


This Report has been cleared for submission to the Director by Marie O'Connor, Programme Manager.

Signed: 

Dated: 12 September 2019



OFFICE OF ENVIRONMENTAL
SUSTAINABILITY

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

TO:	Dr. Eimear Cotter, Director	
FROM:	Ewa Babiarczyk, Inspector,	Environmental Licensing Programme
DATE:	12 th September 2019	
RE:	Application by Limerick City & County Council for a Certificate of Authorisation for a closed landfill at Churchtown, Newcastle West, County Limerick . Certificate of Authorisation Register Number H0291-01 .	

1. Application details

Type of facility:	Closed landfill as defined in the Regulations ¹
Original site ownership	Limerick City & County Council
Current site ownership	Limerick City & County Council
Operator of closed landfill	Limerick City & County Council operated this site since early 1950's. Prior to that the site was used as a dump site since 1935.
Proposed use post remedial works	The applicant is considering development of a low grade amenity. No details as to the type or use of this amenity were provided in the application.
Risk category of closed landfill:	High risk (class A) due to the following Source-Pathway-Receptor linkages: <ul style="list-style-type: none">○ leachate migration to private wells;○ leachate migration to the underlying aquifer; and○ lateral and vertical landfill gas migration to surrounding houses.
Section 22 register number:	S22-02465

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

Grid Reference	127449 E and 134603 N
Application received:	12 th July 2018
AA screening determination:	10 th June 2019
Regulation 7(4) notice:	11 th June 2019 and 15 th August 2019.
Additional information received:	Regulation 7(4) Replies were received on 24 th June 2019 and 29 th August 2019. Unsolicited information was received on 27 th June 2019, 16 th July 2019, 17 th July 2019 and 19 th July 2019.
Name of Qualified Person:	Finbarr Murphy, Credentials provided by Engineers Ireland.
EPA site inspection:	No inspection was required.

2. Information on the closed landfill

Location of facility	<p>The closed landfill is located within a former limestone quarry on the north-western perimeter of Newcastle West, Co. Limerick. The landfill site extends to an area of domestic dwellings and is accessed from the Old Mill Road, approximately 150m west of its junction with the R521 Road.</p> <p>The location of the landfill site is shown in Figure 1.</p> <p>In 2005, Limerick County Council sold a narrow strip of land on the eastern part of the landfill to householders whose properties backed onto the landfill site. This strip of the land is outside the eastern boundary as indicated in Figure 2 and forms back gardens of the adjacent properties. i.e. these back garden extend slightly over the footprint of the waste extent.</p>
Period of landfilling	<p>1935 to 1986</p> <p>Since 1935 the site was used as a dump. The Council acquired this site in early 1950's and operated it as a landfill until 1986.</p>
Surrounding area	<p>The lands to the east and south-east are built up. The site boundary borders with private and commercial properties as shown in Figure 2. There are approximately 20 houses within 50m of the waste body. These houses are connected to water mains and sewers.</p> <p>There is also one structure (a shed) located on the eastern boundary of the former landfill footprint. The shed appears to have been affected by the settlement of the landfill waste with some large cracks in the structure.</p> <p>The lands to the north and the west of the site are used for agricultural purposes.</p>
Area of the closed	The landfill covers an area of 1.76 ha.

landfill	
Quantity of waste at the facility	Approximately 207,500 tonnes.
Characterisation of waste deposited	The waste body comprises of municipal, commercial waste and industrial waste. The deposited waste includes fatty waste, paper and cardboard packaging, plastic packaging, textile packaging, car tyres and car exhausts, concrete and bricks, paper and cardboard, glass, biodegradable kitchen waste, clothes, nappies, textiles, batteries, electrical equipment, wood, plastic, metals and bulky waste and soil and stones.

3. Site investigations

Current condition and appearance of closed landfill:	<p>The landfill surface slopes gradually from 77m O.D. at the north-east corner of the site towards 68m O.D. at the south-west corner of the site.</p> <p>The site is overgrown. The western part is largely inaccessible due to briars. The eastern section of the site contains areas of unmaintained grass. The application states that there has been some unauthorised horse grazing in recent years. Condition 3.16 requires that there shall be no unauthorised public access to the facility.</p> <p>No waste on the surface of the landfill, ponding or seepage of landfill leachate, subsidence or water logging, dead vegetation or bare ground were evident during the site walk overs. Also, no odour was detected.</p> <p>The landfill is unlined and there is no landfill gas collection system in place. There is a pumping station comprising of a sump and a pump installed in the south-western corner of the site. The application states that this pumping station was installed in 1987 to prevent flooding a neighbouring site. Some of the landfill leachate is collected in the sump and pumped, via a pipe, into a public sewer for treatment in a waste water treatment plant which is operated by Irish Water. Limerick City & County Council stated in the correspondence dated 26th August 2019 that there is no authorisation for this discharge. In accordance with Regulation 7(7)(b) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008, the recommended certificate of authorisation requires that the local authority obtains authorisation for the discharge to sewer within six months.</p> <p>The landfill has a cap but this cap is of a poor quality and is likely it have allowed landfill gas to vent freely to the atmosphere.</p>
Site investigations	<p>The Tier 2 investigations were conducted in 2007 and 2012. Additionally, the applicant carried out gas monitoring and took a sample of water from the pumping station in 2019.</p> <p>The site investigations established the following facts:</p>

- the waste body extends beyond the northern and eastern site boundaries as shown in Figure 2;
- the existing ground levels vary from 68m to 78m AOD and that thickness of the waste body is 5 to 15m;
- the landfill is comprised predominately of industrial, domestic, commercial and construction and demolition waste;
- groundwater flow is from the north-east to south-west direction towards the tributary of the Doally River shown in Figure 3. This tributary is referred to by the applicant as Leonard's Stream;
- the waste body is partially saturated with perched leachate and some waste is below the groundwater table;
- landfill gas is being generated within the waste body;
- soil and stones were used to cover the waste and that the surface cover is not an engineered cap;
- the landfill is not lined on the base or side;
- some leachate has penetrated in to the bedrock;
- as the site is underlain by limestones bedrock aquifer, there is a potential for landfill leachate to migrate into the groundwater body and towards the nearby Leonard's Stream;
- the waste throughout the site was mixed with a high fraction of inert material, predominately fractured shale sourced locally but also with subsoil and C&D material and the high stone content provides numerous drainage pathways for the downward migration of rain water and the upward migration of the landfill gas.
- The capping layer is composed mainly of gravel, silt or clay. The capping layer was absent at 28 out of 83 probing locations.
- Ammonia, Nickel and Manganese concentrations within the landfill are above their respective maximum admissible concentrations (MAC) in EU (Drinking Water) Regulations 2014, as amended.
- Ammonia concentrations are elevated in Leonard's Stream but are below the limits specified in the Salmonid regulations.
- Elevated concentrations of landfill gas are present within the landfill area however no landfill gas has been detected at the nearest sensitive receptors.
- No hydrocarbon or PAH contamination was detected or observed in the overburden/bedrock groundwater monitoring boreholes however benzene was detected off site. Phenols were not detected in any of the groundwater monitoring boreholes.

Condition 3.6 requires monitoring on a biannual basis of groundwater from at least three groundwater monitoring boreholes, two of which shall be downgradient of the closed landfill.

<p>Monitoring and analysis of samples (water, gas, waste):</p>	<p>The site investigations included:</p> <ul style="list-style-type: none"> • trial pits; • trial trenches; • waste sampling; • leachate sampling; • gas monitoring, including assessment of the possible migration of landfill gas towards an occupied residence on the site; • gas sampling of leachate wells and surrounding areas; and • sampling of the nearby waterbody, the Leonard's Stream.
<p>Hydrology</p>	<p>There is no discharge to surface water from the closed landfill.</p> <p>The closest surface water to the closed landfill is a drainage channel locally named as the Leonard's Stream as shown in Figure 3. It flows 160m south-west of the landfill site and discharges to the Doally River (waterbody code: IE_SH_24A040500) 880m downstream of the closed landfill. The status of the Doally River is poor.</p> <p>The Doally River discharges into the Arra River (waterbody code: IE_SH_24A040500) at a location 1km south-east of the closed landfill. The status of the Arra River is also poor.</p>
<p>Hydrogeology</p>	<p>The site overlies Newcastle West Groundwater Body (Code: IE_SH_G_190). Its status is good. The underlying limestone has a moderate to low permeability. The groundwater body beneath the site is designated as regionally important karstified aquifer (Rkd). Groundwater in the vicinity of the site is highly vulnerable to contamination. The groundwater vulnerability within the site is extreme as the waste body is in direct contact with the underlying bedrock. The groundwater flow is from north-east to south-west, towards Leonard's Stream.</p> <p>The nearest public water abstraction is Castlemahon Water Supply (Abstraction code: 1900PUB1042_1). This water abstraction is located on the Deel [Newcastlewest] River 5km south-east from the closed landfill. The Deel [Newcastlewest] River forms a tributary of the Arra River, therefore there will be no impact from the closed landfill on the quality of the water which is being abstracted.</p>
<p>Leachate and water quality:</p>	<p>There is a risk of landfill leachate contaminating the underlying aquifer. There is a well located 340m to the west of the landfill site on the lands of Mr. Peter Leonard. This well was installed in 2007 and is used to supply water for cattle and horses only and is not used for human consumption. Due to the fact that groundwater flow is from the north-east to south-west therefore, no impact is expected from the closed landfill on this well.</p> <p>The nearby houses to the south and east of the closed landfill are supplied from the water mains.</p>

	<p>The disposal of waste ceased in 1986 and it is expected that by now most of the contamination from the waste would be washed out by groundwater.</p> <p>The site investigation showed that the waste body is partially saturated with perched leachate and that there is a potential for landfill leachate to migrate into the groundwater body and towards the nearby Leonard's Stream.</p> <p>The most recent sampling of leachate was carried out at the pumping station in May 2019. The sampling results show that concentration of Ammoniacal Nitrogen was recorded at 9.98 mg/l which was a significant exceedance of the limits set up in the EU Environmental Objectives (Surface Waters) Regulations 2009, as amended. Other measured parameters were in compliance with the aforementioned Regulations and EPA Water Quality Standards 2001.</p>
Landfill gas:	<p>There is a risk of landfill gas migration to nearby houses. The most likely pathway for the migration of the landfill gas is through the underlying bedrock and through the existing landfill cap.</p> <p>In order to estimate the potential landfill gas generation, a model using GasSim was run in 2012. The results showed that a peak in landfill gas generation for the closed landfill was in 1987 (53.8 m³/hr). A total bulk LFG of 20.9m³/hr was predicted for 2012 and 19.7 m³/hr in 2014 with a slow decline over the following years.</p> <p>Following the outcome of the model, testing was carried out in 2012. This involved the installation of three gas monitoring wells (GW1 to GW3) as shown in Figure 4. Monitoring results indicated that elevated concentrations of gas were detected in all wells. The monitoring recorded methane levels up to 73.6% in GW3 in the south-east corner of the site, 38.2% in GW2 and 35.7% in GW1.</p> <p>The subsequent monitoring took place in 2013, however no adequate measurement was recorded due to absence of sufficient differential pressure.</p> <p>The most recent landfill gas monitoring was carried out at two out of three monitoring locations GW1 and GW2 on 17th June 2019. Methane concentration were recorded at 46.2 % v/v at GW1 and 22 % v/v at GW2. CO₂ was recorded at 27.5 (% v/v) at GW1 and 18.2 % v/v at GW2. The applicant stated that GW3 was inaccessible due to heavy over growth. Condition 3.15 requires that all sampling and monitoring points have safe and permanent access and are clearly labelled.</p> <p>No landfill gas was detected in the shed which is located on the eastern boundary. Also, the gas monitoring of the adjacent houses showed the results below a detection limit of 0.1% v/v methane.</p> <p>A survey was completed to detect non-specific VOCs (methane and other hydrocarbons). Four zones of surface emissions were identified</p>

	<p>within the landfill site that exceeded 500 ppv for non-specific VOCs. A follow up VOC monitoring was carried out at five locations adjacent to the closed landfill in 2013. Council Directive 2008/50/EC has set a benzene ambient air quality standard of 5 µg/m³ as an annual mean. Benzene concentrations over the 30 day sampling period were found to exceed this annual mean ambient air quality standard at two locations. The concentration of benzene at one of these two locations was 60 µg/m³ which is 1200% of the ambient mean air quality standard. The concentration of benzene at the second location was 5.9 µg/m³ which 118% of the ambient mean air quality standard. The associated report states that a monitoring over a longer period would be required to determine compliance with the annual mean air quality standard for benzene at both locations.</p> <p>No elevated levels of benzene were detected in wells GW1 to GW3 in June 2013. Also, no benzene was detected within the landfill during the initial Tier 2 site investigations 2007. The associated report states that the presence of elevated benzene off site may suggest that either cross contamination has occurred or an off-site source is responsible for the contamination.</p> <p>Condition 3.6 requires monitoring for benzene at both on-site and off-site locations. Additionally, Condition 3.9 requires an investigation of the source of the elevated benzene in the off-site monitoring locations to be carried out within twelve months.</p> <p>The report further states that with regards to all other VOCs assessed and all other sampling locations, measured levels of VOCs were below the respective Environmental Assessment Levels.</p>
<p>Conceptual site model:</p>	<p>The original conceptual site model was developed in 2011. Following the site investigations the site model was reviewed in 2014. Four pathways were identified in Tier 2 as High Risk: SPR3, SPR5, SPR10 and SPR11:</p> <ul style="list-style-type: none"> • human health exposure pathway of off-site migration of landfill gas and emission into nearby houses (SPR 10 and SPR11); • Migration of leachate to private wells (SPR 3); • Migration of leachate to the underlying aquifer (SPR 5). <p>The conceptual site model is shown in Figure 5. 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 migration from the site through the bedrock into the aquifer.

	<ul style="list-style-type: none"> - Leachate can migrate through the base of the landfill into underlying aquifer beneath and discharge to the nearby surface water bodies and private wells. - Gas migration can occur through the permeable cap and through the bedrock beneath the waste. - Gas migration beyond the site boundary. <p>Receptors:</p> <ul style="list-style-type: none"> - the underlying bedrock and aquifer; - houses and private wells outside the site; - Surface water bodies. <p>No public groundwater supply sources are present within 1km of the site.</p>
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4. SPR linkages and remedial actions

<p>SPR linkage scenarios (applicable ones only):</p>	<p><u>Leachate migration scores:</u></p> <p>High scores:</p> <ul style="list-style-type: none"> • SPR 3, Receptor = Human presence (vertical and horizontal groundwater migration of leachate to wells) • SPR 5, Receptor = Aquifer (vertical and horizontal groundwater migration) <p>Moderate scores:</p> <ul style="list-style-type: none"> • SPR 6, Receptor = Public water supplies (vertical and horizontal groundwater migration) • SPR 7, Receptor = Surface waterbody (vertical and horizontal groundwater migration) <p><u>Landfill gas migration scores:</u></p> <p>High scores:</p> <ul style="list-style-type: none"> • SPR 10, Receptor = Human presence (lateral migration of gas through subsoil) • SPR 11, Receptor = Human presence (vertical migration of gas through subsoil) <p>Summary:</p> <p>Upon the review of the monitoring data and surface water assessment;</p> <ul style="list-style-type: none"> - Remedial action is warranted to address the risk of leachate migrating from the site to the aquatic habitats and surface water in proximity of the site. - remedial action is warranted to address the risk of offsite migration of landfill gas.
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Proposed remedial actions:

The following remedial actions to manage the landfill gas and improve the capping layer by utilising an inert landfill capping system are recommended in Condition 3.1:

- a) Minimise the disturbance of deposited waste to the extent possible.
- b) Install a low permeability landfill cap, minimum 1m, with 1mm thick low permeability geomembrane having a hydraulic conductivity of less than or equal to $1 \times 10^{-9} \text{m/s}$.
- c) Install passive gas venting system, which includes:
 - i. gravel filled vent trenches with fans for gas extraction along the southern and eastern site boundary. The fans shall be installed on the trenches every 20m and at other locations, as appropriate, such that the increased back-pressure caused by the cap does not result in increased lateral movement of gas.
 - ii. The trenches shall be connected to the existing gas wells.
 - iii. The gas vent pipes shall not be perforated above the ground level.
- d) Maintain the leachate sump and pumping station and the associated connection to the public sewer.
- e) Install a water collection trench along the southern boundary to direct the collected water via the sump and pumping station into the public sewer.
- f) Ensure that recommendations in the guidance given in the Department of Environment 1994 publication "Protection of New Buildings and Occupants from Landfill Gas" and any subsequent revisions have been considered and applied to all buildings constructed on the facility.
- g) Reseed grass within the site.

Condition 3.6 requires monitoring to detect the presence and concentration of landfill gas on a quarterly basis.

The proposed remedial actions are intended to break the SPR linkages by preventing:

- potential migration of leachate to groundwater; and
- migration of landfill gas to off-site locations.

The recommended certificate of authorisation allows for the importation and use of soil and stone to complete the works.

Condition 3.18 of the recommended certificate of authorisation provides for a communications programme directed at the occupiers

	of buildings adjacent to deposited waste (the site). The communications programme will inform the relevant occupiers of what they should be doing to protect their property, health and well-being, and members of the public from the risk of an incident involving landfill gas.
Proposed aftercare monitoring and assessment:	Monitoring as specified in Condition 3.6 of the recommended certificate of authorisation. Validation report to be submitted within 30 months.
Adequacy of risk assessment:	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 the actual waste deposit, the risk assessment is adequate for the following reasons: <ul style="list-style-type: none"> • It has identified, assessed and adequately addressed the associated risks inherent with the landfill site. • An Appropriate Assessment screening was also completed to evaluate the potential risk to the European sites associated with the nearby surface waterbodies. It concluded that the remedial measures will not impact on the protected site: Lower River Shannon SAC [Site Code: 002165].

5. Appropriate assessment

There are four European Sites within the vicinity of the facility. These are listed in the Appendix 1.

A screening for Appropriate Assessment was undertaken to assess, in view of best scientific knowledge and the conservation objectives of the site, if the 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 Sites at Lower River Shannon SAC [Site Code: 002165], Askeaton Fen Complex SAC [Site Code: 002279], Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [Site Code: 004161] and River Shannon and River Fergus Estuaries SPA [Site Code: 004077].

The activity is not directly connected with or necessary to the management of any European Site and the Agency considered, for the reasons set out below, that it cannot be excluded, on the basis of objective information, that the activity, individually or in combination with other plans or projects, will have a significant effect on any European Site and accordingly determined that an Appropriate Assessment of the activity was required.

The reason for this determination is as follows:

- Although there is no discharge to surface waters from the closed landfill, it cannot be certain that the landfill leachate which infiltrates into the underlying aquifer does not ultimately reach a surface waterbody that is hydrologically connected to the above European Sites.

An Inspector's Appropriate Assessment has been completed and has determined, based on best scientific knowledge in the field and in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 as amended, pursuant to Article 6(3) of the Habitats Directive, that the activity, individually or in combination with other plans or

projects, will not adversely affect the integrity of any European Site, in particular Lower River Shannon SAC [Site Code: 002165], Askeaton Fen Complex SAC [Site Code: 002279], Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [Site Code: 004161] and River Shannon and River Fergus Estuaries SPA [Site Code: 004077], having regard to their conservation objectives and will not affect the preservation of these sites at favourable conservation status if carried out in accordance with the application, risk assessment and recommended certificate of authorisation and the conditions attached hereto for the following reasons:

- Specifically, the remedial works will be undertaken to avoid the potential for water pollution and will ensure that there will be no significant impact on Lower River Shannon SAC (Site Code: 002165) or River Shannon and River Fergus Estuaries SPA (Site code: 004077), and with a further objective to result in positive impacts to current water quality conditions.
- The project, alone or in-combination with other projects, will not adversely affect the integrity, and conservation status of any of the qualifying interests of Lower River Shannon SAC (Site Code: 002165) or River Shannon and River Fergus Estuaries SPA (Site code: 004077).
- Also, there are no significant emissions to air from the landfill which could affect the bird species that River Shannon and River Fergus Estuaries SPA (Site code: 004077) is designated for.
- Condition 3.6 requires ongoing environmental assessment and monitoring.
- There is no hydrological or hydrogeological connection between the landfill and Askeaton Fen Complex SAC (Site code: 002279) or Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (Site code: 004161).
- Also, there are no significant emissions to air from the landfill which could affect the bird species that Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (Site code: 004161) is designated for.

In light of the foregoing reasons, no reasonable scientific doubt remains as to the absence of adverse effects on the integrity of those European Sites: Lower River Shannon SAC [Site Code: 002165], Askeaton Fen Complex SAC [Site Code: 002279], Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [Site Code: 004161] and River Shannon and River Fergus Estuaries SPA [Site Code: 004077].

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



Ewa Babiarczyk

Date 12th September 2019

Procedural Note

Any representations received by the Agency within 30 days of the draft certificate of authorisation 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 Churchtown Landfill

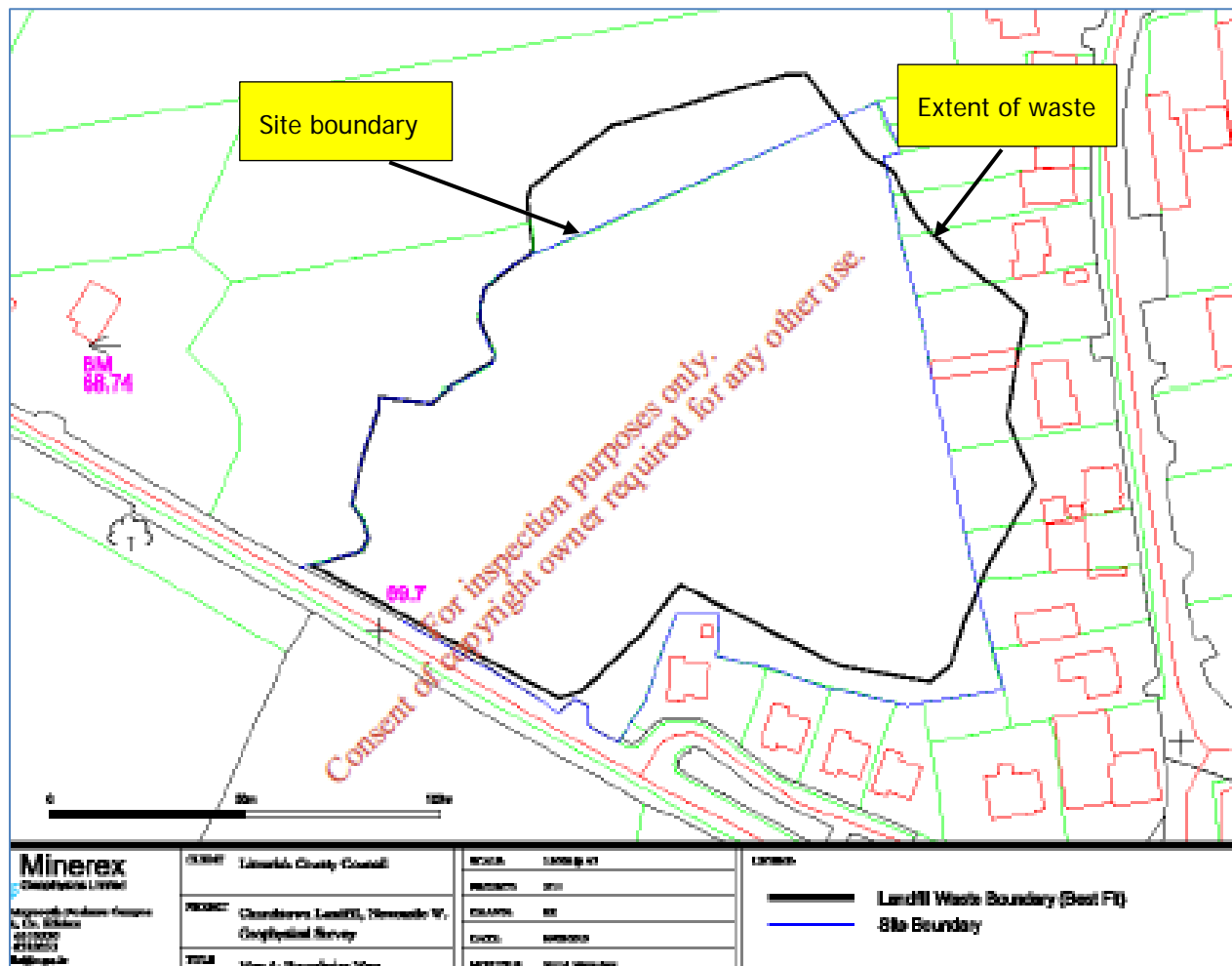


Figure 2: Extent of deposited waste

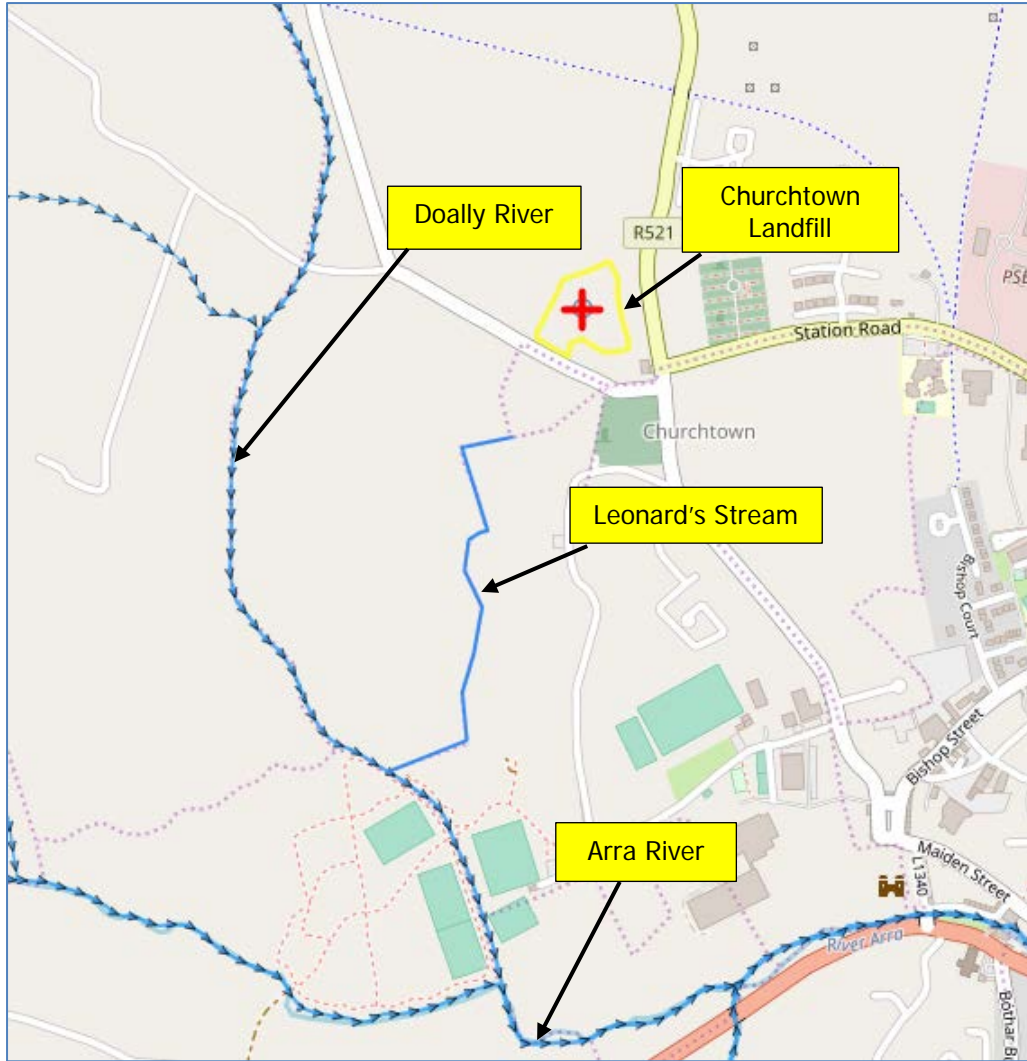


Figure 3: Local river network

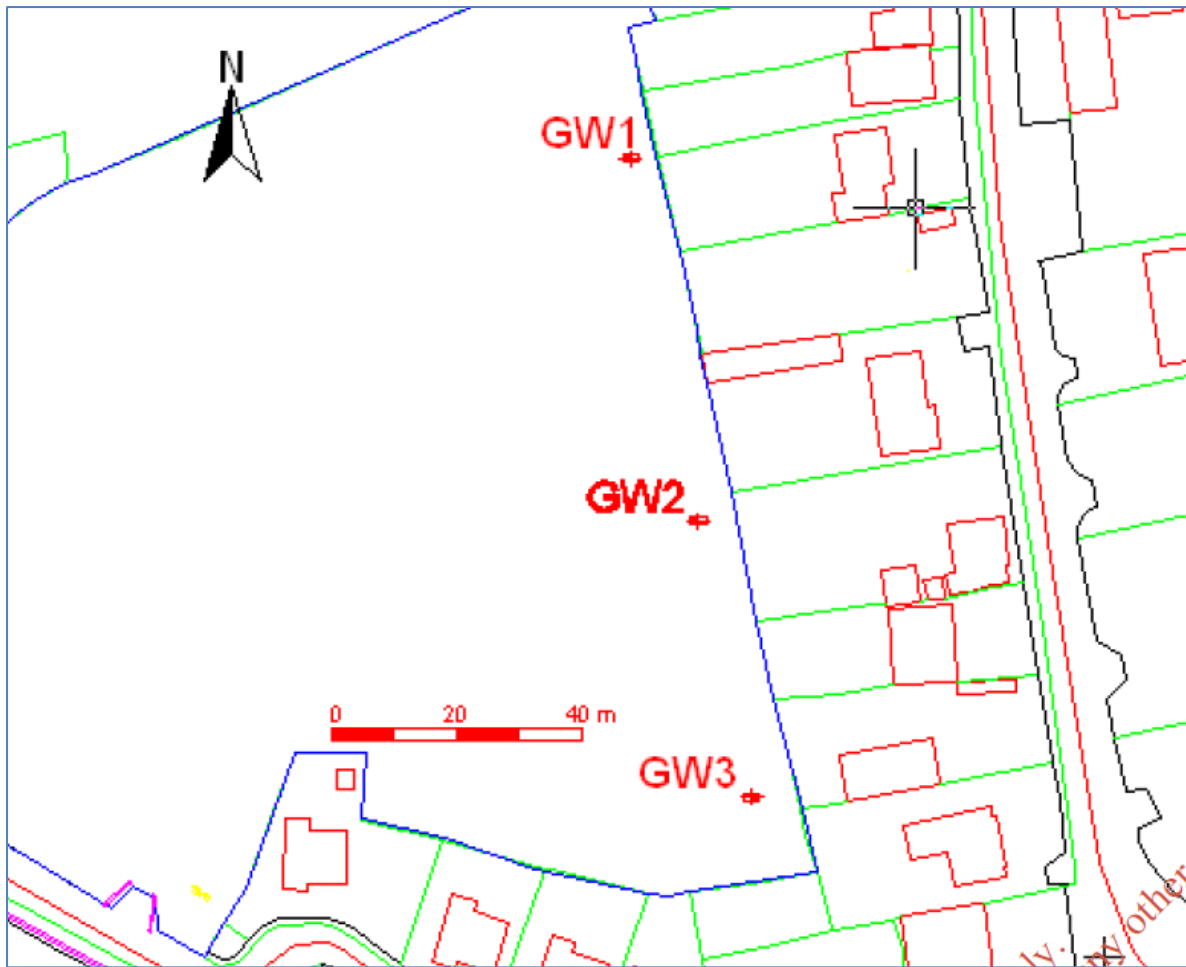


Figure 4: Location of gas monitoring boreholes 2019.

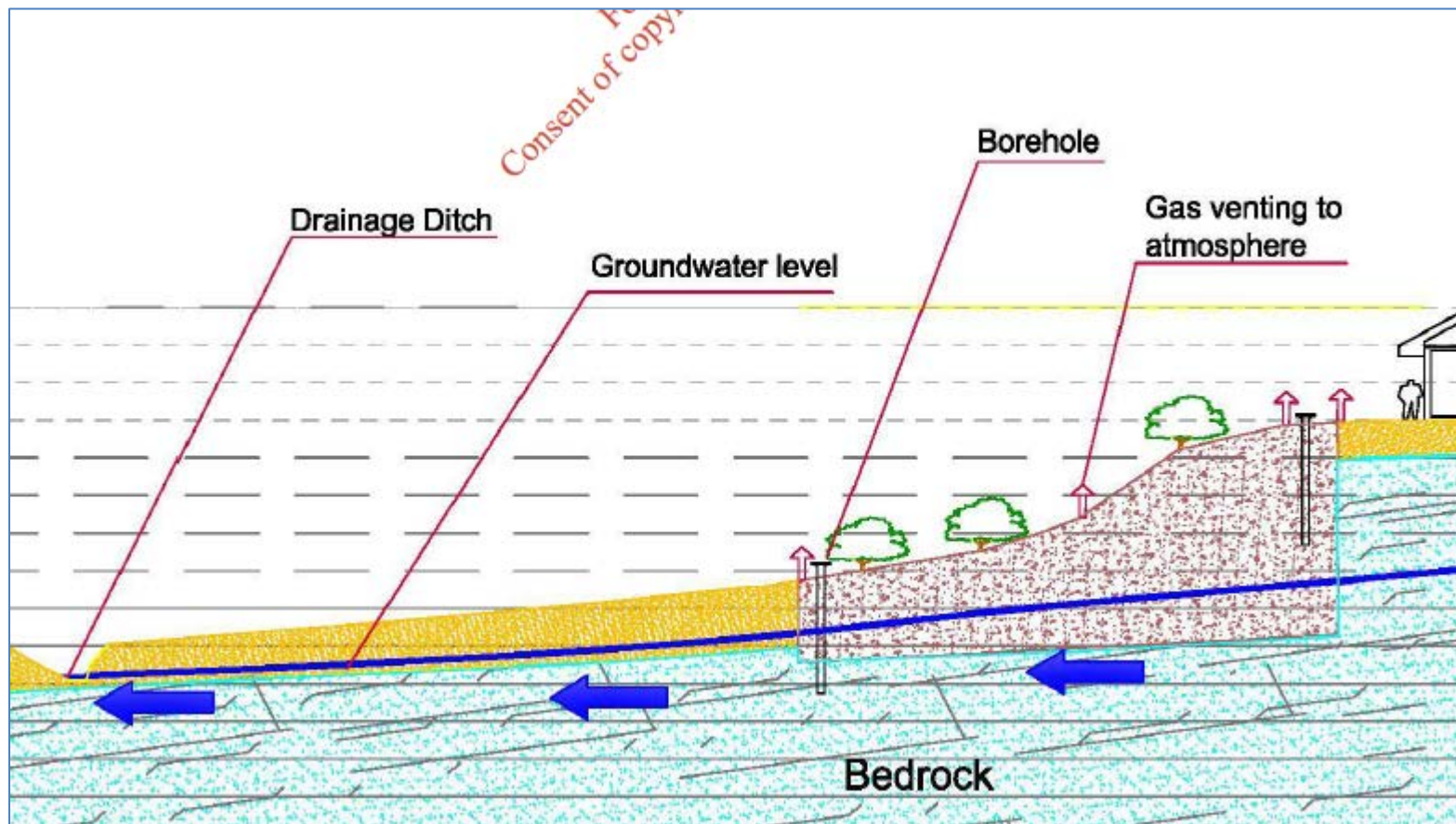


Figure 5: Conceptual site model for Churchtown Landfill site

Appendix 1: Assessment of the effects of activity on European sites and proposed mitigation measures.

European Site	Distance from the facility (km)	Qualifying Interests (* denotes priority habitat)	Conservation Objectives	Assessment
Lower River Shannon SAC [Site Code: 002165]	8.2 km west of the site and 15.5km north of the closed landfill	1029 Freshwater Pearl Mussel <i>Margaritifera margaritifera</i> 1095 Sea Lamprey <i>Petromyzon marinus</i> 1096 Brook Lamprey <i>Lampetra planeri</i> 1099 River Lamprey <i>Lampetra fluviatilis</i> 1106 Atlantic Salmon <i>Salmo salar</i> (only in fresh water) 1110 Sandbanks which are slightly covered by sea water all the time 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1150 *Coastal lagoons 1160 Large shallow inlets and bays 1170 Reefs 1220 Perennial vegetation of stony banks 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 1310 <i>Salicornia</i> and other annuals colonizing mud and sand 1330 Atlantic salt meadows (<i>Glauco-</i>	NPWS (2012) Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht [dated 7 August 2012].	<p><u>Emission to Water</u></p> <p>There are no emissions from the landfill site to surface water.</p> <p><u>Conclusion:</u></p> <p>Condition 3 of the certificate of authorisation outlines the remedial actions required at the site.</p> <p>Condition 3.6 requires monitoring, sampling, analysis and characterisation of leachate. It also requires biannual sampling of the surface water drain located downgradient from the landfill site and sampling, analysis and characterisation of groundwater from on-site and off-site boreholes.</p> <p>The controls in the recommended certificate of authorisation ensure the qualifying interests of the European sites are protected.</p> <p><u>Emissions to Air</u></p> <p>Recommended certificate of authorisation requires installation of a landfill cap and passive gas venting system.</p> <p><u>Conclusion:</u></p>

		<p><i>Puccinellietalia maritimae</i>)</p> <p>1349 Bottlenose Dolphin <i>Tursiops truncatus</i></p> <p>1355 Otter <i>Lutra lutra</i></p> <p>1410 Mediterranean salt meadows (<i>Juncetalia maritim</i>)</p> <p>3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation</p> <p>6410 <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)</p> <p>91E0 *Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)</p>		The controls in the recommended certificate of authorisation ensure the qualifying interests of the European sites are protected.
River Shannon and River Fergus Estuaries SPA 004077	15.5 km north of the closed landfill	<p>A017 Cormorant <i>Phalacrocorax carbo</i></p> <p>A038 Whooper Swan <i>Cygnus cygnus</i></p> <p>A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i></p> <p>A048 Shelduck <i>Tadorna tadorna</i></p> <p>A050 Wigeon <i>Anas penelope</i></p> <p>A052 Teal <i>Anas crecca</i></p> <p>A054 Pintail <i>Anas acuta</i></p> <p>A056 Shoveler <i>Anas clypeata</i></p> <p>A062 Scaup <i>Aythya marila</i></p> <p>A137 Ringed Plover <i>Charadrius hiaticula</i></p> <p>A140 Golden Plover <i>Pluvialis apricaria</i></p>	NPWS (2012) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht [dated 17 September 2012].	<p><u>Emission to Water</u></p> <p>There are no emissions from the landfill site to surface water.</p> <p><u>Conclusion:</u></p> <p>Condition 3 of the certificate of authorisation outlines the remedial actions required at the site.</p> <p>Condition 3.6 requires monitoring, sampling, analysis and characterisation of leachate. It also requires biannual sampling of the surface water drain located downgradient from the landfill site and sampling, analysis and characterisation of groundwater from on-</p>

		<p>A141 Grey Plover <i>Pluvialis squatarola</i> A142 Lapwing <i>Vanellus vanellus</i> A143 Knot <i>Calidris canutus</i> A149 Dunlin <i>Calidris alpina</i> A156 Black-tailed Godwit <i>Limosa limosa</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A160 Curlew <i>Numenius arquata</i> A162 Redshank <i>Tringa totanus</i> A164 Greenshank <i>Tringa nebularia</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A999 Wetlands</p>		<p>site and off-site boreholes.</p> <p>The controls in the recommended certificate of authorisation ensure the qualifying interests of the European sites are protected.</p> <p><u>Emissions to Air</u></p> <p>There are no significant emissions to air from the landfill which could affect the bird species River Shannon and River Fergus Estuaries SPA (Site code: 004077) is designated for.</p> <p>Recommended certificate of authorisation requires installation of a landfill cap and passive gas venting system.</p> <p><u>Conclusion:</u></p> <p>The controls in the recommended certificate of authorisation ensure the qualifying interests of the European sites are protected.</p>
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [Site code: 004161]	4.3 km west of the facility	<p>A082 Hen Harrier <i>Circus cyaneus</i></p>	NPWS (2018) Conservation objectives for Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht [dated 21/02/2018]	<p>There is no hydrological or hydrogeological connection between the landfill and Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (Site code: 004161).</p>

Askeaton Fen Complex SAC [Site code: 002279]	13.8 km north-east of the facility		NPWS (2018) Conservation Objectives: Askeaton Fen Complex SAC 002279. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht [dated 18 May 2018].	There is no hydrological or hydrogeological connection between the landfill and Askeaton Fen Complex SAC (Site code: 002279).
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