

This Report has been cleared for submission to the Board by David Flynn,
Programme Manager

Signed:



Date: 16 August 2018



OFFICE OF ENVIRONMENTAL SUSTAINABILITY

INSPECTOR'S REPORT ON AN APPLICATION FOR A CERTIFICATE OF AUTHORISATION FOR A CLOSED LANDFILL

TO: Each Director

FROM: Magnus Amajirionwu, Inspector

Environmental Licensing
Programme

DATE: 16 August 2018

RE: Application by **Kilkenny County Council** for a Certificate of Authorisation for
a closed landfill at **Shermans, County Kilkenny**.

Certificate of Authorisation Register Number **H0233-01**.

1. Application details

Type of facility:	Closed landfill as defined in the Regulations ¹
Risk category of closed landfill	High risk (class A) <ul style="list-style-type: none">Reason(s): pollutant linkages:<ul style="list-style-type: none">Leachate migration to ground water,Off-site human receptors from landfill gas migration. <p>The landfill as a source of leachate and landfill gas is a contributing factor to the high-risk classification.</p> <p>Post-assessment, the risk of gas migration from the landfill remains a pollutant linkage of less importance.</p>
Section 22 register number	S22-02589
Application received	16/03/2018
AA screening determination	23/07/2018 Screened out.

¹ Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 (S.I. No. 524 of 2008).

Name of Qualified Person	Sean Moran (MSc, Eur. Geol., P. Geol.) of O'Callaghan Moran & Associates Credentials provided by Institute of Geologists of Ireland
EPA site inspection	25/07/2018

2. Information on the closed landfill

Location of facility	The Shermans landfill is located 1.5km south-east of Ballyragget in the townland of Donaghmore, about 650m east of the N77 road from Kilkenny to Ballyragget (Figure 1). It is in a former sand and gravel quarry surrounded by agricultural land and access is via a private road that runs along the boundary of the landowner's farmland. For the purposes of the risk assessment, the restoration of the site to agricultural use has been envisaged by the Qualified Person.
Period of landfilling	1987 – 1989
Surrounding area	The landfill site is approximately 50m north of a local private road. There are farm roads running along the northern boundary and most of the eastern site boundary. The surrounding land use is mainly agricultural. The closest residential dwelling is approximately 150m to the west. There is a gravel quarry approximately 300m south of the site (Figure 2).
Area of the closed landfill	1.7 hectares.
Quantity of waste at the facility	Approximately 40,000m ³ or 20,000 tonnes estimated. Following closure in 1989, the landowner obtained a Waste Facility Permit ref: WMP 24/2005 from Kilkenny County Council to import additional soil and stone to level the site. A stockpile is visible in the north-west of the site. The Permit expired in 2008.
Characterisation of waste deposited	Investigations show that the waste body comprises of typical municipal solid waste including paper and plastic timber in varying stages of degradation interspersed with a gravelly clay matrix.

3. Site investigations

Current condition and appearance of closed landfill	The landfill is capped with gravelly clay ranging in thickness from 1.5m in the east of the site, to 0.8 m in the north-west of the site, and 0.3m in the south-east of the site. It slopes from south (79mOD) to north-northwest (73mOD). The waste is generally thickest in the east central area and thins to the north-west and south. The depth of waste varies across the site from 0.5 m in the west of the site to 3.3 m in the east of the site. The waste overlies clayey gravels which extend to 5-7m bgl and which are underlain by the limestone bedrock. The waste deposition area has been covered with soil and seeded and is currently used for grazing and to grow grass for animal fodder. On the day of the site visit, 25 animals were counted grazing on the site. The northern and western boundaries are defined by a tree lined fence. The eastern and southern boundaries are delineated by an electric fence that
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	prevents access by cattle in the surrounding lands. There is a stockpile of soil and stone in the north-west of the site. There are no surface water features either on, or in the vicinity of the site.
Site investigations	<p>The Tier 2 site investigation, carried out in 2010 / 2011, comprised the excavation of 10 No. trial pits (TP-1 to TP-10) to delineate the lateral and vertical extent of the waste and allow an assessment of the nature of the waste. It also involved the installation of three groundwater monitoring wells (MW-1, MW-2 and MW-3) in the gravels above the bedrock and one landfill gas/leachate well (MW-4) in the waste body. MW-1 was located up topographic gradient of the landfill, while the remaining wells were installed on the landfill footprint.</p> <p>The Tier 3 investigations in 2017 comprised the installation of three additional groundwater monitoring wells (MW-5, MW-6 and MW-7). MW-7 is located up gradient of the landfill to replace MW-1, which was dry in 2017. MW-5 and MW-6 were to the north-west and north-east of the landfill to establish groundwater quality down hydraulic gradient of the site.</p>
Monitoring and analysis of samples (water, gas, waste)	<p>One round of monitoring was carried out in 2010 as follows:</p> <ul style="list-style-type: none"> • 2 groundwater samples from two monitoring wells. Monitoring wells MW01 and MW04 were dry. • 4 landfill gas monitoring events from 4 groundwater monitoring wells which also serve as gas monitoring wells • Eluate testing was carried out on 10 waste samples (from TP1 – TP10). • No leachate sampling was reported. <p>One more round of monitoring was reported to have been carried out in 2017 as follows:</p> <ul style="list-style-type: none"> • 4 groundwater samples were taken from 4 locations. • 7 landfill gas monitoring events at 7 locations. • No leachate sample was taken from MW-4 in the centre of the landfill as it was dry.
Hydrology	<p>The nearest surface water feature is the River Finnan, approximately 900m to the north of the site which flows in a westerly direction to join the River Nore approximately 1.5km to the north-west. There are no field drains or other surface water features connecting the site to the river.</p> <p>The site lies within the Lisdowney, Tributary of the Nore Water Body (E_SE_15_479). While the physiochemical status of the water body is good the overall status of this Surface Water Body (SWB) is 'At Risk' due to impacts on ecological receptors.</p>
Hydrogeology	<p>The bedrock is classified by the GSI as a Regionally Important Karstified aquifer (RKd) with diffuse flow paths. Groundwater recharge is estimated by the GSI to be 466mm per year. The travel paths can range from 100s of metres to >1 kilometre and groundwater levels can change rapidly in response to rainfall recharge, with large fluctuations likely between winter and summer.</p> <p>The GSI vulnerability classification for the site is 'High'. The site investigations indicate a depth to bedrock of approximately 5-7m beneath the landfill. Given that the depth of waste is up to 3.3m the aquifer vulnerability beneath the landfill is considered to be extreme.</p>

	<p>The closest down hydraulic gradient well is approximately 450m to the north east (downgradient) of the site. The use of this well is unknown and it is described as a poor yielding well (37 m³ /d).</p>
Leachate and water quality	<p>No leachate sample was collected in the monitoring rounds carried out in both 2010 and 2017.</p> <p>However, groundwater monitoring results down gradient of the site show elevated levels of ammonium, nitrate, and nitrite, chloride, and ammonium. Manganese, zinc, and potassium level also exceed the IGV in these wells.</p> <p>The results from MW-2, MW-5 and MW-6, which are down gradient of the waste, are indicative of leachate impacts. In MW-5 and MW-6 the results are indicative of slightly reducing conditions, which are commonly associated with the migration of a leachate plume.</p> <p>No evidence of leachate break out around the sides of the landfill was reported.</p>
Landfill gas	<p>The ongoing generation of landfill gas at the landfill potentially poses a risk. Landfill gas is being generated, with elevated methane and carbon dioxide detected in the centre of the site. Concentration of methane of 64% v/v above the upper explosive limit of 5% v/v was recorded at this location in 2017. However, the gas flow rate was low indicating that the gas source may be localised and of limited extent.</p> <p>The landfill gas risk is considered by the Qualified Person to be low.</p>
Conceptual site model	<p>The conceptual site model developed in Tier 1 risk assessment and provided with the original application identified the following pollutant linkages:</p> <ul style="list-style-type: none"> • human health exposure due to migration of landfill gas; • migration of leachate into the underlying aquifer and discharge to the adjoining surface water body. <p>The conceptual site model is shown in Figure . The source, pathways and receptors can be described as follows:</p> <p>Source:</p> <ul style="list-style-type: none"> – Rainfall on the landfill will preferentially percolate through the cap and into the waste. – Leachate is generated in the waste. – Gas is generated at the landfill. <p>Pathway:</p> <ul style="list-style-type: none"> – Leachate can migrate through the clayey gravels immediately beneath the waste into the karstified limestone bedrock aquifer. – Landfill gas appears to be venting to atmosphere rather than moving laterally through the surrounding soils. The risk of gas migration risk will increase when the final cap is in place, however the closest residence is approximately 140m to the west of the site. – There are no surface water drains or streams in the vicinity of the site. The nearest surface water body is the Finnan River located approximately 900m north of the site. It is likely that shallow groundwater discharges to the Finnan River. <p>Receptors:</p> <ul style="list-style-type: none"> – The bedrock aquifer beneath and down hydraulic gradient of the landfill is the primary receptor. There are no groundwater supply wells within 450m down hydraulic gradient of the landfill.

	<ul style="list-style-type: none"> - The closest dwelling to the site is approximately 140m to the north-west of the landfill. Landfill gas monitoring in MW-5 along the northwest site boundary did not detect any landfill gas.
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4. SPR linkages and remedial actions

<p>SPR linkage scenarios (applicable ones only)</p>	<p>Leachate migration to groundwater. SPR 5, Receptor = Bedrock aquifer.</p> <p>Landfill gas migration through lateral and vertical pathway SPR 10, Receptor = Human</p> <p>Summary: Upon the review of the updated monitoring data;</p> <ul style="list-style-type: none"> - the impact of leachate migrating from the site is considered significant on the receiving water quality. - remedial action is warranted to address the risk of migration of landfill gas from the site.
<p>Proposed remedial actions</p>	<p>The risk assessment and remedial actions are based on the current and proposed future end use for the site, which will be agricultural. There are currently top soil and grass on the entire landfill and in some areas (central portion), this complies with the EPA recommended cap thickness. The topsoil will be stripped to allow additional capping soils to be placed and to allow for grading and compacting the entire capping layer.</p> <p>The Qualified Person has confirmed in the Risk Assessment report that the soil stockpile on-site is suitable for use to increase the capping thickness. Additional clay will be placed in the south of the site. It may be possible to use surplus soils from the central portion of the site as a source. However, it is proposed that additional soil will be brought into the site to achieve the required gradient across the site.</p> <p>A surface water collection drain will be installed around the perimeter of the landfill to collect run-off from the compacted clay layer. The drain will be lined with an LDPE membrane and piped to a percolation area located to the north of the landfill.</p> <p>The overall landfill gas remediation strategy includes the installation of four gas ventilation wells, one in each quadrant of the waste, to allow passive ventilation of the gas. The gas ventilation well pipes will be 100mm slotted uPVC and will extend 150mm above the top soil layer. These wells will be fitted with cowls and fenced off to prevent damage by livestock. It is intended to break the SPR linkages by preventing potential migration of landfill gas to offsite locations and to vent the gas in a controlled manner to the atmosphere.</p> <p>Estimated cost: €500,000.</p>
<p>Proposed aftercare monitoring and assessment</p>	<p>Monitoring as specified in Condition 3.5 of the recommended certificate of authorisation.</p> <p>Validation report to be submitted within 30 months of the date of grant of the certificate of authorisation.</p>
<p>Adequacy of risk assessment</p>	<p>Regulation 7(7) of the Regulations states that the EPA must be satisfied with the risk assessment before proposing to grant a certificate of authorisation. Notwithstanding the fact that the boundary of the application is smaller than</p>

	<p>the actual waste deposit, the risk assessment is adequate for the following reasons:</p> <ul style="list-style-type: none"> • It has identified, assessed and adequately addressed the associated risks inherent with the landfill site. • Appropriate Assessment screening was also completed to evaluate the potential risk to the sensitive habitats associated with the adjoining receiving waters. It concluded that the remedial measures will not impact on the protected site: River Barrow and River Nore [SAC 002162]. • Report of Tier 2 intrusive investigation show that municipal waste deposited in the landfill was relatively low in biodegradable waste. Therefore, the waste deposits in the "closed landfill" will present relatively low risks of ongoing leachate and gas generation.
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5. Appropriate assessment

A screening for Appropriate Assessment was undertaken to assess, in view of best scientific knowledge and the conservation objectives of the site, if the proposed activity, individually or in combination with other plans or projects is likely to have a significant effect on any European Site. In this context, particular attention was paid to the European Site at the River Barrow and River Nore [SAC 002162].

The assessment is documented in the recommended certificate of authorisation.

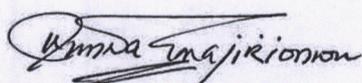
6. Consultation

I consulted with Mr John Gibbons (OEE) on landfill gas assessment and treatment.

7. Recommendation

I recommend granting the certificate of authorisation as proposed.

Signed



Dr. Magnus Amajirionwu

16 August 2018

Date

Procedural Note

Any representations received by the Agency within 30 days of the draft certificate of registration being made available will be considered by the Agency.

As soon as practicable after the expiry of the 30-day period the Agency will determine the certificate of authorisation, which may vary from the draft certificate, and shall issue an appropriately validated certificate of authorisation in accordance with the Waste Management (Certificate of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008.

Figure 1 Location of landfill (yellow boundary) as originally delineated in the section 22 register



Figure 2 Boundaries at the closed landfill showing surrounding land use.



<p>O'Callaghan Moran & Associates, Unit 15 Melbourne Business Park, Model Farm Road, Cork Tel. (021) 4345366 email: info@ocallaghanmoran.com</p>	<p>CLIENT Kilkenny County Council</p>	<p>Details: — Site Boundary</p>
<p><small>This drawing is the property of O'Callaghan Moran & Associates and shall not be used, produced or disclosed to anyone without the prior written permission at O'Callaghan Moran & Associates and shall be returned upon request.</small></p>	<p>TITLE Surrounding Land Use</p>	

Figure 3 Conceptual site model

