

SEPA Monitoring Assessment update for Tarbolton Landfill – December 2021



This report provides:

- A summary of the changes to the on-site work at Tarbolton Landfill due to COVID-19 restrictions and the SEPA cyber attack
- A summary of recent site conditions
- A review of environmental monitoring, including data collected from 16 October 2020 to 18 November 2021
- Information on any additional monitoring collected by SEPA to support the NHS led Problem Assessment Group
- An update on work to establish potential options for management of the site

COVID-19 Pandemic and Cyber Attack

SEPA prioritised and reinstated site visits and monitoring at Tarbolton Landfill after COVID-19 in March 2020. As restrictions eased and following a review of our Health and Safety procedures, we recommenced site activity at Tarbolton Landfill in July 2020. We continue to review our approach in line with Scottish Government guidelines.

On Christmas Eve 2020, the Scottish Environment Protection Agency (SEPA) was subject to a serious and complex cyber-attack which significantly impacted our contact centre, internal systems, processes and communications.

While the attack continues to significantly impact the agency and our infrastructure, we've set out two clear external priorities.

- Protecting Scotland's environment
- Providing priority services to individuals and businesses across Scotland

We again worked quickly to reinstate site visits and monitoring at Tarbolton Landfill site and we will continue to work to expand our services and recover data lost during the cyber-attack.

Recent site conditions

Since October 2020, SEPA noted the general condition of Tarbolton landfill and in particular the northern, eastern and southern side of the landfill site continue to be significantly impacted. Excess leachate observed in these areas is entering the drainage ditch on the eastern side of the site which flows into the Biggary Burn. The leachate also appears to be affecting trees and other flora, which are beginning to die. A seasonal increase in invasive species giant hogweed and Japanese knotweed were noted on site over the summer months.

Environmental risk assessment

Media	Risk type	Previous Risk Assessment	Current Risk Assessment
Landfill gas	Migration of landfill gas through sub-surface pathways	Low/Moderate	Low/Moderate
Groundwater	Groundwater quality impact	Low/Moderate	Low/Moderate
Surface water	Surface water quality impact	High	High
	Impact on farm animals drinking contaminated surface water	Very Low	Very Low

SEPA has carried out intensive environmental monitoring around the Tarbolton site since May 2018 to assess the site impact on associated water bodies and wider effects. SEPA continues to review the monitoring data gathered on each sampling occasion and revise the environmental monitoring plan where necessary to inform our ongoing environmental risk assessments.

Since the issue of the last risk assessment report in October 2020, and prior to the cyber-attack, we completed six site visits at Tarbolton Landfill undertaking surface water, leachate, groundwater and landfill gas monitoring. Following the cyber-attack, we

recommenced our site visits quickly, undertaking monthly landfill gas monitoring from February 2021. Groundwater and leachate monitoring were reinstated in August 2021. Surface water monitoring restarted in September 2021.

Landfill Gas

Landfill gas is a variable mixture of gases generated by decaying organic matter within a landfill site, although its principal components are methane and carbon dioxide. SEPA monitor the gas within boreholes around the perimeter of the landfill on a monthly basis as part of an ongoing programme to assess the risk posed by landfill gases migrating off site through sub-surface pathways.

Since our last update in October 2020, SEPA has continued to undertake monitoring of landfill gas monthly, with the exception of January 2021 due to the impact of the cyber-attack. This update considers the monitoring results recorded from November 2020 to November 2021, inclusive.

Levels of methane remained below permit trigger levels (1% v/v) at all perimeter boreholes, with the exception of GWD4 and GWD7 which lie to the south and south-southwest of the landfill, respectively. The methane levels within GWD4 were found to be above 1% v/v on one occasion. The measured concentration of 2.0% v/v in February 2021 is consistent with measurements taken in the previous two winters.

Borehole GWD7 continues to periodically contain high levels of methane and carbon dioxide following the identification and repair of a damaged pipe connection within the borehole in 2019. The measured concentrations of methane in the months of November 2020, February 2021, March 2021 and April 2021 were well above the 1% v/v trigger level (ranging from 3.2 to >50% v/v). The levels of carbon dioxide in these months, in addition to September and October 2021, were also above the 1.5% v/v trigger level (at levels ranging from 1.9 - 14.8% v/v). Levels of carbon dioxide in borehole GWD7 were below trigger levels during the months of December 2020 and May to August 2021 increasing again to above trigger levels in September to November 2021. Methane was below detectable limits during December 2020 and from May to November 2021. The high concentrations over the winter months indicate the presence of landfill gas within this borehole and therefore may indicate that, at least localised, landfill gas migration is occurring in this area. There are other possible explanations for these readings, including that this borehole may have been drilled in waste deposits or

that leachate ingress into the borehole is causing elevated results. The highly changeable measurements within this borehole are most likely due to the high water-level within the borehole, meaning that there is only a small pocket of gas, often high in carbon dioxide and methane, within the borehole which is quickly exhausted when measurements are carried out.

Levels of carbon dioxide continued to be detected at or above permit trigger levels (1.5% v/v) in several perimeter boreholes on the southern and western perimeter of the site. However, levels are generally stable and consistent with concentrations detected during the corresponding period of the previous two years.

Based on the monitoring observations discussed above, there is some evidence to indicate that there may be a low level of lateral landfill gas migration occurring to the south and west of the landfill, although this is not definitive as the levels of gas measured may be due to other sources such as gas formed within the marshland itself.

The gas concentrations within the perimeter boreholes measured over the period November 2020 to November 2021 are broadly similar to those measured previously. Therefore, the monitoring evidence remains similar to that within the October 2020 update and following this review the risk assessment also remains consistent with that update.

The overall risk from subsurface landfill gas migration is considered to remain low for all local housing and building receptors and for all land areas to the north and east of the landfill, including the closest receptor, the building owned by Ayrshire Waste Management. The risk to local housing to the south and southwest remains low due to the lack of viable gas pathways between this location and the housing. The nearest houses are several hundreds of metres from the region of gas migration and the intervening marshy land is cross-cut by streams and ditches, which can act as ground gas venting trenches preventing near-surface transmission.

However, due to the high methane measurements within borehole GWD7, SEPA has assessed the risk level as low/moderate and will continue to monitor this borehole and areas to the southwest of the landfill.

Groundwater quality

SEPA currently aims to undertake monitoring of groundwater quality and leachate quality and levels every 6 months. All samples are analysed for a range of inorganic parameters and metals. Groundwater level monitoring is undertaken monthly. The monitoring programme was impacted by COVID-19 throughout 2020 and 2021 and also by the cyber-attack in December 2020. We continue to work on recovering data lost during the cyber-attack. Recent groundwater chemistry and leachate monitoring was undertaken in December 2020, and August and September 2021.

The results from the four leachate wells sampled in December 2020 and August and September 2021 were consistent with those from previous monitoring rounds and suggest that there had been little change in leachate quality in 2020-2021. Leachate levels were largely stable.

Groundwater quality in boreholes GWD5 and GWD7 adjacent to the unlined Zone 1 landfill area continued to be impacted by landfill leachate in 2020 and 2021. These boreholes displayed elevated chloride and ammoniacal nitrogen concentrations. Total metal concentrations were elevated compared with drinking water standards, but generally filtered metal concentrations were lower, indicating migration of metals through the subsurface is likely to be partially mitigated by natural attenuation mechanisms. In September 2021 increased chloride concentrations were recorded in GWD6. This is also likely to be an indication of the impact on groundwater from the Zone 1 landfill area. Concentrations monitored in all other boreholes showed little or no change.

Groundwater level monitoring has continued monthly where possible since COVID-19 and the cyber-attack. In general, the groundwater levels on site display seasonal fluctuations and this was particularly apparent in spring and summer 2021. Almost every borehole recorded a downward trend consistent with the lower-than-average rainfall values recorded in the region during this period.

The overall risk from the landfill to groundwater is considered to remain unchanged (i.e. moderate from Zone 1 and low/moderate from Zone 2), however there is some uncertainty associated with this assessment given the restrictions on the collection of monitoring data in 2020 and 2021.

Surface water quality

SEPA aims to monitor a range of inorganic parameters and metals at six locations on the Biggary Burn and Water of Fail on a two-weekly basis. The data is compared to statutory water quality standards used to classify water quality under the requirements of the Water Framework Directive (WFD)¹. The monitoring has demonstrated that the chemical concentrations measured fluctuate depending on available dilution. The watercourses around Tarbolton Landfill are heavily influenced by local rainfall patterns which affect the resultant flow.

Since COVID-19 restrictions came into place in March 2020, SEPA was unable to undertake water quality monitoring until November and December 2020. The cyber-attack further impacted delivery of our monitoring programme, but SEPA has worked hard to reinstate our capabilities. Surface water quality monitoring resumed every two weeks on 14 September 2021. During the resumption of the sampling not all sites have been monitored on each occasion due to access issues with the sites closer to the landfill. The cyber-attack has resulted in the loss of data for samples taken in November and December 2020. This update includes an assessment of the data from samples taken from 14 September to 10 November 2021.

The concentrations measured on 14 September 2021 were higher than average but within the normal range of the historical data set. The concentration of ammoniacal nitrogen in the Biggary Burn was 132 mg/l. The maximum recorded at this site is 222 mg/l and the average of all data is 77.5 mg/l. Similarly, the data from the Water of Fail at Willies Mill was 8.83 mg/l (compared to a maximum of 19.2 mg/l and the overall average of 5.91 mg/l). The samples taken from 28 September through to the 11 November 2021 were lower than average of the dataset. The concentrations recorded from the Water of Fail at Willies Mill in this period was between 0.48 and 3.8 mg/l. As more data becomes available in the coming months we will consider if there is any evidence of changes in the impact on surface waters. At present, we consider the results obtained were within the normal ranges experienced at the site especially when the low rainfall from earlier in the month is considered. Samples taken later followed heavy rainfall in the preceding days.

¹ [The Scotland River Basin District \(Standards\) Directions 2014](#)
[The Scotland River Basin District \(Standards\) Amendment Directions 2015](#)

Since November 2020, the rainfall recorded has been below average for each month. We might therefore expect lower dilution to be available in the watercourses leading to slightly higher concentrations of ammoniacal nitrogen in the Biggary Burn and Water of Fail. September 2021 saw a return to more normal rainfall for the month overall, but rainfall in the period prior to the samples reported was relatively low (25% of the monthly total for almost half of the month). We have not been able to access the rainfall data from November 2021 due to an IT failure. We therefore consider that the environmental impact remains significant and would lead to a classification of bad under the relevant WFD standard for ammoniacal nitrogen.

The overall risk assessment for surface water quality is considered to remain unchanged (i.e. high).

Farm animals

In the Biggary Burn, in particular, there is significant contamination of the watercourse as discussed above. However, the burn is steep and fenced in this area and as such should be inaccessible to livestock. In addition, under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended), General Binding Rule (GBR) 19 on the keeping of livestock states that poaching of any land within 5 m of any river, burn or ditch must be prevented². SEPA has had discussions over meeting the requirements of the GBR with farmers in the local area.

The current risk assessment is considered to remain at very low.

Odours and information to support public health risks

SEPA has received infrequent odour complaints in recent months from residents living in close proximity to the boundary of the landfill; in May, one in October and one in November 2021. SEPA Officers have noted leachate odour fairly localised on site or at the site boundary close to ponded leachate and leachate weeps, particularly along the northern and eastern boundary of the landfill. No landfill gas odours on-site or off-site has been noted in recent site visits.

² [The Water Environment \(Controlled Activities\) \(Scotland\) Regulations 2011- A practical guide](#)

A cross agency Problem Assessment Group (PAG) was established by NHS Ayrshire & Arran to enable the NHS to assess risks to public health. In addition to the NHS, the members of this group are: South Ayrshire Council, SEPA, Health Protection Scotland, Health and Safety Executive and Scottish Water. SEPA updates the PAG on odour assessments and environmental monitoring.

The PAG meets as required to consider results of ongoing monitoring and sampling by SEPA and other agencies in order to assess the risk to public health. Previous SEPA monitoring has confirmed that potentially hazardous gases have been occasionally detected within the boundary of the unmanaged landfill site. In response to the detection of gases and the risk of deep water at the site, on behalf of all members of the problem assessment group, South Ayrshire Council has erected signage, warning members of the public to keep off the site.

South Ayrshire Council has undertaken gas monitoring at various off-site locations.

The risk to the general public outwith the site has been assessed as low and this will be kept under review by the Problem Assessment Group.

As per signage, which has been erected at the perimeter of the landfill by South Ayrshire Council, we would urge members of the public to keep off the unmanaged landfill site. Anyone experiencing symptoms that they think are related to the landfill should seek medical advice from their GP in the first instance.

Work to establish potential options for management of the site

SEPA has been in regular contact with Scottish Government in relation to Tarbolton landfill site. Early in 2019, Scottish Government asked SEPA to commission a report into options for the management of the site which would mitigate the impact on the environment.

As a result of the initial report, it became clear that, in order to arrive at accurate costed options for managing the site, further survey work was required. Scottish Government funded this additional work.

During January 2020 specialist contractors attended Tarbolton Landfill to assess the condition of the leachate discharge connection to the sewer and to undertake a topographical survey. Reports detailing a leachate management strategy and a site capping appraisal document have been received by SEPA and shared with local stakeholders.

On behalf of Scottish Government, SEPA has, at the end of November 2021, contracted an environmental consultant, SLR Consulting Ltd, to design and project manage the construction of measures to prevent the ongoing discharges of landfill leachate to neighbouring watercourses and make it possible for leachate disposal to the public sewerage system.

The design phase is likely to commence before Christmas, with construction works likely on site in Spring 2022.

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