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Cilyrychen Quarry - IDO Stage II Registration

Analysis of Tarmac's Application and Technical Statements

on behalf of

Dinefwr Green Group/Friends of the Earth and the Campaign for the Protection of the Gwenlais Valley

June 1997

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Introduction and Summary

This report has been produced on behalf of Dinefwr Green Group/FoE and The Campaign for the Protection of the Gwenlais Valley in response to the application by Tarmac Quarry Products Ltd. for the determination of conditions in the registration of their Interim Development Order (IDO).

This reports contains an analysis and commentary on the application and technical documents supplied with it. The report considers four key areas:

- the effects of continued operation of the quarry, and the ancillary quarrying operations on the site;
- the effects of deepening of excavations on hydrogeology;
- the restoration/reuse of the site; and
- the applications of conditions to control all of the above.

The summary of the main points of the report are as follows...

The Effects Of Continued Operation Of The Quarry, And The Ancillary Quarrying Operations On The Site

Cilyrychen Quarry has a significant local environmental impact. These broad issues are considered in the report - *but they are not sufficiently quantified*.

Aggregate stockpiling - particularly of crushed rock, sand and fines - can be a significant source of dust. If not managed properly large mounds of this material represent a large 'surface area' to allow for the windblow of material. The removal of the previously tipped material will also give rise to dust - at perhaps more significant levels because of their location on the side of the valley.

There is no proper evaluation of the effects of existing dust emissions in the applications or technical reports. The level of dust in air could have been simply measured using sticky pads, or more accurately using high volume air samplers. From observation if trees in the area, there is evidence that there is substantial deposition of fine dust in the area a few hundred yards from the quarry edge. Coarser dust is more difficult to track down.

The regime of dust suppression and management suggested in the reports is not adequate. Also, it is also essential that the performance of dust mitigation/dust management procedures is checked by regular monitoring.

Noise is a problem. Noise from face excavation will be minimised because it takes place within an enclosed area. The major area of concern therefore is the noise from transport, crushing and other ancillary operations. It is difficult to prescribe precise measures for minimising noise on site because this requires specific detail about the types of plant used on site and the maintenance systems they are subject to. The best way to control noise at a site is therefore to suggest noise limits at affected properties near to the site, and require noise levels to be maintained within these limits. This leaves the methods used to comply to with these limits to the company rather than specifying any particular programme of works. We would suggest that a limit of 66dB$_{Aeq.L}$ be set for daytime operations, and 50dB for any night time activity that may take place.

Blasting is a problem, not so much from the problem of noise but from the transmission of vibration. There should be a requirement to sequence the shots to minimise the ground movement.

The operation of prescribed processes is not directly relevant to the standards/conditions imposed by planning permissions. However, because the application relies heavily on the standards applied in these process they should be considered as part of the application.

As part of the research for this report the public register for the prescribed processes on the site was searched. This produced very little information - the register has not been kept up to the standard required by the legislation governing the content of registers. The standard of the public register, if indicative of the standards to which Carmarthenshire County Council regulate the site as a whole, does not lead me to have confidence in the control of emissions. I believe that the County Council should launch an internal review to ensure that it is discharging its legal obligations adequately.

The conditions suggested in the application are inadequate. They should be revised to ensure that the '*best practicable means*' are met to abate emissions, and in general conditions should seek to minimise disruption (in the first instance) to residents nearby, and (generally) in the area as a whole.

The Effects Of Deepening Of Excavations On Hydrogeology

The main effect of quarrying in relation to the water environment is the lowering of the water table. This can have serious consequences in terms of water resources, or damage to water sensitive wildlife habitats. In this sense the most sensitive habitats are the local watercourses, and the Pant y Llyn turlough.

The surface geology of the area is fairly certain - due in part to the good exposures of rock from the long history of quarrying in the area, and because of the proximity of the South Wales coalfield which has been subject to extensive geological surveys. The deeper geological structure is largely conjectural. The geology/hydrogeology of the area is discussed in the application, and Tarmac have provided a hydrogeological report. But a more detailed explanation is found in the '*hydrogeology of Cilyrychen Quarry*' report that was produced for Wimpey Minerals Ltd. (of the same title). There are significant differences between these two reports.

There are various plausible theories to explain the mechanism which could provide a path for groundwater movement between the turlough and the quarry - none of these has been adequately investigated. In my view the likelihood of a link between the groundwater in the west and east sub-catchment is extremely high.

This is not the question. The question is the magnitude of the link, in terms of the permeability and hence the depletion of water resources in the west sub-catchment.

The watercourses and the turlough represent a very important nature conservation feature. The turlough provides a valuable breeding grounds for protected amphibian species such as newts and toads. Any action which caused damage to the habitat would therefore be contrary to the EC Habitats Directive, and the UK regulations made to implement this directive. Article 13 of the Habitats Directive also has a clause relating to the '*indirect*' effects on protected habitats and species.

Given the problems further deepening of the quarry void could cause, I am extremely concerned that Carmarthenshire County Council has allowed continued work to deepen the quarry to occur. Further deepening should be prevented until these issues are finally determined.

The Restoration/Reuse Of The Site

The restoration of this site is problematic. It will not be possible to infill with any material that contains leachable contaminants - which rules out the importation of any material other than mineral waste or clean, inert soils. Once dewatering ceases, it is unlikely that water levels will rise near the height of the Nant Gwenlais - perhaps only 60m AOD. For the levels to rise higher will require significant recharge from the strata to the west - a point of contention expressed in the previous section because of the potential effects on the turlough. To what level the water table will naturally return to after completion is therefore not certain.

The restoration proposal does not provide enough detail. At this stage it is fairly safe to say that landfill of anything other than inert soils (not construction waste) or mineral waste could be considered as a means of providing fill material. The reexcavation of the old tip area to provide new stone is actually working against the needs of satisfactory restoration.

Conclusion and recommendations

Having investigated the issues raised by this application I consider that...

- It is not consider it 'safe' to allow further deepening of the quarry void to be carried out because there is insufficient information to show without doubt that there will be an insignificant or acceptable effect upon the turlough.
- In terms of the operation of the site, greater attention needs to be given to the management of dust emissions
- The management of the prescribed processes on the sites needs to be investigated.
- It is essential to the responsible and enforceable management of noise that limits are set for the site as a whole, rather than just requiring 'review'.
- It is unacceptable for the permission to last until 2024 because of the blight on properties in the area. The permission should be limited to a much short period to ensure prompt working and restoration.
- The restoration of the site is problematic because of the volume of material that will need to be imported. There is no clear reliable scheme at present because all the proposals have flaws.

I recommend that:

- The full application should not be granted at this stage. Working of the site can continue, but there should be no further deepening of the quarry void.
- All the necessary studies should be carried out to prove or disprove the possibility of a permeable route for water to move from the turlough to the quarry.
- In the delay caused by the hydrogeological investigations, negotiations should take place with regard to introducing better dust management practices, particularly with regard to stockpiled materials.
- There should be a review of the regulation of prescribed processes on the site to ensure that the requirements of the relevant up-to-date process guidelines have been satisfactorily implemented.
- The options for restoration, and in particular the availability of fill material to achieve each option, need to be considered before any particular proposal is adopted. This issue could be resolved over the period the quarry is worked, but it would need to be completed before working ceases.

1. The Effects Of Continued Operation Of The Quarry, And The Ancillary Quarrying Operations On The Site

This section of the report relates to all issues involving working practices, dust management, blasting and noise.

Cilyrychen Quarry has a significant local environmental impact. Noise from the actual quarry face operation is lessened by the fact that it takes place within a three sided quarry. Blasting produces a short impulse noise, and vibration. But noise from the ancillary crushing, grading and stone coating. There are also significant dust emissions from the transport of stone from the quarry face, from blasting and ancillary operations. The manufacture of tarmac and the crushing of stone also produce significant atmospheric pollution, and for this reason they are controlled under Part I of the Environmental Protection Act as 'prescribed processes'.

These broad issues are considered in the report - *but they are not sufficiently quantified*.

Dust

Aggregate stockpiling - particularly of crushed rock, sand and fines - can be a significant source of dust. Where stockpiles are not surrounded by some sort of barrier or stockade, the top and sides can release dust into the air in even moderately fast winds. It is certainly not acceptable that stockpiles reach or exceed the height of surrounding buildings.

As well as operating regular mounds of material for use/sale, it would appear that stockpiles are maintained as a buffer or reserve to handle the demand or large quantities over short periods of time. If not managed properly the concentration of this material represents a larger 'surface area' to allow for the windblow of material.

The removal of the previously tipped material will also give rise to dust - at perhaps more significant levels because of their location on the side of the valley. The notion that this material is taken during '*winter months*' is not acceptable. There should be strict requirements to minimise dust emissions whenever the material is taken. Even in winter strong sunshine, and moderately windy conditions will desiccate the surface of any tipped material to the point where it is dry enough to break free and rise into suspension.

There is no proper evaluation of the effects of existing dust emissions in the applications or technical reports. The level of dust in air could have been simply measured using sticky pads, or more accurately using high volume air samplers. From observation if trees in the area, there is evidence that there is substantial deposition of fine dust in the area a few hundred yards from the quarry edge. Coarser dust is more difficult to track down.

As noted above, if the stockpiles were kept within concrete stockades, or even mobile/temporary stockades, this would reduce the surface area exposed to the wind. If water sprays were used for dust suppression, as suggested in the application, reducing the surface area exposed to the wind would reduce desiccation and prevent wind blow for longer using less water.

It has been suggested that water sprays are sufficient for dust suppression. On their own they are not. There are problems with water consumption, but this could be alleviated if the water from pumping were stored and used (there is no suggestion of this in the reports). There are also problems about the periods over which water sprays are used. Outside working hours, for example over the weekend, mounds of stockpiled materials can desiccate quickly in strong sunlight and be subject to wind whip. Where fine material (under 5mm) is stockpiled, spray suppression may not be enough. These mounds should be sheeted when they are not in use.

Such a detailed regime of dust suppression and management is not suggested in the reports, or is suggested within the proposed conditions. It is also essential that the performance of dust mitigation/dust management procedures is checked by regular monitoring.

Noise and vibration

Noise is a problem. Noise from face excavation will be minimised because it takes place within an enclosed area. The major area of concern therefore is the noise from transport, crushing and other ancillary operations.

It is difficult to prescribe precise measures for minimising noise on site because this requires specific detail about the types of plant used on site and the maintenance systems they are subject to. The best way to control noise at a site is therefore to suggest noise limits at affected properties near to the site, and require noise levels to be maintained within these limits. This leaves the methods used to comply to with these limits to the company rather than specifying any particular programme of works.

In rural areas daytime noise levels above 55dB$_{Aeq.T}$, and 40-45dB$_{Aeq.T}$ at night, can be considered significant. Ideally any 'noisy' development should be restricted to around 66dB$_{Aeq.T}$. Night time levels should be restricted to 50dB$_{Aeq.T}$. This type of noise level will provide an adequate level on control for general noise, but one further consideration which has to be made in quarrying operations are the effects of 'impulse' sources - single loud noise emissions from tipping of stone into hoppers, blasting or hammering. It is therefore advisable to also apply noise limits with much sorter time weightings. But again the same equivalent limits should apply.

The approach taken in Tarmac's application is unacceptable. For example in paragraph 3.2.1, it is stated that there will be '*no discernible increase*' in noise levels. It is generally accepted that 3dB$_A$ is the general level of 'discernible' change in sound level. But there are no figures provided in the report for the probable change in levels.

Blasting is a problem, not so much from the problem of noise but from the transmission of vibration. There should be a requirement to sequence the shots to minimise the ground movement (the 'peak particle velocity') - essentially each shot is detonated in a sequence rather than simultaneously in order to reduce the energy imparted to the ground at any given time. To validate the management of blasting, monitoring points should be maintained in order to record the vibrations caused by blasting, and this data should be regularly sent the minerals planning authority.

Prescribed processes

The operation of prescribed processes is not directly relevant to the standards/conditions imposed by planning permissions. However, because the application relies heavily on the standards applied in these process - for example parts of the authorisation are reproduced in appendix 3 - they should be considered as part of the application.

As part of the research for this report the public register for the prescribed processes on the site was searched. This produced very little information - the register has not been kept up to the standard required by the legislation governing the content of registers. Also, the monitoring/supervision of processes by the local authority has obviously not been at a level adequate to discharge their legal obligations under the Act.

It is clear that the upgrading plan, required under the relevant process guidance, has not been submitted. There is no evidence that the routine monitoring has ever been submitted in accordance with the authorisation. It is also not clear if the plant has fully been brought up to date with the necessary operations and emissions standard (due in part to the lack of an upgrading plan).

The standard of the public register, if indicative of the standards to which Carmarthenshire County Council regulate the site as a whole, does not lead me to have confidence in the regulation of emissions from the site as a whole. I believe that the County Council should launch an internal review to ensure that it is discharging its legal obligations adequately.

Conditions

The conditions suggested in the application are inadequate. They should be revised to ensure that the '*best practicable means*' are met to abate emissions, and in general conditions should seek to minimise disruption (in the first instance) to residents nearby, and (generally) in the area as a whole.

Condition 1 is unacceptable. On cessation of working restoration should be completed as soon a practicable. The selection of 2124 as the expiry date of the Interim Development Order. If it can be demonstrated that the site can be worked and completed by an earlier date then this should be the date of expiry in order to lessen the blight on surrounding properties. In my estimation, the planning permission does not need to run longer than the year 2008 or 2009.

Condition 3 is unacceptable. On cessation of minerals extraction, once any stockpiles of stone have been exhausted all work on the site should cease, other than that required for restoration. Given that the completion of mineral extraction will be known months in advance, any argument that minerals must still be shipped to the site for use on the crushing or coating plants is irrelevant. There will be plenty of time to make alternative arrangements for the material that is currently imported to the site, and to arrange the transfer/redeployment of staff and equipment.

Condition 5 is unacceptable as the working times for Sundays start much too early. 10am to 1pm is a more acceptable period for Sunday working.

Condition 7 is insufficient to reliably control dust emissions from the site since the specification of dust mitigation measures in the application is inadequate. Instead we would suggest the following set of conditions...

- All crushed material shall be kept in engineered compounds, and material shall not be piled more than 3 metres above the walls of the compounds. *Reason - to minimise dust emissions*;
- Water sprays must be provided on all permanent stockpiles, and these must be maintained in working order at all times. Systems should be put in place to ensure that sprays can be operated outside of normal working hours. Reason - to minimise dust emissions;
- On temporary stockpiles, mobile water sprays must be erected to damp down material, or stockpiles must be sheeted. *Reason - to minimise dust emissions*;
- All material under 5mm that is stockpiled, and that is not immediately in use, must be sheeted. *Reason - to minimise dust emissions*;
- A monitoring protocol will be agreed between the operator and the minerals planning authority for the monitoring of dust emissions to air, and may be subject to revision and review when the planning authority consider it necessary. *Reason - to ensure that dust management procedures are effective and that dust emissions are not excessive*.

2. The Effects Of Deepening Of Excavations On Hydrogeology

This section of the report relates to all issues relating to water, hydrogeology and water pollution.

Geological/hydrogeological considerations in the report

The main effect of quarrying in relation to the water environment is the lowering of the water table. This can have serious consequences in terms of water resources, or damage to water sensitive wildlife habitats. In this sense the most sensitive habitats are the local watercourses, and the Pant y Llyn turlough.

The surface geology of the area is fairly certain - due in part to the good exposures of rock from the long history of quarrying in the area, and because of the proximity of the South Wales coalfield which has been subject to extensive geological surveys. The deeper geological structure is largely conjectural. The main source of information for constructing any model of the geology in the area is therefore the British Geological Survey's 1:50,000 series maps. From such a model it is possible to make inferences about the hydrogeology of the are in terms of volumes and flow rates.

The geology/hydrogeology of the area is discussed in the application, and Tarmac have provided a hydrogeological report. But a more detailed explanation is found in the '*hydrogeology of Cilyrychen Quarry*' report that was produced for Wimpey Minerals Ltd. (of the same title). There are significant differences between these two reports.

The conclusion of Tarmac's report is that the additional void created by the deepening of the quarry is insignificant when compared to the void of the quarry as a whole. This is a fundamental mistake. To consider that water cannot drain into Cilyrychen Quarry from the area around the turlough because there is a strata of a certain composition between the two ignores the fact that in complex geology, water moves in three dimensions.

The conclusion of the Wimpey report does acknowledge the problems regarding prediction of the groundwater regime in the area...

- "*There are few details on natural groundwater levels and no data on flowlines in the east sub-catchment* [Cilyrychen Quarry area]..."
- "*Deepening of the Cilyrychen Quarry excavation has intercepted a groundwater body, although the size, extent and degree of hydraulic connectivity with other groundwater bodies east or west is a present unknown*"
- "*The most probable source of groundwater in the Cilyrychen Quarry is leakage from the west sub-catchment [the Glangwenlais Quarry/Pant y Llyn area] via the Bettws Fault. A trace of groundwater draining from Pant y Llyn turlough on its draining cycle would be needed to prove or disprove a connection*"
- "*Further deepening of the quarry could impact on the wider area depending on the degree of hydraulic conductivity across the catchment*"

- "*Additional work is required to investigate the hydrogeological regime and the potential impact of future quarry deepening*"

Observations on the hydrogeological information

The information in the report really needs a greater interpretation of the structure of the local geology. For example the junction between the limestone and the sandstones represents an unconformity. The nature of the junction, which is often characterised by pebbly conglomerate produced from surface erosion, will result in a markedly different hydrological continuity between the strata. If this junction is of relatively low permeability there will be a greater flow laterally between the two strata than across the unconformity between them.

The two diagrams on the following page show a simplified representation of the surface geology taken from the British Geological Survey map. From this a simplified representation of a section between Cilyrychen Quarry and the turlough has been constructed. If the unconformity between the sandstone strata and the limestone strata is highly permeable it would represent a significant conduit for water movement from the west sub-catchment to the east sub-catchment, as identified in the Wimpey report.

The Geological Survey map identifies the limestone/sandstone junction as comprising various 'pebble beds'. The grey grits/plateau beds can be found a few miles to the east and represent the deposition of pebbly material contemporaneous with the deposit of the limestones. The 'pebbly beds' which occur in this area however represent material which formed part of the original erosion surface of the sandstones. From the scaled stratigraphic column the thickness of this strata varies from 0 to 120 metres. From calculations made using the apparent width of the strata at the surface, and the angle of dip, the thickness of the strata in this area would be around 10m to 20m. This would represent a significant conduit for water movement.

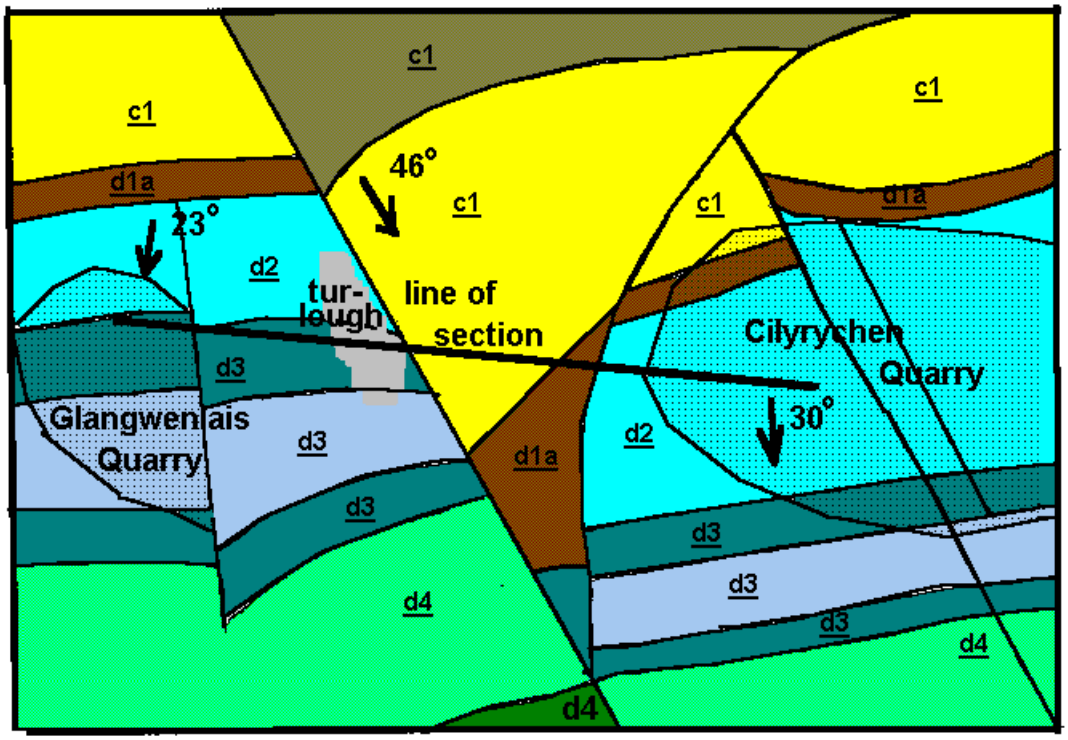
Another consideration is the relative hardness and solubility of the junction between the pebble beds and the Cil-yr-ychen Limestone. It is highly likely that solution voids - characteristic of the karst geology - have opened up along this junction. If there were a significant number of solution voids along joints in the limestone, or fully eroded caves (mentioned in the Wimpey Report) this would present an extremely permeable conduit for water movement. However it is likely that such a junction would only exist to the south of the section plotted below, and so water movement between the turlough and Cilyrychen Quarry water be regulated by water flow within the Bettws Fault, and between the Cil-yr-ychen and Llandyfan Limestone Beds.

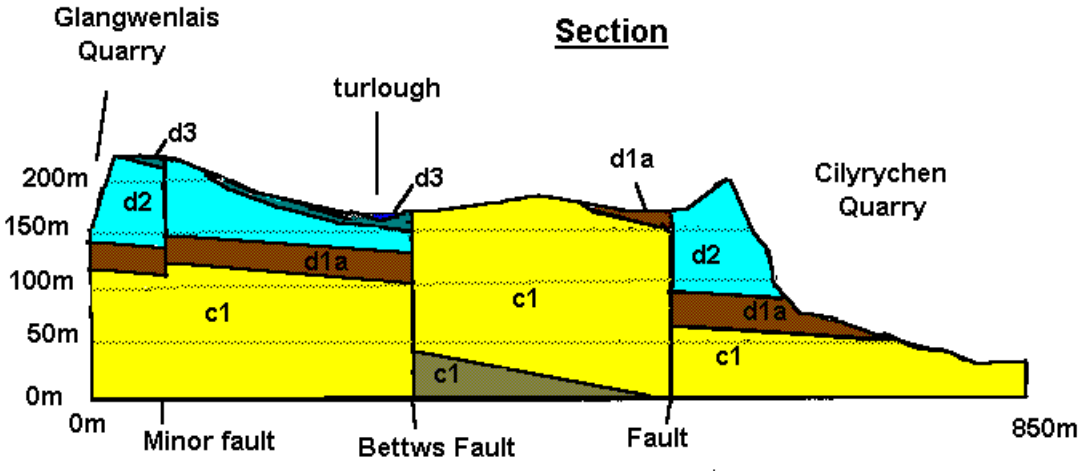
To conclude this section, it is clear that there is insufficient evidence to prove or disprove a link between the east and west sub-catchment. This would need to be established by direct observation using boreholes to monitor the relative changes in water levels across the upthrust block. If larger void were identified as a possible cause

Geological plans

The following plan and section are derived from the British Geological Survey plan no.230 (1:50,000 series, solid edition).

The plan shows a simplified representation of the solid geology between the Cilyrychen and Glangwenlais Quarries. The plan shows the geology at the surface, and so the boundaries are affected by topography. The section below - the line of which is given on the plan - runs between the two quarries, and directly beneath the turlough. The vertical scale has not been exaggerated on this plot. The limited availability of information also means that the section is only notional - there are no other sources of data to confirm the dip of the strata at depth, or the maintenance of strata thickness in the upthrust block between the eastern and western ends of the section.





of groundwater movements between the two sub-catchments then quality analysis could provide clearer information, or a tracer could be used with the agreement of the Environment Agency.

Nature conservation and the turlough

The watercourses and the turlough represent a very important nature conservation feature. The turlough provides a valuable breeding grounds for protected amphibian species such as newts and toads. Any action which caused damage to the habitat would therefore be contrary to the EC Habitats Directive, and the UK regulations made to implement this directive. Article 13 of the Habitats Directive also has a clause relating to the '*indirect*' effects on protected habitats and species. Put simply, if the planning authority were to permit the deepening of Cilyrychen Quarry and this causes the turlough to drain and recharge at a lower level, then Tarmac and the planning authority may be liable for the damage to the protected species. The basic question is about the foreseeability of the damage.

In my view the likelihood of a link between the groundwater in the west and east sub-catchment is extremely high. This is not the question. The question is the magnitude of the link, in terms of the permeability and hence the depletion of water resources in the west sub-catchment. There are plausible mechanisms for a transfer of water by a more or less direct route. Either by the Bettws Fault (favoured in the Wimpey Report) or by the pebble beds (my thesis). Given the effect that such an action would have, it is essential that the planning authority apply the '*precautionary principle*' and ensure that there is adequate scientific proof before proceeding further - it does not exist at the moment.

Earlier, when listing the conclusions of the Wimpey Report, I omitted one point - that is that any effects of dewatering on the turlough would cease when the dewatering ceased. This is not a clear state of affairs.

If the water levels in the turlough were depleted to such a degree that the lake failed to materialise for a number of years consecutively, there would be significant changes in the permeability characteristics of the solution fissures supplying the lake. Many of the cave systems and solution fissures in this area have been found to contain fine silt, washed in during the Ice Age. If there are a significant lack of water flow in the fissures supplying the turlough it is conceivable that the silt could slump and block the fissures. The possibility of the water breaking through again would be dependent upon the level of pressure the recharge of the system would create, and the amount of available slit on the system. But it must be made clear that once the system of discharge and recharge has been interrupted, there is no guarantee that it would return at the same level as before.

Finally, given the problems further deepening of the quarry void could cause, I am extremely concerned that Carmarthenshire County Council has allowed continued work to deepen the quarry to occur. Further deepening should be prevent until these issues are finally determined.

3. The Restoration/Reuse Of The Site

The restoration of this site is problematic. It will not be possible to infill with any material that contains leachable contaminants - which rules out the importation of any material other than mineral waste or clean, inert soils.

Once dewatering ceases, it is unlikely that water levels will rise near the height of the Nant Gwenlais - perhaps only 60m AOD. For the levels to rise higher will require significant recharge from the strata to the west - a point of contention expressed in the previous section because of the potential effects on the turlough. To what level the water table will naturally return to after completion is therefore not certain.

A deep lake is not suitable for recreation. Diving cannot safely be carried out because of the problems of temperature stratification, and the dangers that deep water presents to inexperienced divers. Wind powered watersports are also unlikely to be successful as the quarry walls on three sides will prevent sufficient wind from entering the site.

If the site is proposed for restoration to a wildlife area, the large body of deep water will be of little use. It would need to be filled to give shallow shelving edges - which again raises the problem of selecting suitable fill materials to prevent groundwater pollution.

Finally, restoration to the point where the land could be suitably redeveloped or used for agriculture would require large volumes of material. This could only be achieved if there were a full scale landfill proposal - which would be obviously unsatisfactory on such a porous geology as this.

The applicants must provide more information about the sources of fill material which would be used to backfill the parts of the quarry void. Information about this is conspicuous by its absence. Leaving the void as is an allowing it to fill with water will provide little benefit to nature, and it will present a serious risk to the public. That is not to say that such an option is impossible - but there are problems associated with it.

The restoration proposal does not provide enough detail. At this stage it is fairly safe to say that landfill of anything other than inert soils (not construction waste) or mineral waste could be considered as a means of providing fill material. The reexcavation of the old tip area to provide new stone is actually working against the needs of satisfactory restoration.

4. Conclusion and Recommendations

Having investigated the issues raised by this application I consider that...

- It is not consider it 'safe' to allow further deepening of the quarry void to be carried out because there is insufficient information to show without doubt that there will be an insignificant or acceptable effect upon the turlough. Before any further lowing of levels in Cilyrychen Quarry is permitted the necessary studies must be completed to show that a conduit for groundwater movement of significant permeability does not exist between the west sub-catchment containing the turlough and Cilyrychen Quarry.
- In terms of the operation of the site, greater attention needs to be given to the management of dust emissions - as described in this report. This could be achieved at minimal costs, but it would require a tightening of operational practices which the applicants may find unacceptable. An essential part of dust management is monitoring of dust levels in ambient air - such data should be provided as soon as possible to provide an 'application baseline' to measure improvement in the future.
- The management of the prescribed processes on the sites needs to be investigated. It is not clear from the research carried out for this report that the legal obligation of Carmarthenshire County Council as regulator, and Tarmac as operator, have been satisfactorily discharged. The Council should undertake an immediate - and open - review of how the Environmental Health Department has managed this site in the past, and where systems and monitoring can be improved.
- It is essential to the responsible and enforceable management of noise that limits are set for the site as a whole, rather than just requiring 'review'. This provides greater freedom to the operator to meet the required target, and it makes regulation by the authority much simpler.
- It is unacceptable for the permission to last until 2024 because of the blight on properties in the area. The permission should be limited to a much short period to ensure prompt working and restoration.
- The restoration of the site is problematic because of the volume of material that will need to be imported. There is no clear reliable scheme at present because all the proposals have flaws.

I recommend that:

- The full application should not be granted at this stage. Working of the site can continue, but there should be no further deepening of the quarry void.
- All the necessary studies should be carried out to prove or disprove the possibility of a permeable route for water to move from the turlough to the quarry.
- In the delay caused by the hydrogeological investigations, negotiations should take place with regard to introducing better dust management practices, particularly with regard to stockpiled materials.
- There should be a review of the regulation of prescribed processes on the site to ensure that the requirements of the relevant up-to-date process guidelines have been satisfactorily implemented.
- The options for restoration, and in particular the availability of fill material to achieve each option, need to be considered before any particular proposal is adopted. This issue could be resolved over the period the quarry is worked, but it would need to be completed before working ceases.

Paul Mobbs, 27th June, 1997