents/industrial discharges, can contain a wide variety of chemical and metal toxins. The level of hazard will depend upon the exact content of the sludge. Currently 39,000 tonnes per year of sludge may be dumped in this site every year;

* *Cadmium/mercury*: These are highly toxic metals which can cause a variety of illnesses and tissue damage at relatively low levels of exposure. currently, over 5 tonnes of cadmium and 2.5 tonnes of mercury may be dumped in this site every year;

* *Asbestos*: Asbestos represents a hazard particularly where it is crushed or the plastic bags it is transported in are broken, and the particles of asbestos are wind-blown away from the site. Currently, over 46 tonnes of asbestos may be dumped in this site every year.

Individually and collectively the dumping of such wastes in an area of high population density presents a serious risk to public health. In the situation presented by the operations at Turner's Hill, the most serious risk will be fire. The contents of household waste, or the effects of chemical wastes when they react, can produce heat and fire. A serious fire at this site could present a serious risk to health as the toxic contents of the site were burnt, carried out of the site as fine particles of soot/ash, or vaporised by the heat of the fire.

Conformity to license conditions

At the moment it is not possible to say whether or not the full range of license conditions are being kept to because the available range of monitoring information has not been reviewed.

Deposit spreadsheet

When visiting the site there was a possibility that at least one of the license conditions was being broken by the operators. Condition 67 of the license, introduced in the third modification, requires that a sign be placed at the main entrance stating...

**HAZARDOUS
WASTE AREA
DISPOSAL LICENSE SL604**

**In the event of an emergency
Contact Site Operators:**

WEST MIDLANDS HAZARDOUS WASTE UNIT

The absence of this sign at the main gate may be accidental, or it may be that it was removed by vandals. However, Sandwell Borough Council should monitor that all of the conditions of the license are kept, and it seems strange that the lack of proper notices was not picked up by their staff.

Leakage from the site

At the moment, without the monitoring data, it is not possible to assess the extent of leakage from the dumping of household and hazardous wastes on the site. Even though the site is within hard rock, past quarrying and blasting operations will have created fractures permeating downwards and sideways through Turner's Hill itself. Should leakage occur, the spread of pollution may be extremely rapid due to the presence of such fractures.

What may be worse, the area has a history of mining, and shafts are surface near to the site. Should leachate enter these old shafts, the spread of pollution would be accelerated further. Also, there are a number of other 'completed' landfill sites nearby which may also be leaking, and which may also contain the same cocktail of wastes that this site is permitted to accept.

It has been stated to me that the lining of the site will prevent leakage - there is a growing body of evidence to the contrary. The US Environmental Protection Agency (EPA) has paid for a series of engineering studies^[4] to find out the best way to make a landfill. They wanted to know what was the "best demonstrated available technology" (BDAT) for making landfills. These studies reach some surprising conclusions. The consultancy employed to do this was Geoservices - a reputable US environmental consultancy company.

'Dry tomb' contained landfills can be made of a huge sheet of plastic underlain by ordinary soil, or it can be a huge sheet of plastic underlain by a layer of compacted soil (usually clay). The third combination, plastic liner and compacted clay soil, is called a "composite liner". A composite liner is not a double liner - it is a single liner made up of two parts. To create a double liner, you would use two composite soil liners together, separated by a layer of sand or gravel. Geoservices did not examine the second type of liner (plastic sheet on ordinary soil) because ordinary soil provides poor support for a plastic liner carrying many tonnes of

weight, so they restricted their analysis to compacted clay liners vs. composite liners.

Geoservices didn't have much good to say about clay liners. The flow of liquids through a liner (the liner's permeability) is measured in metres per second (m/s-1) . The EPA's (and the UK's) current requirement for a liner for a hazardous waste landfill is that it pass liquids through it no faster than $1.0 \times 10^{-9} \text{ms}^{-1}$. However, based on actual experience in the field, Geoservices concludes that this ideal permeability is often not achieved for a variety of reasons. Therefore, they assume that the actual permeability in the real world lies between 1.0×10^{-9} and $1.0 \times 10^{-8} \text{ms}^{-1}$. Geoservices concludes, possibly the most significant observation is that with compacted clay bottom liners leakage out of the landfill will be larger if there is leakage through the top liner, even in landfills meeting current EPA design requirements, including permeability of $1.0 \times 10^{-9} \text{ms}^{-1}$. By "large" leakage, Geoservices means nearly 1000 litres of fluid leaking through each hectare each day, or 10,000 litres per day leaking from a average 10ha landfill. Their calculations show that, with 12.5cm of water standing on the bottom liner, it will take 15 years for leakage to break through a 1 metre thick compacted clay bottom liner, but once break through has occurred, 1000 litres per hectare per day will pass through the liner continuously thereafter. It won't take very long to contaminate a large drinking water supply if you pour 1000 to 10,000 litres of toxics into it day after day, year after year. Thus Geoservices has shown that clay liners are an environmental liability - not a solution to landfill containment.

Geoservices also reports that all plastic liners (also called Flexible Membrane Liners, or FMLs) always have some leaks....

"A common misconception regarding FMLs is that they are impermeable, that is, no fluid will pass through an intact FML. However, it is important to realize that all materials used as liners are at least slightly permeable to liquids or gases and a certain amount of permeation through liners should be expected. Additional leakage results from defects such as cracks, holes, and faulty seams."

It is this concept in the minds of decision makers - that the liners are 'impermeable', which is leading to landfills being sited near or over major aquifers, and risking the future of that aquifer as a potable water resource.

FML's often develop defects called "pinholes" during manufacture. These result from thin places ("fisheyes"), bubbles, foreign material, or lumps of carbon in the raw molten plastic from which the FML is rolled ("calendered") into sheets. Furthermore, when a large landfill liner is created by joining strips of FML together with glue or by welding, the resulting seams often leak. Geoservices provides some data on typical seam defect rates.

They look at six case studies. Based on these six case studies, they drew the following "tentative conclusions"...

* An average of one leak per 30 feet of seam can be expected if there is no quality assurance program (quality assurance being a third party coming along behind with special equipment to check the adequacy of the seams.

* Even with good quality assurance, "an average of one leak per 300 metres of seam can be expected with reasonably good installation, adequate quality assurance, and repair of noted defects". That is to say, under the best circumstances, you will get one leak per

300 metres of seam - if the landfill liner is made up of FML that are 7 to 10 metres wide, you can expect three or four defective seams in every hectare the liner covers.

* Based on actual data, Geoservices conclude that a "standard" leak in a FML has an area of one square centimetre, and that the "standard" number is two holes per hectare. They point out that the "standard" hole size and "standard" number per hectare are based on the assumption that "intensive quality assurance monitoring" will be performed during liner installation, so clearly we are talking about the best case, not the worst case, here.

* Design flaws, poor construction practice, or poor quality assurance would result in larger holes, greater numbers of holes, or even large tears.

Geoservices then go on through an elaborate mathematical analysis to figure out how much fluid will pass through a composite liner under the best possible conditions and under less than ideal (but still optimistic) conditions. They conclude that the "best demonstrated available technology" (BDAT) for composite landfill liners will allow leakage rates somewhere between 0.25 and 11 litres per hectare per day. Thus they conclude that an average 25 hectare landfill site will have a leak rate somewhere between 6.25 and 275 litres per day, or between 2300 and 100,000 litres per year. And this is the "best demonstrated available technology" - the very best we can have when everything we do goes right.

Conclusion

This site needs a thorough, and public, investigation to determine what effects it is having on the environment and the health of the local population now. There should also be a detailed investigation, preferably involving the National Rivers Authority (as 'guardians' of groundwater) to consider the effects of waste dumping in an area with mining history.

From my analysis of the information available I have concluded two things...

1. That there is not enough information available! this is mainly because of the poor record keeping, and failure to carry out legal obligations to collect and hold monitoring data. These problems need to be corrected as soon as possible;

2. It makes no sense to me that such polluting operations as minerals extraction, crushing coating and hazardous waste disposal should be carried out in the heart of a densely populated area. My 'worst scenario' concern would be a serious fire in the landfill site, but even the routine discharges - in particular dust from quarrying/crushing - may aggravate the health of local people.

There is an urgent need for a comprehensive review of the future of this site.

Paul Mobbs.
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