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

Signed: **Dated:** 24th January 2020

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:	24th January 2020
RE:	Application by **Cavan County Council** for a Certificate of Authorisation for a closed landfill at **Dunaree, Kingscourt, County Cavan**. Certificate of Authorisation Register Number **H0016-01**.

1. Application details

Type of facility:	Closed landfill as defined in the Regulations[1]
Original site ownership	Cavan County Council
Current site ownership	Cavan County Council
Operator of closed landfill	Cavan County Council operated this site since 1970.
Proposed use post remedial works	Cavan County Council intends to continue the existing use of the part of the site where no waste was deposited as the Council's storage yard.
Risk category of closed landfill:	The risk category was reduced from high (Class A) to a moderate risk (Class B) due to the actual extent of the deposited waste which proved, via site investigations, to be smaller than anticipated.
Section 22 register number:	S22-02575
Grid Reference	277993 E and 295740 N
Application received:	28th July 2014
AA screening	20th August 2019

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

determination:	
Regulation 7(4) notice:	No further information requested.
Additional information received:	Unsolicited information was received on 20th August 2019, 4th September 2019, 5th November 2019 and 9th January 2020.
Name of Qualified Person:	Tim Moynihan, Credentials provided by Institute of Geologists of Ireland.
EPA site inspection:	No inspection was required.

2. Information on the closed landfill

Location of facility	The closed landfill is located 0.6km from Kingscourt town, in the townland of Dunaree, Co. Cavan, at the L35360 Road. The location of the landfill site is shown in Figure 1.
Period of landfilling	1970 to 1991
Surrounding area	The use of the surrounding land is predominantly residential and industrial. Apart from the south-eastern site boundary which borders with an undeveloped construction site, the closed landfill is surrounded by housing estates and other buildings as shown on Figure 2.
Area of the closed landfill	The landfill covers an area of 1.2 ha.
Quantity of waste at the facility	Approximately 6,000 tonnes.
Characterisation of waste deposited	The waste body comprises of municipal solid waste (MSW) and construction & demolition (C&D) waste. The deposited waste includes plastic, paper, glass, metal and textiles. There is also a stony clay matrix. The approximate extent of the deposited waste is shown in Figure 3.

3. Site investigations

Current Condition and appearance of closed landfill:	The closed landfill is located in a former quarry which was filled with waste. Cavan County Council uses this site as a storage yard. There is one small shed within the site located at the lower part of the site. There are no buildings located on the upper section of the site where the waste was deposited. The site contains large amount of overgrown vegetation and outcropping rock. The lateral extent of waste covers an area of approximately 2,300m^2. From the trial hole excavations (see their locations in Figure 4), it was estimated, that approximately 6,000 tonnes of waste were deposited at the site.
Site investigations	The site investigations carried out as part of Tier 2 and Tier 3 assessments established the following facts:

	• no evidence of any hazardous waste on site was detected; • some of the deposited waste has undergone considerable biodegradation; • the base of the waste is defined by bed rock at the depth between 1m and 4.6m below ground level; • waste material was encountered in 10 (TH1, TH4, THS TH6, TH7, TH10, TH12, TH14, TH15, and TH24) of the 32 trial holes excavated, shown in Figure 4. The most extensive quantities of waste were encountered towards the South East of the site on the upper level. The waste extends from the eastern boundary (TH 6) to the top of the slope (TH 12) in a northerly direction towards the Council's storage yard. Negligible quantities of waste were found outside this area; • no groundwater or leachate was encountered in any of the trial holes; • landfill gas was being generated within the waste body; • the closed landfill is capped with a thin layer of soil/aggregate, through which precipitation is freely entering the waste body.
Monitoring and analysis of samples (water, gas, waste):	The most recent monitoring was the landfill gas monitoring which was carried out at six monitoring locations MW1 to MW6 on 17th October 2019. Other gas monitoring events took place at four locations (MW1 to MW4) on 14th December 2017 and at three locations (MW1 to MW3) on 11th October 2018. Prior to this, the following site investigations were carried out as part of Tier 1 and Tier 2 assessments: • site walk-over (carried out in 2009); • topographical survey (carried out in June 2013); • ecological survey (carried out in August 2013); • trial hole survey (carried out over two days in May 2013); a total of 32 trial holes were excavated. No trial holes were excavated outside the boundary of the landfill site due to the close proximity of domestic dwellings, industrial units and the presence of bedrock in the area. See Figure 4 for trial holes locations; • soil sampling (one round of sampling was carried out in 2013 at three locations: TH10, TH14 and TH20); and • gas monitoring (14 monitoring events between July 2013 and August 2013).
Hydrology	There are no watercourses within or adjacent to the site. The applicant stated that during capping works, the site was regraded and a small earthen embankment was created to the North-eastern aspect of the landfill slope to encourage surface water flow to one location. All surface water run-off from the landfill cap is collected at this location and flows into a concrete chamber. This chamber discharges to the adjoining sewer network which passes

	the site. The applicant stated in the correspondence dated 9th January 2020 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. The nearest river downgradient of the site is the Cabra river (waterbody code IE_NB_06G020070). This river is located 1km to the East of the closed landfill. The status of this river is good. The Cabra river discharges to surface waters which ultimately discharge into the Stabannan-Braganstown SPA (Site Code: 004091) 23km east of the landfill site and the Dundalk Bay SAC (Site Code: 000455) and Dundalk Bay SPA (Site Code: 004026) 29km east of the site.
Hydrogeology	The site overlies Louth groundwater body (Groundwater body Code: IEGBNI_NB_G_019). The quality status of this groundwater body is good. The bedrock aquifer beneath the site is classified as Poor Aquifer – bedrock which is generally unproductive except for local zones (Pl). The groundwater vulnerability beneath the site is Extreme/Rock at or near surface. The groundwater flow from the site is to the East and North-east. Tier 3 Report states that there was no groundwater encountered during trial hole excavations therefore no groundwater sampling took place. Soil sampling was carried out at three trial holes TH 10, TH 14 and, for the control at TH 20. The samples were analysed for inorganics, metals, mineral oil/ oils & greases, extractable petroleum hydrocarbons (EPH), polyaromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs). TH14 exceeded the Dutch Reference value for Copper. The concentration of Nickel in TH20, TH10, and TH14 exceeded the Dutch Reference values and the concentration of Zinc in TH 20 was the same as the Dutch Reference Value. However, none of the results exceeded the intervention values. The majority of the buried waste was found on the higher ground in the South-eastern part of the site. Waste was encountered in trial holes TH1, TH4, TH5, TH6, TH7, TH10, TH12, TH14, TH15, and TH24. The adjacent housing estates are serviced by Kingscourt Public Water Supply (PWS code: 0200PUB1015_1) which is located 2 km South-west of the landfill and sourced from a river. There will be no impact from the closed landfill on this water supply due to the fact that the groundwater flow beneath the closed landfill is in the opposite direction, towards the East and North-east. There are seven wells within 2km of the closed landfill. Four of them are located to the east and north-east of the landfill with the nearest

	well located within 800m of the site. The remaining three wells are located to the south-west and south-east. There is potential for the landfill leachate to impact the water quality in the wells to the east and north-east of the closed landfill however, the appropriate capping of the landfill will limit ingress of rain water into the waste body thus limiting the generation of leachate. Condition 3.8(d) requires monitoring of groundwater quality downgradient of the landfill.
Leachate and water quality:	The applicant stated that no groundwater was encountered during trial hole excavations and therefore, no groundwater sampling took place. Condition 3.8(d) 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. Additionally, Condition 3.8(b) requires biannual monitoring for leachate.
Landfill gas:	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 existing landfill cap. The most recent gas monitoring was carried out at six monitoring locations MW1 to MW6 (as shown in Figure 5) on 17th October 2019. The monitoring results show that Methane (CH_4) concentrations varied from 1 to 1.1 % v/v at MW1, MW2, MW4 and MW6. Carbon dioxide (CO_2) varied from 0.1 to 1.7 % v/v with 1.7 % v/v recorded at MW2 and 0.1 % v/v recorded at MW4, MW5 an MW6. The amount of gas generated at the closed landfill is insufficient for utilisation or flaring. The findings of the Tier 2 and Tier 3 Environmental Risk Assessment gas monitoring established that the majority of gas being generated at the former landfill is most likely escaping through the surface, due to the shallow depth of the landfill and the composition of the existing landfill cap. However, the findings further state, the lateral migration of landfill gas cannot be disregarded given the subsurface rock, fill material and as both Methane and Carbon Dioxide are heavier than air. Condition 3.1 requires a landfill cap, to include a 1mm thick low permeability geomembrane and a passive gas venting system. Additionally, Condition 3.8(c) requires monitoring to detect the presence and concentration of landfill gas on a quarterly basis.
Conceptual site model:	Trial hole investigations carried out as part of Tier 2 revealed that the extent of the deposited waste was significantly smaller than it had been initially thought after Tier 1 Risk Assessment. This resulted in the change of a number of SPR linkages and the reduction of overall risk rating of the site from High Risk (class A) down to Moderate Risk (class B). The conceptual site model is shown in Figures 6(a) and Figure 6(b).

4. SPR linkages and remedial actions

SPR linkage scenarios (applicable ones only):	**Leachate and gas migration scores**: Low scores: Two pathways were identified in Tier 3 Assessment as Low Risk: • Migration of leachate to private wells (SPR 3); and • Migration of leachate to the underlying aquifer (SPR 5); Moderate scores: One pathway was identified as Moderate Risk: • Human health exposure pathway of off-site lateral migration of landfill gas into nearby houses (SPR 10). High scores: No High scores for gas or leachate migration were identified. **Summary:** Upon the review of the monitoring data; • remedial action is warranted to address the risk of leachate migrating from the site into groundwater. • remedial action is warranted to address the risk of off-site migration of landfill gas.
Proposed remedial actions:	The applicant considered the following remedial actions as the feasible options: • Leaving the waste in-situ; • Gas venting system; • Regrading of the landform of the closed landfill; • Capping of the landfill; and • Monitoring the levels of landfill gas. Gas venting system A proposed passive venting well system would consist of installation of 300 mm boreholes at 1 m centres to the base of the fill material and constructed with 160 mm diameter perforated vertical pipe with filter sock. All vertical pipes would be connected to a horizontal, 160mm diameter perforated pipe with filter sock located within a gravel-filled trench located in the top 1.0 meters below ground level (mbgl). Vent stack manifolds and vertical risers located at 10m centres along the horizontal gas collection duct would vent the landfill gases to the atmosphere. Venting wells would be installed to the base of the waste. Re-grading of landform The applicant states that re-grading of the landform is vital to the overall remediation of the site and will break the infiltration of rainfall into the waste body. The applicant further states that the re-grading of the slopes of the closed landfill would have a positive effect on the following:

	• Stability of the side slopes; • Enhanced surface water drainage; • Reduction in the infiltration of rainwater; • General landscaping and scenic amenity. <u>Landfill Gas Monitoring</u> There are six gas monitoring wells currently installed at the site. As part of a continued programme of monitoring it is proposed to install three additional gas monitoring wells at the site. In combination with the existing six gas monitoring locations the new gas monitoring locations will be positioned on both sides of the passive gas venting system in order to show whether gas is breaching the gas venting barrier and to test the effectiveness (or otherwise) of the gas venting system. Having regard to the monitoring results submitted in support of the application for certificate of authorisation, the age of the closed landfill, the location of the nearest private well (within 800m of the site) and the fact that the nearby dwellings are serviced by Kingscourt Public Water Supply (PWS code: 0200PUB1015_1), the following remedial measures are considered appropriate and recommended in Condition 3.1: (a) install of a low permeability landfill cap, minimum 1m, with 1mm thick low permeability geomembrane having a hydraulic conductivity of less than or equal to 1x10-9m/s; (b) install passive gas venting system. The gas vent pipes shall not be perforated above the ground level; (c) install additional gas monitoring wells as recommended in Tier 3 Assessment; (d) regrade the landform of the closed landfill; and (e) reseed grass within the site. Additionally, Condition 3.8(c) 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: • migration of leachate into the bedrock; • migration of landfill gas to off-site locations. The proposed capping will also prevent any waste materials from appearing on the surface of the landfill site. The recommended certificate of authorisation allows for the importation and use of soil and stone to complete the works.
Proposed aftercare monitoring and assessment:	Monitoring as specified in Condition 3.8 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. The risk assessment is adequate for the following reasons: • It has identified, assessed and adequately addressed the associated risks inherent with the landfill site. • An Appropriate Assessment was also completed to evaluate the potential risk to the European sites associated with the adjoining surface waters. It concluded that the remedial measures will not impact on the protected sites at Stabannan-Braganstown SPA (Site Code: 004091), Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026), River Boyne and River Blackwater SAC (Site Code: 002299) and River Boyne and River Blackwater SPA (Site Code: 004232).

5. Appropriate assessment

There are five 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 Stabannan-Braganstown SPA (Site Code: 004091), Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026), River Boyne and River Blackwater SAC (Site Code: 002299) and River Boyne and River Blackwater SPA (Site Code: 004232).

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:

- there is groundwater connectivity between the landfill site and surface waters which ultimately discharge into the Stabannan-Braganstown SPA (Site Code: 004091), Dundalk Bay SAC (Site Code: 000455) and Dundalk Bay SPA (Site Code: 004026).

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 Stabannan-Braganstown SPA (Site Code: 004091), Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026), River Boyne and River Blackwater SAC (Site Code: 002299) and River Boyne and River Blackwater SPA (Site Code: 004232), 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 in Stabannan-Braganstown SPA (Site Code: 004091), Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026) and will ensure that there will be no significant impact on these European Sites;
- the project alone, which consists of the remediation of the closed landfill, or in-combination with other projects, will not adversely affect the integrity, and conservation status of any of the qualifying interests of Stabannan-Braganstown SPA (Site Code: 004091), Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026);
- also, there are no significant emissions to air from the landfill which could affect the bird species that the Stabannan-Braganstown SPA (Site Code: 004091) and Dundalk Bay SPA (Site Code: 004026) are designated for;
- there is no hydrogeological connectivity between the closed landfill and River Boyne and River Blackwater SAC (Site Code: 002299) or River Boyne and River Blackwater SPA (Site Code: 004232); and
- Condition 3.8 requires ongoing environmental assessment and monitoring.

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: Stabannan-Braganstown SPA (Site Code: 004091), Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026), River Boyne and River Blackwater SAC (Site Code: 002299) and River Boyne and River Blackwater SPA (Site Code: 004232).

6. Recommendation

I recommend granting the certificate of authorisation as proposed.

Signed

Date 24th January 2020

Ewa Babiarczyk

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.

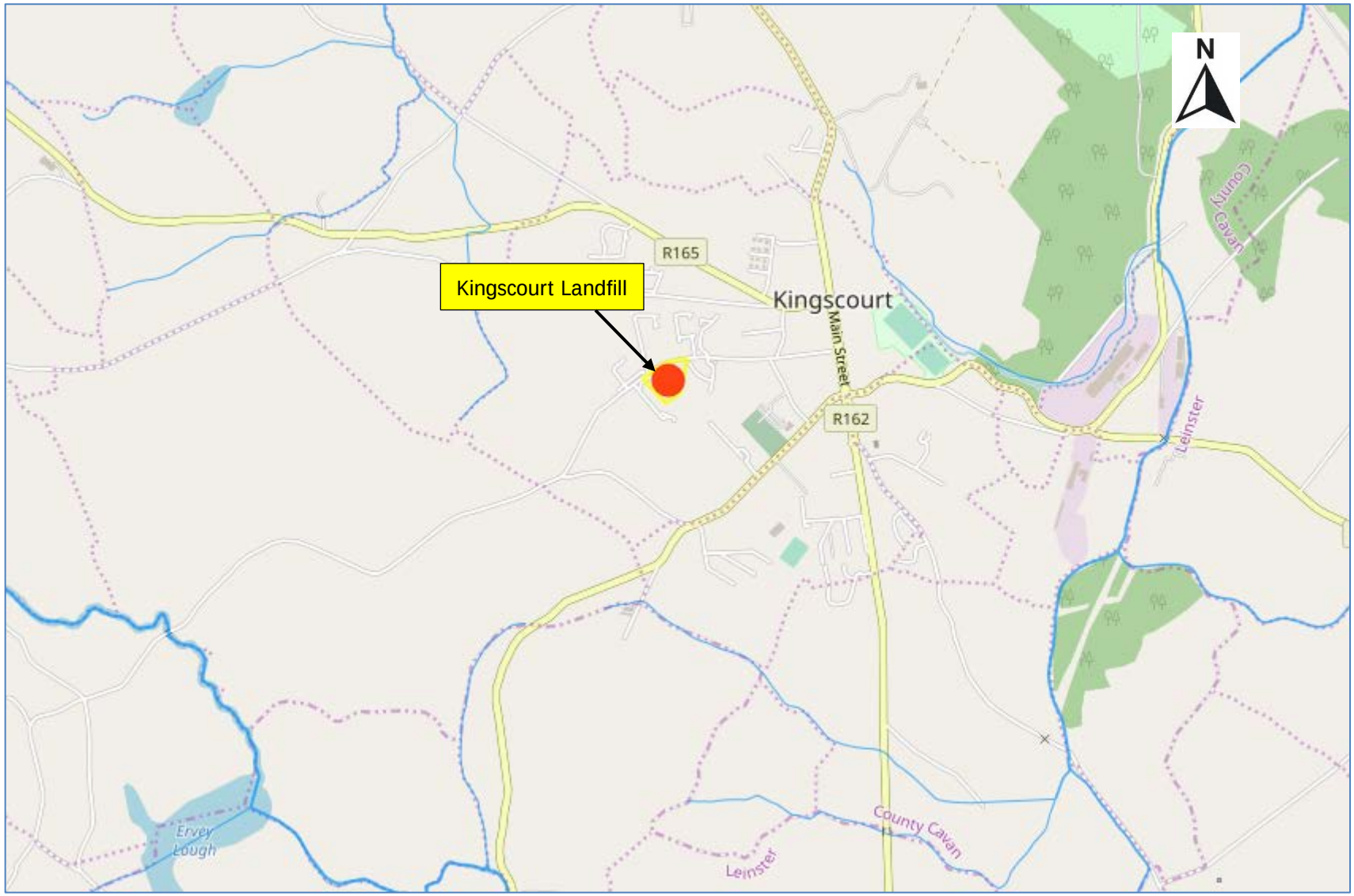

Figure 1: Location of Kingscourt Landfill

Figure 2: Kingscourt Landfill's surroundings

Figure 3: Approximate extent of deposited waste

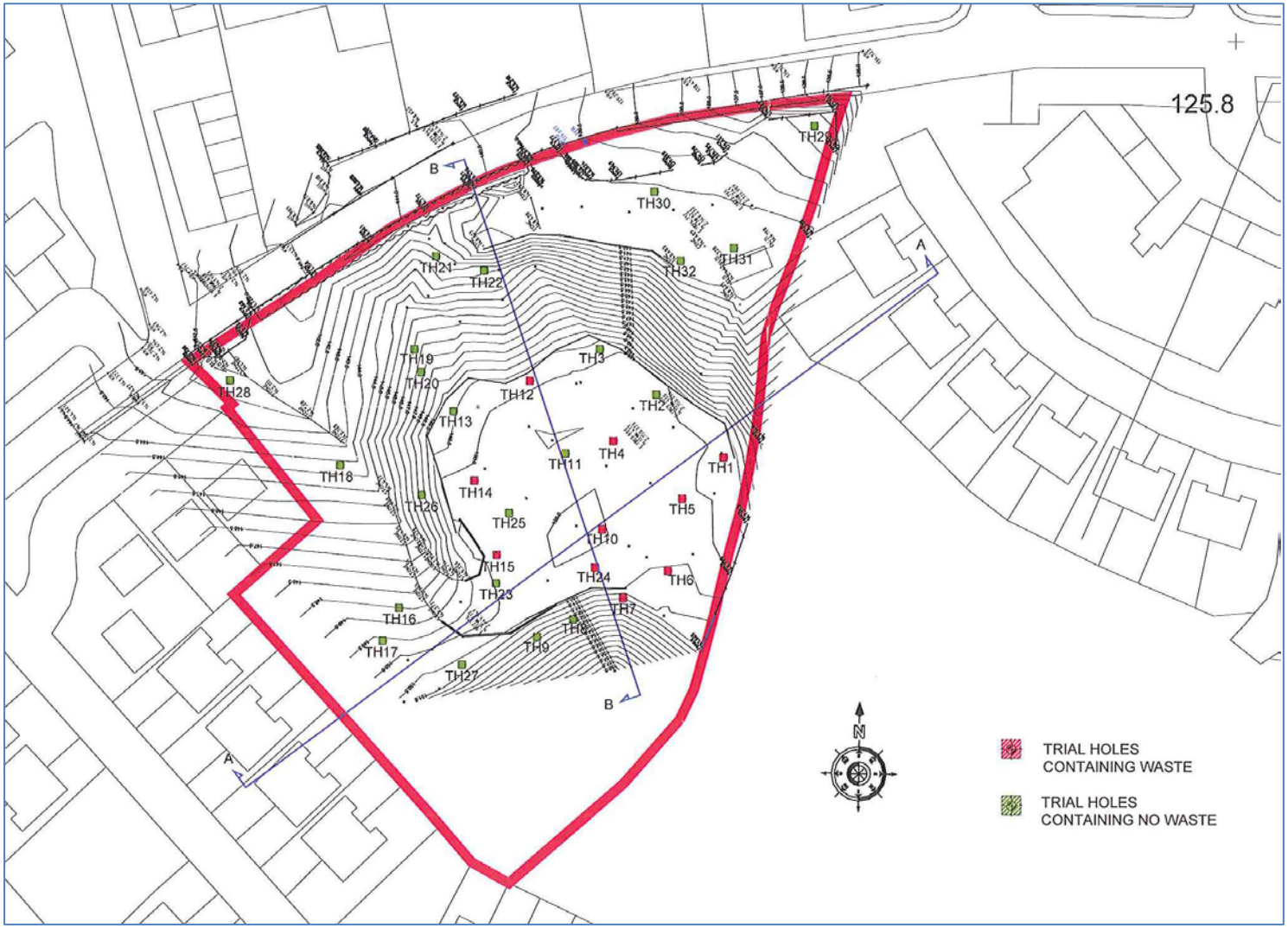

Figure 4: Trial holes location

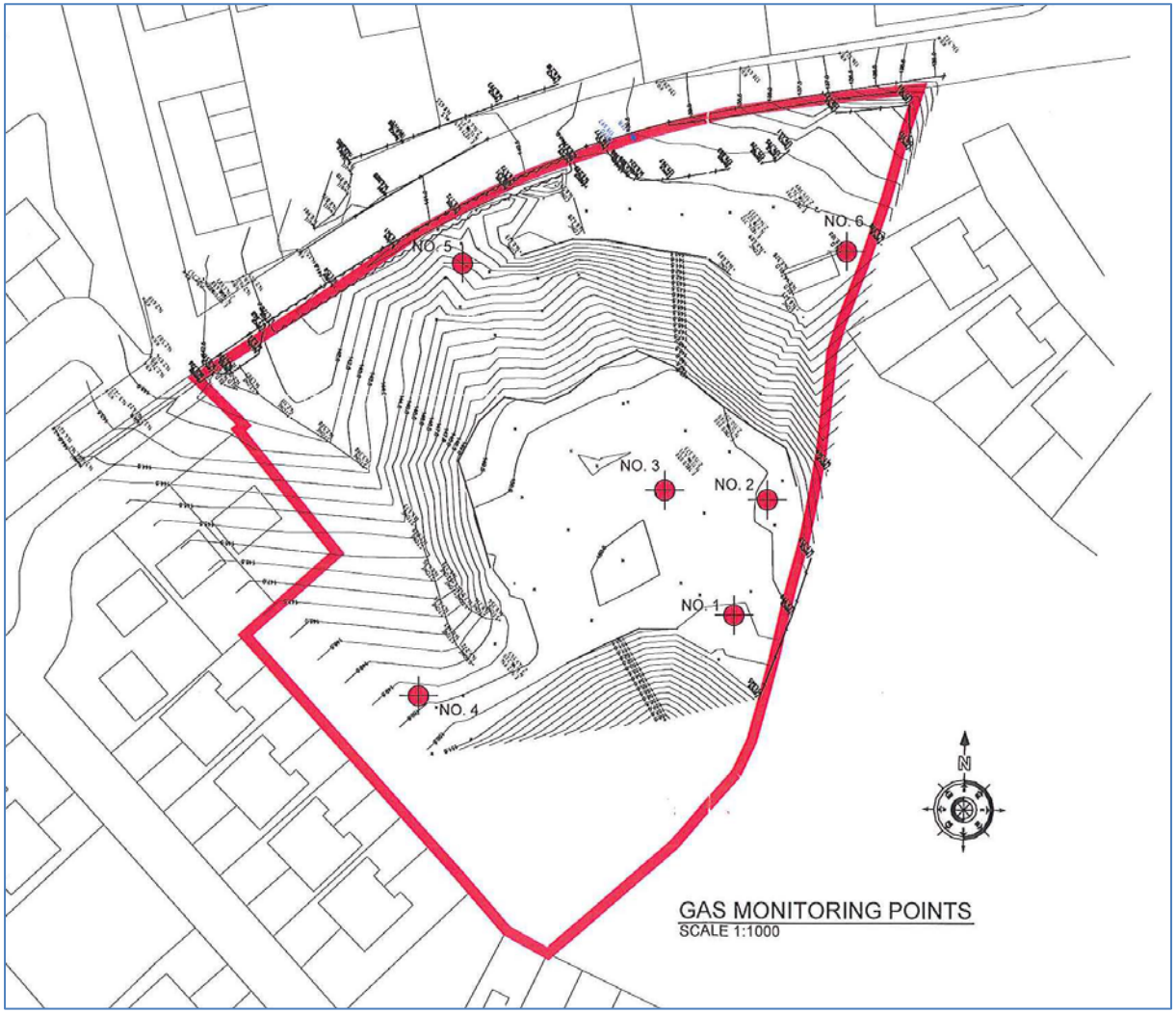

Figure 5: Gas monitoring locations

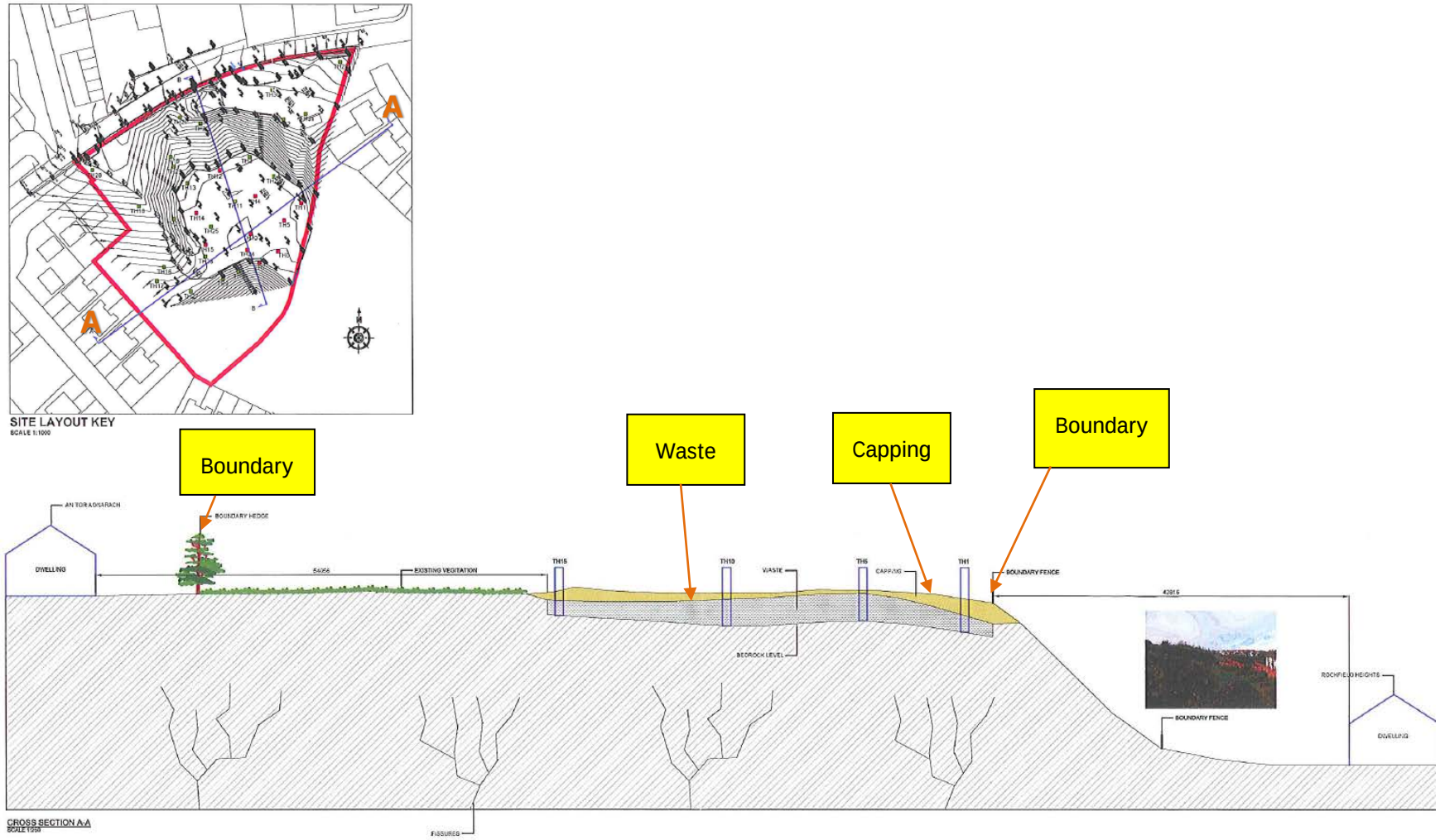

Figure 6(a): Conceptual site model for Kingscourt Landfill site – Cross section A-A

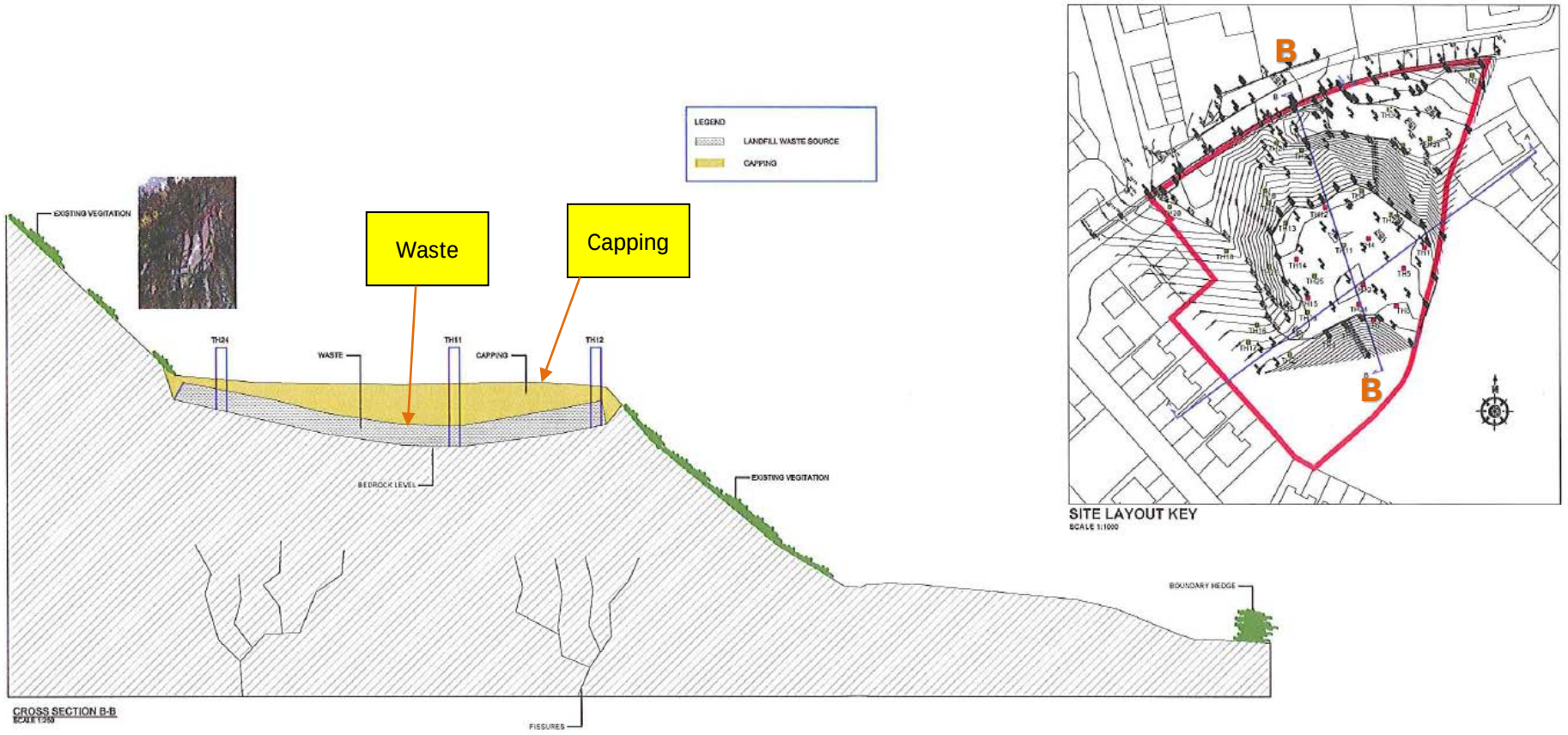

Figure 6(b): Conceptual site model for Kingscourt Landfill site – Cross section B-B

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
Stabannan-Braganstown SPA (Site Code: 004091)	23km east of the closed landfill	A043 Greylag Goose *Anser anser*	NPWS (2018) Conservation objectives for Stabannan-Braganstown SPA [004091]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht [dated 21st February 2018].	<u>Emissions to Water</u> There will be no emissions from the landfill site to surface water. <u>Conclusion:</u> Condition 3.1 of the certificate of authorisation outlines the remedial actions required at the site. Condition 3.8 requires monitoring, sampling, analysis and characterisation of leachate. It also requires sampling, analysis and characterisation of groundwater from on-site and off-site boreholes. The controls in the recommended certificate of authorisation ensure the qualifying interests of this European site are protected. <u>Emissions to Air</u> Recommended certificate of authorisation requires installation of a landfill cap and passive gas venting system. <u>Conclusion:</u> The controls in the recommended certificate of authorisation ensure the qualifying interests of this European site are protected.

Dundalk Bay SAC (Site Code: 000455)	29km east of the closed landfill	1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1220 Perennial vegetation of stony banks 1310 *Salicornia* and other annuals colonizing mud and sand 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) 1410 Mediterranean salt meadows (*Juncetalia maritimi*)	NPWS (2011) Conservation Objectives: Dundalk Bay SAC 000455 and Dundalk Bay SPA 004026. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. [dated 19th July 2011].	<u>Emissions to Water</u> There will be no emissions from the landfill site to surface water. <u>Conclusion:</u> Condition 3.1 of the certificate of authorisation outlines the remedial actions required at the site. Condition 3.8 requires monitoring, sampling, analysis and characterisation of leachate. It also requires sampling, analysis and characterisation of groundwater from on-site and off-site boreholes. The controls in the recommended certificate of authorisation ensure the qualifying interests of this European site are protected. <u>Emissions to Air</u> Recommended certificate of authorisation requires installation of a landfill cap and passive gas venting system. <u>Conclusion:</u> The controls in the recommended certificate of authorisation ensure the qualifying interests of this European site are protected.
Dundalk Bay SPA (Site Code: 004026)	29km east of the closed landfill	A005 Great Crested Grebe *Podiceps cristatus* wintering A043 Greylag Goose *Anser anser* wintering A046 Light-bellied Brent Goose *Branta bernicla hrota* wintering A048 Shelduck *Tadorna tadorna* wintering	NPWS (2011) Conservation Objectives: Dundalk Bay SAC 000455 and Dundalk Bay SPA 004026. Version 1.0. National Parks and Wildlife Service, Department of Arts,	<u>Emissions to Water</u> There will be no emissions from the landfill site to surface water. <u>Conclusion:</u> Condition 3.1 of the certificate of authorisation outlines the remedial actions required at the site.

		A052 Teal *Anas crecca* wintering A053 Mallard *Anas platyrhynchos* wintering A054 Pintail *Anas acuta* wintering A065 Common Scoter *Melanitta nigra* wintering A069 Red-breasted Merganser *Mergus serrator* wintering A130 Oystercatcher *Haematopus ostralegus* wintering A137 Ringed Plover *Charadrius hiaticula* wintering A140 Golden Plover *Pluvialis apricaria* wintering A141 Grey Plover *Pluvialis squatarola* wintering A142 Lapwing *Vanellus vanellus* wintering A143 Knot *Calidris canutus* wintering A149 Dunlin *Calidris alpina* wintering A156 Black-tailed Godwit *Limosa limosa* wintering A157 Bar-tailed Godwit *Limosa lapponica* wintering A160 Curlew *Numenius arquata* wintering A162 Redshank *Tringa totanus* wintering A179 Black-headed Gull *Chroicocephalus ridibundus* wintering A182 Common Gull *Larus canus* wintering A184 Herring Gull *Larus argentatus*	Heritage and the Gaeltacht. [dated 19th July 2011].	Condition 3.8 requires monitoring, sampling, analysis and characterisation of leachate. It also requires sampling, analysis and characterisation of groundwater from on-site and off-site boreholes. The controls in the recommended certificate of authorisation ensure the qualifying interests of this European site are protected. <u>Emissions to Air</u> Recommended certificate of authorisation requires installation of a landfill cap and passive gas venting system. <u>Conclusion:</u> The controls in the recommended certificate of authorisation ensure the qualifying interests of this European site are protected.

		wintering A999 Wetlands & Waterbirds		
River Boyne and River Blackwater SAC (Site Code: 002299)	19km south-east of the closed landfill	1099 River Lamprey *Lampetra fluviatilis* 1106 Salmon *Salmo salar* 1355 Otter *Lutra lutra* 7230 Alkaline fens 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*	NPWS (2018) Conservation objectives for River Boyne and River Blackwater SAC [002299]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht [dated 21st February 2018].	There is no hydrogeological connectivity between the closed landfill and this SAC.
River Boyne and River Blackwater SPA (Site Code: 004232)	19km south-east of the closed landfill	A229 Kingfisher *Alcedo atthis*	NPWS (2018) Conservation objectives for River Boyne and River Blackwater SPA [004232]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht [dated 21st February 2018].	There is no hydrogeological connectivity between the closed landfill and this SPA.