Obj + OH. (4).

Foyle, Carlingford & Irish Lights Commission

Comisiun an Fheabhail, Chairlinn agus Shoilse na hEireann

Foyle, Carlinford, an Airish Lichts Commission

ENVIRONMENTAL PROTECTION AGENCY
19 JAN 2006

Environmental Protection Agency
P.O. Box 3000
Johnstown Castle Estate
County Wexford

17th January 2006

Waste Licence Register no.: 215-1

Dear Sir,

With regard to the proposed granting of **a** waste licence to Donegal County Council at Meenaboll the Loughs Agency have strong objections to the issuing of this licence.

The stream on which the dump will be constructed is a tributary of the Cummrick River and hence the River Finn. As you are no doubt aware these rivers have been designated as Special Areas of Conservation for salmon under the EU Habitats Directive. The Finn system is of particular International importance, due to the presence still, of substantial multi-sea-winter spring salmon. Globally, these have declined dramatically in the last number of years. This designation which is cross border in nature was designed to protect these particularly vulnerable stocks. It is our opinion that this landfill site poses a direct and potentially devastating threat to these stocks which have been shown by recent Agency work to be genetically distinct and unique.

With the forthcoming Water Frame Work Directive it is incumbent upon all Agencies to ensure that the water quality within these systems is maintained and improved. The Agency feels very strongly that this landfill site has the potential to adversely affect the quality of the downstream waters and salmonid habitat of the river system. Therefore it is our view that this site is not suitable for this facility and an alternative site should be sought.

The Agency while lodging these objections to the proposed decision would also wish to request an oral hearing of the objection. Please find enclosed as part of the Loughs Agency's submission

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an independent geologists report on the **EIS** submitted to the EPA by Donegal County Council. We also enclose the oral hearing fee of €200 (the Agency is the Statutory Fisheries Authority for the region and as clarified with EPA qualifies for the lower fee).

Yours sincerely

pp Derick Anderson
Chief Executive

Review of Impacts on River Flnn Fishery arising from a Proposed Landfill at Meenaboll

for

Loughs Agency

Pentland Macdonald Ltd Report No. PM06-1002

Issue	Final	Date	17th January 06
Completed By	Tim Pentland	Reviewed By	Neil Macdonald
Position	Director	Position	Director
Signature		Signature	

TABLE OF CONTENTS

1 INTRODUCTION

During September-December 2004, Donegal County Council applied for Planning Permission and a Waste Licence for a proposed landfill at Meenaboll. In December 2005, the Environmental Protection Agency (EPA) granted a Waste Licence and it is understood that An Bord Pleanala have indicated its intention to grant Planning Permission.

The proposed landfill lies with the Finn Catchment which is an important salmonid fishery and candidate Special Area of Conservation. Loughs Agency is the statutory body charged with the conservation, protection and development of the fishery resources associated with the Finn Catchment. Loughs Agency has concerns over the possible effects on the fishery resources resulting from the landfill and intends to make an objection to the EPA's decision and request an Oral Hearing.

Pentland Macdonald Ltd was commissioned by Loughs Agency on 6th January 2005 to undertake the following:

- A review of relevant sections of the Environmental Impact Statement (EIS) and Additional Information submitted to An Bord Pleanála to accompany the Planning Application;
- A review of relevant sections of the Waste Licence (and attached conditions) and the EPA inspector's report;
- A site inspection.

The aim of the works was to provide an independent assessment of the potential impacts of the proposed landfill on the fishery in order to either:

a) provide supporting information for the objection to the granting of the Waste Licence; or
b) provide Loughs Agency with greater confidence that the fishery is unlikely to be significantly impacted.

2 METHODOLOGY

2.1 INTRODUCTION

The aim of the EIS is to identify all possible environmental impacts and to recommend mitigation measures in order to minimise or prevent any adverse impacts on any environmental medium. Early consultation by Donegal County Council's consultants with Loughs Agency during the preparation of the EIS identified the Finn catchment as an important salmonid fishery which required a high degree of protection from potential pollutants sourcing at the proposed landfill site.

2.2 WORKS UNDERTAKEN

Although impacts on the fishery are covered within the EIS, in light of the fact that a Waste Licence has been granted despite Loughs Agency's opinion that there remains the possibility of adverse impacts it was considered necessary to undertake an independent review of the investigations and assessments within the EIS with specific attention being paid to the fishery. Pentland Macdonald Ltd completed the review of the works undertaken in order to determine whether:

a) the hydrological and hydrogeological setting (i.e. baseline conditions) of the site had been adequately determined;
b) all possible impacts had been identified;
c) a sufficient, defensible assessment of the risks had been carried out; and
d) the mitigation measures are sufficient to guarantee maintenance of water quality in the fishery.

A site visit was undertaken by Pentland Macdonald Ltd to allow confirmation (or otherwise) of the prevailing conditions on site with respect to the review of the findings in the EIS.

In addition to the site visit and review of the EIS, a review of the Waste Licence was undertaken in order to assess whether the imposed conditions are adequate, in combination with the mitigation measures volunteered within the EIS, to incur a satisfactory degree of environmental protection with respect to the fishery.

2.3 REPORT FORMAT

The following outlines the format of the review:

- Section 3 summarises the baseline hydrological and hydrogeological conditions at the site and assesses the adequacy of these aspects of the EIS with respect to those factors affecting the fishery. The hydrogeological risk assessment carried out is also reviewed and discussed in Section 3.
- Section 4 identifies all possible impacts on the fishery; discusses what assessment works have been undertaken; discusses the mitigation measures proposed; and identifies any shortfalls in the EIS.
- Section 5 discusses the implications of the Waste Licence conditions.
- Section 6 provides a summary of the findings of the Pentland Macdonald Ltd review.

3 HYDROLOGY AND HYDROGEOLOGY

3.1 HYDROLOGY (SURFACE WATER)

3.1.1 REVIEW OF INFORMATION CONTAINED WITHIN EIS

The section of the EIS most relevant to the hydrological (surface water) setting of the site is Section 12 of Volume I – Surface Water. Various other aspects are pertinent such as the aquatic biology, rainfall data and hydrogeological considerations.

Investigations confirm that the entire proposed landfill lies within the catchment of a tributary of the River Finn system. The upper reaches of a stream referred to as Sruhanpollandoo source towards the southeast of the proposed landfill and the stream flows through the site towards the northwest. At a distance of approximately 100m to the NW of the proposed site boundary, the stream turns towards the southwest. The stream is joined by several other tributaries before its confluence with the Cummirk River (approximately 3km SW of the site) which flows broadly south to join the River Finn. Numerous man-made drainage channels (emplaced during the establishment of the forest plantation) transmit water to the Sruhanpollandoo.

It is recognised that stream flows are controlled largely by rainfall, topography and soil types and the EIS indicates that due to the interaction of these factors on-site the flow in the stream is likely to be flashy, i.e. the discharge responds rapidly to rainfall events. Rainfall is considered to be somewhere in the region of 1400-1600mm per annum with potential evapotranspiration data expected to be somewhere in the region of 577mm.

In terms of water quality, chemical analyses indicated that the water in the Sruhanpollandoo stream is typical of afforested areas of upland blanket bog typically with low pH; high iron and manganese; and occasional episodes of elevated artificial fertiliser impact. In terms of biological water quality the upper reaches are considered to be 'fair' while lower reaches of the stream are considered to be 'fair to good'. Slight impact on biological quality due to forestry activities is indicated.

3.1.2 CRITIQUE OF EIS CONTENTS

The assessment of the hydrology is relatively brief and although not necessarily factually incorrect (perhaps with the exception of rainfall data – see below) Pentland Macdonald Ltd considers that the assessment would have benefited from the following additional information:

1. More detail on the channel characteristics (parameters such as description of bed and banks, depth, width, sinuosity and degree of channelisation);
2. Indication of the flow regime and discharge volumes within the stream in the vicinity of the study area;
3. A discussion of the interaction between surface water and groundwater. A site inspection carried out by Pentland Macdonald Ltd indicated that in the vicinity of the site the stream was incised partially or entirely through the peat deposits and into the underlying clays, sands and gravel. In the lower reaches of the stream bedrock outcrop was noted in the bed of the stream. The implications of this are that several water bearing strata are present in the bed of the stream and baseflow of groundwater could contribute significantly to stream flow, particularly during dry periods.

4. More comprehensive chemical data during later (and therefore most relevant) monitoring rounds.
5. More information on the number, frequency and influence of the man-made drainage channels with respect to site hydrology.

By way of an associated issue, information provided by Loughs Agency suggests that the rainfall data quoted is not necessarily representative of the site specific conditions. Information provided by Loughs Agency indicates that annual rainfall figures for a rain gauge located within 3km of the site and at similar or slightly lower elevation, range from 1634mm to 2145mm per annum for the period between 1998 and 2004. These figures are significantly higher than those reported in the EIS.

3.2 HYDROGEOLOGY (GROUNDWATER)

3.2.1 REVIEW OF INFORMATION CONTAINED WITHIN EIS

The sections of the EIS most relevant to the hydrogeological (groundwater) setting of the site are:

- Section 11 of Volume I – Geology and Soils
- Section 13 of Volume I – Hydrogeology
- Section F of Volume II – Geology

Various other aspects are pertinent such as the rainfall data and hydrological (surface water) considerations.

Documentary review and site investigation identified three discrete geological layers beneath the site. These comprised:

1. Peat. Very soft, spongy, fibrous peat mantles the entire site ranging in thickness from 0.5 to 4.4m.
2. Glacial Till. Glacial till comprising ill sorted sand, gravel, cobbles and boulders in a finer grained matrix of fine sand, silt and clay was identified across the entire site beneath the peat and ranged in thickness from 0.5 to 5.2m.
3. Bedrock. A sequence of grey to dark grey psammitic schists (metamorphosed sandstones) and sub-ordinate pelite (metamorphosed mudstone) strata were encountered which were attributed to the Upper Falcarragh Pelite Formation of the Dalradian Supergroup (aged somewhere between 810 and 525 million years old). The formation comprises a thick sequence (c.600m) of such rock forming a NE-SW trending band through the region. The upper parts of the bedrock were found to be more significantly weathered and fractured to a depth of typically 0.5 to 2m. A fault zone characterised by irregular compound fractures (partially healed by quartz veining) and a dolerite dyke was identified close to the line of the Sruhanpollandoo stream. Several other possible minor faults were also identified.

In-situ hydraulic testing determined that the permeability of the glacial till was low to moderate with the higher permeabilities reflecting coarser sand and gravel rich regions and lower permeabilities reflecting clay and silt rich regions. The values measured ($3.4x10^{-4}$ to $2.5x10^{-7}$m/s) are within the expected range for glacial till. The bedrock permeability also varied with the more fractured, weathered surface exhibiting a higher permeability. Values ranged from $6.1x10^{-4}$ to $7.4x10^{-7}$m/s, falling within the expected range for fractured

crystalline or metamorphic rocks. The identified fault zone did not exhibit a higher permeability than the surrounding rocks.

Water level monitoring and observations during drilling suggested that the glacial till and bedrock strata were saturated. Groundwater flow direction is towards the northwest, broadly parallel with topography, and hence towards the Sruhanpollandoo stream. The site is therefore considered to fall within the River Finn catchment with respect to the groundwater. The hydraulic gradient was measured at approximately 0.092. Little temporal variation in water level was observed during a 2 week monitoring period due largely to the waterlogged conditions prevailing on site.

Groundwater quality was determined to be generally good with several elevated heavy metals species identified most likely resulting from bedrock mineralogy. The nearest groundwater abstractions were identified 3-5km from the site. Given their locations and distance from the site, these would not be impacted by any contaminant release.

An assessment carried out in accordance with the Geological Survey of Ireland (GSI) Groundwater Protection Matrix determined the site to possess an R2[1] rating which considers the setting acceptable for landfilling providing special attention is given to checking for high permeability zones, downgradient wells and projected future development of the aquifer.

3.2.2 CRITIQUE OF EIS CONTENTS

The site investigation and hydrogeological investigations carried out at the site are considered to be comprehensive and of a high standard. The geological and hydrogeological conditions are well defined with a high density of investigation points and a significant amount of in-situ and laboratory testing.

However, it is considered that the subsequent discussion of the findings would have benefited from the construction of a site conceptual model detailing the hydrogeological conditions and perhaps more importantly, defining the interactions between groundwater and surface water.

It is the absence of a discussion of the groundwater-surface water interactions that represents the main concern with regards to potential impacts upon the Finn fishery. As discussed in Section 3.1.2 Point 3, inspection of the bed of Sruhanpollandoo stream indicated the presence of glacial till in several sections close to the landfill. The till is a saturated, water bearing stratum with moderate permeability in parts and there is therefore potential for significant ingress of groundwater into the stream as baseflow. In the lower reaches, bedrock also outcrops in the stream bed, again highlighting the possibility of baseflow inputs to the stream. In the event of a reduction in quality of groundwater, there is the possibility of an associated impact on water in the stream. There is a requirement therefore to discuss the findings of the hydrogeological risk assessment in the context of risk to surface waters.

A further element of the groundwater-surface water interaction not discussed in the EIS is the situation arising from the inclusion in the landfill design of a groundwater drainage layer discharging to the surface water system. As the landfill will be excavated below the water table, the groundwater drainage layer is designed to transmit groundwater ingressing into the excavation to a constructed wetlands by gravity flow. The excavation therefore acts as a groundwater discharge zone, potentially changing the hydrogeological

regime and affecting contaminant transport pathways. A portion of leachate leakage may be transmitted to the constructed wetlands. The constructed wetlands discharges to the Sruhanpollandoo stream.

3.3 HYDROGEOLOGICAL RISK ASSESSMENT

3.3.1 REVIEW OF INFORMATION CONTAINED WITHIN EIS

The sections of the EIS most relevant to the hydrogeological risk assessment are:

- Section 6 of Volume I – Site Development
- Section 13 of Volume I – Hydrogeology (paragraphs 13.57 – 13.61).
- Section G of Volume II – LandSim Assessment

Various other aspects are pertinent such as the geology and soils information; rainfall data; hydrological considerations; site operations, restoration and aftercare; and several engineering cross section drawings in the Additional Information.

The hydrogeological risk assessment was undertaken using the Environment Agency's LandSim software, considered to be the most applicable risk assessment tool. The software models the predicted impact on groundwater resources beneath the site resulting from leakage of leachate through the base of the landfill, based upon site specific environmental data and proposed landfill design.

Based upon the input parameters specified in the EIS, it is reported that no significant contaminant loading of groundwater is expected with none of the relevant quality standards being significantly exceeded throughout the life of the landfill.

3.3.2 CRITIQUE OF EIS CONTENTS

The validity of any outputs from a predictive model such as LandSim is wholly dependant upon the relevance, defensibility and robustness of the input parameters. To this end the critique of the Hydrogeological Risk Assessment carried out by Pentland Macdonald Ltd focused upon assessing the applicability of the input parameters.

Table 1 below lists the main input values used in the risk assessment. Each is accompanied by an assessment by Pentland Macdonald Ltd as to the acceptability or otherwise of each. Input parameters that are based upon design specifications of the landfill are considered to be acceptable inputs. However this is based upon the assumption that construction will be carried out to a high standard of workmanship.

Those input parameters highlighted in grey are considered not to be acceptable. Use of these input parameters may result in a less than conservative assessment and result in the modelled output appearing less of a risk. Of particular importance are the input values for:

1. Infiltration (dependant upon rainfall data). If the rainfall data used is confirmed (through site specific measurement) to be erroneously low, the volumes of leachate generation could be significantly underestimated.

Parameter	Units	Value Input for EIS			Pentland Macdonald Ltd Notes
		Minimum	Most Likely	Maximum	
Infiltration - Uncapped Phase	mm/year		923		100% effective rainfall used (incident rainfall (1500mm) - potential evapotranspiration (577mm). However, it is considered that the rainfall data is not sufficiently site specific. Information provided by Loughs Agency suggests that incident rainfall at Meenaboll could be between 9% and 43% higher than the value used. In the absence of site specific data, a conservative range should have been input reflecting the uncertainty and allowing for the upland, exposed site.
Infiltration - Capped Phase	mm/year		92		10% Effective rainfall is an acceptable input but erroneous rainfall data input is carried through.
Phase Dimensions			various		Phase dimensions input as rectangles equivalent to average areas. This is considered to be acceptable.
Leachate Source - Waste thickness	m	5		18	Design value. Acceptable input.
Leachate Source - Field capacity of waste	Fraction	0.1		0.3	Model Default Value. Acceptable for the purposes of predictive modelling for a parameter that cannot be tested.
Leachate Source - Composition inventory	mg/l		various		Model Default Values. Acceptable for the purposes of predictive modelling for a parameter that cannot be tested.
Drainage Information - Slope to sump	Gradient		1:25		Design value. Acceptable input.
Drainage Information - Sump diameter	m		3		Design value. Acceptable input.
Drainage Information - Blanket thickness	m		0.5		Design value. Acceptable input.
Drainage Information - Blanket permeability	m/s	1 x 10-3		1 x 10-1	CQA specification allegedly reduced 1 order of magnitude to reflect clogging. The only reported minimum permeability in the EIS is 1 x 10-3. Reducing by 1 order of magnitude would result in a permeability of 1 x 10-4 which would be a more conservative input value. The higher values may reflect the inclusion of collection pipelines but this is not stipulated. CQA specification not included in EIS submission.
Drainage Information - Fixed head conditions	m		1		Conservative value if landfill well managed. Acceptable input.
Engineered Barrier - BES Construction Thickness	m		0.5		Design value. Acceptable input.
Engineered Barrier - BES Permeability	m	1 x 10-11		1 x 10-10	Input range implies a less permeable layer than the design value reported in the EIS therefore the input is not considered to be sufficiently conservative. CQA specification not included in EIS submission.
HDPE Defects - Pinholes	No. per ha	0	5	12	Based upon CQA with leak detection. Less conservative than default but agreed with model developers. Generally acceptable input.
HDPE Defects - Holes	No. per ha	0	2	2	Based upon CQA with leak detection. Less conservative than default but agreed with model developers. Generally acceptable input.
HDPE Defects - Tears	No. per ha	0	0.1	2	Model Default Value. Acceptable for the purposes of predictive modelling for a parameter that cannot be tested.
HDPE Defects - Area of each defect	mm2		various		Model Default Value. Acceptable for the purposes of predictive modelling for a parameter that cannot be tested.
Unsaturated Zone - Hydraulic conductivity	m/s	1 x 10-8		1 x 10-5	These values reflect a less permeable range than the measured values for the bedrock (which will directly underlie the landfill) so are not sufficiently conservative.
Unsaturated Zone - Pathway length	m/s	0.1		0.5	Allegedly estimated from borehole hydrograph data. However, landfill construction means that the base of the landfill is below the water table so there is no unsaturated zone and this value should be 0m.
Unsaturated Zone - Pathway moisture content	Fraction	0.1		0.25	The zone will be completely saturated being below the water table.
Unsaturated Zone - Longitudinal dispersivity	m	0.01		0.05	Calculated as 10% of the vertical pathway length. This would be 0m in the saturated zone.
Aquifer Pathway - Hydraulic gradient			0.092		Calculated from borehole monitoring data. May be affected by landfill construction but generally considered to be an acceptable input at this stage.
Aquifer Pathway - Hydraulic conductivity	m/s	6.4 x 10-7		1.5 x 10-5	Based upon in-situ tests but values from fractured surface omitted. Slightly less conservative but probably not an unreasonable assumption given that the majority of the pathway would be at the level of leakage - i.e. below the fractured surface.
Aquifer Pathway - Pathway porosity		0		0.1	Model Default Value. Could perhaps be more conservative by increasing maximum value but generally an acceptable input.
Aquifer Pathway - Dispersivities	m		various		Calculated by Model. Acceptable assuming other relevant inputs are acceptable.
Aquifer Pathway - Mixing Zone Thickness	m	5		20	Assumed value. Acceptable input.
Aquifer Pathway - Phase dimensions			various		Pathway lengths based upon a compliance point close to site boundary. Acceptable inputs.

Other General Model Setup Parameters	Pentland Macdonald Notes
Modelled as five phases with the first four capped and the fifth operational	Conservative in one respect (i.e. the majority of the void is filled hence maximum amount of waste) however. the situation modelled reflects the period during which the active phase (and area of maximum leachate generation) is furthest from the compliance point. It is not certain whether this is the worst case to be modelled. Does perhaps best reflect the long term impacts.
Substances modelled - chloride, potassium and ammoniacal nitrogen	Useful landfill contamination indicators
Substances modelled - mercury	Default leachate compositional value is lower than the IGV (quality standard) so this contaminant will never exceed the IGV upon release to the environment. Cadmium which is present in the default leachate at several orders of magnitude greater than mercury would be a more useful indicators of potential pollution.

2. The values assigned to the saturated zone. It is understood that the landfill will be excavated to below the water table and so the base will be entirely within the saturated zone. There is therefore no unsaturated zone at the Meenaboll landfill site.

A re-assessment using alternative input parameters was outside the scope of this review. It is therefore not known what effect revising the inputs in the table below would have on the overall output of the model. However, there are sufficient discrepancies with the input values to cast doubt over the validity of the outputs presented. In order to allow a greater degree of confidence in the output of the model it is considered that a revised modelling exercise would be beneficial.

As a further note, the groundwater drainage layer will transmit a significant proportion of groundwater from the vicinity of the base of the landfill into the surface water system. Leakage from the landfill will be released to the discharging groundwater in the drainage layer and a portion of the leaked leachate would therefore be transmitted to the surface water system. Although this would reduce risk of groundwater contamination it has not been considered in the risk assessment.

4 DISCUSSION OF POSSIBLE IMPACTS ON FISHERY

4.1 IDENTIFICATION OF IMPACTS

The major mechanisms by which the fishery could be impacted by the landfill are reduction in water quality through contaminant releases or changes in the flow regime. Accordingly, the list of possible impacts presented below is based upon a detailed review of the proposed construction and operation of the landfill compared against the environmental setting of the site. Lists A and B are comprised of those impacts identified in the EIS and List C comprises additional possible impacts that have come to light as a result of the Pentland Macdonald Ltd review.

List A

1. inclusion of significant qualities of suspended solids in stormwater runoff during construction.
2. inclusion of suspended solids in stormwater runoff from newly capped cells.
3. possible slight alteration of flow regime in Sruhanpollandoo due to change in land use.

In the 'Impacts' sections of the relevant chapters of the EIS very few possible impacts are explicitly identified and discussed. It is recognised however that several implied impacts are mitigated via design elements without having been formally discussed. For example, oil interceptors have been included in the drainage design without oil release being identified as a potential environmental impact. Therefore, List B below includes those impacts implied but not formally discussed in the EIS.

List B

4. release of fuels / oils from the plantshed, diesel tanks and pump due to accidental spillage or leakage.
5. release of leachate from storage tanks due to accidental spillage, leakage or overflowing.
6. run off of reduced quality stormwater associated with site infrastructure.

Pentland Macdonald Ltd has identified several additional possible impacts.

List **C**

7. alteration of flow and generation of significant suspended solids during culverting of upper reaches of Sruhanpollandoo.
8. reduction in surface water quality through ingress of reduced quality groundwater.
9. reduction in surface water quality through discharge of reduced quality groundwater from drainage blanket.

The identified possible impacts and the proposed mitigation measures are discussed in Sections 4.2.1 – 4.2.4.

4.2 **DISCUSSION** OF IMPACTS

4.2.1 **SUSPENDED SOLIDS RELEASE**

The generation and release of significant quantities of suspended solids can impact water quality and result in silting-up of stream beds. Four main mechanisms of suspended solids release were identified (points 1, 2, **6** and 7 in Lists A-C above).

The mitigation measures provided include early provision of settlement lagoons and a constructed wetlands during the construction phase to facilitate suspended solids removal through settlement and filtration. The sizing and design of these systems is fundamental to their efficacy and no information has been provided to date to give confidence in the system. Furthermore, if inappropriately maintained, their effectiveness could be significantly reduced resulting in suspended solids being released to the surface water environment.

It is noted that the scale of excavations are substantial with the possibility of very large quantities of sediment being generated. In addition, much of the excavated material will comprise peat. Fine grained, light peat particles can be particularly difficult to remove from suspension.

Further detail on the design of the lagoons and constructed wetlands and the management procedures would be welcomed. Furthermore, no measures have been put forward for the control of the suspended solids generated during works within the Sruhanpollandoo channel (e.g. during culverting).

4.2.2 **ALTERATION OF THE FLOW REGIME**

Alterations to the flow regime of the Sruhanpollandoo stream may result from in-channel works; changes in the run-off properties of the surrounding lands and changes to the hydrogeological regime.

These are considered to be minor given the regional context and no specific mitigation measures are considered necessary.

4.2.3 **RELEASE OF CONTAMINANTS ASSOCIATED WITH REDUCED QUALITY SITE RUNOFF; FUEL AND OIL RELEASES; AND RELEASE OF LEACHATE FROM STORAGE TANKS**

All tanks are to be adequately bunded. The proposed site drainage design includes oil interceptors and sediment traps to facilitate the prevention of contaminant release. Road drainage is directed towards a dedicated settlement lagoon. ***As*** a further polishing phase, all drainage is ultimately directed towards the constructed wetlands prior to release to surface water.

While these systems are satisfactory in principle, as with the management of suspended solids, their efficacy depends upon appropriate design and adequate management. No details of either have been provided to date and these would be welcomed. Furthermore, no information has been provided on what safeguards will be put in place to prevent leachate releases from the storage tanks.

4.2.4 DISCHARGE OF REDUCED QUALITY GROUNDWATER

Reduced quality groundwater may arise through leakage of leachate into either the underlying groundwater in the bedrock aquifer or the groundwater drainage blanket.

The hydrogeological risk assessment suggested that groundwater would not be significantly impacted due to the limited quantities of groundwater and the provision of a well constructed containment system. Therefore, no mitigation measures have been provided with respect to the impacts of reduced quality groundwater, because groundwater not expected to be impacted.

While it is accepted that this may be the case, there are sufficient discrepancies in the inputs to the risk assessment model to merit a lack of confidence in the outputs. In order to progress with confidence, assurances on the findings of the risk assessment would be required.

4.3 THE EFFECTS OF **DILUTION**

Although not fully discussed in the EIS, it perhaps should be noted that during the site inspection carried out by Pentland Macdonald Ltd, it was noted that the Sruhanpollandoo stream was a relatively small channel in the vicinity of the landfill but within a relatively short distance exhibited significant flow. This results from confluence of several tributaries, each contributing significant discharge.

The implication is that there is a very large dilution factor within a relatively short distance of the site. Any contaminant ingress to the stream may therefore represent a negligible impact given the magnitude of dilution.

The EIS does not attempt to quantify this dilution factor, which may have been a useful exercise in allaying fears of downstream pollution.

5 DISCUSSION OF RELEVANT WASTE LICENCE CONDITIONS

Several conditions within the Waste Licence directly relate to the maintenance of water quality in the fishery. These impart a legal obligation to control contaminant releases and theoretically enforce a greater degree of environmental protection during the operation of the landfill.

Perhaps of particular relevance are the following conditions:

2.1 Facility Management – This requires that the landfill be operated by suitably qualified personnel.

2.2 Environmental Management System (EMS) – this requires that an EMS be established to document, communicate and maintain good environmental practice.

3.6 Landfill Lining – This condition sets out minimum standards of liner construction.

3.13 Tank and Drum Storage – aimed at preventing liquid contaminant release.

3.15 Silt Traps and Oil Separators – aimed at preventing reduced quality runoff.

3.18 Leachate Management Infrastructure – aimed at preventing release of leachate from storage tanks.

3.20 Surface Water Management – requesting a detailed and defensible design of the constructed wetlands and settlement lagoons.

3.21 Groundwater – requirement for the groundwater discharged from the drainage blanket to be discharged via the settlement lagoons prior to discharge to the constructed wetlands.

5 Emissions – preventing any emissions to surface waters that could '...cause tainting of fish...' and making provision for continuous monitoring of water quality in the settlement lagoons

6.5 Groundwater – including setting of groundwater trigger levels.

6.12-6.22 Establishment of a rigorous monitoring programme.

Schedule **C** Details the monitoring requirements.

The conditions attached to the Waste Licence allow for considerable environmental protection, providing they are adhered to throughout the life of the landfill.

6 SUMMARY

A review of the Environmental Impact Statement submitted by Donegal County Council; a review of the EPA Waste Licence conditions; and a site visit were completed by Pentland Macdonald Ltd in order to independently assess the possible impacts on the Finn fishery associated with a proposed landfill development at Meenaboll. The findings are summarised below.

The assessment of the hydrology (surface water) of the site within the EIS was considered to be relatively brief and while identifying the major elements of the surface water regime would have benefited from additional detail in some areas. Based upon information provided by Loughs Agency, the rainfall data (a major factor in determining flow regimes) attributed to the site appears to be erroneously low.

The hydrogeological setting of the site was well determined through site investigation and in-situ and laboratory testing. However, there was considered to be a notable shortfall in the discussion of the interaction between groundwater and surface water which is considered to be a major consideration at the site. Construction of a conceptual model illustrating the interactions would have been a beneficial exercise. The absence of such as discussion resulted in several possible impacts on the fishery being overlooked and resulted in several discrepancies in the hydrogeological risk assessment.

The hydrogeological risk assessment was carried out using the most appropriate software tool. However, confidence in the outputs of the model (which suggested no significant impact upon groundwater) is considered to be low due to discrepancies in the input values – particularly with respect to the rainfall data and inclusion of an unsaturated zone which will not be present at this site.

Very few actual relevant impacts were noted in the EIS however, in broad terms the main possible impacts comprise:

1. suspended solids release (particularly during construction elements)
2. contaminant release from reduced quality runoff and releases from storage tanks
3. discharge of reduced quality groundwater

It must be assumed that the first two impacts from the above list will be adequately mitigated through implementation of the proposed mitigation measures and imposed conditions of the Waste Licence. These measures include settlement lagoons, a constructed wetlands, oil interceptors and silt traps aimed at reducing contaminant levels in surface waters leaving the site. Imposed environmental management and monitoring programmes aim to provide a further degree of confidence in the likely environmental protection.

However, the efficacy of the systems is dependant upon adequate detailed designs and sufficient management and maintenance. The designs of the pollution prevention measures and the management and maintenance procedures are not available for inspection.

There remains uncertainty over the possible impacts associate with discharge of reduced quality groundwater either by baseflow or via the groundwater drainage blanket. Until a robust, defensible risk assessment has been carried out it is considered that this potential impact has not been adequately addressed.