# APPLICATION

**By**

## Donegal County Council

**to**

## Environmental Protection Agency

**for**

**Waste Licence Review**

**W0024-02**

**Ballynacarrick Landfill Site,**

**Ballintra County Donegal**

## ATTACHMENTS TO SECTION K

## Remediation, Decommissioning, Restoration and Aftercare

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**ATTACHMENTS TO SECTION K** **REMEDIATION, DECOMMISSIONING, RESTORATION AND AFTERCARE**

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**Appendix K**

Refer to Drawings

IBL0266/111 Capping Plan

IBL0266/112 Final Contours

IBL0266/106 Surface Water Infrastructure

IBL0266/110 Monitoring Points

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## ATTACHMENTS TO SECTION K

### Attachment K.1 Cessation of Activity

The Environmental Impact Statement previously undertaken in 2003 has been included as a reference document for information purposes only.

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## RESTORATION AND AFTERCARE

### INTRODUCTION

The restoration and aftercare plan for Ballynacarrick Landfill Site has been revised to take into consideration the proposed changes in the final contours for the site. A key component of landfill design is the restoration and aftercare of the landfill after it has ceased receiving wastes. The purpose of the process is to cap the site to reduce leachate generation and to facilitate environmental management and to return the landscape to beneficial use. The site will be progressively capped and restored at regular intervals during its remaining life as detailed in Drawing IBL0266/111 Capping Plan and in accordance with letter dated 20th June 2007 Ref- Circular letter to all landfills from EPA regarding revision of strategies outlined in operation (Landfill Operational Practices) and design (Landfill Site Design Manuals).

The capping and restoration layers are designed to contain the wastes, to control the ingress of rainfall and surface water thereby managing leachate production and to provide a suitable growing medium for restoration planting.

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### RESTORATION PROPOSALS

Drawing IBL0266/111 Capping Plan shows the stages of restoration which have been carried out or are intended to be carried out over the remaining lifetime of the facility. The majority of the original and unlined part of the site has been capped. Therefore, following completion of infilling and allowing time for settlement, the remaining phases will be capped and progressively restored. Once any one phase has been capped, it will be restored in the first available soil moving season. The overall profile consists of two essential elements, a low permeability capping to minimise water infiltration of the wastes, and a layer of soil to meet the restoration objectives.

The permanent capping of the remainder of the site will be undertaken as detailed in Table K.1.

**Table K.1 Programme for Permanent Capping**

| Cell | Permanent Cap |
|---|---|
| Phase 1 & Cell 2A, 2B | 2009 |
| Cell 2C | 2011 |

* To commence within 12 months of issuing the revised licence. This is to include for infilling of waste within Phase 1 and Cell 2A to achieve the revised contour levels.

The infilling of waste within Phase 1 and Cell 2A to achieve the revised contour levels will be undertaken when the revised waste licence is issued. This is expected to commence within 3 months of the revised licence being issued. It is expected that filling in this area will take 6 months to achieve the revised



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contours. Capping of these phases will commence within 3 months after waste disposal ceases in this area. Phased Capping of Phases 1, 2A, 2B & 2C will be undertaken as shown on Drawing IBL0266/111 Capping Plan.

An interim capping arrangement, to reduce odour at the site, is proposed to be placed on the uncapped slope areas of Phase 1 and 2B. This will consist of a 1mm LLDPE liner. The interim capping will provide a seal which shall improve the efficiency of the gas collection system reducing passive venting and odour. This will be undertaken in 2008.

## CAPPING DESIGN

### Permanent Cap

Details of the proposed restoration and cap profile are shown on Drawing IBL0266/112 Final Contours. Following completion of infilling, a regulating layer will be laid over the final layer of waste. A geonet layer will be placed to act as a gas collection layer with a Geosynthetic Clay Liner (GCL) placed as the containment layer. The GCL sheets will be overlapped in accordance with the manufacturers instructions. As with the basal lining system, CQA procedures will be adopted.

Above the GCL a geonet drainage layer will be installed, to drain any water which infiltrates through the restoration sub-soils above. Finally the restoration soils will be placed. It is envisaged that a 150 mm restoration top soil layer (settled depth) will be placed above a 850 mm sub-soil layer. Appropriate additional depths of soils will be provided in the areas where tree planting is proposed over the landfill cap.

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Placement of restoration soils on each cell will take place in the first available soil moving season following completion of capping of that cell. Soils will be placed using machinery of low load bearing weight whilst soils are dry and friable. Care will be taken to avoid unnecessary trafficking over previously placed soil.

Following topsoiling the surface will be prepared for seeding. The preparation carried out will depend upon the time of seeding and the circumstances of the soils (ie need for weed removal, stone picking etc).

### Interim Cap

An interim capping arrangement, to reduce odour at the site, is proposed to be placed on the uncapped slope areas of Phase 1 and 2B. This will consist of a 1mm LLDPE liner. The interim capping will provide a seal which shall improve the efficiency of the gas collection system reducing passive venting and odour.



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**SURFACE WATER DRAINAGE**

The site has been designed to provide good surface water run-off from the site in order to reduce the likelihood of surface water ponding.

Surface water run-off from the capped and profiled landfill will be collected in the existing peripheral drains as shown on Drawing IBL0266/106 Surface Water Infrastructure. Theses drains consist of perforated concrete pipe, bedded into a trench and backfilled using a 20mm clean stone. The pipe discharges the surface water run-off into the existing watercourse to the North West of the site.

**SETTLEMENT**

Landfilled wastes will continue to settle over a protracted period due to physical compaction and biological degradation. It is, therefore necessary to estimate the amount of settlement that will occur if proposed final levels are to be achieved. Experience has shown that a settlement allowance of 15% of the overall depth should be allowed. Slopes on the restoration profile vary between 1 in 3 and 1 in 8 and as such can accommodate differential settlement within the cap without compromising the ability of the cap to shed surface water.

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**POST CLOSURE MONITORING**

All post closure monitoring will be in accordance with the requirements of the Environmental Protection Agency's Manual on Landfill Monitoring. The minimum requirements for aftercare monitoring are shown in Table K.2. The location of the aftercare monitoring points are shown in Drawing IBL0266/110 Monitoring Points.



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**Table K.2 Proposed Aftercare Monitoring Programme**

| Parameter | Frequency | Determinand |
|---|---|---|
| Surface water | Six Monthly will depend on water body and flow rate.<br>Annually | $NH_4$-N, BOD, COD, Cl, DO, EC, pH, TSS, Temp<br>Cd, Cr, Cu, Fe, Pb, Mg, Mn, Hg, K, $SO_4$, Alk, $PO_4$, TON, Zn |
| Groundwater | Quarterly (may be reduced to 6-monthly if there is evidence of stable conditions).<br>Annually (may be reduced to bi annually if there is evidence of stable conditions). | Visual, Groundwater level, $NH_4$-N, Cl, EC, pH, Temp, Fe, TON.<br>Cd, Cr, Cu, Cn, Pb, Mg, Mn, Ni, Hg, K, $SO_4$, Alk, $PO_4$, Zn, Phenols, List I & II substances. |
| Landfill gases | Six Monthly | $CH_4$, $CO_2$, $O_2$, AP |
| Leachate levels | Monthly (reduce to quarterly if stable conditions prevail) | Leachate level |
| Leachate Volume and Composition | Six Monthly<br>Annually (may be reduced to bi annually if there is evidence of stable conditions). | Visual, Level, $NH_4$-N , BOD, COD, Cl, EC, pH, Temp, TON<br>Cd, Cr, Cu, Fe, Pb, Mg, Mn, Hg, Ni, $SO_4$<br>Tot. Phos, Zn. |
| Meteorological Data | Monthly | Precipitation, Temp, Wind, Evaporation, Humidity, Atmospheric Pressure |
| Other parameters | Annually | Settlement |

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**LANDSCAPING**

Landscaping proposals were described in full in Section 15.0 of the Environmental Impact Statement previously undertaken in 2003, but are summarised below as they form a key element of the site restoration proposals.

It is not proposed to carry out major areas of landscaping on the landfill site itself. This is consistent with good landfill practice, as root systems from trees and shrubs, etc, may compromise the integrity of the capping system (ie the GCL). However, it is recognised that the restoration of the site would benefit from the planting of hedgerows and trees both in terms of creating a visually acceptable landscape in the long term and help where possible to screen operations by advance works.

It is therefore proposed to carry out the landscaping works as previously proposed in the EIS 2003.



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Perimeter planting has been undertaken prior to the commencement of landfilling operations in Phases 1 and 2. A perimeter berm has been constructed along the eastern and southern boundary of the site. The perimeter berm along the western and southern boundary of Phase 1 has been planted with Ash (*Fraxinus excelsior*), hawthorn (*Cratagegus monogyna*), Alder (*Alnus Glutinosa*), Holly (*Idex Aquifolium*), Elder ( *Sambugus Nigra*), Hazel (*Corylus Avallana*), Willow (*Salix Caprea and cinera*), Birch (*Beyula Pubsescens*) and Sorbus (*sorbus Acuparia*).

Further planting is to be undertaken along northern and eastern boundary of Phase 2 before the end of 2007.

**SITE AFTERCARE**

Donegal County Council will assume responsibility for the aftercare management of the site. The Council will ensure that a suitable level of staffing is maintained to allow this process to continue as required.

The following aftercare issues are likely to be considered depending upon site conditions:

- The need for a programme of soil analysis to determine requirements for liming and fertilising during the year;
- Need for ripping or other treatment of the soils to improve drainage;
- Areas where reseeding is necessary and any changes to the rate of seed application or seed mix;
- Modifications to the mowing or grazing regime.

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This will be carried out in addition to the environmental monitoring, which will continue whilst the site licence is maintained.

Leachate treatment will be ongoing during site operation, restoration and closure. It is proposed that leachate recirculation should be included in this system to use the flushing effect on the waste mass. Leachate monitoring with regard to level, volume and composition will continue on the site to allow an assessment to be made on the duration of treatment post closure. The cessation of treatment will be by agreement with the EPA on the basis of the results of ongoing monitoring.

Landfill gas management will also continue on the site, be it active or passive. When management of the system ceases by agreement with the EPA the passive system will be left in place.

**Aftercare of infrastructure**

During the aftercare period the maintenance of the gas management system shall include:

- Regular monitoring of boreholes and balancing of landfill gas wells,
- Monitoring of the flare stack for combustion efficiency and emissions.



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Performance and gas yield will identify areas where maintenance works are required. Any remedial work required to wells and pipework shall be carried out in a manner with minimal impact on the proposed afteruse.

Leachate monitoring will include regular checks of the leachate monitoring points and pumping system. Any remedial works or modifications to the leachate system, including collection, treatment and monitoring systems, shall be carried out with minimal impact on the afteruse.

The current SCADA System installed at the site for leachate and landfill gas management will be maintained with Call Out system should problems arise. The SCADA system will be accessible from Donegal County Council Office.

In the event that maintenance to the capping system is required, it will be ensured that the repaired cap is properly sealed to prevent the ingress of water and the various layers re-laid. The effectiveness of the drainage system will be monitored and any remedial works to the drainage layer or surface water collection system will be carried out where required. If required, the site operator will employ soil specialists to undertake soil maintenance checks to assess the physical and chemical status of the soils.

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All drainage ditches and outfalls carrying run-off from the site will be regularly checked to ensure effective surface water flows are being maintained. Any depressions created through settlement will be re-profiled to ensure surface water runoff.

A surface water management plan will be implemented as part of the final capping to prevent the ingress of water.

**Vegetation**

The long-term aftercare of the site will require vegetation management. This will require fencing, cutting, fertilising and replanting in areas where vegetation may not be flourishing. Personnel with appropriate landscape experience will undertake such maintenance work.

**Decommissioning**

It is envisaged that the site building, leachate treatment plant and gas flare stack will all be retained on site post closure. Ultimately it will be possible to remove the building, leachate treatment plant and gas flare stack. The weighbridge, wheelwash and waste inspection area will be removed after completion of the final phase of restoration on the infilled area. The perimeter security fencing will be removed and replaced with post and wire fencing except for areas involved in the ongoing aftercare management of the site.



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All controls shall be maintained on-site until the EPA approves of their decommissioning. Once leachate abstraction and landfill extraction is no longer required, decommissioning and removing of redundant structures shall take place. All work in relation to leachate and landfill management shall be carried out in an environmentally safe manner and shall not adversely impact the afteruse or users of the restored site.

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