



# **Written Record of Determination CONTAMINATED LAND**

Landfill 4  
Land off Moody Lane, Great Coates, Grimsby  
DN31 2SS. United Kingdom

Site reference: NELC/CL5a/Landfill 4

## 1 Introduction

The Environmental Protection Act 1990 Section 78A (2) defines Contaminated Land as 'any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

- a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- b) significant pollution of controlled waters is being, or is likely to be, caused;

and in determining whether any land appears to be such land, a local authority shall subject to section 5, act in accordance with guidance issued by the secretary of state in accordance with S78YA with respect to the manner in which that determination is to be made.'

This Written Record of Determination of Contaminated Land has been prepared as required by paragraphs 5.17 – 5.19 of the Contaminated Land Statutory Guidance as issued by the Department for Environment, Food and Rural Affairs [DEFRA] in April 2012. Its purpose is to explain in simple terms why the Local Authority considers the land to be Contaminated Land.

North East Lincolnshire Council (the Authority) inspected the site in accordance with Paragraph 2.9 of the statutory guidance. The Authority commissioned the services of Arcadis (UK) Ltd to undertake the contaminated land assessment and a report (Arcadis, 2017) was produced as a result of that inspection. The Authority considers that the factual content of that report and the conceptual model presented constitutes a scientific and technical assessment of the evidence presented and that the land identified below meets the definition of Contaminated Land.

## 2 Site Details

### *Location*

Landfill Number 4, Land off Moody Lane, Great Coates, Grimsby, DN31 2SS. United Kingdom

### *National Grid Coordinates*

524012(E) 412872(N)

### *Area [ha]*

1.65

### *Current Use*

Landfill (non-operational)

***A site plan is presented in Annex 1***

### 3 History of the Site/Context

The Moody Lane production site was built around 1956 originally to produce viscose fibres. In 1959 acrylic production commenced and in 1992 the production of 'S25 Tencel', a cellulosic material started. As part of the process, sodium thiocyanate was manufactured on site from sulphur and sodium cyanide. In addition, between 1965 and 1999 sulphuric acid was manufactured from elemental sulphur. From 1965, the waste from the various processes along with general site waste was deposited within four on-site landfills.

Landfill 4 was operational between 1995 and 2005. It is rectangular in shape and measures approximately 150m by 110m. The landfill comprises a land rise of approximately 3.5m. The landfill was designed to have cellular construction, with waste disposal operations beginning in 1998 with the filling of Cell 1 followed by Cell 2 in approximately 2003, when Cell 1 became full. Filling of Cell 2 was almost complete when the operator entered administration. Cells 3 and 4 were never constructed. The landfill is lined but not currently capped, as such infiltration is expected during periods of rainfall, which creates leachate, which is contained within the landfill liner and requires manual removal to keep levels within a safe limit to avoid overtopping of the perimeter clay bund.

The landfill accepted a wide range of wastes from all site plants including general waste, boiler ash, fibre contaminated with sulphuric acid, carbon disulphide, Courteille fibre and dope, viscose cellulose waste, viscous alkali wastes, anhydrous sodium sulphate, waste contaminated with sodium thiocyanate, plant sweepings, empty used containers and contaminated packaging, ferrous and non-ferrous scrap metals, residues arising from boiler and flue cleaning, barium sulphate, bonded and fibrous asbestos, dewatered effluent treatment plant filter cake/sludge, interceptor pit wastes, acrylic polymer wastes, used filter materials and cloths.

The landfill was intended to comprise of four cells filled over eight phases. Each cell was to be constructed with a clay liner at least 1m thick (0.5m in existing clays) graded to drain to a leachate collection sump at the centre of each cell. The four cells were to be surrounded by a bund 2.05m above the sump level, with each cell separated by a berm (raised mound) 1.4m above sump level. The four cells were to be used for waste deposition sequentially (referred to as phases 1 to 4) followed by three further phases of waste deposition raising the landfill to its final permitted height.

Due to the Operator entering administration, only Cell 1 and Cell 2 were constructed, the bund was completed to just beyond the berm, which would have separated Cell 2 and Cell 3, but as Cell 3 was never constructed, this forms the edge of the installation. Materials within Cell 1 and Cell 2 remain uncapped. The landfill was declared as onerous property by the Administrators and the landfill license ceased to exist.

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As an interim management solution, under a gentlemen's agreement, the neighbouring landowners arranged for leachate levels within landfill 4 to be monitored and transfers to be made as and when necessary to the wider sites main effluent system, under agreement with the Environment Agency.

The Environment Agency undertook two assessments of the site, in 2009 and 2014. The assessments highlighted a deterioration in surface water quality within land drains, with landfills 3 and 4 being the likely cause. The Environment Agency raised concerns that there was the potential for greater environmental impact should leachate management at the site cease. This would allow larger volumes of undiluted landfill leachate to overtop the landfill and enter site drains, adjacent watercourses, the River Humber and its foreshore.

The gentlemen's agreement ended in December 2016 and a leachate transfer from landfill 4 has not taken place since October 2016.

Forming part of an initial risk assessment, Arcadis (UK) Ltd, on behalf of the Authority, undertook a site visit in March 2017. On the south-eastern edge of Cell 2 of landfill 4, standing water was observed on the ground close to the level of the external berm. A small excavation in the same area showed leachate within the waste mass was close to the top of the berm near an uncontrolled release of leachate that had occurred several years earlier. These observations indicated that the landfill was close to saturated, and as leachate was not currently being transferred, the potential for leachate overtopping the bund into the surrounding drainage ditches was considered significant.

The surrounding ditches drain in to land drains eventually feeding into the Mawmbridge drain from where water is discharged into the Humber Estuary.

## 4 The Legal Context

For a site to be determined, as contaminated land there has to be a:

**Contaminant** [e.g. contaminated soils]; and  
**Pathway** for the contaminants to travel [e.g. inhalation, ingestion]; and  
**Receptor**, which can be affected by the contamination [e.g. humans]

The contaminant, pathway and receptor are collectively known as a **contaminant linkage** and this has to be complete and significant for a site to be determined as 'Contaminated Land'. If one element is not present then the contaminant linkage is not complete and if the contaminant linkage is not significant then the site cannot be considered to be statutory 'Contaminated Land'.

## 5 Information on Contaminants at the Site

The following table is intended to describe what the contaminants of concern are at the site and where they may have come from:

Contaminants	What Could be the Source?
<b>Sodium Thiocyanate, Ammoniacal nitrogen and chloride</b>	<p>Landfill Leachate (polluted water) generated by rainwater percolating through the waste material associated with the former fibre manufacturing process, picking up contaminants and collecting at the base of the landfill.</p> <p><i>*Leachate: A leachate is any liquid that, in the course of passing through matter, extracts soluble or suspended solids, or any other component of the material through which it has passed</i></p>

## 6 The Conceptual Site Model

A Conceptual Site Model [CSM] sets out the critical contaminant linkages of concern for a particular land contamination problem. It develops an understanding of the risks associated with a site and informs the process on what needs to be done to manage the risks associated with Contaminated Land.

<b>Significant Contaminant Linkage</b>	<b>CONTAMINANT:</b>	Landfill leachate containing known elevated concentrations of sodium thiocyanate, ammoniacal nitrogen and chloride
	<b>PATHWAYS:</b>	Overtopping of landfill berm (clay mound) forming the south-western perimeter of landfill 4, into surface water land drains which flow towards Mawmbridge Drain
	<b>RECEPTOR:</b>	<p>Mawmbridge Drain (Controlled Waters)</p> <p><i>Controlled waters include relevant territorial waters, coastal, inland freshwaters (including lakes and ponds) and groundwaters.</i></p>

**An illustrated site conceptual model is presented in Annex 2**

## 7 Contaminant Comparison

The following tables are intended to show how the contaminants of concern concentration levels found onsite (the source) compared to the target concentration at the *compliance point* that has been used in the risk assessment process, to protect controlled waters (the receptor).

A *Compliance Point* is the point along the contaminants pathway where the target concentration should not be exceeded, as this would represent an unacceptable risk of harm to the receptor. Surface water quality standards are derived to be protective of aquatic ecosystems or terrestrial ecosystems directly depending on ecosystems.

		Description/Source	Concentration Level mg/l
Sodium Thiocyanate	Leachate	Recorded concentration in leachate sampled from landfill 4. Source: Environmental Consultants Quarterly Monitoring Report (Enitial, 2016)	7379
	Screening Value *PNEC	PNEC Water Quality Compliance Point Standard at Mawmbridge Drain. Source: Environmental Agency Report (Environment Agency, 2014)	0.35 (Acute) 0.10 (Chronic)

\* PNEC – Predicted No Effect Concentration

		Description/Source	Concentration Level mg/l
Ammoniacal Nitrogen	Leachate	Recorded concentration in leachate sampled from landfill 4. Source: Environmental Consultants Quarterly Monitoring Report (Enitial, 2016)	1070
	Environmental Quality Standard (Freshwater)	Water Quality Compliance Point Standard at Mawmbridge Drain. Source: Environmental Agency Report (Environment Agency, 2014)	0.60 (*WFD Good Status)

\* WFD – Water Framework Directive

		Description/Source	Concentration Level mg/l
Chloride	Leachate	Recorded concentration in leachate sampled from landfill 4. Source: Environmental Consultants Quarterly Monitoring Report (Enital, 2016)	6100
	Environmental Quality Standard (Freshwater)	Water Quality Compliance Point Standard at Mawmbridge Drain. Source: Environmental Agency Report (Environment Agency, 2014)	250

## 8 Possible Effects

### *Controlled Waters*

Uncontrolled release of landfill leachate in to land drains resulting in a significant deterioration of water quality below environmental standards for surface waters, at the compliant point located at Mawmbridge Drain.

## 9 Likelihood the Effects May Occur

### *The estimated likelihood that the effects mentioned in Section 8 may occur:*

The likelihood that the adverse effects described in Section 8 may occur is considered HIGH, given that there are no management systems in place to monitor and arrange for the manual transfer of leachate from landfill 4. Leachate levels will continue to rise until a breach/overtopping occurs.

## 10 Timescales

### *How long it may take for the risk to manifest itself:*

Landfill 4 was designed with a low permeable base and sides, engineered to store leachate. The landfill however, has no engineered capping layer and is therefore vulnerable to precipitation, which generates leachate as it percolates through the waste. Leachate will accumulate until levels rise to such an extent that the perimeter of the landfill is overtopped. This poses an imminent threat.

Uncertainty is a key part of all risk assessments including those of potentially contaminated land and could arise from scientific uncertainty over the effects of substances, and the assumptions that lie behind predicting what might happen in the future. The uncertainty underlying risk assessments means there is unlikely to be any single "correct" conclusion on precisely what is the level of risk posed by land, and it is possible that different suitably qualified people could come to different conclusions when presented with the same information.

*What has the Local Authority done to minimise Uncertainty?*

Arcadis UK Ltd was commissioned to undertake a detailed preliminary risk assessment of the landfill. The assessment included the review of historical information held by the Environment Agency and the Local Authority including the findings of a site reconnaissance and the review of two previous surface water monitoring exercises undertaken by the Environment Agency. These confirmed breaches of surface water quality standards, which would be exacerbated, should leachate overtop the perimeter of landfill 4.

*What Uncertainty Remains?*

1. At this stage, it is unclear as to what extent landfills 1, 2 and 3 may be contributing to the deterioration of site surface waters, which drain in to Mawmbridge Drain.
2. Whether the wider industrial complex is contributing to the deterioration of site surface waters
3. Chemical analysis of surface waters is limited. Not all potential chemicals of concern have been tested for, and other, as yet unidentified contaminants or 'contaminant linkages' may be present. Further assessment will be required to identify these.
4. Additional sampling of the waste mass will be required to determine chemical composition and leaching properties of the waste within landfill 4.

An intrusive site investigation is likely to be required for all four landfills, including soil and water sampling, followed by a detailed risk assessment to gain a better understanding of the area as a whole and mitigate these uncertainties.

## 11 How does the Local Authority/Responsible Persons Intend to rectify this Issue?

*A Description of Likely Works:*

Short-term remedial solution – to tanker leachate from landfill 4 to an offsite disposal facility. To undertake monitoring of leachate levels and arrange tankering as and when necessary to maintain leachate at safe levels, reducing the risk of leakage/overtopping. To evaluate and if required undertake enabling works to improve site access for the above purpose.

Medium to long-term remedial solution – dependent upon the findings of an intrusive ground investigation, detailed risk assessment and remedial options appraisal; to consider ways in which leachate generation can be minimised e.g. the possible capping landfill 4 with low permeable materials and to consider treatment options for leachate to allow for a more sustainable, cost effective disposal solution.



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*How long will the Proposed Works Take:*

Short Term solution – tankering. Each ‘tankering event’ is likely to last for two days with a tanker making several journeys to remove a sufficient amount of leachate to reduce leachate levels to an acceptable level. The number of tankering events during the course of the coming months will vary according to leachate generation, which is closely linked to the weather. During the course of this work, consideration for a more sustainable remedial solution should be found.

Medium to long term solution – This is dependent upon the findings of further assessment and after undertaking a remedial options appraisal and only a rough estimate can be given although it is likely to be a number of months.

*Net Benefits*

- Remove the risk of leachate overtopping and reduce the risk of leakage
- Protect the quality of surface waters
- Mitigate the risk of any neighbouring land becoming impacted by contaminants
- Reduce the risk of property blight in that locality

*Effects on Local People and/or Businesses:*

Given the location of the former industrial installation, in particularly the location of landfill 4 to the rear of the site, it is envisaged that there would be no impact to local residents and minimal, if any, impact on adjacent businesses who occupier the land associated with the former fibre manufacturing process.

*How it will affect the Risks Posed by the Land:*

In the short term, to mitigate the imminent risk of leachate overtopping the landfill berm/clay bund surrounding landfill 4.

In the long term, to find and implement a sustainable remedial solution to reduce risks to an appropriate level so the land can no longer qualify as contaminated land, as defined by Part 2A of the Environmental Protection Act 1990.

## 12 A Summary of Relevant Assessment of Evidence

Arcadis (UK) Limited was commissioned by the Authority to complete a Land Quality Assessment for the landfills located at the former fibre manufacturing facility, Moody Lane, Grimsby (Arcadis, 2017).

The assessment included the following activities:

- Carry out a site reconnaissance of the site;
- Review documentation held by the Authority and Environment Agency concerning the landfills;
- Review potential contaminants of concern (CoC) based on information obtained regarding types of waste accepted;
- Develop an initial conceptual site model (CSM) or refine any existing CSM's
- Review SCLs identified in previous environmental reports;
- Identification of data gaps that require further investigation; and,
- Develop an outline work plan for intrusive investigations at the site (if required).

The work included the review of two previous reports produced by the Environment Agency:

1. Report of the environmental risks and future regulation for the Former Arcadis Landfill Sites (Environment Agency, 2009);
2. Former Arcadis Landfills, Grimsby Environmental Risk Assessment (Environment Agency, 2014)

The report (Environment Agency, 2009), provided an assessment of surface water and leachate around Landfill 4. The results showed elevated concentrations of sodium thiosulphate, chloride, and ammonia in leachate as the main known contaminants of concern.

Concentrations of sodium thiocyanate, chloride, and ammonia were also identified in the surface water land drains surrounding the landfill suggesting leachate seepage or overflowing from the waste mass was occurring. The land drains eventually feed into the Mawmbridge drain from where water is discharged into the Humber Estuary.

A further report (Environment Agency, 2014), provided the results of a second surface water and groundwater sampling program conducted in 2013/2014. Several sampling points were identified which could be used as compliance points where the presence of identified contaminants at levels exceeding target concentration values may be used to represent an unacceptable risk of harm to the receptor (e.g. pollution of controlled waters).

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The results indicated further decreasing surface water quality down gradient of Landfill 4. Poor levels of Biological Oxygen Demand were measured in the drains when compared to Environmental Quality Standards (EQS) around the landfill, as was ammoniacal nitrogen, which was also occasionally detected in excess of the EQS. Sodium thiocyanate was also detected above the predicted no effect concentration. Impacts of chloride, and sporadically sodium thiocyanate had also been measured at the outfall to the Humber Estuary from the Old Fleet and Mawmbridge land drains.

In the same report, the Environment Agency raised concerns that there was the potential for greater environmental impact should leachate management at the site cease. This would allow larger volumes of undiluted landfill leachate to over top the landfill and enter site drains, adjacent watercourses, the River Humber and its foreshore.

The site walkover performed by Arcadis (UK) Ltd in March 2017, in preparation of report (Arcadis, 2017) identified the landfill was close to saturated, and as leachate was not currently being managed the potential for leachate overtopping the bund into the surrounding drainage ditches was considered significant.

Based on existing information, the presence of polluting substances within the leachate, rising leachate levels on the brink of overtopping, plus evidence of historic leachate discharge, and the imminent risk of a further uncontrolled release from landfill 4, the Authority feels this presents a significant possibility of significant pollution of controlled waters.

The Authority considers that the factual content of (Arcadis, 2017) and the conceptual model presented in Annex 2 constitute a scientific and technical assessment of the available evidence.

### 13 Summary of why the Authority considers that the requirements of relevant sections of the Statutory Guidance have been satisfied

The Authority inspected the site in accordance with Paragraph 2.9 of the statutory guidance in that, where it considers there is a reasonable possibility that a significant contaminant linkage exists, it should inspect the land to obtain sufficient information to decide whether it is contaminated land.

A risk assessment has been undertaken following the requirements of the statutory guidance in particularly paragraphs 3.3 and 3.17 to inform the regulatory decision making process and to do so as efficiently as possible.

Paragraph 5.6 of the Statutory Guidance presents the four possible grounds for determining land as contaminated land (with regard to non-radioactive contamination) and 5.6(d) identifies one of those reasons as being 'that there is a significant possibility of significant pollution of controlled waters being caused.'

*Cont.*

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Paragraph 5.6 of the Statutory Guidance presents the four possible grounds for determining land as contaminated land (with regard to non-radioactive contamination) and 5.6(d) identifies one of those reasons as being 'that there is a significant possibility of significant pollution of controlled waters being caused.'

In considering, in some circumstances what may constitute significant pollution, paragraph 4.39(b) states that the local authority may consider 'significant concentrations of priority hazardous substances, priority substances or other specific polluting substances in surface water at an appropriate risk based compliance point.' Previous monitoring work undertaken by the Environment Agency identified several risk based compliance points including at Mawmbridge Drain and the discharge point in to the Humber Estuary.

In deciding whether significant possibility of significant pollution of controlled waters is being caused the statutory guidance requires the Authority to consult the Environment Agency and have 'strong regard' to the Agency's advice (paragraph 4.35). The urgency of such a decision has been considered in accordance with paragraph 5.12.

Based on available information and in consultation with the Environment Agency, the Authority has determined that a significant contaminant linkage exists in respect of the land, which represents a significant possibility of significant pollution to controlled waters and that there are no suitable and sufficient risk management arrangements in place to prevent such pollution occurring. The Authority considers that the site falls within the description of land found within Category 1 of the Statutory Guidance (paragraph 4.46(a)).

This information forms the basis for the Authority determining the land identified in Annex 1 as contaminated land, as defined in Section 78A(2) of Part IIA of the Environmental Protection Act 1990.

## 14 References

**Arcadis. 2017.** *Phase 1 environmental desk study report for moody lane, Landfills 1, 2, 3, and 4, dated March prepared by Arcadis (UK) Ltd dated, March 2017.*

**Enitial. 2016.** *Quarterly Monitoring Results dated October 2016, prepared by Enitial for Humber Land (Grimsby) Unit Trust. 2016.*

**Environment Agency. 2014.** *Former Arcadis Landfills, Grimsby Environmental Risk Assessment, October 2014.*

**Environment Agency. 2009.** *Report of the environmental risks and future regulation for the Former Arcadis Landfill Sites, Grimsby, May 2009.*

## 15 Further Contact

Please contact the Technical Officer by:

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## 16 Authorisation

Dated: 31<sup>st</sup> July 2017

This 'Written Record of Determination of Contaminated Land' has been prepared and authorised by:

Signed:



**Shaun Poole**  
Technical Officer  
North East Lincolnshire Council



**Adrian Moody**  
Licensing Manager  
North East Lincolnshire Council

Annex 1 – Site outlined in red

North East Lincolnshire Council  
Ordinance Survey Licence Number: 100020759



## Annex 2 – Pictorial representation of Conceptual Site Model



