NON-TECHNICAL SUMMARY

LEADENHAM LANDFILL SITE
QUARRY LANE
POTTERGATE
LEADENHAM
LINCOLNSHIRE
LN5 0QF

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SiriUS Environmental

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Information Sheet

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ENVIRONMENTAL PERMIT (REF.: XP3798NK) VARIATION APPLICATION

NON-TECHNICAL SUMMARY

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1.0 INTRODUCTION

Application Details

1.1.1 Lincwaste Limited is seeking to vary Environmental Permit EPR/XP3789NK. This permit relates to the landfilling of non-hazardous waste at Leadenham Landfill Site.

1.1.2 In summary this application seeks to:

- Increase annual waste for disposal tonnages to 300,000 tonnes with an additional total of up to 100,000 tonnes of imported restoration material;
- Incorporation of additional land into the Environmental Permit Boundary, to support auxiliary operations to the main landfill activity only (no additional void to be created within the area);
- Submit for approval a revised landfill containment cell configuration layout for the Northern Development Area;
- Submit for approval a Revised Surface Water Management System Design and CQA Plan;
- Submit for approval a revised scheme of restoration and an associated Restoration Plan;
- Incorporate updates to Monitoring Point References and associated monitoring parameters and frequencies;
- Proposal of operational and non-operational phase leachate compliance limits within the Northern Development Area;
- Discharge of Pre-Operational and Improvement Conditions; and
- Proposal of Compliance Limit sand Action Levels for perimeter gas monitoring boreholes installed around the northern development area.

Regulated Facilities

1.1.3 Leadenham Landfill Site is located approximately 750m to the east of the village of Leadenham at National Grid Reference (NGR) SK 964 524. The Site is located within the confines of a limestone quarry on the crest of a significant topographic feature.

1.1.4 Access to the site is obtained via Quarry Lane located to the south of the site, which leads to the waste reception area; the site entrance is located at NGR SK 96197 52036.

1.1.5 The site is located within the footprint of a former limestone quarry and on the western edge of an escarpment known as the Lincoln Edge, at an elevation of approximately 100mAOD. The escarpment is orientated in a north-west, south-west direction with the dip slope to the east and a steep scarp slope to the west. The scarp slopes fall steeply to an elevation of approximately 50mAOD over ~500m to the village of Leadenham. To the west of the village of Leadenham the ground surface slopes gently towards the River Brant approximately 3.5km further to the west.

1.1.6 The Site was first developed for its current use in 1988 and was operated by Lincolnshire County Council and subsequently Lincwaste Ltd. Prior to development as a landfill, the Site was a limestone quarry.

1.1.7 The Site has been developed in a phased manner to optimise use of minerals, clay and void space on-site. The Site is currently operated in accordance with planning permission No. N.35/672/95, which was granted in July 1995, and

Waste Management Licence No. L242 (and amendments), which was obtained in September 1993. Planning permission for landfilling at the Site was originally granted in 1985 by permission N.35/1085/85.

1.1.8 The site is currently permitted to accept up to 150,000 tonnes/year of non-hazardous waste, 5,000 tonnes/year of inert waste and 20,000 tonnes/year of waste for restoration. The current approved landfill development allows the disposal of non-hazardous wastes in a total of 3 development areas containment phases; the Southern Development Area (restored), the Western Development Area (operational) and the Northern Development Area (that is yet to be built), with a combined void capacity of c.1.96 million cubic meters (as of April 2009). Current remaining void is 1,599,715 m³ (as of March 2021)

1.1.9 The revised development proposals will maintain the consented landfill void at its current value.

The Operator and Its Activities

1.1.10 The landfill operator is Lincwaste Limited, a subsidiary of the FCC Group of Companies, whose registered office and installation addresses are below:

Registered Office:	**Installation Address:**
Lincwaste Limited Ground Floor West 900 Pavilion Drive Northampton Business Park Northampton NN4 7RG	Lincwaste Limited Leadenham Landfill Site Quarry Lane Pottergate Leadenham Lincolnshire LN5 0QF

1.2 TECHNIQUES FOR POLLUTION CONTROL

Management Techniques

1.2.1 Lincwaste Limited operates an independent Environmental Management System at Leadenham Landfill Site that has been developed during the operation of the installation.

The Main Activities

Site Construction and Engineering

1.2.2 The Southern Development Area was the first part of the site to be developed. This area was managed on the principal of dilute and disperse.

1.2.3 The Western Development Area comprises the current area of disposal. It comprises of Cells 1-6. Cells 3-6 were constructed and filled in the following order; Cell 5, 3, 6 and 4. Cells 5 and 6 were capped and restored in 2010; Cells 3 and 4 were capped in 2015. The Site was mothballed until 2018, with part of this entailing an engineered containment/ intercell bund, constructed at the toe of Cell 3 and 4 to assist in the management of leachate levels and minimise the risk of leachate migration. Cells 1 and 2 in the southern area have now been merged to form 'Cell 1', and as part of these works Cells 3 and 4 have been utilised with the membrane capping removed. Cells 1, 3 and 4 are currently operational.

1.2.4 The Northern Development Area comprises future landfill development void. The area is currently occupied by lagoons (the subject of dewatering ahead of cell development) in which no controlled wastes have been deposited to date. Among other elements, this application seeks to develop a more effective

surface water management system, and discharge the appropriate Pre-Operational Conditions set in the permit to facilitate the commencement of infilling operations in the Northern Development Area.

Capping and Restoration

1.2.5 The Southern Development Area has been capped and restored with 1m of subsoil.

1.2.6 Permanent capping is currently in place over Cells 5 & 6 (and part of Cell 3) of the Western Development Area. The permanent caps for these locations consist of a welded geomembrane capping system.

1.2.7 It is proposed that all future permanent caps will be installed using one of the following design options:

- Option 1: Geomembrane Liner
- Option 2: Engineered Clay Cap
- Option 3: Geosynthetic Clay Liner

1.2.8 The decision of which permanent cap design option will be made for each stage of permanent capping on a case-by-case basis during the Construction Quality Assurance Plan Stage. Each of the proposed permanent cap design options provide the same level of protection to the underlying waste deposits.

Surface Water

1.2.9 Surface water at the site will be managed using sustainable drainage techniques, to restrict discharges from the site to the greenfield rate of runoff and to minimise any impacts to water quality throughout the life of the development.

1.2.10 The Environmental Permit Variation Application also seeks to propose a Surface Water Management Plan to be adopted at the site to facilitate the infilling of the Northern Development Area of Leadenham Landfill Site. It is therefore proposed to extend the site boundary between the western and northern development areas to accommodate the new settlement and attenuation lagoon systems. For the avoidance of doubt, no additional landfill void is being generated within this boundary extension area.

Leachate Management

1.2.11 Leachate generated with Western Development Area (Cells 1-6) will continue to be managed via the existing network of extraction wells. Due to the Southern Development Area being constructed as a Dilute and Disperse Landfill Cell, no leachate management is undertaken in this phase.

1.2.12 Management of leachate generated within the Northern Development Area (Cells 7-13) will be achieved by utilising the same methodologies employed the Western Development Area and presented in Leadenham Landfill Site's dedicated Leachate Management Plan.

Landfill Gas Management

1.2.13 The landfill gas management on site is currently operated on an active extraction basis with both gas wells and scavenger pipes currently removing landfill gas from the waste mass in both the Southern Development Area and the cells within the Western Development Areas from which are permanently capped. Landfill gas modelling has shown that gas generation originally peaked

at ~380m^3/hr in 2009. The proposal to increase the rate of waste input to 300,000 tonnes per annum is predicted to result is a second peak of ~385m^3/hr towards the end filling operations of the site, anticipated by around 2029. After this, gas generation rates will decline rapidly.

1.2.14 The gas management compound is current fitted with a gas engine capable of efficiently treating between 100 and 200 m^3/hr of landfill gas. This engine is supported by a 350m^3/hr capacity flare with a turn-down ratio of five. This plant offers a landfill gas treatment capacity range of between 70m^3/hr and 550m^{3}hr. It is therefore capable of supporting landfill management at the site until ~2050, which includes the small amounts of landfill gas still being generated in the southern development area of the site.

Restoration Plan

1.2.15 Permit Condition 2.7.2 of the current permit (Ref.: EPR/XP3798NK) authorises restoration of the quarry by means of a non-hazardous landfill disposal activity. The current Environmental Permit requires the acceptance of wastes listed in Schedule 2, Table S2.2 in accordance with a restoration plan agreed with the Environment Agency.

1.2.16 Utilising the Scheme of Restoration approved by Lincolnshire County Council, a Restoration Plan for Leadenham Landfill Site has been prepared and contains the waste types and quantities to be utilised to achieve the designated end-uses stipulating by Lincolnshire County Council.

1.2.17 Additionally, this Restoration Plan provides confirmation of the Waste Acceptance Criteria/Procedures to be applied to incoming restoration material.

1.3 RISK ASSESSMENTS

Overview

1.3.1 As part of the Application to Vary the landfill Environmental Permit, the following Risk Assessments were reviewed, and revised where appropriate, to determine whether any of the proposed changes would have an unacceptable impact on the environment:

- Landfill Gas Risk Assessment;
- Hydrogeological Risk Assessment;
- Amenity Risk Assessment (Nuisance and Health);
- Stability Risk Assessment.

Landfill Gas Risk Assessment

1.3.2 The original PPC Permit Application for Leadenham Landfill Site was submitted in 2009 with the support of a Landfill Gas Risk Assessment carried out using GasSim modelling software. A subsequent Landfill Gas Risk Assessment was submitted in 2020 which considered the gas generation potential of the site when up to 150,000 tonnes of potential gas generating material was deposited each year.

1.3.3 Considering the proposal to increase the rate of deposition for potentially gas generating waste at Leadenham Landfill Site, it was considered appropriate to review the Landfill Gas Risk Assessment for the facility.

1.3.4 This risk assessment review accounts for the projected waste input rates and streams to review the landfill gas generation potential. The revised model

indicates that increasing the rate of waste input to the site each year will result in a second period of peak gas generation. This second period of gas increased gas generation will peak in 2029 to a similar rate to that experienced at the site in 2009 i.e. ~380m^3/hr.

1.3.5 In light of the results, it is considered that the current gas management capacity installed at Leadenham Landfill Site is sufficient and that there is sufficient redundancy in the system.

1.3.6 The risk assessment also demonstrates that surface emissions of and the combustion of landfill gas will not result in the exceedance of any Environmental Assessment Limits in the vicinity of the site.

Hydrogeological Risk Assessment

1.3.7 The Hydrogeological Risk Assessment submitted in support of the original PPC Permit application was completed by Golders in 2009 and subsequently reviewed in 2015 and 2019.

1.3.8 The 2009 HRA identified that the risk posed by the Southern development Area (restored dilute and disperse area) could be assessed by the review of the groundwater monitoring data adjacent to this area. The 2015 HRA Review identified that this approach remained valid and applied the same assessment methodology.

1.3.9 The 2009 HRA also indicated that there is no pollutant linkage between leachate contained in the base of the site (western and northern areas) and the groundwater within the Lincolnshire Limestone Formation and therefore no assessment was required. Similarly, due to the thickness of the Whitby Mudstone Formation and the protection that this affords to the underlying Marlstone Rock Formation, that assessment is not required for this pathway. The 2015 HRA Review also considered this approach to remain valid and as a consequence of the site being mothballed, with the risks posed by the site were further reduced.

1.3.10 The only pathway which was identified as a potential risk that required assessment was the potential effect of perched leachate on the upper aquifers via migration through the sidewall lining system of the Western and Northern Development Areas. This assessment was undertaken using standard hydrogeological equations. The 2015 HRA Review reassessed the risks posed by theoretical perched leachate adjacent to the sidewall liner. The assessment of the risks was undertaken in compliance with parameters agreed as part of the 2009 HRA and related to a theoretical discrete area of perched leachate along 20m of the sidewall boundary. This theoretical length was agreed in 2009 when Cell 1 was still included in the assessment. Therefore, the reassessment of this failure/perched scenario in 2015 with the updated current source term is considered to remain valid and no further assessment is required. This was proposed based on the 2009 report, if Cell 1 had not been mothballed in 2015, then the assessment of the perched leachate against the sidewall would have remained the same.

1.3.11 The 2019 HRA Review examined the potential impact of increasing leachate compliance levels in the Western Development Area to 2m below the top of the Whitby Mudstone Formation (~80 mAOD) for all leachate compliance monitoring locations. The 2019 HRA Review considered that the proposed changes to the leachate management and control systems at the site do not vary from the existing conceptual model where leachate is contained below the

top of the Whitby Mudstone Fm. Therefore, it was concluded that there have been no significant changes since the 2009 HRA was approved.

1.3.12 As part of this variation application, a HRA review has been undertaken of the potential impact from increasing the rate of waste input and confirming the operational and post-operational leachate compliance limits within the Northern Development Area.

1.3.13 The HRA review consisted of a review of existing monitoring data, conceptual site model and comparison of the resultant data against previously undertaken qualitative and quantitative modelling. These assessments concluded that leachate generation potential will not be altered due to the increase waste input proposals. Additionally, as with the western development area, the proposed leachate compliance levels in the Northern Development Area set below the upper boundary of the Lias Clay - thereby the risk of pollution entering the Northampton Sand Formation will be negligible.

1.3.14 Additionally, comparison of the previously modelled leachate source terms against current leachate quality data confirmed that the recent values fall below the thresholds used in previous perched leachate pollution assessments. Accordingly, it was concluded that no additional modelling was required.

Amenity Risk Assessment (Nuisance and Health)

1.3.15 The potential impact of the following nuisances from the installation on the surrounding receptors has been considered in detail as part of the Original PPC Permit Application submitted in 2009. The Dust and Odour MPs was further updated in 2020 as a result of the proposed increase to waste inputs to the site;

- Noise and Vibration
- Odour
- Particulate Matter
- Litter
- Birds, Vermin, and Insects
- Mud on Highway

1.3.16 All parts of the Amenity Risk Assessment have been reviewed as part of this Variation Application. Whilst this application seeks to incorporate an area land into the Environmental Permit Boundary for Leadenham, the proposed area for incorporation will not be utilised for and landfill activities. The proposed area for inclusion will host the revised Surface Water Management System only. As a result, it is considered the potential risks posed by Leadenham Landfill (and the associated activities) are unchanged. Accordingly, it is considered that the Amenity Risk Assessment submitted in support of the Original PPC Permit Application remains applicable.

Stability Risk Assessment

1.3.17 A review of stability risk assessment has assessed the stability and integrity of the lining system, and subsequent waste placement under the proposed increased rate of waste input.

1.3.18 The SRA considered the worst-case development, stability, and integrity scenarios with characteristic laboratory test results to determine the factors of safety of stability. The SRA concluded that the stability and integrity of the waste containment system at Leadenham Landfill Site under the proposed increased rate of infill return factors of safety in excess of 1.3 for the scenarios considered and are deemed acceptable so long as the construction sequence (for shallower

and steeper side-slope lining construction, and QM waste in-filling) and waste slope batter restrictions are adopted.

1.4 ENVIRONMENTAL MONITORING

1.4.1 During the operational and post closure period, the landfill and restoration operations will be subjected to detailed environmental monitoring covering the following areas (as appropriate):

- Landfill Gas
- Leachate
- Surface Water
- Groundwater
- Site Topography
- Odour (Operational Phase Only)
- Particulate Matter (Operational Phase Only)

1.4.2 Monitoring results will be submitted to the Environment Agency in accordance with the Permit conditions and records will be kept in order that monitoring trends can be reviewed and appropriate actions taken if necessary.

1.4.3 All monitoring systems will be maintained and calibrated by trained technicians and the equipment manufacturers to ensure that the equipment and infrastructure is maintained in good working order.