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Mr. Jonathan Derham
Environmental Protection Agency
PO Box 5000
Johnstown Castle Estate
Co. Wexford

30 January 2006
Job No: 03719116



**WASTE LICENCE APPLICATION 204-1**

Dear Mr. Derham,

We are writing on behalf of our client and the applicant Brownfield Restoration Ireland Ltd. (W.L.A 204-1) in relation to a report prepared by Mr. David Ball (Technical Advisor to an Bord Pleanala) in July 2005. This Report was submitted to the Agency on the 15th of November 2005. We note that Golder Associates Ireland is the trading name of Environment & Resource Management Ltd (ERML), consultants to Brownfield Restoration Ireland Ltd.



Our client has asked us to write to express their disappointment in the quality of the report prepared by Mr. Ball. We too have examined the report by Mr. Ball and would suggest he has been certainly selective in his review and commentary, and overtly negative in relation to the work carried out and the interpreted hydrogeological conditions at the site. Mr. Ball's report is inconsistent in respect to a number of items and there are also a number of errors. Mr. Ball also appears to draw broad conclusions about the hydrogeology of the study area without any offering any facts or basis for his conclusions.

Some specific issues that we would like to raise are as follows:

1. The commentary on pages 1 and 2 appears to suggest that all landfill sites are to be selected in a systematic way and should be in "greenfields". Mr. Ball states that "The proposed landfill development is unusual. The site has not been chosen at the end of a systematic investigation of alternatives." We note that amongst other things this application concerns itself with excavating and processing of the existing wastes that are presently not contained in lined cells and placing the residual wastes in lined engineered cells which will meet the requirements of the Landfill Directive. Thus a prime objective of the proposed development is the remediation of a "brownfield" site, which is in this case an existing landfill. A site selection exercise is this case is therefore not particularly relevant.

We can say that there are many examples of landfill sites operating and being further developed in Ireland that were not the result of a systematic investigation of alternatives. For example the Ballealy Landfill in North County Dublin, the Offaly County Council Landfill at Derryclure, the Wicklow County Council landfill at Rampere, the Cork County Council Landfill at Rossmore, and the Gortadroma Landfill in Co. Limerick. Mr. Ball seems to ignore the reality of the former and ongoing situation in Ireland in regard to landfill site selection and ongoing development/extension.

Mr. Ball also chooses to ignore the Wicklow County Council (WCC) document submitted to the EPA in July 2004, entitled "*The Remediation and Management of a Contaminated Site at Whitestown Sand and Gravel Quarry.*" This document was provided to An Bord Pleanala (ABP) by ERML in the first party appeal submission to the Board on the 20th April 2005. On page 4 of 13 of the WCC document it is stated that the WCC policy regarding the remediation of illegal landfills includes *"The construction of a properly engineered landfill on site to retain residual wastes"*. In the same document page 10 of 13, WCC also states that "*it envisages the construction of an engineered landfill – The construction of an engineered landfill on the site to retain residual wastes.*" Mr. Ball has also ignored the fact that WCC had selected the site as a landfill for wastes and indicated to the former landowner that "*Wicklow County Council will apply for a waste licence to operate this facility with the permission of Mr. O'Reilly.*" (See attached letter dated 8 February 1999).



2. In the last paragraph of page 2 and on page 3 of his report, Mr. Ball refers to various documents that have been submitted, but fails to provide a comprehensive list of the documents, with proper references, that he reviewed and relied upon to prepare his report. So it is not clear from Mr. Ball's report if he has read all of the relevant documents. Mr. Ball also appears to be critical of the fact that the technical information is contained in a number of documents instead of one comprehensive document. The March 2004 EIS submitted to ABP and EPA contained text that relied on and refers to more detailed technical information contained in Appendix 9 of the March 2004 EIS. We do not see this as a negative. It is not unusual to place detailed technical information on ground investigations, water sampling programme etc in an Appendix leaving the main text of the EIS to describe the existing environment, potential impacts, mitigation measures and likely significant effects without all of the detail. We also would say that some of Mr. Ball's comments are misleading on the bottom of page 3 where he suggests that the March 2004 Preliminary Risk Assessment was revised for the EPA. This is not true and this was clearly stated on page 2 of 51 of the document prepared by ERML entitled "*Preliminary Risk Assessment Report for a Non Hazardous Waste Engineered Landfill*" which was submitted to the Agency in May 2005 and subsequently to ABP in July 2005. This second risk assessment was supplied to the EPA to address its Article 16(1) request dated 22 March 2005 and ABP in relation to the 1st party Observations on 3rd Party Submissions. The second risk assessment referred to by

Ball was a separate stand-alone risk assessment pertaining to the proposed landfill development.

Mr. Ball seems to not appreciate that environmental impact assessment is a process and that all information collected during the process should be considered prior to a final determination being made. Two separate application processes were underway during 2003 through to 2005 and as such additional data was being collected on an ongoing basis. This is not unusual in Ireland so the fact that information is contained in different documents should not be considered an issue.

3. On the pages 4 to 8 of his report Mr. Ball provides a commentary on what he considers to be omissions in Sections 3.7.1 to 3.7.4 of the EIS without reference or acknowledgment of the data contained in Appendix 9 of March 2004 EIS. This commentary is very selective and does not draw in the information provided in Appendix 9. We believe this commentary is misleading.

Some of the points that he raises are:

- Mr. Ball states: "*The hydrogeological units were based on desk top reviews and the information used in the desk top review is unspecified.*"

We note that the sources of information used are specified in the report contained in Appendix 9 of the March 2004 EIS. The term "desk top review" used in Section 3.7.1 of the March EIS is unfortunate as published information by the GSI, a site reconnaissance, examination of third party rock core that had been left on site, trial pitting and a limited number of boreholes supervised by ourselves were used to determine that there were three hydrogeological units of interest at the site. The GSI identified the bedrock aquifer and indicated that the sands and gravels in the area were unclassified (See correspondence dated 15 December 2004 and 9 December 2003 from the G.S.I. – attached to this letter). Our study revealed that there was sand and gravel and other finer grained deposits underlying the floor of the pit and the previously deposited wastes and that the upper bedrock was fractured and weathered. The conceptual model developed for the site and described in Section 10 of Appendix 9 of the March EIS clearly indicates the basis for determination of the hydrogeological units.

- Mr. Ball states: "*It is unusual to lump together a shallow groundwater system in sands and gravels with the groundwater flow system in the upper fractured bedrock.*"

The sand and gravel and upper weathered bedrock were discussed as a single unit together in the conceptual model, as they are considered to be hydraulically connected and as such the groundwater in these formations would be the first receptor of any contaminants leaching from the existing wastes or leaking through a fully lined engineered landfill site. The permeability of the sand and gravel and fractured weathered bedrock were estimated to be in the same order of magnitude and for the purpose of computation of approximate groundwater flow travel times an average porosity of 0.2 for the sand and gravel deposits and fractured rock was

assumed. Literature value suggest that fractured rock can have a porosity of 0 to 20% and sand and gravels can have a porosity in the range of 20 to 40%. A value of 20% for computation purposes does not appear to be unreasonable in this case.

- Mr. Ball states: "*There also is no description of the aquifer characteristics of the main Butter Mountain Formation or the Donard Andesite Member.*"

The GSI has classified these formations and given that there is sand and gravel in hydraulic continuity with the upper fractured weathered rock and these units are hydraulically connected to the River Carrigower, there did not appear to be a need for a detailed characterisation of these bedrock units. In any case as Mr. Ball states "*The proposed development is not sitting on or upgradient of some major groundwater resource that is or could be exploited and a major source of high quality water.*" So given this we question why Mr. Ball is concerned with the detailed characterisation of the bedrock units. The relevant horizon in the bedrock units was examined in the context of its hydraulic connectivity, permeability and likelihood as a receptor of contaminants from the existing wastes or leakage from the proposed lined landfill.

- Mr. Ball states: "*The use of the GSI's classification is relevant only in so far as it relates to protection of groundwater resources. It is evident in general terms that the groundwater resources in an ancient slate or andesite rock are generally limited, but groundwater resources are not the prime issue in relation to the development.*" It is our understanding that the GSI's classification system is irrespective of protection. The system relates to the physical/hydrogeological characteristics of the geological unit such as transmissivity values, productivity, borehole yields, lithology, structure etc. Mr. Ball seems to be confusing the GSI-EPA Response matrix with the GSI Aquifer Classification System. Furthermore groundwater can be a resource for purposes other than for domestic or industrial use. It can be a resource in the sense that it provides base flow to water courses or feed wetlands. Mr. Ball acknowledges that this is the case on the top of page 6 of his report. With these comments, Mr. Ball does not show that he has a full understanding of the aquifer classification system in Ireland.



- Mr. Ball states: "*There is also no account given for why the applicant think it is just the upper bedrock is fractured. Usually if a rock is fractured it is fractured throughout.*"

Mr. Ball provides no information to support this sweeping statement. The drilling programme supervised by ERML suggested that sound rock lies below the upper fractured weathered bedrock below a depth of 2 to 7 metres below the bedrock surface or rock head.

- Mr. Ball states: "*The applicant has taken the combination of the GSI aquifer classification (groundwater water resource classification) and the vulnerability rating and has applied them to the GSI-EPA matrix for Groundwater Protection Responses for Landfills but for the bedrock aquifer alone. The applicant has discounted the sand and gravel aquifer. The applicant has accepted the extreme*

*vulnerability rating and used the Ll aquifer classification for the bedrock which produces R22 Resource Protection response.*" Mr. Ball goes on to say that "*The use of the GSI- EPA response matrix is not logical for three reasons:*"

Firstly, we would say that the use of the response matrix is a requirement of the EPA for landfill proposals and thus should be applied. Secondly, the sand and gravel which underlies parts of the pit would not be defined as an aquifer in this context given its limited extent, discontinuous nature, limited saturated thickness beneath the proposed base of the landfill and position next to a flood plain and the River Carrigower. Mr. Ball agrees that this is the case by his earlier comment "*The proposed development is not sitting on or upgradient of some major groundwater resource that is or could be exploited and a major source of high quality water.*" Furthermore the applicant has indicated in the First Party Appeal document dated April 2005 and the Second Risk Assessment document dated May 2005 that at least 3 metres of soil will be left above the bedrock surface and the formation level of the landfill will be at least 1 metre above the high water table. We say that the vulnerability of the bedrock aquifer which is continuous across the base of the site and which is deemed to have a classification of Ll by the GSI will be reduced to High. Thus the response matrix designation of R2[1] is appropriate. What Mr. Ball has demonstrated here is a lack of understanding of the classification of aquifers if he believes that the sand and gravel under this site would be given an Lg classification.



- Mr. Ball states: "*There are no monitoring data for the fluctuation of groundwater level during the course of a year.*"

Mr. Ball is making this comment in isolation of the content of all other relevant documents submitted in respect to this application. On page 14 of 51 of the First Party Appeal document dated April 2005 there is Table 3.7.1 Rev. B displaying a series of water level measurements that show water levels over the period December 2003 to April 2005. Groundwater maps could be prepared using any one of the sets of data. We did this and found that the groundwater flow direction and gradients were generally the same. The flow beneath the site is to the southeast toward the River. The highest groundwater levels would be expected to be in the spring and this would be confirmed before final design of the landfill cells as stated on page 15 of 51 of the First Party Appeal document (April 2005). As such we do not understand what point Mr. Ball is trying to make.

- Mr. Ball makes a number of comments in respect to Sections 3.7.3, 3.7.4 and 3.7.5 of the March 2004 EIS.

We agree the text appears some what confusing but the intention was to show that a number of systems must be put in place to ensure that a landfill development does not impact on the groundwater and surface water environment resources under and/or adjacent to the development. The environmental impact assessment process included looking at an arbitrary worse case landfill development on this site i.e. one without any containment systems, then take into the account the containment systems which are considered to be mitigation measures and then assess the impact of the landfill development with the containment measures. The environmental

assessment of the proposed development in respect to groundwater and surface water impacts and risk was dealt with later and in more detail in the Second Risk Assessment report submitted to EPA in May 2005 and made available to An Bord Pleanala and Mr. Ball in July 2005. Mr. Ball should have concentrated his review on this subsequent document to the original appeal documentation.

- On the bottom of page 8 and the top of page 9 Mr. Ball makes a number of statements in regard to his understanding of geology, and hydrogeology of the Carrigower catchment and then makes a comment that his general understandings were not discussed in the EIS. Mr. Ball's descriptions of the catchment are not substantiated with any facts and not particularly relevant in this context of the proposed development. Mr. Ball also ignores the fact that some of the information that he says has not been dealt with was discussed in the April 2005 First Party Appeal documents ( e.g. information on flood events). This information was provided to the EPA in the May 2005 Article 16(1) response.

- In the middle of page 9 fourth paragraph down Mr. Ball states there is no reference to groundwater contributing to the Carrigower River and the Carrigower River being affected by contaminated groundwater from the site. We would say that Mr. Ball did not consider the content of Appendix 9 of the March 2004 EIS very carefully or has just chosen to ignore it and not incorporate it in his discussion. This is another example of how Mr. Ball's report is written in a way to critique elements of the application documents in isolation and not take all of the application documents as one. It would be clear to any hydrogeologist or groundwater engineer that the groundwater contours shown on Figures 3.7.4 and 3.7.6 and the cross sections on Figure 3.7.5 show connectivity of the groundwater flow system beneath the site to the River. Furthermore page 29 of 39 in Appendix 9 of the March 2004 EIS section 10.1.1 second paragraph last line states "*This active zone of groundwater is considered to be hydraulically connected to the river.*"



4. On page 10 of Mr. Ball's report there is a comparison of the two Risk Assessment reports prepared by ERML. Mr. Ball states that "*It might be reasonable to assume that the later version would contain all of the information presented in the earlier version but this is not so.*"
Mr. Ball has obviously missed the fundamental point that the two reports dealt with two different risk assessment scenarios. The first risk assessment scenario, published in Appendix 9 of the March 2004 EIS dealt with the risks associated with the existing situation, (i.e. the presence of unauthorised wastes at the site), if there was no development on the site and if the existing wastes were left in their current state.

The second risk assessment scenario dealt with the proposed engineered landfill and wastes that would be deposited in the facility. Thus there may be similarities and common information in the two documents, however two different risk assessment scenarios are nonetheless addressed, not 'versions' of the same scenario.

5. On page 12 third paragraph from the top of the page of this report Mr. Ball makes a comment that he is frustrated that the Board has not been provided with more accurate information on the boreholes in order to make a more informed interpretation of the data obtained from each borehole. The applicant was equally frustrated as Wicklow County Council refused to hand over the same information to him or his consultants.

6. On page 12 Mr. Ball also seems to criticise the order in which the water sampling and drilling programme is reinserted in section 7 of Appendix 9 of the March 2 and 4 EIS This seems petty. The reason the information is presented as it is in Appendix 9, Section 7 is to follow the order of the investigative works. The initial work on the site in December 2003 was to sample the existing wells that were installed by others as this was expedient. Additional boreholes were commissioned by the applicant and these allowed installation of monitoring wells and sampling of groundwater in early 2004.

7. On page 14 Mr. Ball comments on the fact that the northern outcrop that he saw in July 2005 was not indicated on the cross sections. This is because that this outcrop was not visible when the cross sections were drawn. Sand and gravel extraction has been ongoing on the site and this outcrop was exposed sometime after ERML field work for the planning and waste licence applications were completed. This outcrop was not exposed at the time that the cross-sections were originally drawn in March 2004.



8. The statement by Mr. Ball on page 18 -"*Therefore I do not feel certain how much credence should be placed in the results of this modelling*" suggests that Mr. Ball did not consider or evaluate the second Risk Assessment for the proposed development carried out on the site. We consider this to be a fundamental flaw in Mr. Ball's assessment of the application and report to the Board. Firstly, Risk Assessments while obviously very technical in nature and requiring an understanding of statistics as well as the parameters of geology and hydrogeology, are currently considered Best Practice both by the EPA here and internationally. Brownfield used the LandSim Risk Assessment Computer Model, which was developed under contract to the Environment Agency in the UK. Golder Associates (UK), who were responsible for developing the LandSim Risk Assessment model for the UK Environment Agency carried out the modelling exercise at the site. Results from the Risk Assessment were positive and demonstrated that the proposed facility (Second Risk Assessment Scenario) could be developed at the Whitestown site without endangering the environment or causing a risk of environmental pollution.

The hydrogeologist employed by An Bord Pleanala did not even consider or evaluate this subsequent Risk Assessment scenario for the proposed engineered landfill; in fact he dismissed it on the grounds that he considered it "very unlikely" that infrastructure control would be maintained at the facility. In coming to this conclusion, Mr. Ball demonstrated a serious lack of knowledge of Irish waste management legislation. Section 48 (1) of the Waste Management Act 1996 states,

"A waste licence may be surrendered by its holder, but only if the Agency accepts it surrender", and Section 48 (7) of the WMA states, "If the Agency is satisfied that the condition of the relevant facility is not causing or likely to cause environmental pollution, it shall accept the surrender of the waste licence, but otherwise shall refuse to accept the surrender of the licence". This legislation ensures that the necessary infrastructure to ensure that no environmental pollution occurs is maintained at a waste facility for as long as is necessary. Without this requirement under the legislation, it would not be possible for the Environmental Protection Agency to grant a waste licence for any landfill as it is well known that it takes at least decades for wastes in landfills to stabilise.

9. Mr. Ball's Assessment and Conclusions are presented on pages 19 and 20. We categorically do not accept the remark he makes in paragraph 2 of page 19. Mr. Ball seems intent on separating the work described in Appendix 9 of the EIS and the main text of the EIS. In this paragraph Mr. Ball suggests that there were some fundamental changes in the applicant's understanding of the groundwater flow conditions in the March 2004 EIS to a later date. This is not true. Further data on water levels and quality were collected but our conceptual model has not changed. It was clear early on, as Mr. Ball points out that there is a pathway for contaminant moment from the site to the Carrigower River. Again, this conceptual model has not changed .

We further note that the proposed engineering measures are to be in accordance with the Landfill Directive. However, Mr. Ball seems to suggest that these engineering measures are not acceptable.



We do not accept many of the comments that Mr. Ball makes in the sixth paragraph on page 19. We agree that some of the information is not included, but all of the information that Mr. Ball suggests should be available is not considered to be necessary at this stage. Detailed investigation are proposed ( See page 9 of 16 of the Article 16(1) response dated May 2005) to refine the design of the cells and provide the information that Mr. Ball is seeking now. All of the information that Mr. Ball seeks is not required to determine the likely significant effects of the proposed development. The hydrogeological conceptual model and the overall catchments models developed and described in the two Risk Assessments Reports completed by the applicant to date provide a consistent description of the likely ground water flow conditions beneath the site and towards the Carrigower River.

Finally, Mr. Ball recommends refusal because the site does not posses natural advantages. However, Mr. Ball chooses to ignore that the Landfill Directive does not require sites to have natural advantages. We note that the site remains a potential threat to the adjoining sensitive surface water because of the decision of the Board not grant planning permission. Mr. Ball also ignores the fact that the proposed development includes more than an engineered landfill and that the facility will be used to treat the existing wastes on the site and any imported wastes. The residual

waste would then be used to restore the site and reduce the potential risk of the site as compared to its current condition.

On another issue, our client has asked us to express their satisfaction that Mr. Louis Moriarty, a director of Swalcliffe Ltd., t/a Dublin Waste and Mr. John O'Reilly the former owner of the quarry, both pleaded guilty to disposing of waste in a manner likely to cause environmental pollution in the Circuit Court on December 21 2005, and that Mr. Neville Watson, a hauler for Dublin Waste pleaded guilty at the same sitting to disposing of waste in an unauthorised manner. Our client believes that these events will greatly assist in ensuring compliance with the Polluter Pays Principle in the future clean up of the site.

If you have any queries with any of the above, please do not hesitate to contact the undersigned.

Yours sincerely,
**GOLDER ASSOCIATES IRELAND**

Geoff Parker M.E.Sc., M.I.E.I.
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Ms. Emma Sweeney,
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**15 December 2004**

**Re: Site at Whitestown, Co. Wicklow**

Dear Ms. Sweeney,

Thank you for your enquiry on the 15/12/04 requesting an aquifer classification and vulnerability rating for the bedrock and for the overlying gravel, the areal extent of the overlying gravels, information on two springs near the site and the landfill response for the site.

Please note that when the National Aquifer Classification Map has been completed as part of the requirements of the Water Framework Directive, the classification given may be subject to revision. It is based on our current understanding of the hydrogeology of the area and on available hydrogeological data. The provisional bedrock aquifer classification is given below.

| Site | Rock unit | Vulnerability (Bedrock) | Provisional Aquifer classification | Subsoil (Teagasc Classification) | Groundwater Protection Zone |
|---|---|---|---|---|---|
| Site at Whitestown, Co. Wicklow | To the northwest of the site: Ordovician Metasediments<br>To the southeast of the site: Ordovician Volcanics | High | To the north of the site: Ll<br>To the south of the site: Ll | GGr: Granite sands and Gravels<br>Alluvium for 100m approximately on either side of the Carrigower River | Ll/H |



Please see attached pages for descriptions of the aquifer classification.

The gravel overburden has not been classified as an aquifer by the Groundwater section, and has not been assigned a vulnerability rating. I enclose an extract from the 'Groundwater Protection Schemes' (1999) which outlines the criteria for aquifer classification. The areal extent of the gravel overburden is shown on the accompanying Teagasc subsoil map.

There is no record of the springs (indicated on the map you forwarded) on the Groundwater sections database.

The landfill responses for the site can be worked out using the above information and the matrix table accompanying the 'Groundwater Protection Schemes' (1999), which is attached. The landfill responses map is available on the internet at www.gsi.ie.

If you have any further questions please do not hesitate to call Jane Coll at (01) 678 2782.

Yours sincerely,

Geoff Wright
Groundwater Section

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Emma Sweeney
Environment & Resource Management Ltd.,
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9 December 2003

**Re: Site at Whitestown, Co. Wicklow**

Dear Ms. Sweeney,

Thank you for your enquiry on the 05/12/03 requesting information on bedrock type, subsoil type, a vulnerability rating and an aquifer classification for your site in county Wicklow.

Please note that when the National Aquifer Classification Map has been completed as part of the requirements of the Water Framework Directive, the classification given may be subject to revision. It is based on our current understanding of the hydrogeology of the area and on available hydrogeological data. The vulnerability rating and provisional aquifer classification are given below.



| Site | Rock unit | Subsoil Type | Vulnerability | Provisional Aquifer classification | Groundwater Protection Zone |
|---|---|---|---|---|---|
| Site at Whitestown, Co. Wicklow (As marked on the map) | BZ – Butter Mountain Formation Dark slate-schist, quartzite & coticule | Please see attached map for details | High | Ll | Ll/ H |

Please see attached pages for descriptions of the aquifer classification and additional hydrogeological information.

If you have any further questions please do not hesitate to call Jenny Rush at (01) 678 2782.

Yours sincerely,

Donal Daly
Groundwater Section