


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

Signed: 

Dated: 27<sup>th</sup> August 2020



## OFFICE OF ENVIRONMENTAL SUSTAINABILITY

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

**TO:** Gerard O'Leary, Director

**FROM:** Ewa Babiarczyk, Inspector, Environmental Licensing Programme

**DATE:** 27<sup>th</sup> August 2020

**RE:** Application by **Monaghan County Council** for a Certificate of Authorisation for a closed landfill at **Killycard, Castleblayney, County Monaghan**.  
Certificate of Authorisation Register Number **H0364-01**.

#### 1. Application details

Type of facility:	Closed landfill as defined in the Regulations <sup>1</sup> .
Original site ownership	Monaghan County Council.
Current site ownership	Private ownership.
Operator of closed landfill	Monaghan County Council operated this site since circa 1980 to 1987. The Council stated that a precise operational period is unknown.
Proposed use post remedial works	Monaghan County Council intends to use this site for agricultural purposes, such as grazing land for animals.
Risk category of closed landfill:	High risk (class A) due to <ul style="list-style-type: none"><li>• migration of landfill leachate into an adjacent Corrinshigo Lough; and</li><li>• migration of landfill gas into on-site industrial units and off-site locations.</li></ul>
Section 22 register number:	S22-02528
Grid Reference	280982 E and 320431 N
Application received:	15 <sup>th</sup> January 2020

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

AA screening determination:	22 <sup>nd</sup> April 2020
Regulation 7(4) notice:	28 <sup>th</sup> February 2020
Additional information received:	Regulation 7(4) Reply received in three parts on: 2 <sup>nd</sup> April 2020, 16 <sup>th</sup> April 2020 and 17 <sup>th</sup> April 2020. Unsolicited information received on 18 <sup>th</sup> June 2020.
Name of Qualified Person:	James O'Neill, Credentials provided by Engineers Ireland.
EPA site inspection:	No inspection was required.

## 2. Information on the closed landfill

Location of facility	The closed landfill is located 1km to the north-west of Castleblayney Town at the R183 Road in County Monaghan. The location of the landfill site is shown in Figure 1.
Period of landfilling	Circa 1980 to 1987.
Surrounding area	The closed landfill is located in a low-lying valley. To the north, south and the east of the site, there are agricultural lands. Immediately to the west the closed landfill borders with the Corrinshigo Lough, to the north with a stream and to the south-west with an open channel, as shown in Figure 2.  There are agricultural and commercial buildings within 50m of the site and five dwelling houses within 250m of the site boundary. The nearest dwelling house is located 50m of the south-western site boundary.
Area of the closed landfill	The site covers an area of 2.2 ha.
Quantity of waste at the facility	Approximately 45,000 tonnes (approx.29,700m <sup>3</sup> )
Characterisation of waste deposited	The waste body comprises of municipal solid waste (MSW) which includes predominantly organic waste (Zone A) and waste mixed with clay/silt glacial till (Zone B) as shown in Figure 3.

## 3. Site investigations

Current condition and appearance of closed landfill:	The closed landfill lies at an elevation of between 93mOD and 95 mOD. The site is currently used for general agricultural purposes, mainly for animal grazing as well as having commercial and industrial units on site, including mushroom houses which are now derelict. All of these developments will be dismantled with the exception of the two industrial units in the eastern part of the site, as shown in Figure 2. Condition 3.1(k) requires continuous gas monitoring and installation of gas vents and gas alarms in these
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	<p>units. Additionally, Condition 3.1(l) requires that the local authority ensures 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 these two buildings.</p> <p>Exposed waste, erosion and Japanese Knotweed were observed by the applicant along the western site boundary, as shown in Figure 4. The Council stated that the landfill cap which will be installed as part of remediation measures will act as a preventative measure to address the erosion. The new cap will also prevent waste being exposed. Condition 3.18 requires an Invasive Species Prevention and Eradication Plan which includes remedial actions for eradication of the invasive species growing at the facility.</p>
<p>Site investigations</p>	<p>The site investigations carried out as part of Tier 1, 2 and 3 assessments established the following facts:</p> <ul style="list-style-type: none"> <li>• domestically sourced municipal solid waste was disposed in the landfill;</li> <li>• the encountered waste consists of a black bag type waste with 30% to 50% plastic, 10% rubber, 15% glass bottles, washing machines, cups, springs, coal bags, clothes, nets, planks of wood and fertiliser bags;</li> <li>• waste was found to be deposited directly into the Corrinshigo Lough and in the Corrinshigo Stream. Condition 3.1(a) requires the removal of waste from these waterbodies as part of the remedial actions;</li> <li>• the existing soil cap allows rainfall infiltration into the waste body;</li> <li>• there is migration of landfill leachate into groundwater;</li> <li>• the landfill is contributing to a deterioration in groundwater quality;</li> <li>• landfill gas is being generated; and</li> <li>• there are two wells present on-site in an area of an industrial unit carpark. The Council believes these to be old methane wells and has no plan to dismantle them.</li> </ul>
<p>Monitoring and analysis of samples (water, gas, waste):</p>	<p>The following site investigations were carried out as part of Tier 1, 2 and 3 assessments:</p> <ul style="list-style-type: none"> <li>• desktop study, including site walk-over which was carried out on 12<sup>th</sup> June 2018;</li> <li>• trial pit excavations (thirteen trial pits were excavated on 20<sup>th</sup> and 21<sup>st</sup> September 2018);</li> <li>• groundwater sampling (two rounds of sampling at three boreholes were carried out on 2<sup>nd</sup> and 9<sup>th</sup> October 2018);</li> <li>• waste sampling (two samples of the made ground/waste were collected on 21<sup>st</sup> September 2018);</li> <li>• geophysical survey (carried out on 1<sup>st</sup> and 2<sup>nd</sup> November 2018);</li> </ul>

	<ul style="list-style-type: none"> <li>• geotechnical analysis, including in-situ capping permeability testing and variable head permeability testing (the latter testing was carried out on 9<sup>th</sup> October 2018);</li> <li>• groundwater level analysis (carried out on 2<sup>nd</sup> October 2018);</li> <li>• surface water quality (sampling carried out at two locations on 2<sup>nd</sup> and 9<sup>th</sup> October 2018);</li> <li>• landfill gas sampling (carried out at three locations on 2<sup>nd</sup> and 9<sup>th</sup> October 2018); and</li> <li>• modelling of the current and future impacts on groundwater quality and surface water quality, and current and future volumes of landfill gas being generated by the deposited waste (carried out on 19<sup>th</sup> March 2019).</li> </ul>
Hydrology	<p>Killycard Historic Landfill is located within the Newry, Fane, Glyde and Dee catchment (catchment Identification Number: 06) and the sub-catchment of River Fane (waterbody code: IE_NB_06F010200).</p> <p>Immediately to the west, the closed landfill borders with the Corrinshigo Lough. To the north, the closed landfill borders with the Corrinshigo Stream which flows from the Corrinshigo Lough towards a northern-easterly direction as shown in Figure 2. The Corrinshigo Stream discharges into the River Fane 2km downstream of the closed landfill (waterbody code: IE_NB_06F010200). To the south-west, the site borders with an open channel which discharges into the Corrinshigo Lough.</p> <p>Two rounds of surface water monitoring were carried out on the 2<sup>nd</sup> and 9<sup>th</sup> October 2018 at an upstream location SW1, which is at the outlet from the Corrinshigo Lough, and downstream location SW2 located 125m downstream of SW1 as shown in Figure 5. Monitoring results show exceedances of Environmental Quality Standards (EQS) set out in European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended, for BOD and ammoniacal nitrogen as N at the upstream location SW1. While the EQS for BOD is less than 2.6 mg/l (95<sup>th</sup>ile flow) the recorded maximum concentration of BOD at SW1 was 3.73 mg/l. While the standard for ammoniacal nitrogen as N is less than 0.140 mg/l (95<sup>th</sup>ile flow) the recorded maximum value for this parameter was 0.318 mg/l. No exceedances of these parameters were however recorded at the downstream location SW2. Tier 2 Assessment states the maximum concentration of BOD recorded at SW2 was less than 1 mg/l and the maximum concentration of ammoniacal nitrogen was less than 0.140 mg/l. The monitoring results show that although there are exceedances of the parameters at the upstream location, the water quality at the downstream location is not impacted.</p> <p>Tier 2 Assessment states that given that the determined groundwater flow direction is west-south-west from the waste body and towards the Corrinshigo Lough, the elevated ammonia and BOD levels at the upstream location SW1 may be evidence of impact from the landfill. The assessment further states however that the presence of ammonia and BOD at these levels may also be an</p>

	<p>indication of slurry spreading run-off from the surrounding agricultural fields in the area.</p> <p>Condition 3.9(d) requires monitoring of surface water at the locations upstream and downstream of the closed landfill on a quarterly basis. This condition also specifically requires monitoring for Molybdate Reactive Phosphorus (MRP) (mg P/l) as this parameter was omitted from the monitoring carried out by the applicant.</p>
Hydrogeology	<p>The closed landfill lies within the Louth Groundwater Body (GWB Number: IEGBNI_NB_G_019). The status of this groundwater body is good. The site is underlain by a poorly productive bedrock. The aquifer vulnerability beneath the site is Extreme. The site investigations at boreholes GW01 to GW03 (see Figure 6) established that groundwater beneath the site flows towards west-south-west and towards the Corrinshigo Lough and the groundwater table is intersecting the waste body.</p> <p>There are no public groundwater supplies and no groundwater dependent ecosystems in the area.</p> <p>The closest groundwater protection area to the site is the Monaghan Town outer protection area located 18km north-west of the closed landfill. Given the groundwater flow beneath the site towards west-south-west, there will be no impact on this groundwater protection area from the closed landfill.</p> <p>There are seven private water wells within 1km of the closed landfill. The nearest well is located 0.3km east of the closed landfill; two wells are located to the north-east of the closed landfill; two wells are located to the south-east of the closed landfill; one well is located to the south-west of the site and one well is located to the north-west of the site.</p> <p>There is potential for the landfill leachate to impact the water quality in the well to the south-west 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 3.9(e)(i) requires monitoring of groundwater quality upgradient and downgradient of the waste body. Additionally, Condition 3.4 requires carrying out appropriate monitoring on a biannual basis to identify any impact on the quality of water abstracted at wells downgradient of the landfill.</p>
Leachate and water quality:	<p>Trial pits investigation at thirteen locations, as shown in Figure 6, established that made ground comprising waste was encountered in all trial pits and that groundwater was encountered in ten trial pits. The investigation further established that the cover material at these trial pits comprised 0.05m to 0.10m topsoil and waste was encountered between 0.1m – 3.4m in all trial pits. Natural ground comprising of cut-over peat and glacial till was confirmed in all trial pits except for TP11 where Made Ground was underlain by glacial till.</p>

	<p>Three boreholes (GW01, GW02 and GW03) were installed within the waste body, as shown in Figure 6, to a total depth of 10m below ground level. Groundwater sampling results from these boreholes show coliforms and elevated concentrations of ammonia. Tier 2 Assessment states that given that all monitoring boreholes were installed within the waste body, as confirmed by the trial pit and geophysical findings, the landfill is contributing to a deterioration in groundwater quality.</p> <p>Tier 2 Assessment further states that presence of peat underlying the waste body across the site may also be contributing to the elevated ammonia concentrations in groundwater. The combined presence of coliforms and elevated ammonia concentrations in all monitoring boreholes, GW01 to GW03, may also be evidence of localised contamination due to agricultural land spreading or poorly functioning septic tanks in the area.</p> <p>The monitoring results also show elevated lead concentrations of 0.168 mg/l and 0.0743 mg/l at monitoring locations GW02 and GW03 and slightly elevated nickel concentration at GW01. Tier 2 Assessment states that the elevated concentrations of these parameters are considered to be evidence of the localised groundwater hydrochemistry based on the presence of historical lead mining north of Castleblayney.</p> <p>Condition 3.9(e)(i) requires monitoring on a quarterly basis of groundwater from at least three groundwater monitoring boreholes, one of which shall be upgradient of the waste body and two of which shall be downgradient of the waste body. Additionally, Condition 3.9(b) requires a quarterly monitoring for leachate.</p>
Landfill gas:	<p>There is a risk of landfill gas migration to nearby buildings. The most likely pathway for the migration of the landfill gas is through the underlying bedrock and existing landfill cap.</p> <p>Landfill gas monitoring was carried out at the same boreholes as the groundwater monitoring, i.e. boreholes GW01, GW02 and GW03 within the waste body as shown in Figure 6. The monitoring was carried out on 2<sup>nd</sup> and 9<sup>th</sup> October 2018. The monitored parameters were methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>) and oxygen (O<sub>2</sub>). The monitoring results show a slightly elevated methane concentration of 1.5% v/v at upgradient monitoring location GW01. The Tier 2 Assessment states that gas concentrations at these levels are an indication of the stabilised nature of the MSW deposited.</p> <p>Condition 3.1(c) requires a landfill cap, to include a 1mm thick low permeability geomembrane, and Condition 3.1(d) requires a passive gas venting system. Additionally, Condition 3.9(c) requires monitoring to detect the presence and concentration of landfill gas on a quarterly basis.</p>
Conceptual site model:	<p>Tier 1 Assessment determined that the overall risk score for the closed landfill was 70%, resulting in a risk classification of High (Class A).</p>

	<p>Tier 2 Assessment confirmed this classification due to the risk of migration of landfill leachate into Corrinshigo Lough, the shallow permeable soil cap contributing to leachate generation and the risk of migration of landfill gas into the adjacent industrial units and off-site locations.</p> <p>The conceptual site model is shown in Figure 8.</p>
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#### 4. SPR linkages and remedial actions

<p>SPR linkage scenarios (applicable ones only):</p>	<p><b>Leachate and gas migration scores:</b></p> <p><u>Low scores:</u></p> <p>Seven pathways were identified in Tier 2 Assessment as Low Risk:</p> <ul style="list-style-type: none"> <li>• Migration of leachate to Surface Water Body Protected Areas (SWDTE) (SPR 2);</li> <li>• Migration of leachate to private wells (SPR 3);</li> <li>• Migration of leachate to groundwater protected area (GWDTE) (SPR 4);</li> <li>• Migration of leachate to the underlying aquifer (SPR 5);</li> <li>• Migration of leachate, via groundwater migration, to surface water bodies (SPR 7);</li> <li>• Migration of leachate to surface water body protected areas (SPR 9); and</li> <li>• Vertical landfill gas migration (SPR 11).</li> </ul> <p><u>Moderate scores:</u></p> <p>One pathway was identified as Moderate Risk:</p> <ul style="list-style-type: none"> <li>• Leachate migration into groundwater, and, via groundwater, to surface waterbodies (SPR 1).</li> </ul> <p><u>High scores:</u></p> <p>Two pathways were identified as High Risk:</p> <ul style="list-style-type: none"> <li>• Migration of leachate, via surface water drainage/runoff, to surface water bodies (SPR 8); and</li> <li>• Human health exposure pathway of off-site lateral migration of landfill gas into nearby houses (SPR 10).</li> </ul> <p><b>Summary:</b></p> <p>Upon the review of the monitoring data;</p> <ul style="list-style-type: none"> <li>• remedial action is warranted to address the risk of leachate migrating from the site into groundwater and surface water bodies.</li> <li>• remedial action is warranted to address the risk of off-site migration of landfill gas.</li> </ul>
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<p>Proposed remedial measures:</p>	<p>Two types of computer modelling were used for purposes of Tier 3 Assessment. LandSim modelling was used to examine the current and future impact on groundwater quality and associated impacts to surface water quality. LandGEM modelling was used to examine the current and future volume of gas being generated by the deposited waste. This information was used to inform appropriate remedial and mitigation measures to either eliminate or reduce those risks.</p> <p>The applicant considered the following remedial measures as the feasible options:</p> <ol style="list-style-type: none"> <li>1. Landfill cap <p>Tier 3 Assessment recommends that the landfill cap will facilitate the future use of the remediated site as grazing land and it consists of the following elements:</p> <ul style="list-style-type: none"> <li>• 200mm topsoil layer;</li> <li>• 800mm subsoil layer;</li> <li>• Sub-surface drainage geocomposite;</li> <li>• 1mm LLDPE Barrier Layer; and</li> <li>• Sub-surface landfill gas collection geocomposite.</li> </ul> </li>   <li>2. Vertical cut-off, leachate interception trench and surface and groundwater monitoring <p><u><i>Vertical cut-off and leachate interception trench</i></u></p> <p>Tier 3 Assessment recommends a vertical cut-off and leachate interception trench along the site boundary bordering the Corrinshigo Lough and Corrinshigo Stream.</p> <p>The leachate interception trench will be drained to a controlled leachate collection sump. The leachate sump will be set to a control level of 0.5m below, or greater, that of the drain invert limiting hydraulic connectivity between the site and the surface water system. The collected leachate will be tankered off site for treatment at the Irish Water Monaghan Agglomeration Waste Water Treatment Plant (WWTP) which operates under Licence Reg. No. D0061-01. The applicant verbally confirmed on 10<sup>th</sup> August 2020 that there is no formal agreement for the acceptance of the landfill leachate at this WWTP. 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 an agreement from Irish Water for the acceptance of the landfill leachate within six months.</p> <p>The vertical cut-off, constructed using linear low density polyethylene (LLDPE) layer, will further limit the potential for leachate to migrate into the surface water.</p> </li> </ol>
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Surface water monitoring

Tier 3 Assessment recommends surface water monitoring on a quarterly basis at the existing monitoring locations SW1 and SW2.

Groundwater monitoring

Tier 3 Assessment recommends quarterly groundwater monitoring at the existing monitoring locations GW01, GW02 and GW03 and two additional boreholes, one of which (GW04) is to be installed upgradient of the waste body and one borehole (GW05) is to be installed downgradient of the waste body. Considering however that the closed landfill is a high risk site (Category A), monitoring of groundwater from at least two downgradient locations, rather than one downgradient location, is regarded as appropriate. Accordingly, Condition 3.9(e)(i) requires monitoring of groundwater from at least three groundwater monitoring boreholes, two of which shall be located downgradient of the waste body and one of which shall be located upgradient of the waste body. Additionally, and to reflect the recommendations of Tier 3 Assessment, Condition 3.9(e)(ii) requires monitoring of groundwater from the existing wells GW01, GW02 and GW03 within the waste body. Condition 3.1(i) requires installation of the upgradient and downgradient boreholes.

3. Landfill gas control and management

Tier 3 Assessment recommends installation of passive gas ventilation and a landfill gas interception trench. Additionally, the assessment proposes a gas pumping trial and gas monitoring at additional locations.

Passive gas ventilation

It is recommended that the capping includes a landfill gas drainage layer which will be directly connected to a collection network and a series of vertical stand pipes venting to atmosphere at 2-3m above the final ground level. The stand pipes will include carbon filtration packs to "scrub" any odour and low concentrations of methane from the landfill gas prior to venting. The pipes will also include wind driven rotating cowls to induce a negative pressure within the stand pipes, improving gas flow.

Landfill gas interception trench

A landfill gas interception trench is recommended to be constructed along the eastern edge of the area to be capped (see Figure 7) and to the right of the two industrial units. Tier 3 Assessment states that the interception trench will comprise a deep vertical cut-off barrier to prevent lateral gas migration to the adjoining buildings and the barrier will be installed to a depth of 2m to 2.5m. It is noted however, that the made ground containing waste was found to be at deeper levels than 2.5m below the ground level. For example, made ground in

trial pit TP08 reached the depth of 4.4m below ground level. Accordingly, Condition 3.1(d)(i) requires that the base of the trench is constructed at the depth of the maximum depth of the waste body.

Gas pumping trial

Tier 3 Assessment states that a gas pumping trial will be used to determine the quantity and quality of landfill gas actively produced at the site.

Having regard to the gas monitoring results submitted as part of Tier 2 Assessment, which show very low levels of gas being generated at the facility, i.e. the highest concentration of methane was recorded at 1.5% v/v at monitoring location GW03, it is recommended that, prior to making a determination whether the gas pumping trial is required, the applicant monitors landfill gas on a quarterly basis and for a period of 12 months. Accordingly, Condition 3.1(m) requires the local authority, following such gas monitoring, to seek agreement of the Agency regarding whether to carry out a gas pumping trial.

Gas monitoring

Tier 3 Assessment recommends gas monitoring on a quarterly basis at the existing monitoring locations GW01, GW02 and GW03 and five additional boreholes, three of which (LFG1, LFG2 and LFG3) are to be installed along the eastern site boundary, one borehole (GW04) to be installed upgradient of the waste body and one borehole (GW05) to be installed downgradient of the waste body. Considering however that the closed landfill is a high risk site, monitoring of landfill gas from at least two downgradient locations, rather than one downgradient location, is regarded as appropriate. Therefore, Condition 3.1(h) requires installation of at least three gas monitoring boreholes, of which one shall be upgradient of the waste body and two of which shall be downgradient of the waste body. Additionally, Condition 3.1(e) requires installation of gas monitoring boreholes along the eastern site boundary of the site and along the south-western site boundary which is near domestic dwellings. Condition 3.9(c) requires quarterly monitoring to detect the presence and concentration of landfill gas in all monitoring boreholes.

Having regard to the monitoring results submitted in support of the application for CoA, the age of the closed landfill, the location of the nearest private well (0.3km east of the site) and the fact that the nearby dwellings are serviced by public supply water mains, the following remedial measures are considered appropriate and recommended in Condition 3.1:

- (a) Remove waste deposited in the Corrinshigo Lough and Corrinshigo Stream;
- (b) Minimise the disturbance of deposited waste to the extent possible;

	<ul style="list-style-type: none"> <li>(c) Install a low permeability landfill cap, minimum 1m, with 1mm thick low permeability geomembrane having a hydraulic conductivity of less than or equal to <math>1 \times 10^{-9} \text{m/s}</math>;</li> <li>(d) Install passive gas venting system, which includes gravel filled vent trench with fans for gas extraction along the eastern edge of the capped area. The gas venting system shall meet the following requirements: <ul style="list-style-type: none"> <li>(i) The base of the trench shall be constructed at the depth of the maximum depth of the waste body;</li> <li>(ii) Gas vent pipes with fans shall be installed within the trench 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;</li> <li>(iii) The trench shall be connected to the existing gas wells; and</li> <li>(iv) The gas vent pipes shall not be perforated above the ground level.</li> </ul> </li> <li>(e) Install perimeter gas monitoring boreholes along the eastern and south-western site boundary of the facility. The gas monitoring boreholes shall be installed at a distance not exceeding 50m from each other;</li> <li>(f) Install a vertical cut-off and leachate interception trench;</li> <li>(g) Install three leachate monitoring boreholes within the waste body;</li> <li>(h) Install at least three gas monitoring boreholes outside the waste body, of which one shall be upgradient of the waste body and two of which shall be downgradient of the waste body;</li> <li>(i) Install at least three groundwater monitoring boreholes, of which one shall be upgradient of the waste body and two of which shall be downgradient of the waste body;</li> <li>(j) Reseed grass within the site;</li> <li>(k) Install continuous gas monitoring, gas vents and gas alarms in the on-site industrial units;</li> <li>(l) 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;</li> </ul>
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	<p>(m) The local authority shall, following gas monitoring, as required under Condition 3.9(c), for a period of twelve months, seek agreement of the Agency regarding whether to carry out a gas pumping trial; and</p> <p>(n) Upon any agreement obtained in accordance with Condition 3.1(m), the local authority shall submit details of the proposed gas pumping trial for agreement by the Agency, and implement any recommendations arising therefrom.</p> <p>Additionally, Condition 3.9(c) requires monitoring to detect the presence and concentration of landfill gas on a quarterly basis.</p> <p>The proposed remedial actions are intended to break the SPR linkages by preventing:</p> <ul style="list-style-type: none"> <li>• migration of leachate into the aquifer and surface water bodies; and</li> <li>• migration of landfill gas to the adjacent industrial units and off-site locations.</li> </ul> <p>The proposed capping will also prevent any waste materials from appearing on the surface of the landfill site.</p> <p>The recommended certificate of authorisation allows for the importation and use of soil and stone to complete the works.</p>
Proposed aftercare monitoring and assessment:	<p>Monitoring as specified in Condition 3.9 of the recommended certificate of authorisation.</p> <p>Validation report to be submitted within 30 months.</p>
Adequacy of risk assessment:	<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. The risk assessment is adequate for the following reasons:</p> <ul style="list-style-type: none"> <li>• It has identified, assessed and adequately addressed the associated risks inherent with the landfill site.</li> <li>• 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 Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026) and Slieve Guillion NI SAC (Site Code: 0030277).</li> </ul>

## 5. Appropriate assessment

There are three 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 Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026) and Slieve Gullion NI SAC (Site Code: 0030277).

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 a hydrological connection between the closed landfill and 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 Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026) and Slieve Gullion NI SAC (Site Code: 0030277), 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 minimise the potential for water pollution in Dundalk Bay SAC (Site Code: 000455) and 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 Dundalk Bay SAC (Site Code: 000455) and 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 Dundalk Bay SPA (Site Code: 004026) is designated for; and
- there is no hydrogeological connectivity between the closed landfill and Slieve Gullion NI SAC (Site Code: 0030277).

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: Dundalk Bay SAC (Site Code: 000455), Dundalk Bay SPA (Site Code: 004026) and Slieve Gullion NI SAC (Site Code: 0030277).

## **6. Recommendation**

I recommend granting the certificate of authorisation as proposed.

Signed



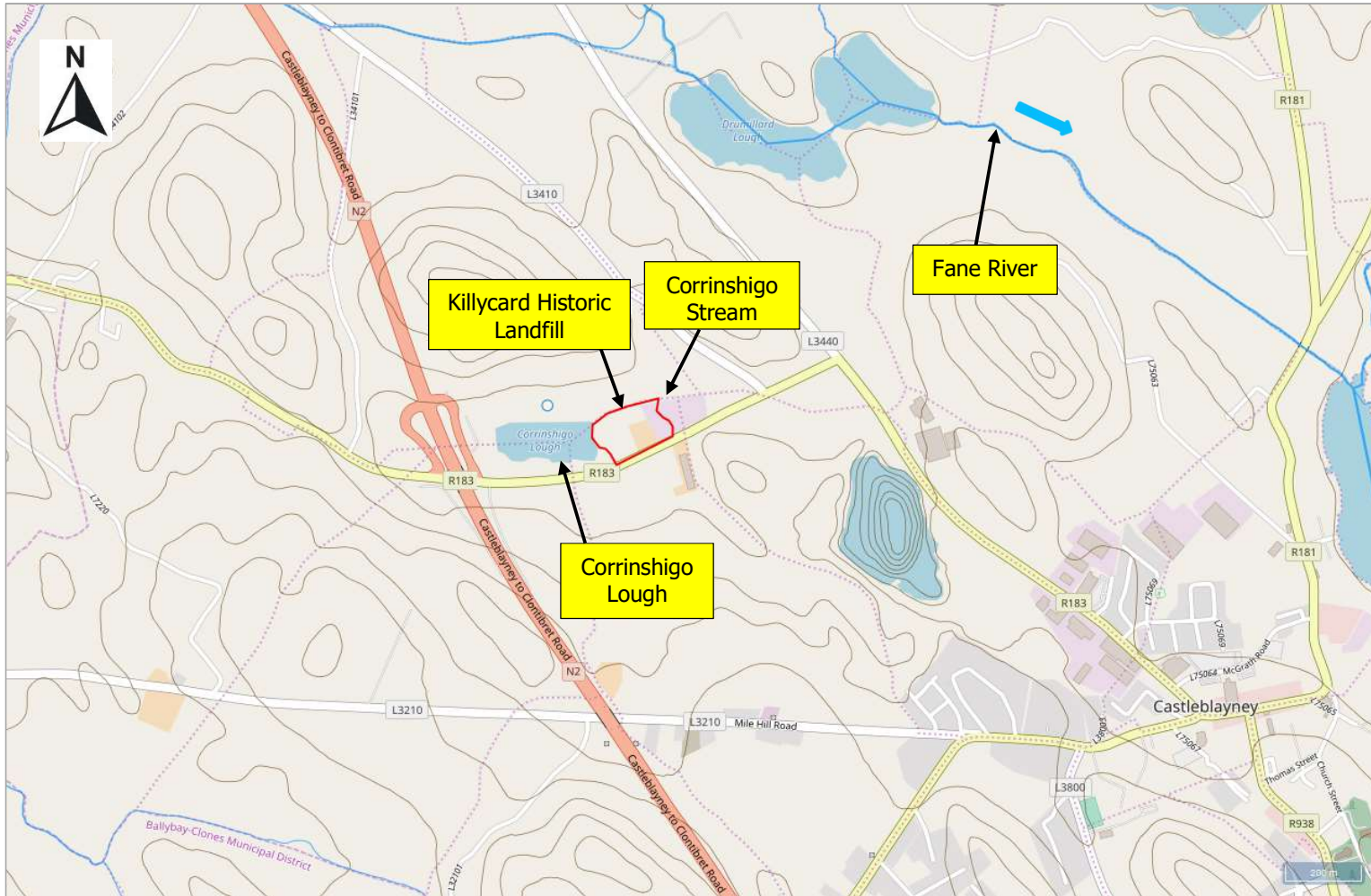
Ewa Babiarczyk

Date 27<sup>th</sup> August 2020

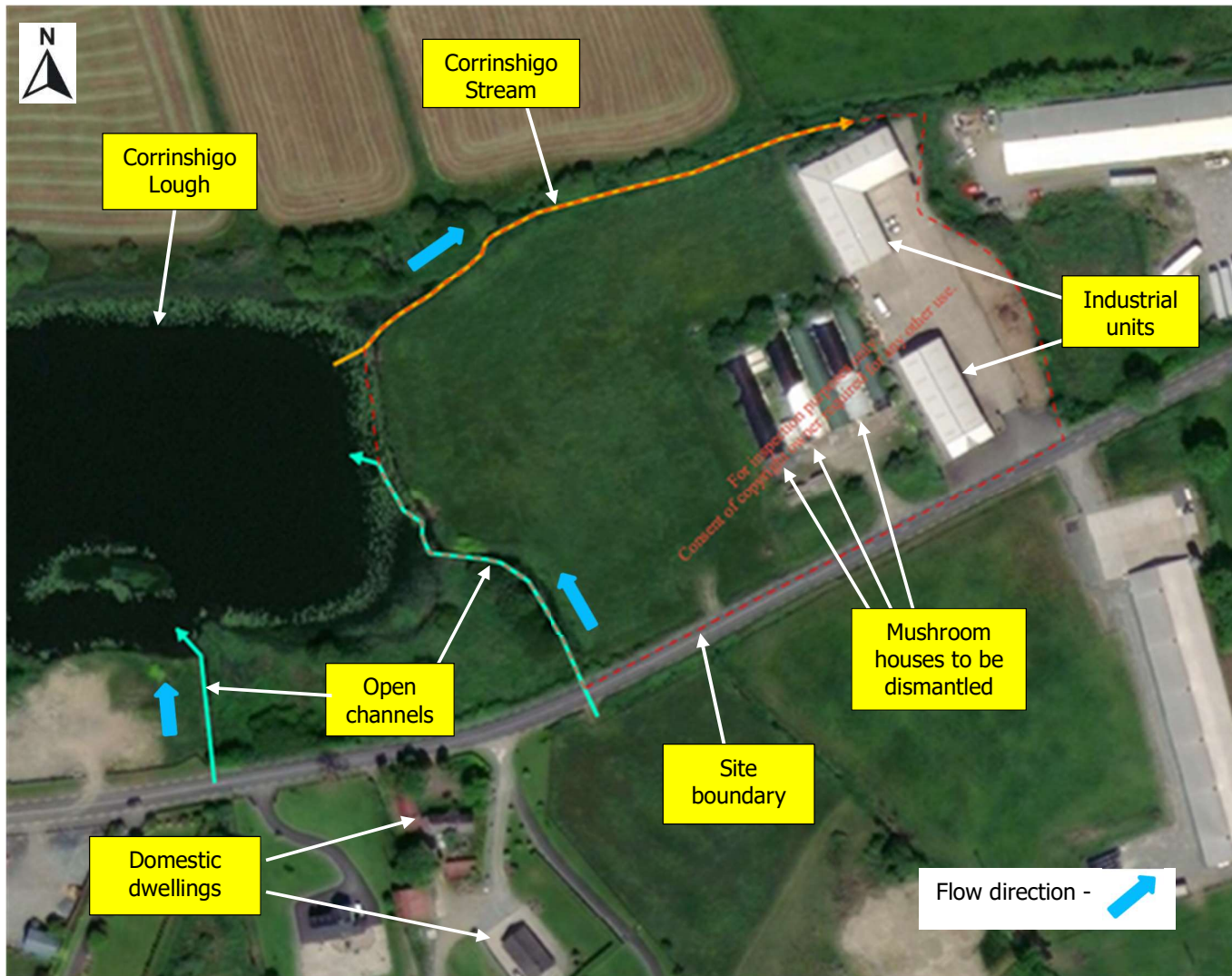
**Procedural Note**

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.

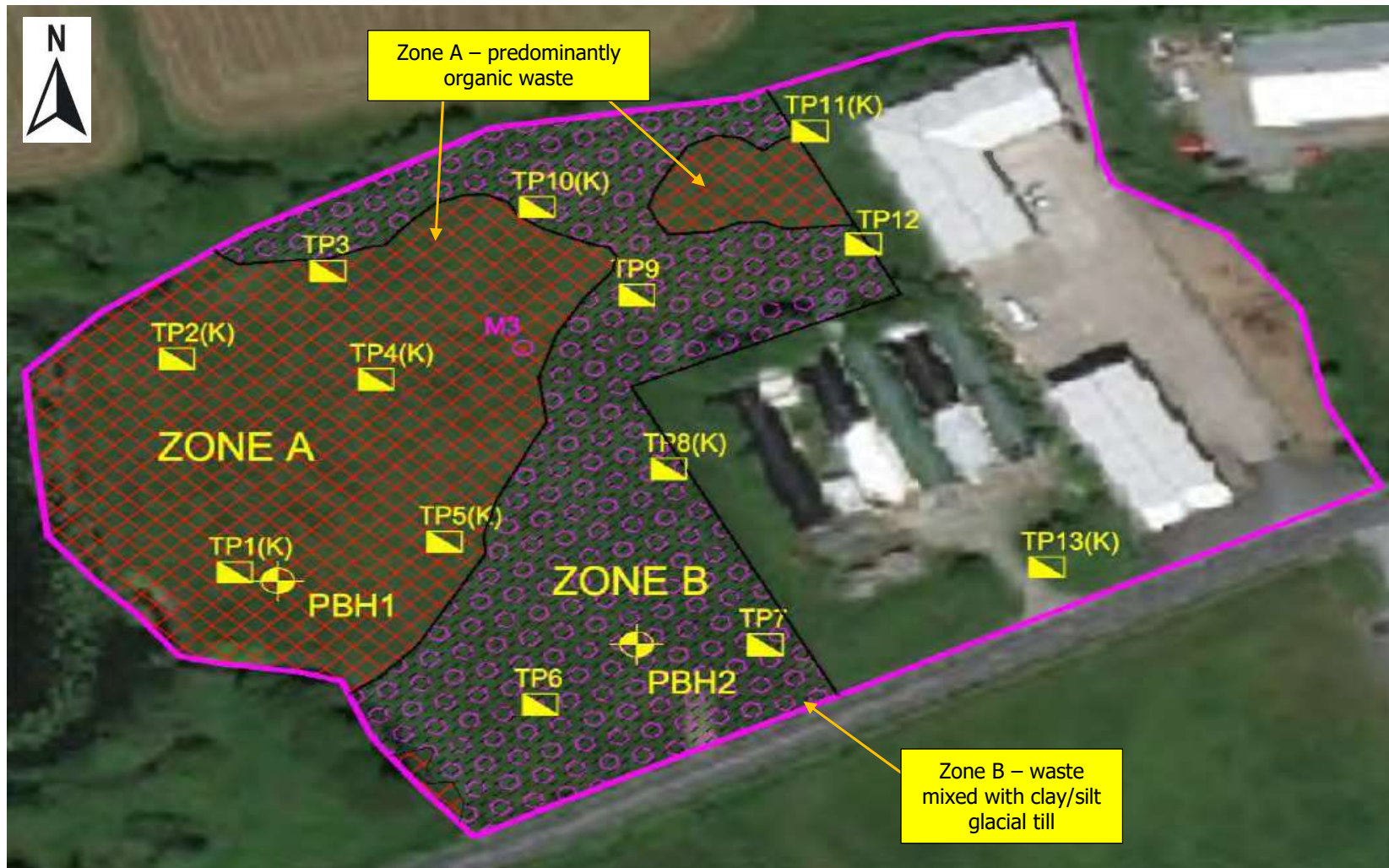


**Figure 1: Location of Killycard Historic Landfill**



**Figure 2: Site layout and site surroundings**

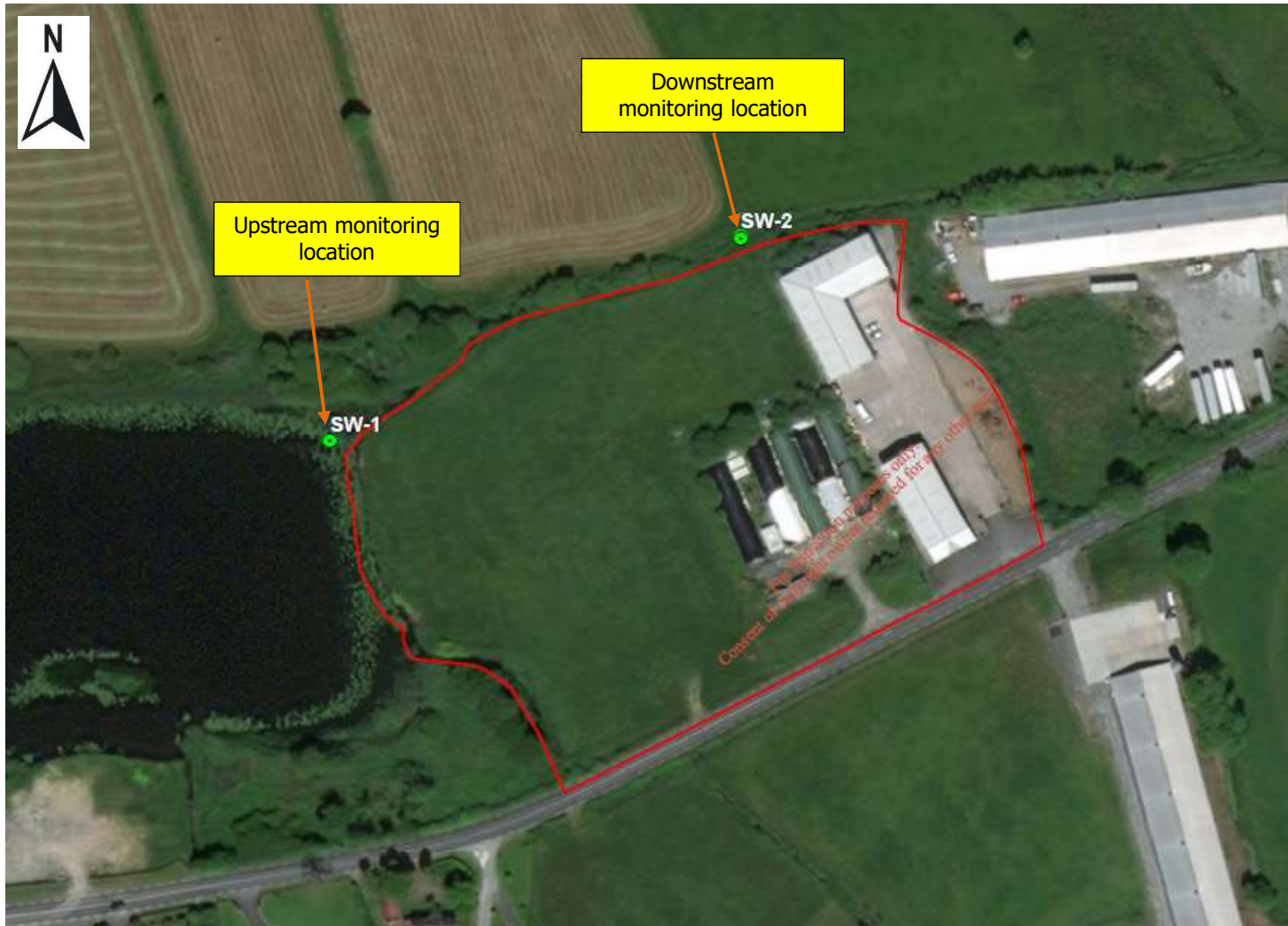




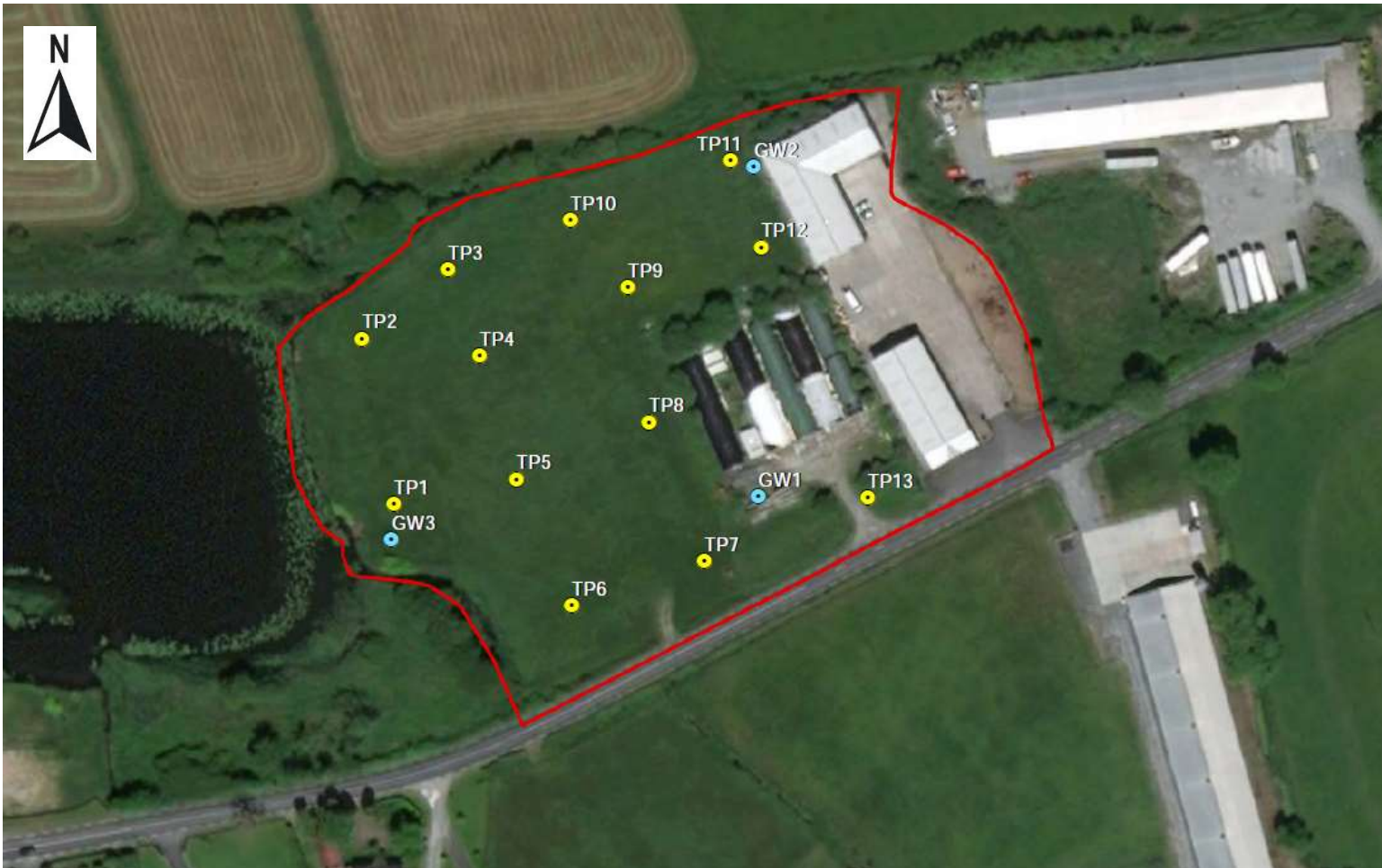
**Figure 3: Extent of deposited waste**



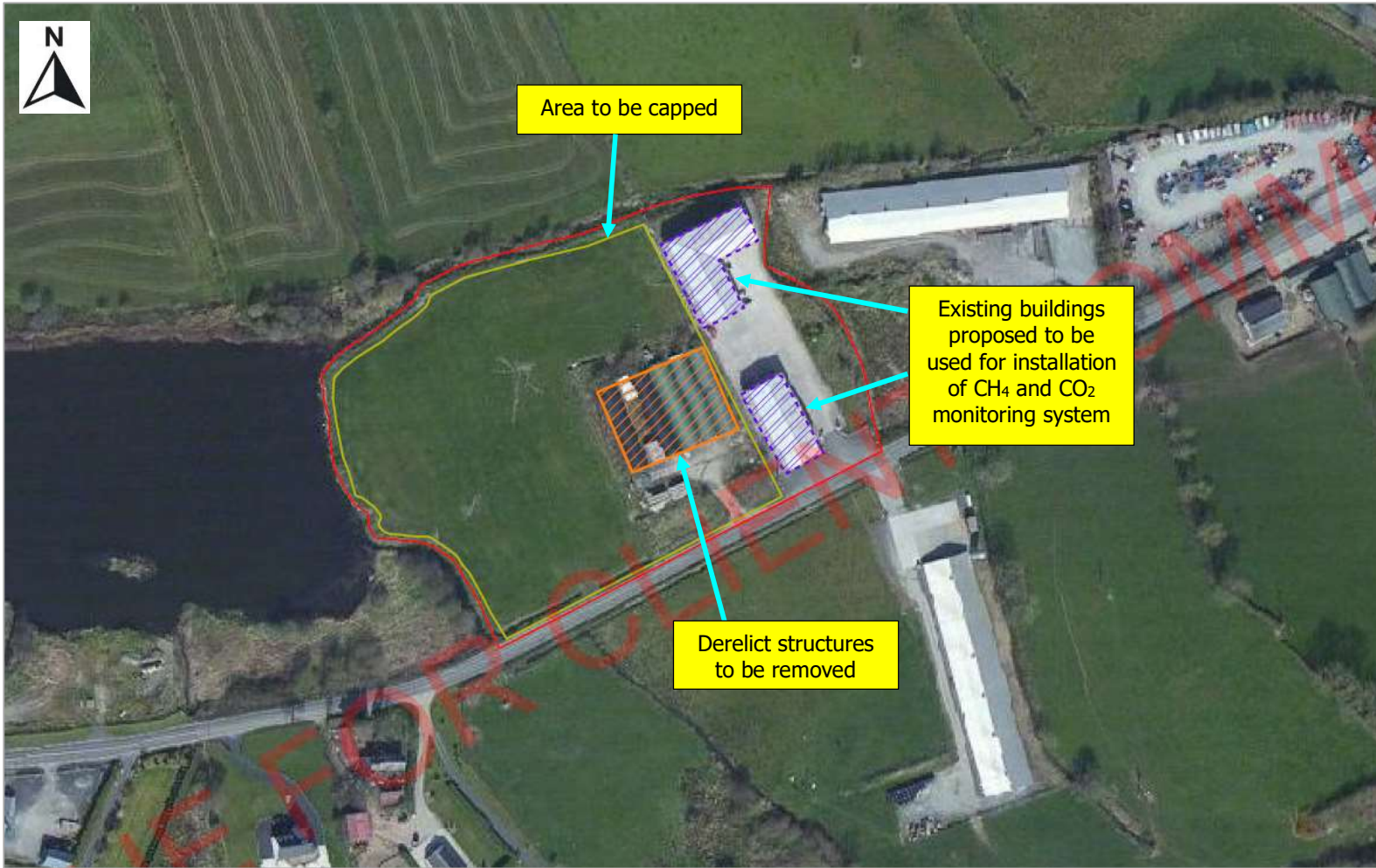
**Figure 4: Japanese Knotweed, exposed waste material and erosion along the western site boundary**



**Figure 5: Surface water monitoring locations**



**Figure 6: Groundwater/gas monitoring borehole (GW) and trial pit (TP) locations**



**Figure 7: Area to be capped**

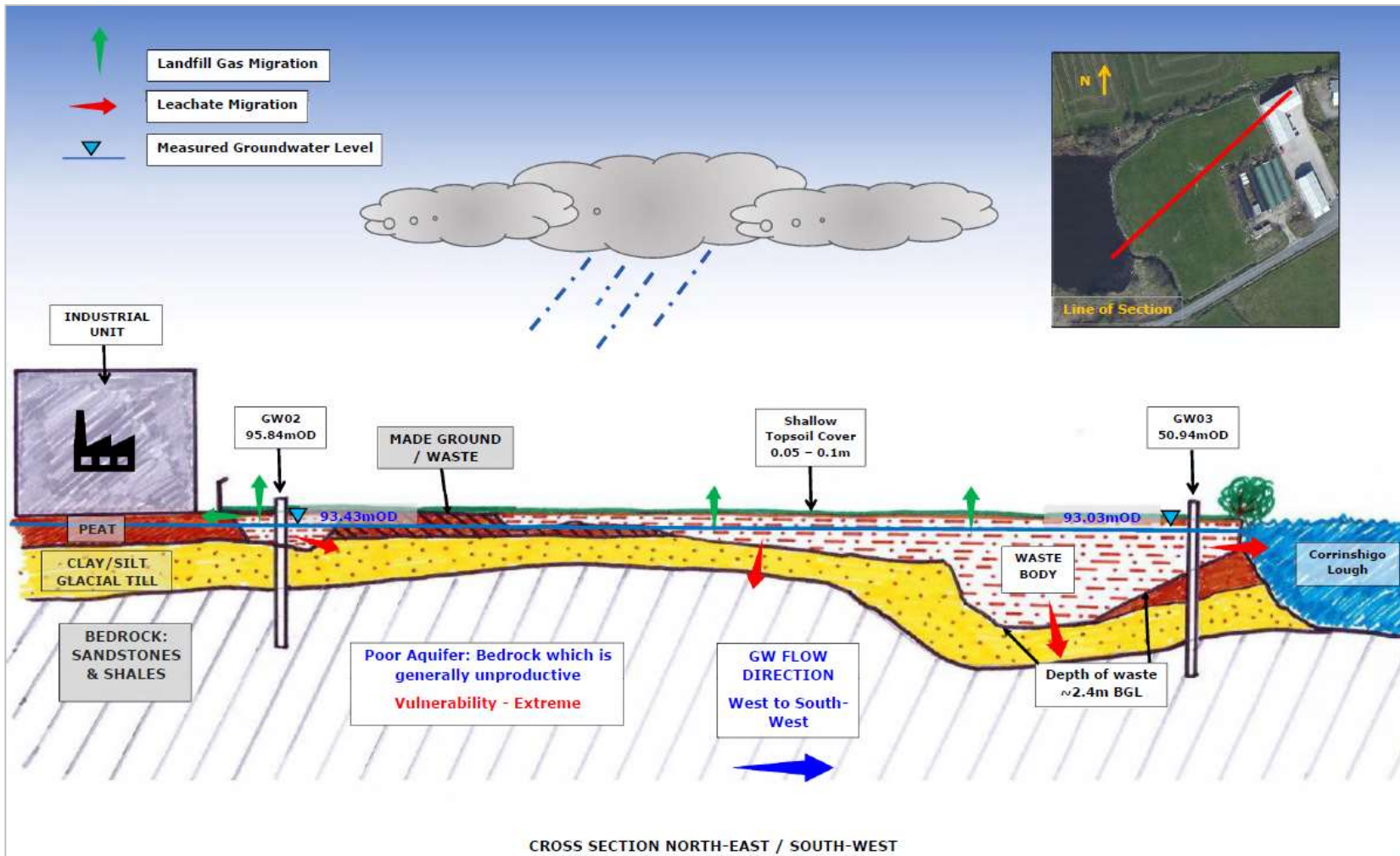


Figure 8: Conceptual site model for Killycard Historic Landfill site

**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
Dundalk Bay SAC (Site Code: 000455)	27.5km south-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 <i>Salicornia</i> and other annuals colonizing mud and sand 1330 Atlantic salt meadows ( <i>Glaucopuccinellietalia maritima</i> ) 1410 Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	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 19 <sup>th</sup> July 2011].	<p><u>Emissions to Water</u></p> <p>There will be no emissions from the landfill site to surface water.</p> <p><u>Conclusion:</u></p> <p>Condition 3.1 of the certificate of authorisation outlines the remedial actions required at the site.</p> <p>Condition 3.9 requires monitoring, sampling, analysis and characterisation of leachate. It also requires 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 this European site 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>The controls in the recommended certificate of authorisation ensure the qualifying interests of this European site are protected.</p>
Dundalk Bay SPA (Site Code: 004026)	26km south-east of the	A005 Great Crested Grebe <i>Podiceps cristatus</i> wintering	NPWS (2011) Conservation Objectives:	<u>Emissions to Water</u>

	closed landfill	<p>A043 Greylag Goose <i>Anser anser</i> wintering</p> <p>A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> wintering</p> <p>A048 Shelduck <i>Tadorna tadorna</i> wintering</p> <p>A052 Teal <i>Anas crecca</i> wintering</p> <p>A053 Mallard <i>Anas platyrhynchos</i> wintering</p> <p>A054 Pintail <i>Anas acuta</i> wintering</p> <p>A065 Common Scoter <i>Melanitta nigra</i> wintering</p> <p>A069 Red-breasted Merganser <i>Mergus serrator</i> wintering</p> <p>A130 Oystercatcher <i>Haematopus ostralegus</i> wintering</p> <p>A137 Ringed Plover <i>Charadrius hiaticula</i> wintering</p> <p>A140 Golden Plover <i>Pluvialis apricaria</i> wintering</p> <p>A141 Grey Plover <i>Pluvialis squatarola</i> wintering</p> <p>A142 Lapwing <i>Vanellus vanellus</i> wintering</p> <p>A143 Knot <i>Calidris canutus</i> wintering</p> <p>A149 Dunlin <i>Calidris alpina</i> wintering</p> <p>A156 Black-tailed Godwit <i>Limosa limosa</i> wintering</p> <p>A157 Bar-tailed Godwit <i>Limosa lapponica</i> wintering</p> <p>A160 Curlew <i>Numenius arquata</i> wintering</p> <p>A162 Redshank <i>Tringa totanus</i> wintering</p> <p>A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> wintering</p> <p>A182 Common Gull <i>Larus canus</i> wintering</p>	<p>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 19<sup>th</sup> July 2011].</p>	<p>There will be no emissions from the landfill site to surface water.</p> <p><u>Conclusion:</u></p> <p>Condition 3.1 of the certificate of authorisation outlines the remedial actions required at the site.</p> <p>Condition 3.9 requires monitoring, sampling, analysis and characterisation of leachate. It also requires 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 this European site 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>The controls in the recommended certificate of authorisation ensure the qualifying interests of this European site are protected.</p>
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		A184 Herring Gull <i>Larus argentatus</i> wintering A999 Wetlands & Waterbirds		
Slieve Gullion NI SAC (Site Code: 0030277)	20km east of the closed landfill	4030 European dry heaths	Slieve Gullion SAC UK0030277 Conservation Objectives Version 2.1 [dated 11 <sup>th</sup> October 2017].	There is no hydrological connection between the closed landfill and this NI SAC.