

Quarrying on the Greenham Common Development

Topic	Quarrying, Contaminated Land
Level and Subject/s	KS3/4 Geography
Duration	4 Hours (2 x 2 hr units)
Background	When a decision was made to convert the Greenham Common Airbase back to heathland, it was agreed that the runways should be removed (see Module 4) and the surface of the site reshaped, 'reprofiled', to a more appropriate landform. Parts of the area were contaminated and needed to be treated - 'remediated', before the public could enter and wildlife could be promoted.
Aim	<ol style="list-style-type: none"> 1. To develop an understanding of the issues relating to quarrying. 2. To critically evaluate the options for dealing with contaminated land.
Enterprise outcomes	<p>Students will develop the following enterprise capabilities:</p> <ul style="list-style-type: none"> ✦ Gathering and analysing information ✦ Managing resources ✦ Managing Health and Safety issues
Project outline	This activity aims to engage the students in evaluating the options for dealing with contaminated land and the effects of quarrying on the environment.
Tasks	<p>Teacher introduces the activity and explains the aims.</p> <p>Teacher gives introduction to Greenham Common's history and geography as an airbase.</p> <p>Teacher Note: The following two sections may be completed independently.</p> <p>Section 1</p> <p>Let nature do our work - dealing with pollution.</p> <p>Teacher organises students to work on the first section.</p> <ol style="list-style-type: none"> a. If the 21 fuel tanks held 8 million gallons in total, what would the ground plan be of a cubic tank to contain all the fuel? (Assume 4.546 litres to 1 gallon, $1000 \text{ cm}^3 = 1 \text{ litre}$). b. The smell of aircraft fuels can produce headaches, how can the workers handling this material reduce the risks of headaches to themselves? c. Discuss the different options for treating the contaminated gravel, including leaving it in the ground. d. If a licensed waste site is 30 kms away, it costs £1.40/tonne/km to move the gravel, the tipping charge is £35/tonne and the Government charge £25/tonne tax, how much will it cost to treat $30,000 \text{ m}^3$ in this way? (Assume $1 \text{ m}^3 = 1.8 \text{ tonnes}$). e. If the average cost of bioremediation/aeration was £3/tonne, what is the cost of treating $30,000 \text{ m}^3$ in this way? f. Discuss whether the hydrocarbons could have been collected and used in some way - say as fuel? g. Apart from cost, can you think of any other advantages of adopting the procedures which they did at Greenham Common compared with other methods? h. Study the cross section of the geology for the area and discuss which of these beds do you think would pose the greatest problem if contaminated with hydrocarbons?

Quarrying on the Greenham Common Development - continued

Section 2

An environmental balancing act.

Teacher organises students to work on the second section.

Whole Class.

a. If it is estimated that there is 707,539 m³ of sand and gravel in the ground, after processing compare this amount with the amount of contaminated gravel (30,000 m³). What was the percentage of usable material in the whole? How many usable tonnes of gravel could be produced from the material in the ground?

(Assume bulk up at 5%, 12% loss during processing and 1m³ = 1.8 tonnes)

b. It takes 50 tonnes of sand and gravel to build a house and its associated roads. How many houses could be built with the quantity in part a? Compare your answer with the 19,500 homes built in the South East, outside London, in 2000.

Teacher then divides the class in to three groups.

Group A. Local Residents.

Go to Google Maps and find Bury's Bank Road. Plot a route from there to Greenham Road, Hambridge Road, Hambridge Lane and Lower Farm gravel works. Work out the approximate length in kilometres.

a. If a truck carries an average of 18 tonnes, how many journeys would this require?

b. If fuel costs are 40p/km, what would be the fuel costs?

Group B. The Company.

The Company have decided to construct a special new road from the extraction site to the gravel works at Lower Farm. However, there are three nature reserves (also classed as SSSIs) between the two places. Assume dumper fuel costs of 65p/km. The Haul Road is 2.5kms long.

a. If a dumper carries 30 tonnes on average, how many journeys will be required?

b. What will be the fuel costs?

c. How are you going to make out a case to take the haul road through the SSSI?

Group C. Naturalists Group.

Your group runs the three reserves. Some of your members also live along the proposed road route.

a. Can you come up with any alternatives?

b. If you think the other groups may have a very strong case that could win in the end, how can you ensure that the interests of nature and particularly biodiversity for the whole area win out in the end?