

David Trigwell
Divisional Director
Planning & Transport Development
Bath & Northeast Somerset Council
PO Box 5006
Bath BA1 1JG

Ref: KNB/8584
15th May 2012

Dear Mr Trigwell

Re: Restoration of Stowey Quarry by Landfilling
Application No. 10/05199/EFUL

1. Introduction

Further to the postponement of the planned meeting with representatives of BANES and the Environment Agency, the Stowey Sutton Action Group have requested that we write to summarise our findings from review of this application. These relate solely to those geological, hydrogeological and slope stability aspects relevant to the applicants 'Conceptual Site Model Report' by Watermill Environment Limited, 20th April 2011 and the Oaktree Environmental Ltd. 'Environmental Statement' (Version 1.5, 10th February 2012).

On 8th May 2012 we met with representatives of the Environment Agency (EA) to discuss this application and the Agency's holding objection detailed in their letter of 20th April 2012.

In particular, the Stowey Sutton Action Group has asked us to address specific queries that have arisen in our discussions with the group representatives, and latterly the Environment Agency.

2. Summary of Comments on Applicants Conceptual Site Model

In March we previously issued Intégrale Report No. 8585/01 'Comments on Watermill Environment Ltd Conceptual Site Model' and assume you are familiar with those findings. The pertinent aspects can be summarised as:

- The EA require that the initial conceptual model must be able to show the site complies with their approach to landfill location.
- It is clear by review that the current Conceptual Site Model is fundamentally flawed due to inaccuracies and omissions.
- It is also evident that the site location, geology and hydrogeology make it inherently unsuitable for any proposal which carries the potential risk of pollution within this groundwater catchment area.
- Specific areas of concern in the Watermill Conceptual Site Model include:
 - No site reconnaissance or walkover survey;
 - Omission of critical evidence for springs, seepages and groundwater issues;
 - Inaccurate cross section modeling;

- Reliance on historical boreholes, which omitted critical data such as elevations and groundwater ingress, or were sunk using inappropriate techniques;
- Sparse, historical data on water level monitoring, without seasonal or temporal ranges;
- Incorrect aquifer classification;
- No consideration of the presence of major and micro geological faulting, superficial disturbances, and ancient landslipping;
- Oversimplification of strata and hydraulic gradients.

Review of the limited borehole information does however indicate that the standing groundwater levels in the late 1990's were at, or within influencing depth of the quarry (ie landfill) base, with a minimal or absent unsaturated zone. There is apparently no adequate geological barrier to potential contaminant leaching present between the quarry sides and base and the groundwater table. Historical satellite imagery and OS mapping indicate several large areas of standing water within the quarry. Former quarry workers report the quarry base being flooded; in particular during wetter winter periods, the quarry base being flooded was the norm rather than the exception.

3. Existing and Proposed Wastes

Stowey Quarry includes existing landfilling in the central southeastern area alongside the road. The exact nature and components, and acceptance controls at the time of its deposition are unknown. There is no clarification within the application, nor consideration of the potential impact on groundwater quality and future behaviour of this waste, either with the existing or future groundwater, dewatering or drainage regimes.

The source sites for the asbestos wastes being proposed will include general demolition and remedial clearance works, generating a mixed material, potentially with other highly polluting components. The required sealed system of collection and transport of asbestos containing materials prevents confirmation of whether other wastes are being combined, intentionally or not. It is the industry standard that asbestos wastes are disposed to landfills proven suitable for either Non Hazardous or Hazardous Wastes (ie with a much greater degree of natural 'insensitivity' to pollution leakage and specific design protection measures than an Inert Waste site would have). This standard provides a degree of assurance that other wastes knowingly or inadvertently disposed alongside the asbestos wastes would be prevented from creating a pollution risk by the very nature of the site. That is clearly not the case at Stowey Quarry, where a limestone aquifer with hydraulic connection to sensitive surface waters is present.

The current application is unclear on the range of new waste types that would be accepted, but refers to leachate being a potential risk, includes a drawing showing a leachate drainage system, and suggests maximum leachate concentrations that might be adopted. In other words, the applicant fully assumes the wastes would produce leachate. This is clearly unacceptable in a location where groundwater is likely to be standing at or very close to the base and sides of the infilling.

We are told (by the EA amongst others) that there is a low requirement for inert waste disposal due to the economic situation and high levels of recycling. That suggests that a landfill with a leachate treatment system installed is likely to be forced to apply for permits to accept other types of waste, in order to be commercially viable or achieve the required intakes.

4. Slope Stability

In April we previously issued Integrale Report No. 8585/02, 'Preliminary Slope Stability Assessment' and assume you are familiar with those findings. The conclusions of that assessment can be summarised as:

The clayey west facing hillslopes in Barelegs Brake immediately adjacent to the proposed landfilling show evidence of instability. Past quarrying and uncontrolled dewatering may have worsened the situation e.g. ponding alongside the site boundary and surcharging at the slope crest. Presently, there is a Factor of Safety against instability of close to unity, and therefore the hillslopes are only just stable.

The proposed landfill screening bund will inevitably worsen the situation, by further surcharging the crest. Intégrale disagree with another consultant who has commented that "...there is no evidence that the proposal will adversely affect adjoining land". It is Intégrale's opinion that engineering the stability of the waste bund proposed at the edge of the application site cannot be isolated from the limitations on stability on the adjacent hillside in other ownership. It would be very difficult and extremely costly to implement stability mitigation measures within the applicants landholding alone and not to worsen the stability on the adjacent farmers land.

Intégrale's opinion is that extensive, costly slope stability mitigation measures are fundamental and critical. We also believe that it is completely inappropriate for these requirements to be dealt with by planning condition or environmental permitting. They constitute a material consideration at the planning application stage. Prior to determination, the applicant must complete intrusive stability investigation on his and adjoining land, and should prepare a detailed and costed design for the mitigation measures, in support of the planning application.

5. Conclusions on Current Application

The baseline data on which the application is founded is inadequate. To obtain sufficient information of high quality on this 9 hectare site would require a significant investment in investigation.

That would by necessity include a sufficient number of boreholes with continuous sampling to represent the insitu state of the strata and allow meaningful interpretation of the ground conditions. Appropriately designed groundwater monitoring installations are required. Long-term water monitoring is needed over a minimum of one typical or worst case full year cycle (and we suspect longer in the current period of overall low groundwater conditions), to anticipate the worst case groundwater regime in these complex and disturbed strata over the complete site area. Interpretation of the hydrogeology is likely to require not only insitu permeability testing, but perhaps pump tests to confirm the effects of the proposals on the adjacent landholding.

The application is fundamentally flawed because, by reliance on inadequate or misleading data, it fails to provide an accurate Conceptual Model.

The Environmental Statement developed using this Model, therefore fails to give appropriate weight to the sensitivity of the receptors to any contamination.

With the background information and limited investigation data available, irrespective of any future additional investigation and monitoring, it is our professional opinion that this quarry is inherently unsuitable for landfilling with mixed waste streams, sealed container disposal, or potentially leachable materials.

We are extremely concerned at the standard of data provided and the interpretations drawn from it, given the sensitivity of this site location, and the proposed types of waste.

The presence of unstable hillslopes, in particular beyond the applicants landholding, is clearly a material consideration, fundamental to safe restoration of this site.

6. Environment Agency & Bristol Water Objections

The Environment Agency letter of 20th April 2012 has clarified their position, now having also reviewed the Conceptual Site Model. Clearly they are in agreement with our findings, as confirmed at our recent meeting. They are currently unable to confirm the acceptability of the site in accordance with their Landfill Location Policy.

They have given the issues that need to be addressed as including:

- a) Confirmation of the proposed *site intake* materials, in order to clarify *long-term site management* requirements.

- b) Adequate data to confirm the *full range of groundwater level movement at the site*, and therefore whether the *proposals constitute a viable landfill void space constructed above the groundwater table*.
- c) *Assessment of groundwater flow from the site and the receiving spring outfalls which could be impacted by landfill development*.
- d) *Risk Assessment* to consider if long term site management will be required to alleviate the groundwater risk.
- e) *Detailed site slope stability assessment*. (Although the Agency consider this appropriate at any future permitting stage, Intégrale consider it a material planning consideration in view of the landholding restrictions and potential impact on neighbouring land. Clearly that stability assessment must include that of the adjoining land).
- f) Proof of suitability of existing strata for use as a future *low permeability landfill mineral liner*. The homogeneity, workability and available volume of these materials remain unproven. The 1998 MJ Carter report on this question has not been provided by the applicant. Based on experience of the local Cotham Member and Westbury Formation bedrock, we suspect that the only potential low permeability materials would lie below approximately 145-150mOD. If these were to prove suitable for reuse as a mineral liner, excavation would be required below the depth that quarrying has previously been permitted, and involve extensive dewatering during extraction. If site won material is not suitable, then any proposed import of a mineral liner creates implications for traffic movements, availability and economics.

The Environment Agency confirmed at our meeting last week that, in line with their landfill location policy, they would object to an application if a risk assessment were to indicate potential for leachate generation, landfilling below the groundwater level, and therefore the requirement for long-term management.

These comments are mirrored in the Bristol Water plc objection to the application, which details their concerns over the risk posed by a large scale waste disposal facility to the quality of springs and streams forming the headwaters to the Chew Valley Reservoir major public water supply, SSSI and Special Protection Area. They have highlighted the long-term risk of reliance on the integrity of a constructed liner and the extremely low concentrations of pollutants which could put the reservoir beyond economic use.

Bristol Water warn against a proposal with 'embedded potential for environmental harm' being granted planning permission. They cite the rapid flow pathways from the quarry site to the north and northwest, notably into Hollow Brook, via the limestone aquifer, which is therefore in hydraulic continuity with surface water courses. They note that no consideration has been given to changes in flow pathways due to infilling of the quarry. They raise concerns over co-deposition of less inert material or mobile contaminants.

7. Conclusions

Clearly it is critical that such a high-profile application, within the BANES Local Plan Groundwater Source Protection Area, is dealt with in a fully transparent and technically stringent manner.

Given the issues discussed above, we consider that the current application is inadequate. If the applicant needs to provide additional information on which all consultees can comment and to allow a determination, then not only does that information need to be detailed, valid and robust enough for scrutiny, but it needs to relate coherently to the current application, within a reasonable and cost-effective timeframe.

The risk assessment of ground, groundwater and stability aspects must prove beyond reasonable doubt that long-term stability and integrity is ensured, and that no significant risk is posed throughout the life cycle of the landfilling.

Integrale consider that, were an approach to the further intrusive investigation required by the Environment Agency, to be based on minimal data collection, it will be flawed. This site measures some 9 hectares, with complex geological conditions, superficial disturbances and faulting, an aquifer of rapid throughflow and varying localised groundwater conditions, historical use as lime kiln workings, and existing landfilling. We consider that a minimum of 12 boreholes is required, but that scope might need to increase as phased interpretation of the findings and anomalies progresses. The adoption of a lesser number would fail to ensure that the data derived can be considered statistically as typical, and not potentially biased towards any anomalies in this complex geological setting.

These boreholes would need to be designed with high quality groundwater monitoring piezometers, and a programme of datalogged groundwater monitoring, correlated to weather and rainfall patterns over a minimum of a complete and typical annual cycle, and potentially a longer period.

We hope the above highlights some of the aspects which require attention to detail for this technically challenging and controversial proposal.

We would be grateful if you would copy this additional letter submission to those statutory consultees concerned, together with any technical advisors the Council is referring to. We would welcome the opportunity of discussing any of these technical matters.

Yours sincerely

Dr Kay Boreland
Integrale Limited

Copy to: Chris Herbert, Planning Case Officer
Andrew Ryall, BANES
Andy Reading, EA Planning Liaison
Barbara Keenan, EA
Martin Berry, Bristol Water plc
Jenny Ellerton, SLR Consulting
Stowey Sutton Action Group