

Mr Chris Herbert  
Bath & North East Somerset Council  
Planning Services  
Lewis House Manvers Street  
Bath  
Avon  
BA1 1JG

**Our ref:** WX/2012/121005/02-L 01  
**Your ref:** 10/05199/EFUL  
**Date:** 28 June 2012

Dear Mr Herbert

**REVISED PLANS/INFORMATION - RESTORATION OF STOWEY QUARRY BY LANDFILLING OF STABLE NON REACTIVE HAZARDOUS WASTE (SNRHW) INCLUDING ASBESTOS AND INERT WASTES AND THAT THE APPLICATION IS ACCOMPANIED BY AN ENVIRONMENTAL STATEMENT AT STOWEY QUARRY, STOWEY ROAD, STOWEY, BRISTOL**

Thank you for consulting the Environment Agency on revised plans/information in relation to the above planning application. From reviewing the Council's website we understand this relates to the Oaktree Environmental Ltd 'response to consultation comments' document (versions 1.2, 9<sup>th</sup> May 2012, document ref: 2055-126-J. We have reviewed this document and the addendum report by Watermill Environment Ltd and have the following comments to make. Where possible our comments are in order of the issues raised.

***Response to Environment Agency Change of Position***

Oaktree Environmental Ltd (OEL) have questioned why the Environment Agency did not object to the original 2011 planning application, but have objected to this current 2012 application on the grounds of insufficient information. Our comments in response to the 2011 planning application for Stowey Quarry were prepared on the basis on the Environmental Statement document dated March 21<sup>st</sup> 2011. This does not refer to a Conceptual Model Report. Our comments for the 2011 application were prepared before the date of the Conceptual Model Report document (document dated the 20th April 2011. We were not consulted on and did not review the Conceptual Model Report as part of the 2011 application.

Our 2011 comments therefore relate to the details of the application submitted at that time. Whilst we acknowledge the 2011 application was titled 'Restoration of Stowey Quarry by landfilling of stable non-reactive hazardous waste and inert waste (SNRHW)', the documents that accompanied the application only highlighted the asbestos and inert wastes. The EIA describes how the proposal is within a former limestone quarry with a *considerable level of unsaturated ground beneath (EIA Para 9.3.2.1)*. The site is to be developed on the principle of containment and any

Environment Agency  
Rivers House East Quay, Bridgwater, Somerset, TA6 4YS.  
Customer services line: 03708 506 506  
[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)  
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leachate generated will be collected and managed according to the conditions of the Environmental Permit. In summary, *the site will include a leachate drainage and management system, which will ensure potential impacts on land and water from contamination are negligible in magnitude, neutral in significance (EIA Section 9.8.4).*

Based on the stated nature of the development proposed, stated ground conditions, low groundwater vulnerability assessment and conclusions of the EIA, the development described in the 2011 application did not contravene the Environment Agency's Landfill Location Policy. Specifically the site is not sub water table, on or in a Principal Aquifer, or within Source Protection Zones 1, 2 or 3. We therefore did not have any reasonable grounds to object to the application at the planning stage. Any subsequent landfill permit application would be required to substantiate these conditions and undertake a quantified assessment of risk to the water environment. Our comments in 2011 reflected this position, and included that we would need a Hydrogeological Risk Assessment (HRA) as part of the Landfill Permit to qualify these planning application statements. Whilst it would be an advantage for the site investigation data and HRA to be submitted at the same time as the planning application, this information is part of the permit application and not necessarily a requirement of the planning process.

As part of the 2012 application we reviewed the Conceptual Model report and further statements in the EIA regarding leachate production and management. The information within the 2012 application was inconsistent in its reference to the potential for leachate production and comprised information for the groundwater regime which indicates the proposed development is unlikely to achieve 'a considerable level of unsaturated ground beneath the site.' In addition the assessment of groundwater flow and potential location of surface water outfall was not reasonable and lacked site specific data and observation.

These three principal issues which govern the risk the site poses to the groundwater and surface water regime are described in our response dated 20th April 2012. Specifically they comprise the following:

### **1. Leachate generation potential**

EIA Section 2.6.4 states 'The site (as proposed) will be accepting waste which by definition will not produce any polluting leachate'. This contrasts with the Conceptual Model Report Section 3.2.3 which indicates poor quality leachate generation is anticipated and comprises the tentative leachate source concentrations for a SNRHW waste.

We now understand that the intention of the planning application is to accept SNRHW waste other than inert and asbestos and hence leachate will be generated which could pose a risk to the local surface and groundwater environment. It had been previously thought that the nature of the SNRHW was solely asbestos and hence there would be limited potential for leachate generation.

### **2. Unsaturated ground beneath the site**

The original 2011 application stated that there was a considerable level of unsaturated ground beneath the site.

The Conceptual Model report, April 2011, includes groundwater level data on which to estimate the thickness of unsaturated strata beneath the site. The Report states that the site is located on potentially porous and permeable geological strata and that

the groundwater is approximately 2 to 5m beneath the quarry base at between 152 to 146m AOD.

No design information is provided for the base of the waste. However, the base of the waste could be at approximately 152m AOD, assuming a 1m thick mineral landfill liner and geotextile barrier plus leachate drainage is constructed above the maximum quarry extraction depth of 150m AOD. This implies no unsaturated zone in parts of the site. Further this assessment discounts a borehole on the eastern corner of the site which indicates higher groundwater levels of between 153 and 156 mAOD, between 1 and 4m above the predicted base of the waste. In addition the data set is based on low groundwater levels in the Lias Limestone for September. Much higher groundwater levels would be expected in the Lias Limestones in high periods of rainfall during the winter or during intense rainfall at any other time of the year. Therefore, instead of supporting the proposal for a considerable level of unsaturated ground beneath the site, the data indicates that the landfill would be at or below the level of the groundwater in the Lias Limestone strata and hence partly of temporally sub water table.

The Conceptual Model data from the report supplied as part of the 2012 planning application does therefore not support the EIA statement. It indicates that the waste could be below the water table within the Lias Limestones, described as underlying as well as adjoining the site. Hence, there is a potential for the influx of Lias Limestone groundwater to the waste. Our response highlighted this issue and identified the need for data to clarify the site conditions.

It may have been the intention of the EIA to describe the groundwater conditions within the mudstone strata underlying the Lias Limestone, believing that the limestones had been removed during quarrying. However, confirmation in the Conceptual Model (Section 3.3.4) that *any downward migrating leachate will be transmitted horizontally within the saturated Lias Limestone strata towards a downgradient water receptor*, indicates that the site lies within the Lias Limestone strata and Secondary Aquifer.

### **3. Proximity to water interests**

The 2011 application undertook a review of water interests within the groundwater, but did not assess that there was any potential risk to Chew Valley reservoir.

The Conceptual Model Report identified the surface water and groundwater interests in hydraulic connection with the quarry site. This assessment was clearly in error and we understand was prepared as a desk study with no site knowledge or observation. We identified these omissions as part of our response. These observations form the basis of the HRA and are a reflection of the suitability of the site for landfill.

Following confirmation of the presence and elevation of groundwater within the limestone, the data indicate that there is a significant potential for groundwater migration within the fractured limestones from the landfill to spring outfalls in adjacent valleys and headwaters of streams draining to Chew Valley reservoir.

### ***RGN3 – Locational aspects of landfills in planning consultation responses and permitting decisions. December 2002***

Following receipt of the revised 2012 planning application it is clear that the 2011 EIA representation of a landfill underlain by significant unsaturated zone and with no potential risk to water interests, is not supported by the Conceptual Model Report.

The Conceptual Model Report confirmed that the site location is proposed within the Lias Limestone, that groundwater levels in the Limestone are potentially above the base of the waste and that there is a likely connection to spring headwaters draining to Chew Valley reservoir. On the basis of these site conditions, the purpose of the Agency objection is to seek to qualify the risk in relation to the landfill location policy. Specifically:

*a risk assessment must be conducted on the nature and quantity of the wastes, and the natural setting and properties of the location. Where this risk assessment demonstrates that active long-term site management is essential to prevent long-term groundwater pollution, the Agency will object to sites:*  
*-below the water table in any strata where the groundwater provides an important contribution to river flow or other sensitive surface waters.*

#### **Watermill Addendum to Conceptual Model Report. 4 May 2012-06-14**

We welcome the additional information provided in the Watermill report for recent borehole installation and observation of water interests. Our comments on the addendum are as follows:

##### ***Geological information***

The report indicates that the quarry has worked all the Lias Limestone (in the northern part of the site) and hence the base of the working quarry is underlain by dark grey mudstone strata.

The permitted working depth of the quarry is however 150m AOD and previous boreholes showed the limestones extend to 144m AOD at their lowest in the northern corner of the site. The implication is therefore that the northern part of the site at least is underlain by limestone. The former boreholes also show that there are limestone bands within the mudstone sequence beneath the major worked Limestone horizon. Therefore, unless the drilling techniques used in 2012 allowed, it may not have been possible to identify both major and minor limestone beds within the mudstone succession. No geological logs or data has been appended as described to assess drilling technique or observation. Further without adequate survey of borehole elevations it is not possible to adequately correlate the current and former borehole data. Additional assessment work is therefore required to clarify the geological strata underlying the quarry floor and the location and depth of limestone units.

It is acknowledged in the addendum report that the boreholes installed are in the base of the quarry only. Further boreholes are required outside the quarry void to characterise the geology and install boreholes for Lias Limestone groundwater monitoring. These will also be required to comply with subsequent Landfill permit groundwater monitoring.

##### ***Groundwater level observation***

The addendum report indicates that the recent boreholes installed are within dry strata, with only occasional minor seepage.

Again, without knowing the drilling technique used and final rest water levels in the completed boreholes, it is not reasonable to comment as to the incidence or level of groundwater present. It would not be uncommon for the drilling technique to prevent detailed observation of slow and moderate seepage of groundwater during drilling. It

should also be noted that the drilling was undertaken during a prolonged unseasonal period of dry weather. This culminated in there being a drought declared by the Environment Agency in this area. Long term monitoring of these borehole is required to characterise the site conditions. The period of monitoring would include both low and high recharge for a minimum of one year.

The addendum observations of no groundwater seepage into the site from the Limestone sidewalls should also be considered in the context of the dry conditions. The mapped and observed presence of a pond in the northeastern corner of the site is likely to be consistent with groundwater flow into the quarry from the limestones. The potential for inflow should be considered on the basis of the borehole installed outside the site in the Lias limestone as well as the water body present.

### ***Surface water observations***

The addendum report comprises the details of a walkover survey of field conditions at springs and streams in the vicinity of the quarry. This information is a marked improvement in that provided in the previous report, which was prepared, as stated, from a desk based survey.

Whilst the information represents the conditions on the day (please confirm if this was 17 March or 17 April), it should be noted that these conditions were preceded by a prolonged period of dry weather, as stated above. The nature of the Lias Limestone aquifer is likely to be for rapid recharge and discharge in relation to rainfall, hence many limestone springs will not be active following a period of low rainfall. In order to characterise the flow regime and potential pathways for groundwater discharge from the landfill the survey should be repeated a number of times during wet conditions to assess and confirm outfalls of limestone groundwater. These would then be the basis for the quantified risk assessment for the site.

### ***SNRHW***

The addendum report suggests that the proposals comprises a low leachate potential as a result of the high proportion of inert wastes to SNRHW (8:1 ratio) It would be an advantage to confirm these relative proportions within the EIA if this is to form the basis of the HRA.

The overall risk to surface waters including Chew Valley reservoir is considered to be low, although not stated as such, due to the low flow contribution from the site. The risk of contaminant migration via the groundwater to springs and the reservoir is also considered to be low due to the significant thickness of low permeability mudstone beneath the site.

These may be reasonable evaluations, but they are not supported by any quantitative assessment of risk incorporating the potential for groundwater inflow representing sub-water table conditions required. What is required as part of the submission is a quantified assessment which demonstrates the acceptability of the site in relation to the Agency's Landfill Location Policy, supported by site specific data demonstrating the ground and groundwater conditions present.

If you have any queries regarding the comments above please contact me on the number below.

Yours sincerely

**Mr Andy Reading**

**Planning Liaison Officer**

Direct dial: 01278 484534

e-mail: [andy.reading@environment-agency.gov.uk](mailto:andy.reading@environment-agency.gov.uk)

cc Oaktree Environmental Ltd

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