Submission	
Submitter:	Mr michael dwyer
Organisation Name:	Michael Dwyer
Submission Title:	W0311 Observations
Submission Reference No.:	S011331
Submission Received:	13 October 2023
Application	
Applicant:	Kilsaran Concrete Unlimited Company
Reg. No.:	W0311-01

See below for Submission details.

Attachments are displayed on the following page(s).

Environmental Protection Agency

PO Box 3000

Johnstown Castle Estate

Co Wexford

Y35 W821

13th October 2023

EPA Ref : W0311 -01

Applicant: Kilsaran Concrete Unlimited Company

Re: Development and Operation of an inert land facility to backfill existing quarry to original ground level.

Dear Sir/Madam

Please find attached my observations on the proposal to back fill the Ballinaclare Quarry with inert waste.

It is clear from my report and ABP refusal of planning application that there is a lack of qualitative studies and assessments (consequently design) in the applicant's submittal.

The Potter river passes through our lands and I am concerned with the impacts on the river and bio diversity particularly in the long term post completion of infill of quarry.

I have further concern that in the case of the inert waste dump proceeding a derogation may be applied for Kilsaran (as seems to be the case in similar inert waste dumps).

Kilsaran did inform local residents about planning application but not this EPA application. I only became aware of the EPA application this week I request that EPA take my report and ABP inspector's report into consideration as part of your assessment of Kilsaran's application for waste license.

Yours faithfully

Michael Dwyer

The Millhouse

Ballinameesda Lr

Kilbride

A67 RT20

PA27.309991 Ballinclare and Carrigmore townlands, Kilbride, Co. Wicklow

Oberservation of: Mr. Michael Dwyer

The Millhouse,

Ballinameesda,

Kilbride,

Wicklow,

Co. Wicklow

Completed by: Mr. Donal Marron

On behalf of: Mr. Michael Dwyer

Dated: 08th June, 2021

Marron Environmental
60 Seapoint,
Dunbur Road,
Wicklow,
Co. Wicklow

The development of an Inert Landfill and associated Recycling Activities at Ballinclare Quarry upstream of Mr. Dwyers property at Ballinameesda, Kilbride, Co. Wicklow

Principal Concerns:

1. Potential for increase in pollution of the Potters river flowing across his lands, impact/reduction in flora and fauna in the river, adverse effects on his riparian rights and benefits from the river.

2. Potential for increased flooding of the Potters river on his lands at Ballinameesda

3. Overall impact of the development on the local community

Overview of Development

Plan to landfill some 17 Ha of disused excavated rock quarry (diorite) ranging from c. 37mOD to 90mOD with inert waste. 6,165,000 tonnes total at a maximum rate of 800,000 t/year (market dependent – primarily sourced in Dublin, some from east Wicklow and Wexford) between c. 8 to 18 years.

Landfill base and sides will be lined with a low permeability clay liner 1 m thick (permeability of $<=1x10^{-7}$ m/s) of compacted clay in accordance with the landfill directive. Landfill surface to be capped with a clay layer up to 1m thick with 0.85m of subsoil overlain by 0.15m of topsoil, grassed and sloped downwards generally from north to south. Other elements of the proposed development include for a C&D recycling process, a soil washing process and stockpiling of unprocessed and processed materials associated with these elements.

During operation, all surface water drainage from the active landfill and open areas of the quarry is to be allowed drain across the quarry floor to the existing quarry sump (c. 22mOD) and pumped from there to the proposed leachate treatment system from where it will be discharged to the Ballinclare stream, a tributary of the Potters river. Prior to landfilling activities the quarry sump containing an estimated volume of 270,000 m^3 (c. 60 million gallons) to be pumped out through the existing lagoon infrastructure to the Ballinclare stream in accordance with the requirements of the Discharge Licence currently in place at the quarry site.

The relevant sections of the EIAR have been reviewed by the author including the Non Technical Summary and chapters on Introduction, Project Description, Geology, Water (Hydrology and Hydrogeology) and Biodiversity (including the Natura Impact Statement). Having assessed these sections of the EIAR we believe that there are serious flaws in the application that should not allow it to be granted planning permission as it is currently proposed or until detailed information, redesign and site specific predictions can be furnished to An Bord Pleanala.

1. Introduction

This application has been designated as a Strategic Infrastructure Development (SID) project by An Bord Pleanala due to the nature, scale and location of the proposed facility and that it is considered to be of strategic economic or social importance to the region or state.

2. Landfilling of Inert Waste and Waste Acceptance Procedures

The proposed methodology for accepting waste and ensuring it is compliant with 'Inert Waste' criteria is as follows. i) EIAR Section 2.147 "*In so far as practicable, the source of each large consignment of soil imported to site for landfilling purposes shall be identified in advance and subject to basic characterisation testing to confirm that it is inert according to the criteria set by Council Decision 2003/33/EC. Ideally, characterisation testing will be undertaken in advance by customers, clients or sub-contractors forwarding soil and stone backfill materials to the application site.* "

Section 2.154 of the EIAR "*A representative sample will be taken (in accordance with waste licence requirements) of inert soil and stone accepted at the inert landfill facility and subjected to compliance testing which is less extensive than characterisation testing and focuses on key contaminant indicators. These data shall be used to confirm that the accepted soils are inert (according to Council Decision 2003/33/EC) and comply with approved waste acceptance criteria. Compliance testing shall be undertaken by the Applicant.*" (Underlining added by author)

This states that only '*large'* consignments coming to the site will be subjected to basic characterisation testing. We ask, what constitutes a "*large Consignment*", what about smaller consignments or one off loads. This is too vague and all consignments should be subject to characterisation testing. Also, it states that it is up to the customers (developers, contractors etc.) to carry out the characterisation testing and provide the data to the landfill. What if the customers get it wrong, or make genuine errors in their testing and document procedures or what about unscrupulous operators who may provide false or misleading documents/results.

It is pointed out that there are presently only two EPA licensed operational inert landfills in the Eastern-Midlands Waste Region. We refer here to the IMS Inert landfill located in North Co. Dublin. A review of the waste licence issued by the EPA for this facility states the following: "*A representative load from every excavation/demolition/waste removal/dredging works is subjected to a comprehensive assessment which must satisfy Level 1 characterisation."* and

"*In addition to the assessment above, representative samples upon delivery of wastes must be taken for compliance testing purposes (Level 2). The tests shall focus on key variables and behaviour identified by the chemical analysis. A representative sample shall be taken from one in every 100 loads of waste accepted at the facility. This sample shall be subjected to Level 2 testing. Part of this sample shall be retained at the facility for three months and be available for inspection/analysis by the Agency.*" (underlining added)

These measures should have been the minimum proposed by the applicant in terms of initial waste acceptance procedures.

The EIAR further states that upon arrival at the weighbridge the waste load will be inspected by the weighbridge operator via a CCTV camera pointed directly at the back of the truck. All trucks carrying clay will be required to have a tarpaulin covering to minimise dust and debris emissions during transport. Therefore the tarpaulin will have to be removed and replaced again at the weighbridge and this takes some time. Once the tarpaulin is removed the CCTV can only see the surface of the waste load and not what lies beneath the surface and therefore is a very superficial examination of the waste load. After leaving the weighbridge the truck traverses to the active tipping face of the landfill and tips out its load where the EIAR states it will be inspected by *"site based personnel*". While this provides a good opportunity for a detailed visual inspection of the waste load it cannot be anyway conclusive of chemical or other non-visual contamination. We also suspect the job of inspecting the tipped wastes will be entrusted to the lone bulldozer driver proposed for the site. We cannot see, no matter how well trained, that the driver would have any time to inspect tipped waste. Even if he does spot untoward waste he has to stop operations, reload the waste onto the truck and direct it himself to the waste inspection/quarantine area, fill in associated documentation etc. while trucks are queuing up on the landfill or perhaps tipping their loads uninspected.

It is noted that in relation to the aforementioned inert landfill in North Co. Dublin, who have greater controls in place than those proposed here that they have reported a number of non-compliant loads entering and deposited on the landfill over the course of its operation to date. This only includes for those spotted and reported and does not include for any rogue consignments that slipped through the net. For example, their waste licence includes for their testing of 1 in 100 loads arriving on site. That leaves 99 loads that are untested by the landfill operator and therefore plenty of scope for rogue loads (inadvertently or otherwise) to enter the site.

It is also noted that the landfill operators can track (GPS system) each and every load entering the site and where it is deposited on the landfill in which case such waste can be retrieved should it be necessary to do so in the event of information coming to light that said load was contaminated. We suggest that the applicant include this tracking system in their operational procedures at Ballinclare.

On the point of "*site based personnel"* checking the tipped wastes, the EIAR proposes for staff numbers that the site will be operated by 4 No. staff to include a site manager and three other staff. This is an incredibly small number of staff to manage and run an operation of this scale with 800,000 tonnes of waste per year requiring to be processed. For example, with c. 1 truck entering and another 1 truck leaving the site every 4 minutes it is highly likely that two weighbridge operators will be kept going continuously. This does not include cover for their lunch breaks, annual leave, sick leave etc. With 1 truck tipping waste every four minutes we believe that there should be at least two or more bulldozer operators to spread the waste and this does not include for lunch breaks, annual leave, sick leave, breakdowns etc. There should be a site manager and an assistant manager. There will be need for staff to carry out daily/weekly patrols of the site to inspect surface water courses, dust emissions, noise and odour emissions, litter patrols, treatment plant, wetland area and wheelwash inspections etc. and fill in and file the associated reports. There will be need for staff to operate the C&D waste processing area, the stockpiling of associated unprocessed and processed wastes, the same for the soil washing plant, maintenance, servicing, general operatives etc. Staff to operate the water bowser to dampen down the access roads, haul routes, stockpiles etc. which covers an extensive area, admin. staff, receptionist, security personnel, first aid staff etc. etc. We believe that the proposal to operate a facility of this size and nature with the potential for significant impacts on all aspects of the environment with only 4 staff is reckless in the extreme and inherently

liable for the occurrence of all manner of errors, breakdowns, malfunctions, miscommunications, inefficiencies and ultimately a significant increase in the potential for a breakdown in environmental controls.

Given the regionally important scale and nature of the activity and that the waste acceptance procedures are largely based on self-regulation by the applicant and customers (in terms of characterisation and compliance testing of wastes prior to and during arrival at the site) and that this is fraught with potential for genuine errors to occur and for unscrupulous customers to exploit and also in light of the fact that only 4 staff are proposed to be in attendance at the site and therefore will be unable to carry out any meaningful checks on the incoming waste we propose the following solution. That the applicant enter into an agreement with Wicklow County Council or the EPA (should they be agreeable) to employ a member of their staff as an independent waste acceptance inspector to be located at the site on a full time basis and paid for by the applicant. The inspectors role would chiefly entail inspecting the tipped out waste loads and should also include for double checking waste acceptance documentation and soil results, carrying out inspections of large scale source sites (will need funding and transport) with some spot checking of smaller source sites and funding for compliance testing of a random and representative number of waste loads arriving at the site in addition to any requirements included in the waste licence should it be granted by the EPA.

There are many potential and significant environmental issues associated with the operation of an inert waste landfill, particularly one of this scale, but we believe that the single biggest action that can be taken to reduce all other potential environmental impacts is to ensure that inert waste and only inert waste is deposited at the facility.

The presence or otherwise of non-inert material in the landfill has significant implications for the quality of potential emissions to groundwater and surface water and therefore is of considerable concern to my client.

3. Leachate Quality

i) The EIAR makes vague and somewhat encouraging statements about the quality of leachate from the proposed 'Inert' landfill. Section 7.149 of EIAR "*Based on past experience with similar inert landfill facilities, it is likely that the inert waste landfill at Ballinclare will have little or no ammoniacal nitrogen, BOD and COD in the leachate, but could have potentially elevated concentrations of sulphate, reduced pH and detectable concentrations of metals. In addition, as inert C&D wastes can often contain road planings and other materials associated with road repairs and construction, some hydrocarbons could also be present*." (underlining added).

From the EIAR this appears to be the sum total of information on leachate quality that was used to design the leachate treatment system. It is necessary in the design of any effluent or leachate treatment system to know the volume and quality of the effluent to be treated. In terms of the quality, it must be known what Contaminants of the leachate are required to be treated and an accurate or at least likely (and using worst case scenario figures) concentration of each parameter. None of this essential data seems to have been gathered or included in the EIAR. For information purposes I enclose an extract from a report prepared by Golder Environmental Consultants for the EPA licensed Inert landfill located in North Co. Dublin based on 3 No. leachate monitoring boreholes (LC-1, LC-3 & LC-4) located in the inert waste cells that were sampled on between 8 and 17 occasions

each (plus a fourth leachate borehole (LC-2) sampled once only) from 2010 to 2017. This only reported on 5 No. leachate parameters (see Annex 1).

This shows ammoniacal nitrogen concentrations ranging from 0.93 mg/l to 64.53 mg/l at LC-1; <0.03 mg/l to 11.27 mg/l at LC-3 and from 0.09 mg/l to 1.34 mg/l at LC-4. The single result from LC-2 recorded a level of 2.53 mg/l. By contrast, levels recorded in Potters river ranged from 0.01 mg/l to 0.81 mg/l (EIAR table 7-4).

Total Organic Carbon (TOC - a measure of the organic carbon concentration in water) concentrations ranged from 6 mg/l to 97 mg/l at LC-1; 8 mg/l to 87 mg/l at LC-3 and 13 mg/l to 131 mg/l at LC-4. No levels for Potters river recorded in the EIAR.

Chloride levels were also very high ranging from 29.4 mg/l to 950 mg/l at LC-1; 109.3 mg/l to 646.5 mg/l at LC-3 and from 174.9 mg/l to 417.3 mg/l at LC-4. The single result from LC-2 recorded a level of 138.8 mg/l. By contrast, Potters river levels ranged from 17.6 mg/l to 19.9 mg/l.

Sulphate levels ranged from 496.9 mg/l to 2,484.8 mg/l at LC-1; from 619.1 mg/l to 1,754.7 mg/l at LC-3 and from 493.6 mg/l to 1,625.1 mg/l at LC4. The single result from LC-2 recorded a level of 944 mg/l. Potters river levels ranged from 18 mg/l to 51 mg/l.

A review of data at LC-1 prior to 2010 indicated even higher levels of sulphate and chloride. Most of the sulphate and chloride levels from the North Dublin landfill exceeded the WAC (2003/33/EC) Inert landfill threshold values (800 mg/l for chloride and 1,000 mg/l for sulphate) which is highly concerning.

My own review of the data from the landfill also indicated high levels of potassium, sodium, COD and DOC (dissolved organic carbon) e.g. LC-1 potassium ranging from 23.5 mg/l to 150 mg/l and sodium ranging from 34.2 mg/l to 2,720 mg/l.

I also attach an extract from the EPA Landfill Manual (Landfill Site Design) Appendix D1 (Annex 1). This shows constituents of inert leachates from 3 inert landfills in Germany and 6 in the UK. These show elevated or high levels of ammoniacal nitrogen (average 13 mg/l and 28 mg/l in Germany and the UK respectively), BOD (20 mg/l in Germany (not reported for the UK)) – the Potters river levels ranged from 1.1 mg/l to 4 mg/l, COD (130 and 236 mg/l respectively), TOC (40 and 93 mg/l) along with high levels of iron, nickel arsenic and lead. The levels of chloride and sulphate were significantly lower than the Dublin landfill but still elevated.

Taking any scenario and particularly the worst case scenario these are all very high concentrations of a wide range of contaminants including ammoniacal nitrogen, BOD, COD, TOC, DOC, Chloride, Sulphate and metals. The high levels of ammoniacal nitrogen, BOD, COD, TOC and DOC are usually associated with organic contamination and of high concern.

It is also accepted by the applicants consultants that landfilled road planings will cause elevated levels of hydrocarbons in the leachate. However, there is no elaboration on the likely concentrations or how it is to be managed in any leachate treatment system.

In our view the applicants consultants have not assessed the likely quality of leachate from the landfill in any detail, have not identified an accurate list of contaminants or parameters of concern and have grossly underestimated the concentrations of said parameters. Therefore, in our view, any discussions in the EIAR relating to leachate treatment systems design, potential impacts from

leachate on groundwater or surface water and assimilative capacities of receiving waters have not been based on anything concrete and therefore needs to be thoroughly reassessed and redesigned prior to the granting of planning permission.

4. Hydrogeology

The section on hydrogeology in the EIAR (section 7) is wholly inadequate for a project of this scale and nature. There are many flaws in this section but chief among them is the fact that only 3 groundwater monitoring boreholes were installed at the site. This is an unusually small number of boreholes for a project of this scale and nature. In order to provide basic hydrogeological information such as groundwater flow direction, water table levels, aquifer permeability, groundwater quality information upgradient and downgradient of a particular site, interaction with streams etc. the minimum requirement is 3 boreholes. Any site, even the smallest located on 0.5 acres would require 3 boreholes. However, it should have been clear that a site of some 37 hectares, with a proposal for a 6 million tonne landfill and all the attendant potential risks to groundwater and/or surface water would require a detailed and site specific understanding of the hydrogeological regimes present within and around the site and this can only come from a sufficient number of data points.

The three boreholes used for information in the EIAR are located more or less in a straight line running NW to SE across the middle of the site. There are no boreholes located in or to the north of the site, in or to the east, west or south. This therefore results in massive gaps in information necessary to properly describe the hydrogeological situation with any degree of confidence. For context, the existing Inert landfill in North Co. Dublin which is of relatively similar size and scale to this application drilled c. 14 no. boreholes in total and are currently monitoring 10 of those on a quarterly basis. The other licensed Inert landfill located in Kildare is required to monitor groundwater at 14 No. boreholes. My own experience in preparing planning application EIARs (mainly for non-hazardous (municipal waste) landfills) of relatively similar or smaller scale than this application resulted generally in excess of 10 borehole installations (in excess of 20 at some sites). Location of boreholes is also important. They need to be located within and around the site boundaries and once the groundwater flow direction is known gaps in the downgradient areas may need to be filled with additional boreholes. 3 boreholes simply does not provide anywhere near enough data points to give any meaningful description of the hydrogeological regimes present at the site with any degree of confidence.

This is compounded by the fact that the 3 boreholes (GW01, GW02 and GW03) are located almost in a straight line with each other. In order to provide groundwater contours and flow directions there must be triangulation between a minimum of three boreholes (many more at a site of this scale and nature) and the 3 boreholes at Ballinclare are located such that they provide little and almost no triangulation. Nonetheless, the consultants provided a groundwater contour map in Figure 7.6 (based on water levels taken on 26/3/19) and showing groundwater moving generally in a southerly to southwesterly direction. In plotting the data myself and using the small triangulation that is available from the 3 boreholes and the groundwater level data from the same date used in the EIAR this shows groundwater moving in a northeasterly direction, roughly opposite to that depicted in the EIAR. Furthermore, 2 other geological boreholes were drilled (BH01 and BH02) though not used in the hydrogeological assessment. There is groundwater level data presented from BHO1 along with GW01, GW02 and GW03 from 4/11/14 and BH01 does provide a good location for triangulation with

the other boreholes being located near the northeastern quarter of the property. Using triangulation between BH01 and any combination of the other 3 boreholes all show groundwater moving in a general northeasterly direction, opposite to that depicted in Figure 7.6. This area needs substantial reassessment as the water table levels and direction of groundwater flow are crucial in understanding the hydrogeological regimes present at the site and can only be ascertained by installation of a sufficient number of properly located boreholes. Also, no water levels are provided from the quarry sump or the local streams and rivers that would provide significantly important information on relative levels in the groundwater and local surface waters and interaction between these and this is also a significant flaw.

It is also pointed out here that in a later section on environmental monitoring, the EIAR proposes that the three boreholes be the only boreholes at the site used for monitoring groundwater throughout the lifespan of the development. If groundwater is indeed moving in a northeasterly direction then these three boreholes will all be located hydraulically up-groundwater gradient of the landfill and will therefore always be monitoring presumably clean groundwater moving towards the landfill and there will be no monitoring infrastructure down-groundwater gradient of the landfill to monitor potential impacts of the landfill on groundwater. Such a monitoring programme would be of no value whatsoever. Ideally, a correct monitoring system for a landfill of this size would have a sufficient number of monitoring points upgradient, a significantly larger number downgradient and boreholes at either side to confirm groundwater quality at all points around the landfill.

It would have been expected that Conceptual Site Models (CSM) describing the sources, pathways and receptors and the hydrogeological regime at the proposed site would have been provided. The CSM should be presented graphically with plans and cross sections and textually in the report and should show the topographic surface, geology, groundwater table levels, groundwater flow direction, the landfill phases/cells, leachate levels within the phases/cells, hydraulic connectivity between groundwater and surface waters (Ballinclare stream, Kilmacurragh stream, Potters river), possible connectivity with sensitive receptors (aquifer, domestic wells), leachate management flow paths etc. A CSM should be produced for the situation as it exists today, predicted CSMs for each phase of the development and a CSM for the final situation post closure of the landfilling activity. Such information is necessary to clearly describe the sources, pathways, potential receptors and the effect of mitigation measures (basal liners etc.) in protecting the environment. This information can only be generated with the installation and monitoring of additional monitoring boreholes located at logical positions in and around the site and is recommended in the publication '*Guidelines for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'* produced by the Institute of Geologists of Ireland (2013).

It is noted that the landfill is designed such that the bulk of its depth will be located beneath the water table (once pumping of the quarry sump ceases). We suggest that this would not be considered best practice due to the possibility of failure of the basal or side wall liners. In such a case leachate could escape directly to groundwater without any containment or attenuation afforded by the liner. It is noted here that all inert and non-hazardous landfills that have been constructed since the coming into force of the Waste Management Act 1996 and granted planning permission and a waste licence from the EPA have been designed and constructed above the water table.

In terms of other activities proposed for the site including operation of the C&D recycling, soil washing, waste inspection & quarantine areas and refuelling it is stated in the EIAR that all of these

activities will take place on concrete hardstand. Some of these areas are to be bunded or partially bunded and most drain to an existing on site hydrocarbon interceptor and from there to a soakaway. It is our view that all of these activities including vehicle/site machinery refuelling be carried out in fully roofed and bunded or ramped areas such that all leaks and spills can be collected and disposed off site in an appropriate wastewater treatment plant. There is no information provided on the existing hydrocarbon interceptor or soakaway relating to their design, capacity, integrity, impact assessment of the discharge and whether they will be suitable for the proposed activities planned for the site.

It is stated in section 7.46 of the EIAR that a hydrocarbon odour was noted in the overburden at GW02. This should be investigated further and remedied if necessary.

In summary, this section of the EIAR is severely lacking in detail and site specific site investigation data (leading to errors in the conclusions) and in our view does not provide the level of data required to provide an accurate assessment with any degree of confidence of the existing hydrogeological situation or predicted situations during and post closure of the operation.

5. Leachate Management during Operation

The EIAR report describes the following methodology for managing leachate during the operation of the facility. The quarry sump is to be pumped out and emptied. Initially a section of the basal clay liner is to be installed covering a sizeable portion of the base of the western side of phase 1 and the clay side walls will be constructed to a manageable height (a few metres up the side walls). At that point landfilling can commence and as it progresses upwards the side walls will be constructed upwards in advance and as the landfilling progresses eastwards the basal clay liner will be installed in advance of landfilling. However, while this is going on the EIAR states in a number of instances and specifically at section 7.160 "*The previous experience of operating the quarry at the site is that the surrounding volcanic rock is relatively tight, with few faults or fractures and therefore relatively limited volumes of groundwater would flow through it to the quarry void. Once the quarry void is dewatered, the volume of groundwater likely to collect in the sump is expected to be low, with the bulk of any water removed comprising infiltrating rainfall and/or surface water run-off over (or possibly through) the landfilled inert soil and stone."* (underlining added). This means that leachate will be allowed to flow through the landfilled waste, across the surface of the basal clay liner, spill out onto the bare rock surface of the quarry floor and into the quarry sump. This will continue for the life of the first three phases of the landfill when the quarry sump will be covered over by phase 3 at which time a similar operation will be in place for phase 4 with leachate draining to a low point on the quarry floor in the southeastern corner of the site. It is our opinion that, under no circumstances should untreated leachate be allowed direct contact with the bedrock surface, direct access to the underlying aquifer and certainly not into the quarry sump deep within the aquifer at a level of 22mOD some 15m below the quarry floor regardless of whether there is a pump in the sump or not. The whole rationale for installing a basal clay liner at inert landfills as a mandatory requirement of the European Landfill Directive and EPA Landfill Design manuals is to ensure that leachate does not and will never have contact or potential to infiltrate into the underlying aquifer. This proposal flies in the face of the legal, mandatory and hydrogeological requirements for the construction and operation of a landfill. As to the assertion that the surrounding rock is of low permeability and "*tight*" and that this is mitigation enough for allowing the use of the aquifer as a transport route for leachate I would point out that there isn't nearly enough boreholes or hydrogeological information

to support this claim. In fact there is evidence to the contrary. Borehole GW02 recorded an inflow rate of 2,000 gallons/hour which is a very high inflow rate for any rock type and shows moderate to good groundwater productivity at least locally. The EIAR reports faulting in the western part of the site and to the east and also reports the presence of sills and dykes on site, the margins of which can provide enhanced flow paths. The results from the three monitoring boreholes record high levels of total coliforms and E.Coli reportedly from local agricultural practices. This indicates that there could be a localised zone of high permeability that needs detailed assessment. The point is, the bedrock is expected to be and may well be of low permeability but there is not nearly enough evidence to establish this as fact across the entire site or to overcome the above mentioned counter evidence and more data is required. In any event, it is our view that any leachate generated should be kept fully contained and transported directly by sealed pipe to treatment facilities. We believe this can be easily achieved by installing low clay bund walls (using waste clays) within each phase to contain leachate from escaping to the aquifer and that a pumping chamber and pump can be installed inside the clay bund to deal with leachate accumulations and pump it directly to treatment facilities.

On the point of the bacteriological contamination in the monitoring wells. One potential contributing factor may be the existing on-site domestic/office effluent treatment system. The report in appendix 7-k provides a log of the trial pit excavated for the purposes of siting the associated percolation area. This intersected an area of 'Fill' containing aggregates, boulders, metal bars and underlain by a concrete slab, in short, a small (presumably) area of 'Fill'. The assessment stated that the "*material was unlikely to be suitable for treatment but will be within the acceptable range for the hydraulic discharge".* The percolation area should not have been sited over an area of fill or an area underlain by a concrete slab or in an area that is not suitable for treatment. The nature of the fill and reported hydraulic conductivity of the materials may be contributing to bacteriological contamination of the site boreholes. If this treatment system is to be used in the future development of the landfill we believe that an alternative percolation area should be assessed and used and the fill from this area removed and landfilled at an appropriately licensed facility.

6. Leachate Management post Landfill Closure

The EIAR states that as the landfill becomes filled that it will be capped initially in the first areas filled in the west of phase 1 and moving progressively eastwards and then southwards until the entire landfill is capped. The landfill cap will consist of a 0.85m thick layer of clay subsoil overlain by a 0.15m thick layer of topsoil (One of the figures (2-4) in the report indicates a cap of 0.35m subsoil overlain by 0.15m of topsoil). The cap will be progressively grassed as it is emplaced and will slope generally from the high point in the north down towards the south. The northern high point will be sloped upwards to blend in with the natural hill present across the northern boundary of the site and rising to in excess of 90mOD further northwards. It is stated in the EIAR that infiltration of rainfall through the cap will be "*significantly reduced*" by a combination of the grass (evapotranspiration), the low permeability of the clay cap and the slope that will promote surface water run-off. This may well be the case but "*significantly reduced*" is far from 'eliminated'. No figures are provided for an actual predicted rate of infiltration. It is considered that even allowing for these mitigations that anywhere between 70 and 200mm/year of rainfall could percolate through the cap and into the waste pile to generate leachate (depending on the nature and construction of the clay cap). This does not include for the potentially extensive volume of water that will run down the hill from the

high ground to the north and onto the landfill surface and would significantly increase the infiltration rates. As the landfill is lined with a very low permeability basal clay liner and side walls this means that the leachate will collect in the landfill and build up until it overtops the side walls and flows down uncontrolled over the surface of the landfill and into the proposed surface water collection system. This could occur during the operational life of the landfill or perhaps sometime after the landfill is closed. Regardless, under the current plan leachate breakout will occur at some point and is more likely to be evident on the lower slopes of the landfill. Leachate breakout can be exacerbated by stratification of low permeability clay layers within the waste pile causing leachate to be perched and causing it to flow laterally. Any leachate breakout will flow down the surface of the landfill, causing dieback of the grass and forming stained soil rivulets or small channels that where present in themselves will cause soil erosion of the cap. The leachate will then flow to the surface water drainage systems proposed for post closure and is discussed in the next sections.

We believe that the landfill design should include for leachate collection by way of pumping chambers with pumps installed to the base of cells within each phase of the landfill both during and after landfilling operations have been completed. Once collected leachate should be pumped directly to the treatment plant by sealed pipework. This will ensure that leachate levels do not build up in the cells and overtop the lined side walls and potentially cause severe or catastrophic contamination to local surface waters and groundwaters. It should be noted that a certain area of the southeastern portion of the landfill is planned to drain to the Kilmacurragh stream and there is no treatment (by wetland or otherwise) planned for this area.

It is also noted that once landfilling is complete that the siltbuster plant is to be decommissioned (its function is only to reduce suspended solids and arsenic levels) and the wetland is to be abandoned and left to its own devices post closure.

7. Leachate Treatment

While inert leachate is of significantly better quality than leachate from a hazardous landfill or leachate from a non-hazardous (municipal waste) landfill it is still highly deleterious and in no way comparable to clean water naturally present in rivers, streams or groundwater. The fact that inert leachate is generated by landfilled 'clay and stones' does not mean that it is a clean water or even "*slightly*" contaminated. It is in fact an effluent that untreated could cause serious pollution to groundwater, rivers or streams. We have shown in section 3 above that inert leachate contains elevated or high levels of ammoniacal nitrogen, BOD, COD, TOC, sulphate, chloride, sodium, potassium, metals and will also contain hydrocarbons from the landfilling of road (tarmac, asphalt etc.) planings. These elements have not been considered in the treatment system design process.

The EIAR states in section 2.128 " *A number of potential leachate treatment and disposal options were considered for the proposed inert landfill and waste recovery facility at Ballinclare. Arising out of this review, it was considered that the most suitable option for treatment of a leachate which principally requires reduction of inorganic substances would be an on-site (passive) wetland treatment system."* However, no information or details of the "*review*" are provided in the EIAR, e.g. what volumes of leachate (worst case scenarios) were considered for the design, what constituents or contaminants were required to be treated, what concentrations of these contaminants (worst case scenarios) would be present in the leachate, what treatment systems were considered, which systems were ruled out and why, the rationale used for the chosen

treatment system and rationale for its design. This information should have been provided in the EIAR.

There is no detail provided in regard to the wetland system itself other than its size. For example, what is "*the anaerobic (biochemical reactor) wetland"*, how it is to be constructed, what are the biochemical elements, what are these designed to achieve, how does this operate and how effective is it; What is the iron sequestering unit, is this a mechanical/chemical unit or part of the biological make-up of the wetland, how is it to be constructed, what systems are used to "*sequester iron*", how effective are these, why is iron the only contaminant considered for a specific unit; Similarly for the "*aerobic wetland*" element of the wetland. All of these elements should be described in the EIAR and provide detail on the objectives of the design, how each element is to be constructed, the nature, type and quantification of the plants to be used, how the system is to be developed and maintained, predictions on the build up of e.g. metals in the soils, substrate and plant matter and how this is to be managed in the longterm, description of the ongoing maintenance requirements etc. We would also request that the applicant furnish proof that such a system will work for the proposed development prior to the grant of planning permission.

Sections 2.124 to 2.126 "*In waste management, 'leachate' is the term assigned to the slightly contaminated liquid that is generated as influent rainwater and/or groundwater flows over or through a waste mass, picking up soluble and particulate matter as it moves to a low point at the base of the landfill.*

2.125 Landfill leachates have varying compositions that reflect the types of wastes deposited and through which rainfall percolates. There is on-going generation of leachate from rainfall and groundwater sources over the operational life of a landfill. As a result of the containment provided by the basal and side liners, any leachate from the landfilled mass needs to be removed and treated prior to being discharged off-site.

2.126 Based on SLR's past experience, it is likely that the inert waste landfill at Ballinclare will generate leachate that will have little or no ammoniacal nitrogen, BOD and COD but could have potentially elevated concentrations of sulphate, reduced pH and detectable concentrations of metals. In addition, as inert soil and stone from construction sites can often contain some road planings and other materials associated with road maintenance and construction, some hydrocarbons / organics could also be present." (underlining added).

It is clear from these statements that the consultants considered that leachate would be only "*slightly contaminated*" (i.e. they grossly underestimated the concentrations of contaminants) and were not aware of and did not include ammoniacal nitrogen, BOD, COD, TOC, chloride, sodium, potassium (or other as yet undefined contaminants) in their considerations or options analysis of the treatment system required for Ballinclare. Therefore, we believe that the entire process was flawed from the start and resulted in the design of an irrelevant treatment system that will not be fit for purpose.

The EIAR states in section 2.133 *"The effectiveness of wetland treatment systems can be enhanced by the temporary addition of various, more active treatment systems, such as chemical dosing, aeration or other such processes. This can allow a wetland system to handle higher contaminant loads or flows for periods of time (should it be necessary) before reverting to more standard modes of operation, therefore providing flexibility should leachate generation rates and chemical constituents change over time."* and section 2.134 (ii) "*A pump house : housed is a standard shipping*

container (6.0m x 2.4m x 2.6m) containing feed, discharge and chemical dosing pumps;". This is very vague and infers that an entire treatment system can be changed at the drop of a hat. It is not possible to just add chemicals to an effluent from a shipping container or to initiate an aeration process for presently unknown "*chemical constituents* (that may) *change over time."* Each of these processes are treatment systems in their own right that require detailed planning, design and construction. The very fact that this vague statement about a shipping container holding chemicals and dosing equipment etc. was included in the EIAR demonstrates that there is no certainty in what may be needed.

When landfilling is completed and fully restored it is planned that the siltbuster treatment system (which only reduces suspended solids and arsenic – nothing else) will be decommissioned and the wetland system is to be abandoned.

Section 2.249 "*Following completion of landfilling and restoration works, the wetland area at the western end of the application site will remain in-situ and allowed to naturally evolve and re-wild, with no provision being made for any active long-term maintenance. The wetland will then effectively serve as a longterm soakaway, settlement lagoon and/or attenuation pond for any surface water run-off prior to its discharge off-site via the established drainage network to the Ballinclare Stream".* (underlining added).

Once oversight and maintenance of the wetland system ceases, the area will become wild and overgrown, siltation will occur in most areas and channelised flow will develop as the effluent naturally seeks to form its own flow paths through the areas of least resistance. In this case there will be virtually no treatment of effluent and this situation can develop reasonably quickly without ongoing maintenance.

As discussed in earlier sections, it is inevitable that leachate breakout from the landfill will occur during the latter phases of development or perhaps post closure and means that there will be a need for longterm treatment of leachate at the site post closure. No provision has been made in the EIAR to deal with leachate build up post closure (or during operation) and this is considered a fatal flaw in the proposal.

It is our opinion that a leachate collection and pumping system should be included in the design of the landfill cells/phases to maintain leachate levels well below the cap level and that the leachate be pumped directly via sealed pipe to a bespoke leachate treatment plant (specifically designed for the leachate in hand). Plans should also be drawn up for the longterm management of the leachate treatment system post closure of the landfill.

In addition, it is planned that surface water drainage from the southeastern part of the facility will be directed to a drain along the L1147 public road which flows to the Kilmacurragh stream, itself a tributary of the Potters river. There has been no discussion on treatment of this element of the drainage, no detail on the receiving drain, no information on the Kilmacurragh stream, no monitoring of flows or quality or assessment of assimilative capacities of either of these waterways, indeed the Kilmacurragh stream is not shown on any maps in the EIAR. Bearing in mind that leachate breakout will undoubtedly also occur in the souheastern part of the landfill, therefore it will be allowed to flow untreated to the Kilmacurragh stream and will have significant consequences for water quality in the receiving drain, Kilmacurragh stream, Potters river, Buckroney fen and possibly locally in the Irish sea.

The whole leachate treatment design process should be revisited and using clearly defined input/output parameters and robust and transparent assessment of treatment options taking into account the longterm (post closure) requirements for leachate treatment should be completely redesigned. It would be expected that clearly defined and distinct primary, secondary and tertiary (tertiary may include but not limited to a wetland) treatment systems are planned, designed and provisioned for the longterm treatment of leachate.

On a related point we would request that clarity be provided on the proposed wetland. It is stated as being 3.8 ha in extent but that it consists of two wetlands situated in parallel which facilitates maintenance on one section while the other section continues to treat the leachate. Does this mean that the entire 3.8 ha is being used or that actual treatment is limited to a 1.9 ha duty facility with a 1.9 ha standby facility.

8. Hydrology

The sections of the EIAR dealing with the local surface waters and receiving waters again seem to have been based largely on desktop studies with little or no site specific information included in the assessment.

Firstly, while discussing the discharge of treated leachate from the site, the EIAR references the Potters river as the receiving water. The effluent discharge is to the Ballinclare stream and this is the correct waterway that should have been assessed as the receiving water. Chemical analyses were carried out at SW1 on the Ballinclare stream just downstream of the discharge point. However, no chemical analyses were carried out upstream of the discharge and there has been no assessment of the biological quality of the stream, no catchment studies and no assimilative capacity assessments carried out on the stream. It seems that the stream is of no importance whatsoever and can be used merely as a 'pipe' to transport the effluent to the Potters river. No rationale is provided in the report to explain this anomaly. One small step further would have seen the Potters river disregarded in its entirety and use of the Irish sea as the receiving water where doubtless there would be ample assimilative capacity!

Notwithstanding the above, the assessment of the Potters river is also flawed as follows. Baseline water quality measurements are used from monitoring stations SW3b some 300m upstream and SW4 some 800m downstream of the confluence of the Ballinclare stream with the Potters river. There is at least one major tributary entering the Potters river between SW3b and the confluence point and at least one major tributary entering the river between the confluence point and SW4 downstream (ref. Figure 7.1). These stations are therefore totally unsuitable and not representative locations for assessment purposes. The upstream station should have been located just upstream of the confluence point (i.e. within 10m) and the downstream station just downstream of the confluence point (i.e. within 30m to allow for the mixing zone) and the river checked that there were no tributaries, major drains or inflowing pipes present between the confluence point and both of the monitoring stations. This therefore means that the baseline data for quality in the selected receiving water is not accurate and therefore any assimilative capacity assessments are invalid.

The catchment area and therefore river flow rates were derived by desk study from the EPA hydrotool website. The catchment area is taken at a point approximately 1.5 km downstream of the

confluence point and therefore also in the wrong place providing a bigger catchment, increased flow rates and assimilative capacities.

The EIAR reports different rainfall rates for the area in different parts of the report (e.g. Table 7.3 "1,127 mm/yr" , Section 7.83 "1,053 mm/yr, Appendic 7-c "1,066mm/yr") and this could result in significant differences in drainage from the site and flow rates in the river used in any assimilative capacity assessment.

Appendix 7-C provides data on the impact assessment on the Potters river. Much of the relevant data required in the assessment is missing from the report such as the water quality data for the discharge and the receiving waters and environmental water quality standards (the word "*error*" is placed where actual data references should be). It seems that the effluent input parameters were based on the current quality of water in the quarry sump (with high arsenic levels) and not the proposed collection and discharge of leachate from the landfilling operation and if this is the case the entire assimilative capacity study on the Potters river is only pertinent to the quarry sump emptying operation (to occur before development starts) and of no relevance to the discharge of treated leachate through the proposed wetland system. If this is the case then it is imperative that a site specific impact assessment be carried out on the receiving water using effluent discharge parameter concentrations from the leachate treatment system. Bear in mind that the proposed leachate treatment system in itself is seriously flawed as it didn't take into account all the contaminants or an accurate prediction of the concentrations of those contaminants that will arise from the leachate.

Other issues that arose from the review of Appendix 7-C include:

- The catchment study should have been carried out on the Ballinclare stream
- In the desk study on the Potters river only orthophosphate, suspended solids, arsenic, lead, mercury chromium and nickel were included in the assimilative capacity assessment. There are many more parameters of concern such as ammonia, BOD, COD, TOC, hydrocarbons, sodium, potassium, chloride etc. that were not included.
- The actual calculations for the assimilative capacities are not provided, merely the results stated.
- Mercury was quoted at 0.22 mg/l upstream of the discharge but all results from the EIAR show mercury at <0.2 mg/l.
- The station used for the desk catchment study from the EPA hydrotool was 10_1301 which is too far downstream and not the actual catchment area of the Potters River at the discharge point. The station closer and upstream of the actual discharge point was not used.
- Predicted worst case low flow rates were not used

As discussed previously, the advent of leachate breakout at the facility will mean that leachate will also discharge to the southern drain and Kilmacurragh stream with no treatment provided. The EIAR does not but should have provided a robust impact and assimilative capacity assessment for these waterways.

We believe that the entire impact assessment on the Potters river from the proposed site discharge should be scrapped in its entirety. A robust assessment, using site specific data, relevant data and revised input parameters based on an accurate assessment of the leachate quality and subsequent

revised treatment system design should be carried out and based on discharge to the Ballinclare stream, not Potters river. In addition a similar exercise should be carried out on the Kilmacurragh stream or alternatively the leachate collecting in this area collected and pumped to the redesigned treatment plant.

9. Biodiversity

The section on biodiversity provides detailed site specific data on the application site but none beyond its boundaries. In terms of the site itself the EIAR provides information on the protected species frogs and newts resident in the existing lagoons. These are to be translocated to the wet grassland area before the lagoons are replaced with the wetland system and it is stated in the report that the wetland will provide a high quality foraging habitat for the frogs and newts. In the interest of wildlife conservation we would request the consultants to elaborate on a few issues as follows:

i) Frogs and newts were not recorded as resident in the wet grassland or semi-natural ponds where it is proposed to relocate the lagoon frogs/newts. If they are not there now can we be sure that this is a suitable habitat for them, will it need new ponds (or lagoon type structures) to be constructed in these areas in order for them to thrive. Are the proposed areas big enough to replace the existing habitat.

ii) The EIAR states that two amphibian breeding ponds are to be created, one associated with each section of the wetland and that the wetland will provide a high quality foraging area for the amphibians. While it is accepted that the wetland is in itself treating the leachate, it is nevertheless filled with largely untreated leachate containing high levels of heavy metals and other organic and inorganic contaminants (see sections 3 & 7 above). These contaminants can build up in the substrate, the roots and leaf matter, in the biotic and faunal organisms and bio-accumulate in the ecological system present in the wetland. Even after leachate passes through the wetland it is still of relatively low quality in terms of surface water quality standards until such time as it is discharged to the receiving water where it receives significant dilution and assimilation. We would have serious concerns therefore that the wetland as presently configured could provide suitable '*breeding ground*' or '*high quality foraging areas*' for these protected species. In fact, would it be prudent to prevent all wildlife, protected or otherwise from coming in contact with the wetland due to potential risks posed by the low quality environment.

We would have expected to see a detailed ecological assessment outside the application site on the Potters river and its tributaries Ballinclare and Kilmacurragh streams. It is submitted that the Potters river and its tributaries are the most significant environmental receptor present at the site as it receives all water discharging from the site either directly via surface water drainage or indirectly via groundwater flow. The river forms an important resource in many multifaceted ways similar to all other rivers in the country. It is a significant freshwater resource, filled with a diverse array of flora and fauna, is an important salmonid river, it provides a magnificent ecological corridor both directly as a water way and along its valley and floodplains and provides significant riparian rights for landowners along its length. Examples of wildlife include trout, frogs, amphibians, heron, kingfisher, dragonfly, and an array of mammals and birdlife not to mention a diverse flora assemblage. In addition, there are a number of landowners along the river who are participating in the Agri Environment GLAS scheme (rural development programme 2014 -2020) relating specifically to the

river and includes demarcation strips along the river which are sown with wild meadow crop to enhance wild life along the river bank.

However, the river and its tributaries seem to have been completely neglected as a receptor in all sections of the EIAR. Apart from 1 chemical sampling station on the Ballinclare stream and two (mis-located) stations on the Potters river, and a desktop review of the EPA historical Q ratings at two locations further downstream of the site there has been no site specific studies of these significantly important water ways. In light of the nature and scale of the proposed operation we would have expected to see a detailed ecological survey of the river(s) and associated corridors, at least representative surveys at sections of the river, kick sampling and biological Q ratings should have been carried out, more detailed and representative chemical sampling and a detailed description of the river as an ecological resource. These are absent from the EIAR and almost full reliance has been placed on desktop studies.

Natura Impact Statement

The NIS carried out for the assessment of the Buckroney-Brittas Fen area relies completely on a desktop study with no site specific surveys or data collected. Potters river is only barely mentioned as a "*hydraulic connective*" route for the discharge from the site to the Buckroney fen located at the mouth of the river. The Ballinclare and Kilmacurragh streams are not mentioned at all. Apart from mention of Buckroney Fen and with some changing of names the NIS could almost relate to any other river in the country.

As with all other sections of the EIAR, the NIS views the rivers and streams merely as pipelines for the transport of effluent discharge and full reliance for non impact to the rivers (and therefore the Fen water quality) is placed on the fact that the effluent from the development is to be treated via a siltbuster system (only during quarry dewatering and the operational stage of the landfill and only for suspended solids and arsenic) and wetland system. As discussed earlier in this submission, the design of the treatment system has not considered all of the contaminants that will need to be treated, their concentrations or flow rates, the fact that there will be leachate flows to the discharge system from the proposed dewatering during site operations and from leachate breakout from the landfill, that the siltbuster is only to be active during the operational stage and that the wetland is to be abandoned shortly after site closure. It is also noted that the siltbuster system only has the capability of reducing suspended solids and arsenic, none of the other metals or contaminants that will require treatment. These are fatal flaws in the treatment system design. In light of this, the current proposals will almost certainly result in severe contamination of the streams, rivers and water quality at Buckroney Fen and this therefore renders any conclusions in the NIS null and void.

We believe that the scale and nature of this strategic infrastructure development warrants detailed 'site specific' ecological assessments of all relevant waterways including the Ballinclare, Kilmacurragh and Potters river systems. Any such assessment should take into account the almost total lack of suitable treatment of leachate present in the current proposals.

10. Monitoring

The proposals for environmental monitoring at the facility as presented are not in any way adequate in terms of numbers of monitoring points and in many cases are of no relevance due to their location. We reiterate here that this is Strategic Infrastructural Development of regional and/or

national importance and consists of a 6,165,000 tonne landfill located in a c. 37 ha site and as such requires relatively intensive and relevant monitoring.

Groundwater

There are only 3 boreholes proposed to be monitored at the site on an ongoing basis. These are located in a straight line running from NW to SE across the middle of the quarry site. For context, there are 10 groundwater monitoring stations located at the Inert landfill located in North Dublin and 14 at the other Inert landfill in Kildare.

Based on our review of the information provided in the EIAR, groundwater is moving roughly from southwest to northeast and therefore these three boreholes will be located up-groundwater gradient of the landfill and therefore are of little relevance to a groundwater monitoring programme. It is also our view that groundwater in the western part of the site will likely be flowing westwards toward the Ballinclare stream. A minimum of another 7 monitoring boreholes should be located around the entire site to ensure that all sides of the landfill are covered with a higher concentration of boreholes downgradient of the landfill once the true groundwater flow direction has been calculated.

The EIAR states that a domestic well survey will be carried out and some of the wells selected for ongoing monitoring. We accept this as being essential but does not make up for the lack of designated site monitoring boreholes that should be located strategically around the landfill (primarily downgradient).

Surface Water

It is proposed that surface water monitoring be carried out at the existing 3 monitoring stations (SW1, SW3b and SW4). Again, this is an abysmally low number of monitoring stations the latter two of which are not in relevant locations. The Ballinclare stream should be monitored at a point upstream of the discharge as well as at SW1 downstream. The Potters river should be monitored at two new stations located just upstream and downstream of the confluence of the Ballinclare stream, at SW4 and at an additional station further downstream and to the east of the landfill. The Kilmacurragh stream, which is also planned to receive discharge post closure should be monitored both upstream and downstream of the drain discharge and an assessment of the merits of providing sampling stations on the drain itself.

Biological Q rating surveys should be carried out on each of the rivers and streams at least annually between the months of May and September at relevant and nearby locations.

Leachate/Effluent

Monitoring of the discharge should be carried out in accordance with the conditions of the discharge licence and include additional parameters based on an accurate review of the chemistry of the leachate. Monitoring should also be carried out on the leachate prior to treatment.

We believe that leachate monitoring infrastructure be installed in each of the landfill cells at a rate of two leachate monitoring stations per hectare as per EPA waste licence requirements for the existing inert landfill in North Dublin. These should be monitored on a quarterly basis.

Dust

There are only three monitoring stations proposed for dust monitoring. We would propose a few additional stations to include the site entrance and at least one station at each of north, south, east and west and perhaps additional stations to the northeast downwind of the prevailing wind direction and/or near sensitive receptors.

Noise

Noise monitoring should be carried out at locations on each of the site boundaries and at a number of the nearest sensitive receptors.

The EIAR makes reference to bi-annual monitoring in one section and quarterly monitoring later in the section and that monitoring would continue for a "*short*" period after closure. Monitoring of all of the above should be carried out at least on a quarterly basis (apart from that covered by the discharge licence and the biological Q rating surveys). In the event of any incidents or untoward results monitoring frequencies may have to be increased.

Also, I am not aware of any licenced landfills that have a condition in the licence stating that monitoring would only continue for a "*short*" period after closure (in relation to leachate, groundwater and surface water). Monitoring of these elements is generally accepted to last for decades post closure and for as long as there is an extant risk of significant impact from leachate on the environment. It is accepted that as time elapses some reduction in stations, frequencies and perhaps parameters can be justified.

We believe that it should have been clear to the consultants that a comprehensive monitoring programme was warranted at this proposed development. Guidance on monitoring programmes for similar facilities is readily available in the EPA manuals and on the EPA website where typical monitoring programmes are included in the Waste Licences for similar facilities.

11. River Potter Water levels/Flood Events

The EIAR states in sections 7.85 & 7.86 that according to their assessments, again based on desktop study research of various websites, that there are, presently or historically, no flooding issues on the Potters river. My client owns a residence located adjacent the Potters river at Ballinameesda about 2km to the southeast of the application site. In Winter or after prolonged heavy rains his property including the house is inundated with floodwaters from the river (Please see photos below). This is also the case for many other house-owners and landowners further upstream and downstream. There are three caravan parks along the Potters river near Brittas Bay further downstream that are inundated during high flow events. Site specific assessments would have revealed these issues. Desk studies based on OPW, EPA websites etc. are very useful tools for a regional or overview type assessment but should only be used as a starting point. These are then followed up by site specific assessments using detailed field surveys or site investigations particularly when the proposed development is of such a scale and entailing waste landfilling.

There are two issues arising from the application for which we are seeking clarification:

i) It is stated in the EIAR that the quarry sump (c. 270,000 m^3 equivalent to c.60,000,000 gallons) is to be dewatered prior to any works on the landfill and this will be carried out over a

period of 4 to 5 months in accordance with the conditions of the discharge licence. In condition 2.1 the discharge licence puts a maximum limit on the volume of water to be discharged (1,728 m^3/day or 72m^3/hr) and in condition 2.3 it states "*There shall be no discharge when flow in the river is lower than the 95%ile flow, or when the river is in flood to the extent that it is likely to overspill its banks*" (underlining added). Can the applicant clarify what methodology will be used to predict when the river is likely to overspill its banks in order that pumping can be halted prior to flooding (e.g. calibrated level recorder, flow measurements or other) and my clients lands protected from additional flows from the site during these events.

ii) There are no calculations in the EIAR relating to the changes in surface water flows to the local drainage network during or after filling is complete. The EIAR seems to indicate that the present day situation is one where the quarry site acts as a sump for all local rainfall and surface water drainage from high areas surrounding the site (rising to in excess of 90mOD along the northern landfill boundary). During landfilling, it seems that all surface water and leachate draining to the site is to be collected and pumped through siltbuster treatment, to the wetland and from there to the Ballinclare stream which drains to the Potters river. After landfilling is complete the site is to be designed to promote surface water runoff from the landfill and surrounding high areas to the site drainage channels which are directed largely to the wetland with some area in the southeast of the site to be drained to the Kilmacurragh stream. The EIAR should have provided calculations of the present day volumes of surface water flow from the site and the predicted flows from the site during landfilling and after landfilling is complete. This is important for winter flows and more particularly for storm return events ranging from 10 year to 100 year storm return events. We would request that this information be provided to demonstrate that there will not be increased flows in the river due to the proposed site activities or after closure of the landfill. This information is of significant concern to my client and to most other landowners along the river valley who are presently dealing with flood events onto their homes, lands and businesses and need full assurance that no aspect of the proposed development will cause an increase in water levels in the river particularly during storm events.

12. Landfill Community Fund

The practice has developed over the past number of years that where a particular community are disproportionately impacted by a specified development that is of benefit to the wider region that a form of local fund be accumulated to try to alleviate some of the impacts. In the case in hand it is clear that the development is of a nature and scale that it is considered a strategic infrastructure development and therefore of strategic regional/national importance and benefit to the wider community as a whole. On the other hand it will significantly and disproportionately affect the lives and wellbeing of the local community in terms of traffic, noise, dust, water quality issues etc. Bearing in mind that the local community has already being significantly impacted by the long years of quarrying activity at the site up until 2016. Such a fund were it put in place and managed well could disburse funds to attempt to generally improve the lot of the local area and community. Community based projects or organisations such as road improvements, footpaths, walking routes, community hall, clubs and societies, charities etc. could all benefit over time. We note that there is such a fund in place at the not too distant Ballynagran landfill and seems to have been well received and of certain benefit to that community.

13. Summary

Our review of sections 2, 6 & 7 of the EIAR shows that all design and risk assessments were based on qualitative risk assessment rather than quantitative risk assessment. Quantitative assessments are based on hard facts and associated data derived from site specific site investigation works.
A qualitative assessment takes into consideration less tangible factors and is based more on desk studies, regional published information and often on 'gut feeling' than on hard facts and data.

EIAR section 7.18 states "*The assessment undertaken here should be viewed as a largely qualitative assessment of the hydrology and hydrogeology."* It should have been clear to the consultants that the nature and scale of the development required detailed site investigations and quantitative assessment. The installation and monitoring of 3 badly located boreholes, or monitoring of 3 badly located river monitoring stations does not constitute anywhere near an adequate site investigation or means for an adequate quantitative risk assessment.

The entire assessment and design of the leachate treatment system was based on inaccurate assumptions of leachate quality at the outset – no information on volumes of leachate, the true contaminants or concentrations of these and therefore everything that followed was flawed. The basis, facts, figures and rationale for the leachate treatment, selection and design are all absent from the document. They were unaware of the inevitability of leachate breakout from the landfill and therefore no provision, assessment or design is specified or included.

No field or site based information on surface water flows in the river, catchment studies or site specific assimilation capacity studies, surface water volume flows pre and post development are all missing. Any information provided was based on desktop studies or previous and sometimes irrelevant assessments.

In our view, the range and number of inadequacies in section 2 & 7 of the EIAR renders many elements of Table 7-11 (Direct Impacts: Description and Significance of Impact) as requiring re-

assessment, especially those that are leachate related, including quality of surface waters and flood events.

Section 5 on Biodiversity provides detailed information and site specific assessment of the site itself. However, there is nothing outside the site, on the Potters river, Ballinclare stream or Kilmacurragh stream, no survey, biological Q rating or assessment. Apart from local residents, this is the single biggest environmental receptor at the proposed development and there is practically no site specific field information on the river in terms of its importance ecologically, as a resource or in terms of riparian rights along its length. The only field information came from 3 badly located surface water monitoring stations, the rest was all desktop study and qualitative. In addition, all conclusions on surface water quality and ecological quality of the rivers and Buckroney fen were based on the assumption that the leachate treatment system (siltbuster and/or wetland) would produce a clean water effluent suitable for discharge. As we have shown, this is simply not the case as the design of the treatment system was seriously flawed and therefore all conclusions based on effluent quality should be considered null and void.

We don't believe that this qualitative approach was in any way appropriate or adequate for such a development and we suggest that a fresh, well resourced and designed EIAR be procured that can demonstrably and by use of quantitative assessment and hard facts from site specific data, answer the questions raised in this submission.

An elementary overview of the planned development provides one with low expectations in terms of proposed management, environmental controls and responsibility. Firstly, the EIAR sections reviewed appear to have been under-resourced, were based largely on qualitative desktop studies with little site specific data collected as would be expected for this development. Secondly, an overview of the entire development plan indicates that the quarry void is to be filled up as quickly and easily as possible to the extent that leachate be allowed traverse through the aquifer. The leachate itself was misrepresented as being "*slightly contaminated*" and of little consequence and therefore the leachate treatment system was totally under-designed and as a result all the follow on effects of pollution to the rivers and groundwater significantly underestimated. The potential for leachate overtopping and breakout from the landfill cells was not indicated at all and therefore the ongoing release of uncontrolled leachate to the environment has not been considered. Environmental monitoring is to be carried out at an extremely low number of monitoring stations, many of them mis-located to the extent that they will not monitor the true potential impact from the landfill that will inevitably occur and only bi-annual monitoring proposed in some sections of the EIAR. Finally, when the landfill is completed the site is to be more or less abandoned with the wetland allowed to "*evolve and re-wild"* of its own accord and environmental monitoring to continue for a "*short period*" only. This plan seems to indicate a highly productive facility operation start to finish but with low emphasis on ongoing management and environmental controls and little or no longterm responsibility.

We respectfully request that this application be refused planning permission in its current form until such time as a detailed EIAR is produced that takes into account and rectifies all of the issues raised in this submission.

Annex 1

A summary of the composition of the liquid with respect to these parameters is presented in Table 9. Where concentrations were below the limit of detection (LOD), half the detection limit has been used to determine the mean and 95th percentile values.

Other parameters listed in the Table C2.2 of the Licence that are required to be monitored in leachate at the Site are also discussed with respect to the findings of the Site Quarterly Monitoring Reports (Patel Tonra Ltd. all dates).Table 9: Summary of Leachate Quality Monitoring Data (February 2010 to September 2017)

Parameter	Well ID	Number of Samples	Number of samples >LOD	Concentration			
				Minimum	Mean	95th percentile	Maximum
pH	LC-1	8	8	6.8	7.20	7.73	7.9
	LC-2*	0	n/a	n/a	n/a	n/a	n/a
	LC-3	10	10	6.7	7.5	8.07	8.2
	LC-4	10	10	7.0	7.7	7.96	8.0
Ammoniacal Nitrogen NH4 as N (mg/l)	LC-1	14	14	0.93	16.54	35.14	64.53
	LC-2*	1	1	2.53	n/a	n/a	n/a
	LC-3	15	14	0.03	3.80	10.68	11.27
	LC-4	17	17	0.09	0.73	1.34	1.34
Chloride (mg/l)	LC-1	15	15	29.4	566.8	927.32	950.0
	LC-2*	1	1	138.8	n/a	n/a	n/a
	LC-3	16	16	109.3	293.9	556.28	646.5
	LC-4	17	17	174.9	321.0	402.90	417.3
Sulphate (mg/l)	LC-1	14	14	496.9	1224.3	1903.93	2484.8
	LC-2*	1	1	944.0	n/a	n/a	n/a
	LC-3	15	15	619.1	1260.7	1751.89	1754.7
	LC-4	16	16	493.6	827.5	1252.77	1625.1
TOC (mg/l)	LC-1	12	12	6	28	62.35	97
	LC-2*	0	n/a	n/a	n/a	n/a	n/a
	LC-3	13	13	8	24	64.20	87
	LC-4	12	12	13	89	122.75	131

* No access to this location for much of the HRA data period

The Site Quarterly Monitoring Reports for the data review period compare the leachate monitoring data to the Class A3 surface waters values in the Surface Water Regulations, SI No. 294 of 1989 – The European

D1 CONSTITUENTS OF INERT AND HAZARDOUS LEACHATE

TABLE D.1: **CONSTITUENTS OF INERT AND HAZARDOUS LEACHATE**

Determinand	Inert Leachate		Hazardous Leachate	
	Germany	UK	Germany (old landfills)	Germany (other landfills)
pH-value	7.5	8.1	6.3-7.6	5.9-11.6
conductivity (mS/m)	250	n.r.	n.r.	n.r.
COD (mg/l)	130	236	2320-29300	50-35000
BOD_5 (mg/l)	20	n.r.	850-15000	41-15000
TOC (mg/l)	40	93	n.r.	n.r.
AOX (mg/l)	n.r.	n.r.	4-292	0.04-36.5
phenols (mg/l)	n.r.	n.r.	5.4-35	<0.01-350
ammmoniacal-N (mgN/l)	13	28	28-3670	<5-6036
sulphate (as SO_4) (mg/l)	450	212	30-7120	18-14968
chloride (mg/l)	100-600	373	300-126300	36-36146
sodium (mg/l)	270	104	n.r.	n.r.
potassium (mg/l)	50	50	n.r.	n.r.
magnesium (mg/l)	30	47	n.r.	n.r.
calcium (mg/l)	200	335	n.r.	n.r.
iron (mg/l)	3.5	70	1.4-2700	0.38-95.8
zinc (mg/l)	0.1-0.2	n.r.	0.14-3.5	0.02-27.24
nickel(µg/l)	7	n.r.	16-1000	14.2-30000
copper(µg/l)	1-11	n.r.	37-300	1.3-8000
arsenic(µg/l)	9-37	n.r.	2-71	<2-240
mercury(µg/l)	n.d.	n.r.	0.56-7	0.17-50
lead(µg/l)	3-6	n.d.	6-650	4.3-525
No of landfills	3	6	7	28

Notes:
Hjelmar *et al.* 1994
n.d. not detectable, n.r. not reported