INSPECTORS REPORT

WASTE LICENCE REGISTER NUMBER 23-1
APPLICANT: Cork County Council
FACILITY: Raffeen Landfill
INSPECTOR'S RECOMMENDATION: That the waste licence be granted subject to conditions.

(1) Introduction:

Raffeen landfill is an existing landfill site and has been operated by Cork County Council since 1979. The application for a licence from the Agency was made in 1998 and an Environmental Impact Statement (E.I.S.) was required due to the increase in waste acceptance at the facility from 30,000 tonnes per annum in 1997 to 60,000 in 1998. The applicant proposes that the continued operation of Raffeen landfill site will serve the urgent short-term requirement for solid waste disposal in Cork County and city, and that the site will be closed on a phased basis.

Raffeen landfill site is situated southeast of Cork City in the Cork Harbour Estuary area, approximately 1.9 km. from the centre of Monkstown and adjacent to Monkstown Creek. The site consists of 7.3 hectares running in a roughly NW/SE direction comprising a valley which forms part of the natural drainage to Monkstown Creek. It is an elongated site (roughly 750m long and varying between 50 and 150m wide) with the gradient falling off steeply from north-west (benchmark 161.6 ft/ 49.25m O.D.) towards the south-east end (65.9 ft/ 20.08m O.D.). The site is located in a worked-out quarry and quarrying activities are ongoing adjacent to the road which leads to the landfill and directly opposite the landfill site. To the north of the site is an area where landfilling has taken place historically. This area has now been capped and grassed but the capping system has not been engineered. Condition 9.11 requires a proposal for the inclusion of this area the monitoring programme.

The application refers to the phasing of future landfill operations into five different cells/areas all of which have been previously landfilled. The facility is currently operated on the principal of dilution and dispersion of the leachate generated as the groundwater table intersects the waste mass.

The draft proposed decision recommends the grant of a licence subject to the cessation of acceptance of all non-inert waste types from the date of grant of the licence. Continued landfilling with inert material to a level to be agreed with the Agency will be permitted in the short term as part of the phasing out of all landfill activities at the facility, and as part of restoration and aftercare development. The remaining space available for waste acceptance will be defined after the restoration and aftercare plan (required by Condition 8.1 within 6 months of the date of grant of licence) has been agreed by the Agency.

In recommending the above, I consider that continued acceptance of non-inert waste types would not comply with the requirements of Section 40(4) of the Waste Management Act, 1996. In coming to this recommendation I have had regard to the following matters:

- The lack of leachate control measures;
- The impracticability of upgrading the facility to meet BATNEEC standards;
- The unsuitability of the site for landfilling of waste from a hydrogeological/ groundwater protection point of view (discussed further in section (4) below);
- Evidence of existing groundwater pollution and the likelihood of further pollution;
- The requirements of the Groundwater Directive (80/68/EEC) and S.I. No. 271 of 1992 (as amended).

Civic Waste Facility

In my opinion the siting of a Civic Waste Facility at Raffeen, as applied for in the application should be refused for reasons of safety and accessibility. Raffeen is not situated in any population centre and perhaps Carrigaline or Monkstown would provide a more appropriate site for a facility of this nature. The quantity of waste accepted per year at the current Civic Waste Facility is small – estimated as a maximum of 60 tpa. Such quantities would not justify the operation of a civic waste facility at the landfill. In my opinion the operation of the current recycling facility by the applicant at Raffeen landfill is unsafe (see accompanying photographs) as is the location of the proposed site (adjacent to proposed waste quarantine area). In addition to the above the steep side slopes of the waste mass at the facility are a cause for concern and ongoing slope stability monitoring is required by the licensee. In my opinion public access to the facility would put the safety of the public at risk. Further, there is no reference to any Civic Waste Facility at Raffeen landfill in the Cork County W.M.P. Taking the above into account the following activities are proposed for refusal: Class 12 of the 3rd Schedule and Classes 2 and 3 of the 4th Schedule of the Waste Management Act, 1996.

C& D Waste Recovery

The proposed decision allows for recovery and recycling of construction and demolition. The recovery and recycling of construction and demolition waste shall only be for the purposes of restoration of the landfill. In arriving at this decision I have had regard to the matters discussed under 'Civic Waste Facility' above, as well as the fact that space restrictions on site render the site unsuitable for any large-scale construction and demolition waste recovery activity.

Appendix 1 contains a site location map and a plan showing the layout of the facility.

Potential nuisances are controlled by Condition 6 'Environmental Nuisances'.

Quantity of waste (tpa) to be accepted	40,000
Environmental Impact Statement Required	Yes
Number of Submissions Received	2

FACILITY VISITS:

DATE	PURPOSE	PERSONNEL
13/03/98, 30/04/99,30/05/99	Site notice check	Tadhg O'Mahony
26/08/98,	Site visit	Tadhg O'Mahony, Gerry Carty
14/10/98	Site visit	Tadhg O'Mahony, Brian Donlon, Anne Butler
09/06/00	Familiarisation with site	Maeve McHugh, Michael Henry

(2) Facility Development

- **Landfill Gas Management;**

Gas extraction pipelines are to be installed within the waste in a grid-like formation at roughly 30m intervals. Gas extraction boreholes will be placed at grid intersections. It is proposed to utilise five existing site investigation boreholes as combined landfill gas and leachate monitoring boreholes on-site. Condition 9.2 requires monitoring proposals to detect offsite migration of landfill gas.

Condition 8.1 requires a comprehensive restoration and aftercare plan to be submitted to the Agency for agreement. A slope stability survey of the site was carried out in August 2000. According to the response to Art 16 notice (dated 30/08/00) 'the survey indicated that a substantial portion of the slopes at the site are at a gradient of less than 1:2. It is proposed by the applicant that in order to ensure the stability of the slopes on site that all slopes would be at a maximum gradient of 1:2.5'. The applicant therefore proposes that the final gradient is to be 1:2.5 in an east to west direction and 1:10 in a north to south direction. The proposed aftercare use of the facility is to return it to an agricultural end use. The EPA Manual on 'Landfill Restoration and Aftercare' states that a slope of 1 in 3 (18°) is the limit for two wheel drive tractors with fully mounted equipment; 1 in 4 is the limit for most machinery used in cereal and grass production including combine harvesters and 2-wheel drive tractors with fully trailed equipment; 1 in 8 is cited as the maximum slope for arable agriculture. Condition 8.2 recommends that final slopes will be no steeper than 1:3 for any part of the site. Other aspects of the proposed restoration plan may still be valid such as the devotion of certain parts of the site to encourage wildlife. Therefore condition 8.1 requires that a

revised restoration and aftercare plan be submitted to the Agency – this will be based upon the plan submitted as part of the response to Art 16 notice (dated 30/08/00) but will is required to be more specific in terms of final use etc. As the restoration and aftercare plan is vital in determining the remaining life span of the facility it is required within 3 months of date of grant of the licence.

(3) Waste Types and Quantities

The total quantity of waste applied for is 60,000 tonnes per annum. This is based on a projection of quantities accepted since 1998, although to date there has been no weighbridge on the site. The type of waste applied for to be disposed of at the landfill is non-hazardous waste consisting of household (10,000 tpa), commercial (10,000 tpa) and construction and demolition wastes (40,000 tpa). It is estimated that 500,000 tonnes of waste of various types have already been deposited over the lifetime of the landfill. No sewage sludge, industrial non-hazardous liquids, household waste, commercial waste, sludges or hazardous wastes are to be accepted once the licence is granted. As 40,000 tpa of construction and demolition waste have been applied for the proposed decision is to limit the total quantities of waste to a maximum of 40,000 tpa of inert waste.

(4) Emissions to Air

Dust will continue to be a source of emission to air in the short to medium term while the handling of waste continues on site followed by the restoration works. Condition 6.6 provides for the control of airborne dust nuisance. Dust from the adjacent quarrying activities is also likely to contribute to emissions to air. Odours from the landfill and landfill gas will be controlled by the use of good site operational practices such as the requirement to cover waste at the end of each working day (Condition 5.8). Condition 4.14 requires the installation of landfill gas collection and flaring infrastructure. A proposal for the utilisation of the landfill gas is also sought (Condition 4.14.4).

There are two main sources of noise at the facility (1) site machinery and (2) vehicles depositing waste. Noise monitoring was carried out at seven locations (three boundary positions and four residences). At the three boundary positions L_{A90} was 29dBA, 33dBA, and 38dBA respectively – in these positions passing traffic and intermittently audible landfill operations controlled the noise environment. At the four residences the situation was similar with traffic dominating and intermittent noise from the landfill operations. L_{A90} at these locations was 43, 44, 50 and 41 respectively. Noise emission limits are set out in Schedule F, Table F.1 of the proposed decision. It is also thought that construction and demolition waste recycling would also be a source of noise emission and that the adjacent quarrying activity is a source of noise emissions.

(5) Emissions to Groundwater/Hydrogeology

- **Geology**

The site is located in a worked out quarry and consequently the overburden geological materials had been removed prior to landfilling. The regional geology map of the area shows that the site is underlain by three different lithologies. From north to south these are: the Gyleen formation, the Old Head Sandstone Formation and the Castle Slate Member. All three lithologies consist of interbedded sandstones and shales. Site specific investigations (bedrock drilling) show sandstones and shales showing fracturing to varying extents.

- **Hydrogeology**

Pumping tests done on these lithologies indicate that they generally form 'poor' aquifers but some yields suggest that they may be 'locally important' in places (according to GSI definition). From the point of view of groundwater vulnerability to contamination the lack of any overburden geology places the site in the 'extremely vulnerable' category.

According to the 1999 publication 'Groundwater protection' the response matrix for landfills on poor or locally important landfills with no overburden material (response $R2^2$) states the development may be 'acceptable subject to guidance outlined in the EPA Landfill Design Manual or conditions of a waste licence'.

The existing site shows fractured slates and sandstones directly underlying the landfilled area, which may provide a preferential flow path/high permeability zone for the groundwater/leachate flow underlying the site. No effective groundwater control measures are proposed by the applicant and the high water table present on site means that the water table intersects the waste mass. Therefore there is risk of leachate movement to these zones.

The monitoring programme specified in Schedule E includes the ongoing monitoring of wells downgradient of the landfill. As a requirement of Condition 4.13, the applicant must submit a proposal for integrated groundwater, surface water and leachate management at the site to ensure the protection of surface and groundwater. Appendix F of the E.I.S. (Volume 4) states that at present local houses receive their water supply from municipal water schemes, and it is understood that water for animals in the area is also received from a municipal supply. It also states that there are no wells in the immediate vicinity of the landfill.

- **Landfill Leachate Management;**

The applicant proposes to utilise an existing surface water collection pipeline as a leachate collection pipe. It is proposed by the applicant that the leachate in this pipeline will gravitate to a pump sump and from there it will be pumped to a leachate holding lagoon before being tankered offsite to Carrigaline to be disposed of by marine outfall without treatment. Condition 7.5 requires that an leachate or contaminated water removed from the facility shall be discharged to a sewer or transported to a Wastewater Treatment Facility whose name and location has been agreed with the

Agency. As the site is unlined and the water table high there is a very close relationship between surface water, groundwater and leachate. In my opinion the applicant has not shown that the existing surface water collection pipeline can operate as an effective leachate collection system. The response to Art 16 notice dated 11/08/00 states that 'it is estimated that 40-50% of the leachate generated on site will be collected by the proposed leachate control measures'. A combined surface water, groundwater and leachate management plan is therefore required under Condition 4.13 and leachate treatment will be required.

- **Groundwater quality**

There is evidence of groundwater pollution on site as there is deterioration and variability in quality downstream within the landfill site in comparison with the upstream monitoring location. Leachate indicator parameters including ammonia, conductivity, nitrite, nitrate and potassium are all present at Raffeen in groundwater samples taken in levels above the Drinking Water Standards (S.I. No. 81 of 1988). Levels of ammonia recorded approach or exceed the levels prescribed in the Drinking Water Standards (S.I. No. 81 of 1988) in all boreholes and reaching 57.9 mg/l and 25.5 mg/l in June and August 1998 respectively. Nitrate and nitrite are present in very variable levels and levels are higher in the downstream monitoring locations (GW1 is upstream of the landfill and all subsequent monitoring locations are within the landfilled area) with nitrates reaching 50.63 mg/l in GW4 and nitrites reaching 32.91 mg/l in GW2. Potassium also shows increasing variability and levels in the downstream boreholes reaching 65.7 mg/l in borehole GW3, 342 mg/l in GW4 and 135 mg/l in GW5. Cadmium which is a List I substance under the Groundwater Directive (80/68/EEC) is present in levels which exceed the drinking water standard (0.012 mg/l, M.A.C. 0.005 mg/l). In my opinion due to the hydrogeological conditions prevailing on site whereby the groundwater table intersects the waste mass there is likely to be dilution of the levels of these chemical parameters. It is also possible that there may be a tidal influence. It is also the case that at present emissions to groundwater from leachate comprise direct discharges. However conditions of this licence will minimise the quantity of pollutants reaching groundwater.

(6) Emissions to Surface Water

As stated above the current hydrological regime onsite indicates that groundwater, surface water and leachate are closely linked. Condition 4.13 requires a proposal for the integrated management of groundwater, surface water and leachate to maximise the protection of water resources within the vicinity of the facility.

There is evidence of surface water contamination caused by the landfill as there is deterioration in quality downstream of the landfill in comparison with the upstream monitoring location. For example ammoniacal nitrogen is measured at levels less than 1 mg/l on seven different occasions between January 1998 and February 1999 at a location upstream of the site (SW1). At monitoring locations SW2 and SW3 further

downstream the levels are higher and more variable ranging from between 3.38 and 14.9 mg/l at SW2, and 0.27 and 9.87 mg/l at SW3.

(7) Other Environmental Impacts of the Development

Ecology

Monkstown Creek is designated as a 'Natural Heritage Area' NHA (site code 001979). The area consists of mudflats, which provide an important feeding area and wintertime refuge for waterfowl. The mudflats are fringed by a small amount of saltmarsh vegetation and two areas of semi-natural woodland. The most southerly boundary of the site is about 100m metres distance from Monkstown Creek.

Birds

Correspondence received from the Irish Aviation Authority was included in the Environmental Impact Statement (Volume 4) regarding the potential increased risk of bird strikes at Cork airport due to birds at Raffeen landfill. This correspondence was reissued to the applicant for comment as part of the Art 16 notice dated 23/06/00.

Cork County Council's response discusses the fact that no specific studies have been carried out on birds at Raffeen landfill but recommends that a survey be carried out. Condition 6.7 requires that vermin, birds, flies, mud, dust and odours do not give rise to nuisance at the facility or the immediate area of the facility. Condition 6.8 requires an updated assessment of the requirement for monitoring of bird populations at the landfill.

In my opinion due to the waste acceptance criteria recommended by the proposed decision (strictly allowing only inert waste to be accepted) bird usage of the landfill should decrease as a source of food will no longer be available.

Traffic

Noise monitoring carried out as part of the licence application showed that traffic on the local roads comprised the most significant noise source.

Local Quarrying Activities

Adjacent quarrying activities also contribute to traffic and noise in the local area.

Agriculture

Correspondence was received from Teagasc as part of the Environmental Impact Statement (Volume 4) regarding concerns for the potential negative impact on farming activities and animal health caused by birds, vermin, dust, odour, ground and surface water quality, noise/transport. This correspondence was reissued to the applicant for comment as part of the Art 16 notice dated 23/06/00.

Cork County Council's response discusses the fact that Section 8.5 of Volume 1 of the E.I.S. outlines potential impacts of the landfill on the agricultural activity in the

surrounding area as well as recommended mitigation measures. Condition 6.11 requires that the licensee shall carry out such mitigation measures as are recommended in this section of the E.I.S. such as: the installation of an adequate system of netting, the use of vermin control specialists, the covering of waste loads, litter patrols, leachate collection and treatment, landscaping of the site etc.

(8) Waste Management, Air Quality and Water Quality Plans

Waste Management Plan for Cork County Council (May1999)
The Waste Management Plan for Cork County states that based on the licence application Raffeen landfill has a total remaining capacity of 300,000 tonnes. However in their response to an Art 16 notice (dated 30/08/00) Cork County Council estimated the remaining capacity of the landfill to be 90,735m^3. The Plan makes no reference to any Civic Waste Facility at Raffeen. This is discussed in more detail in Section 1 above.

Air Quality Management Plan
There is no Air Quality Management Plan for Cork County.

Water Quality Management Plan
There is no Water Quality Management Plan for Cork Harbour.

(9) Submissions/Complaints

Two submissions were received from the South Western Regional Fisheries Board. The first submission was copied to the applicant for comments as part of the Article 16 notice.

(1) South Western Regional Fisheries Board (received 11/09/00)
The principal concern of this submission is that management of this facility should incorporate effective leachate collection, containment and disposal/treatment methods which at present it does not.

Condition 4.13.1 requires the licensee to submit to the Agency for its agreement proposals for integrated surface water, groundwater and leachate management, including monitoring at the facility. Proposals are required for the installation of measures to remediate existing contamination of water resources in the vicinity of the facility, measures to prevent the migration of contaminated waters offsite, monitoring and timescales for implementation of these measures.

(2) South Western Regional Fisheries Board (received 10/10/00)
This second submission relates to the comments made by the applicant in relation to the first submission by the South Western Regional Fisheries Board in the response to the Article 16 notice. The concerns expressed again relate to surface water and groundwater protection and the control of leachate.

See response to submission (1) above, as well as discussion in sections 5 and 6 above.

Signed _____ Dated:

Inspector, Environmental Management & Planning

APPENDIX 1
LOCATION MAP & LAYOUT PLAN