Former Municipal Landfill

Moate,

County Westmeath

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History

The site operated as a landfill from around 1970 until it closure ca 1990 following the opening of Ballydonagh Landfill. In 2007, Westmeath County Council appointed O' Callaghan Moran & Associates (OCM) to undertake an environmental assessment of a former Council operated landfill in Moate. The council was considering development options on part of the site to the north of the waste deposition area. The objective was to establish the nature and extent of the wastes, identify and quantify any environmental impacts, evaluate the risks and if necessary identify appropriate remediation measures. Tier 1, 2 and 3 assessments were carried out. The assessments included trial pits, trench excavations, installation of permanent landfill gas, leachate and groundwater monitoring wells. The Risk Assessment was carried out based on a source-pathway-receptor(SPR) model and concluded that the overall risk is High Risk (Class A)

Assessment conclusions *(Extract from OCM Tier 3 Assessment Report)*

Leachate

The leachate risk to surface water is based on the precautionary assumption, given the proximity of the waste to the stream and the presence of surface water drains in the children's play area, that there is a direct pathway between the waste and the stream along the southern boundary. It must be emphasised that there is no evidence that such a direct pathway exists and the surface water monitoring carried out in 2007 and 2011 did not identify any impact on water quality in the stream. The planning application by Moate Football Club includes the installation of four perforated surface water drains across the waste deposition area, which will connect to a drain that will outfall to the stream on the southern boundary. At the time the Tier 3 Assessment was completed, it was not known if the applicant intended to extend the drains into the waste. However, based on the proposed finished levels of the playing surface, this would be necessary. Any excavation into the waste is unacceptable as it is gives rise, albeit temporarily, to the generation of leachate. Furthermore, the proposed perforated drainage pipes would, if installed into the waste,

provide a direct pathway between the waste and the primary surface water receptor. This presents an unacceptable risk to the receptor. The proposed development also involves regrading the cover layer, which would reduce the thickness by approximately 0.5m and could result in the exposure of the waste. Any reduction in the depth of cover over the waste is unacceptable, as it would increase the risk of leachate generation.

Landfill Gas

Given the distance to the existing residences from the edge of the fill area (>80m) and the measured gas concentrations, it is considered that landfill gas generated by the waste does not present a risk to these dwellings. However, the gas does present a risk to future residential development in the undisturbed northern part of the site and to the proposed Dressing Rooms outside the north eastern edge of the fill area. It also presents a risk to the children's playground and civic amenity area although, at present, the risk to users of both the playground and civic amenity area is negligible, given the absence of enclosed spaces in which landfill gases can accumulate. The gas levels measured in the waste and in the external monitoring wells exceed the limits set in the DOE Guidance on the Protection of Buildings and Occupants from Landfill Gas. Although the volumes of gas being generated will decline over time, as the residual organic matter is depleted, the levels currently being generated require the implementation of remedial measures if the proposed residential development within 50m of the site proceeds or if the application by Moate Football Club for the soccer pitch and Dressing Rooms is approved.

Human Health

The monitoring data indicates that the waste does not present a significant environmental risk to either surface water, or groundwater. At present there is no direct pathway by which the waste could impact on human health. The construction of the playground involved the placement of 600mm of aggregate at the ground surface both inside and adjoining the playground and asphalting the play area. This minimises the exposure to the waste by children digging.

The proposed development of the soccer pitch involves regrading the cover layer, which would reduce the thickness by approximately 0.5m. This presents an unacceptable risk to human health, as it significantly increases the risks of future exposure to the waste.

Recommendations *(Extract from OCM Tier 3 Assessment Report)*

Leachate

Surface water monitoring should be carried out in the stream annually to confirm that the waste is not affecting water quality. The parameters should include pH, electrical conductivity, ammonia and BOD. Under no circumstances should the thickness of the existing cover layer be reduced. If the application for the development of the soccer pitch is approved OCM recommends that the following conditions should be applied;

- The cover layer should be increased to a minimum thickness of 1m across the both the pitch and the warm up area. Details of the type of cover materials and the method of placement must be submitted to and approved by Council in advance of the works being carried out.
- The surface water drains must not extend into the waste and there must be a minimum of 500mm of subsoils between the invert level of the drains and the waste to ensure that there is no connection between the drains and the waste and to minimise the infiltration of water into the waste.

Landfill Gas

It is recommended that the landfill gas monitoring wells be maintained and used for long term monitoring purposes. Monitoring should be carried out at 6 monthly intervals to confirm that the gas levels within the waste body remain at levels that do not present a risk to the existing dwellings.

It is recommended that no buildings or enclosed spaces be either constructed, or provided at the playground or civic amenity area.

Should the planning application for use of the site as a soccer pitch be approved OCM considers that it should be a condition of the permission that appropriate landfill gas control measures, as specified in the DOE Guidance, be incorporated into the design of the Dressing Rooms. These may include either active or passive systems.

The decision on whether active or passive systems are required must be based on the results of the landfill gas monitoring in a minimum of two landfill gas monitoring wells installed between the edge of the waste and the building footprint. Details of the proposed monitoring

well location, construction and the landfill gas monitoring programme must be submitted to and approved by the Council in advance of installation.

Should it be decided to proceed with the development of residential areas to the north of the waste deposition area, gas control measures should be provided. Subject to the results of the landfill gas monitoring, these may include;

- The layout of any proposed residential area should be such that the houses are themaximum practical distance from the edge of the fill area. If possible, the rear gardens should be 10 m from the edge of the fill.
- Incorporating appropriate gas protection measures, as specified in the DOE Guidance,into the building design.
- The installation of a landfill gas migration barrier north of the northern edge of the waste between it and the proposed residential area. The barrier should extend the full length of northern edge and may comprise a trench excavated to approximately 5m below ground level, with a flexible membrane liner (e.g. High Density Polyethylene) placed against the northern face and the trench backfilled with granular material.

Human Health

Should the application to develop the soccer pitch be approved, OCM considers that it should be a condition of the permission that a minimum depth of 1m of cover material be provided beneath those parts of the pitch and warm up area that are above the waste. The objective is to minimise the risk of future exposure of the waste.

Current Status

- Westmeath County Council submitted a Certificate of Authorisation to the EPA on the 7th September 2012.
- Department of Communications Climate Action & Environment approved funding of €120,000 for landfill remediation works.

Final Proposal

In developing the construction detail for the construction phase, Westmeath County Council have modified the detail of the proposal for practical reasons, the changes include;

- Gas migration trench north of the northern edge of the waste. The barrier should extend the full length of northern edge. See Figure 1 below.
- Trench depth to be approximately 3.0m below ground level and approximately 1.0m wide. See Figure 2 below
- Trench to be back filled with uniform size granular material with no fines. Granular material to be wrapped in Terram (permeable geotextile filter separator)
- Gas vents to be provided every 10m with a rotary cowl to induce a negative pressure in the trench and extract the gas

The additional cover to the waste body shall proceed as set out in the original proposal. Excavated material from the trench will be re-used on site for this purpose unless evidence of contamination is encountered.

Rationale for revision

1. Practicality of excavating a 5m deep trench and providing a liner on the northern face. It would have significant implications in relation to civil works, Health & Safety and cost.
2. As the groundwater table has been identified at 2.6-2.8m below ground level, significant de-watering would be expected to keep the excavation free of water. The possibility of leachate contamination in the ground water may have implications on how this ground water would be treated on site.
3. Although not showing up in the site investigation, there is a possibility that waste is located outside of the areas identified in previous assessments. The new proposal would allow for gas to be extracted from both sides of the interceptor trench.
4. Recent gas monitoring results would appear to suggest that is still some activity in the main waste body with consistent Methane levels of 1.2% - 3.8% measured at boreholes 1 & 2. However this has reduced from the levels recorded in November and December

of 2011 of 6.6% - 10.7%. No Methane was recorded at boreholes 5, 6 & 7 (located outside the main waste body) in 2018. See Table A and B for Gas Monitoring Logs.

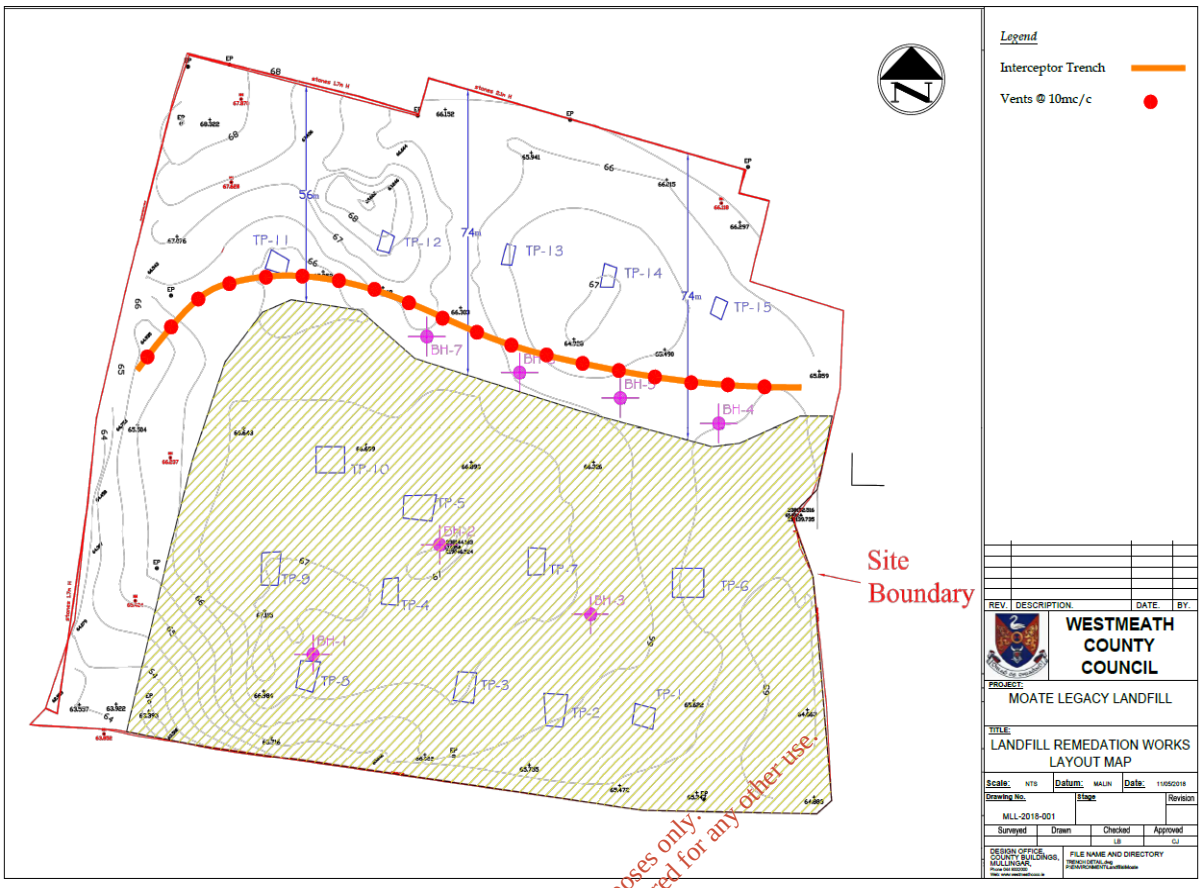

Figure 1: Proposed Gas Migration Interceptor Trench Location

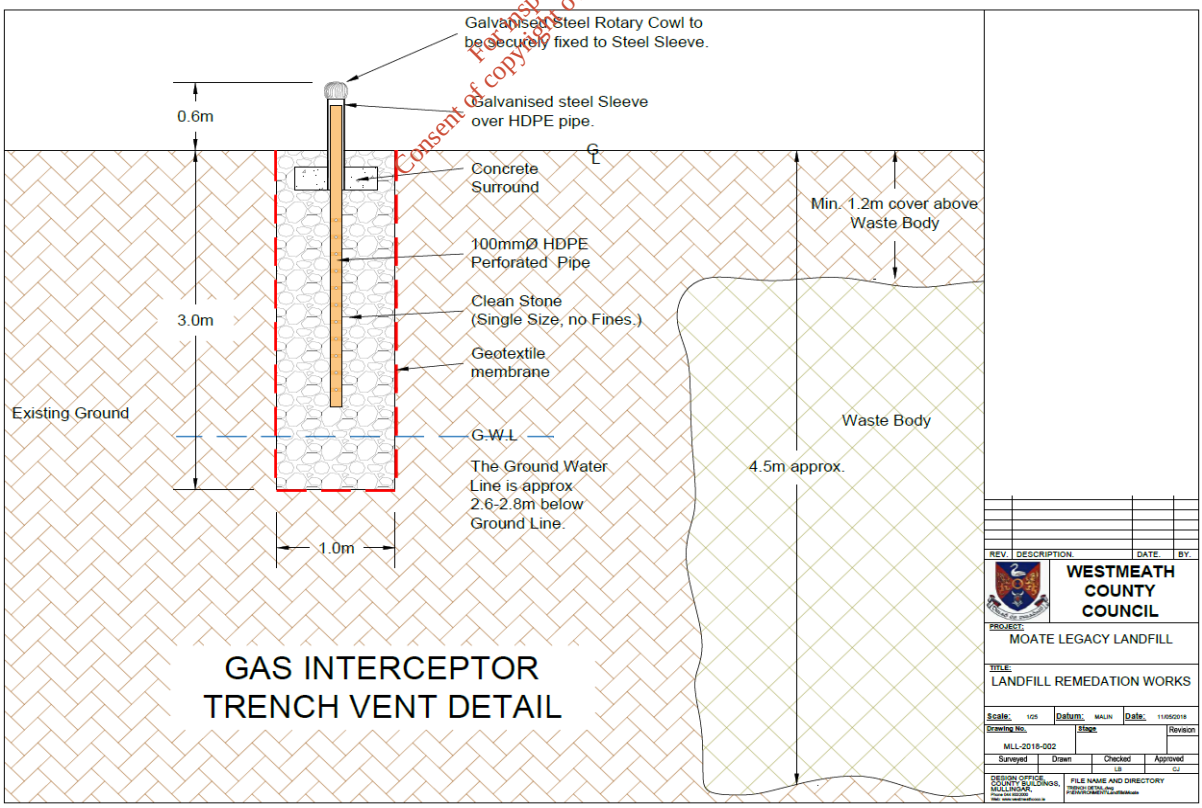

Figure 2: Gas Interceptor Trench Vent Detail

Moate Legacy Landfill
Q1 & 2 Gas Monitoring 2018

Methane									
% CH4									
Date	**Wells**	**BH1**	**BH2**	**BH3**	**BH4**	**BH5**	**BH6**	**BH7**	**Comments**
20/02/2018		0	1.2	0	?	0	0	0	
05/04/2018		3.5	1.4	0.0	?	0.0	0.0	0.0	
12/04/2018		3.8	1.7	0.0	?	0.0	0.0	0.0	
16/04/2018		3.8	2.2	0.0	?	0.0	0.0	0.0	
26/04/2018		2.6	2.2	0.0	?	0.0	0.0	0.0	
01/05/2018		3.5	2.4	0.0	?	0.0	0.0	0.0	
10/05/2018		3.1	2.3	0.0	?	0.0	0.0	0.0	
17/05/2018		3.1	1.3	0.0	?	0.0	0.0	0.0	
Carbon Dioxide									
% CO2									
Date	**Wells**	**BH1**	**BH2**	**BH3**	**BH4**	**BH5**	**BH6**	**BH7**	**Comments**
20/02/2018		0	4.5	0.2	?	2.9	2.8	0	
05/04/2018		10.3	7.3	7.3	?	3.8	3.4	2.8	
12/04/2018		9.4	5.8	0.1	?	3.9	3.4	3.0	
16/04/2018		10.5	7.5	7.4	?	4.2	3.6	2.7	
26/04/2018		7.6	6.5	0.9	?	4.6	3.6	3.0	
01/05/2018		0.0	7.7	4.8	?	4.9	3.0	3.1	
10/05/2018		8.0	7.3	7.8	?	0.0	3.3	3.1	
17/05/2018		7.6	4.7	2.0	?	4.6	3.5	3.3	
Oxygen									
% O2									
Date	**Wells**	**BH1**	**BH2**	**BH3**	**BH4**	**BH5**	**BH6**	**BH7**	**Comments**
20/04/2018		21.9	5	21.7	?	15.4	14.4	21	
05/04/2018		0.1	1.1	11.1	?	13.9	14.9	14.3	
12/04/2018		1.2	4.0	20.8	?	12.8	14.4	13.6	
16/04/2018		0.1	0.4	10.1	?	12.3	14.0	15.8	
26/04/2018		6.1	2.6	19.3	?	12.5	14.0	15.5	
01/05/2018		1.5	0.5	13.8	?	12.3	14.9	15.1	
10/05/2018		4.8	0.5	6.7	?	20.7	14.4	15.0	
17/05/2018		5.0	7.2	16.8	?	13.0	14.1	14.6	

* BH4 - Covered/Missing

Table A : Gas Monitoring 2018

Moate Legacy Landfill
Gas Monitoring 2011

Methane									
% CH4									
Date	**Wells**	**BH1**	**BH2**	**BH3**	**BH4**	**BH5**	**BH6**	**BH7**	**Comments**
15/11/2011		10.6	8.3	0	0	0	0	.01	
01/12/2011		10.7	6.6	0	0	0	0	0	
16/12/2011		3.3	0.3	.01	.01	0	0	0	
Carbon Dioxide									
% CO2									
Date	**Wells**	**BH1**	**BH2**	**BH3**	**BH4**	**BH5**	**BH6**	**BH7**	**Comments**
15/11/2011		14.8	12.6	3.8	0.0	8.0	5.2	5.3	
01/12/2011		14.2	9.2	2.8	0.1	0.4	8.1	2.8	
16/12/2011		3.5	0.4	0.1	0.1	0.6	2.3	3.2	
Oxygen									
% O2									
Date	**Wells**	**BH1**	**BH2**	**BH3**	**BH4**	**BH5**	**BH6**	**BH7**	**Comments**
15/11/2011		0.0	0.6	18.2	20.8	9.6	12.2	12.1	
01/12/2011		0.0	6.4	18.0	20.1	19.6	7.3	16.9	
16/12/2011		15.4	19.5	19.7	19.4	17.9	14.3	14.1	

* BH4 and BH5 – no lid or bung

Table B: Gas Monitoring November –December 2011