LLANWERN EAST WASTE MANAGEMENT SITE LANDFILL CORUS WORKS LLANWERN

CLOSURE REPORT

Report Number 525.1/0/0207

Commissioned by

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1 INTRODUCTION

Llanwern East Waste Management Site (LEWMS) is a landraise occupying an area of some 200,000m^2 at the eastern end of the Llanwern Steelworks. It has accepted approximately 2.5 million tonnes of non-hazardous industrial and commercial wastes from the steel plant since its inception in 1978. Corus (UK) Ltd. the operator of the site, applied to the Environment Agency (EA) for a Pollution Prevention and Control Permit for the landfill as it still has a significant void space available within its planning consent. However, the permit application has been refused and the site now has to initiate closure in accordance with current regulations.

The EA served a Closure Notice on Corus on 14th November 2006, requiring a series of risk assessments to be undertaken to inform the closure process. Corus has expressed a desire to continue waste acceptance for a limited period to allow the landform to be completed and the site restored. Accordingly, this report and the four risk assessments to which it refers have been drafted to examine the environmental and human health risks in allowing continued waste acceptance for a limited period.

The risk assessments developed during this study have modelled the site in its current state to quantify the risk profile of the site if it was to close immediately. The assessments have then considered the risk profile of the site if it was to continue waste acceptance for the anticipated time to complete the landform. The risk assessments will form the basis of the detailed design of the restoration scheme for the site. It is expected that restoration works will commence whilst the site continues to accept wastes.

2 PURPOSE OF ONGOING WASTE ACCEPTANCE

Llanwern East Waste Management Site (LEWMS) is close to attaining a uniform restoration profile, having been filled since the 1970's. The existing landform, illustrated on Figure 2, comprises a plateau with uniform side slopes over all of its footprint, except for a small area on the western edge of the site. At this location (also identified on Figure 2) landfilling is progressing currently to infill a disused access road which traverses the western batter. The working face is progressing southward along a full width of 18.5m with a face height of 2.5m. There is a further 140m of this single lift face remaining to place until the face abuts the site access road.

When the current face has achieved its final location the landfill will be of uniform height and will be enclosed by uniform slopes, allowing a full restoration and capping scheme to be implemented. The current height of the landfill plateau remains 5m below the permitted levels and the completion of this section will result in a uniform restoration height.

The landform completion can be carried out using either site generated waste materials, imported inert materials or a combination of the two. To complete the works in a reasonable timescale it is proposed to use a combination of both.

3 WASTE TYPES, QUANTITIES AND INFILLILLING RATE

LEWMS currently accepts the non-hazardous and inert wastes listed on Table 1 below, in the proportions indicated (over the last 12 months). Since the steelmaking part of the plant closed in 2000 the quantity of waste being deposited has fallen sharply from the original 70,000 tonnes per annum to only 4,000 tonnes per annum in the year before last. Over the last 12 months some re-development work has seen a slight increase to 7500 tonnes.

Table 3-1 Last 12 months waste inputs and permissible waste types

Description	EWC Code	Proportion
Cover	10 02 01	17%
Refractory	16 11 04	22.4%
Demolition	17 09 04	25%
General	20 03 01	17%
Wood	20 01 38) 25 01 03)	1.5%
Horticultural	20 02 01	0.1%
Sub-Dredgings	17 05 04	11.6%
Canteen Waste	20 01 08	0.24%
Shotblast	12 01 17	4.75%

3.1 Waste Quantities

The void space remaining to be filled by advancing the tipping face over the last available panel has been calculated by generating a digital terrain model of the existing topography (Figure 2) and the proposed topography (Figure 3). The volume amounts to 6475m^3. Assuming this is to be filled entirely with waste this would amount to 9065 tonnes.

3.2 Infilling Rate

Waste arisings at the Llanwern Plant destined for EWMS are delivered at a rate of between 4000 tonnes per annum and 7500 tonnes per annum. To complete the panel would therefore take between 27 months and 15 months, depending on the input rate. Latest Defra guidance requires all landfills without a PPC permit to cease accepting waste by July 2009, some 29 months from the present. However, the Environment Agency has to close the site as soon as is practical with due regard to the environmental and economic consequences of immediate closure. It is considered practical to continue waste acceptance for a 15 month period so that the larger part of the required intill materials are sourced from the Llanwern waste stream. The expected shortfall of some 1565 – 5065 tonnes can be made up by the reprofiling of the oversteep slopes on the northeast corner of the site and by the importation of externally sourced inert waste soils.

4 WASTE EMPLACEMENT

An examination of the existing waste streams has identified that two of the waste streams:- horticultural wastes and canteen wastes, are undesirable due to their gassing nature. The gas risk assessment has concluded that even though their presence makes little difference to the overall gas profile of the site their characteristics make them undesirable. The wastes proposed to comprise the continued infilling include all other waste streams with the exclusion of:

Horticultural wastes	20 02 01
and Canteen wastes	20 01 08

The wastes will be placed in accordance with current systems. A working face of no greater than 2.5m height will be developed and pushed southward with heavier waste types used to provide cover to lighter fractions. In the absence of food wastes vectors are not expected to be an issue, as described in the nuisance risk assessment.

5 HYDROGEOLOGICAL RISKS FROM THE SITE

The overall risk from the site to groundwater and environmental receptors via groundwater is described in detail in the Hydrogeological Risk Assessment (HRA) (Appendix 1). This assessment has concluded that the addition of a further 7500 tonnes of waste within a waste mass already totaling 2,500,000 tonnes will have no perceptible effect on the risk profile.

The LandSim Model has identified that at no time do List 1 substances reach groundwater below the facility. Therefore the site poses no threat to groundwater quality from List 1 substances through-out the facilities full life cycle and complies with the requirements of the Groundwater Directive. With respect to List 2 substances, all predicted concentrations at the compliance point are below the established EAL, indicating that there is no significant deterioration in groundwater quality.

6 LANDFILL GAS RISKS FROM THE SITE

A landfill Gas Risk Assessment (GRA) has been carried out to quantify the gas emissions profile from the exisiting waste mass. The assessment has been carried out using the quantitative landfill gas generation model GasSim, and is included in Appendix 2 of this report. Using a simulation approach advocated in Environment Agency guidance has allowed the landfill gas generation profile over a 40 yr post closure period to be calculated. The GRA therefore establishes the risks to receptors, including the global atmosphere, from gases evolved due to the degradation of the wastes that are currently placed.

As this report is concerned with the effects of ongoing waste disposal activities the model has been amended to include a further 12 months of waste disposal. This has then allowed a second set of quantitative emissions predictions to be produced for comparison with the existing case. The GRA concludes that the effect of a further 12 months landfill disposal is barely perceptible in short term emissions, and when considered as a total global atmosphere impact is imperceptible. The conclusion is therefore that ongoing waste disposal will not increase the risk profile to nearby receptors or the global atmosphere.

7 STABILITY OF THE WASTES

A Stability Risk Assessment (SRA) has been undertaken to quantify the risk of instability at the site. The SRA is included in Appendix 3 and concludes that the site in it's current configuration requires two principal elements of work:

- the infilling of the disused access road to form an appropriate and uniform long-term profile; and
- the reprofiling of the north-eastern slope to reduce gradients to slopes with an adequate factor of safety.

An assessment has been made of the quantities of materials available from the regrading of the northeastern slope and it has been established that up to 3000 tonnes of surplus materials will be excavated. These materials will be placed into the infill area to form part of the quantity required for restoration, leaving slopes with an appropriate long-term factor of safety.

The excavated materials could, in combination with a waste input equivalent to the last 12 months, comprise the infilling materials. However, if waste quantities of only 4000t were to arrive in the next 12 months then supplementary externally sourced materials would be required.

An assessment of both the waste mass stability and the final waste slopes (where capped) has revealed that the proposed restoration scheme will not suffer instability, and offers factors of safety that are in accordance with current Environment Agency guidance.

8 NUISANCE DURING ONGOING SITE ACTIVITIES

The nuisance risk assessment has been undertaken in accordance with Environment Agency Guidance and has examined source pathway receptor linkages in order to evaluate the potential for nuisance around the site. The risk screening process identified only four source pathway receptor linkages and rated them as medium or low risk. Specific procedures have been identified to mitigate these risks. It is noted that the risks are not new; the site has been operational for many years and the same nuisance issues have been controlled adequately in the past. The nuisance risk assessment supports the conclusion that ongoing waste acceptance for a limited time period will not cause undue nuisance to the surrounding area.

9 RESTORATION SCHEME

The plateau area and the flank on the western and southern sides of the landfill will be restored using a combination of geo-composites and geomembranes. The eastern flank comprises of the bund constructed as confinement to the waste along this edge. This flank is also heavily vegetated with many mature trees established on the side slopes. It is therefore proposed that as this surface area is relatively small and due to the presence of established vegetation, no capping is proposed.

The plateau cap currently has gradients varying from approximately 1 in 70 to 1 in 130. It is likely however that via a combination of re-grading of the existing waste, and placement of small amounts of new waste, gradients on the cap will increased to be no less than 1:50. This will allow more effective removal of surface and infiltrated precipitation. This surface water will be directed to the existing surface water collection system surrounding the site. It is proposed that restored flanks will have a gradient of no greater than 1 in 2.40 or 22.6 degrees.

The existing completed waste surface, which generally comprises slag covered by sub-dredgings will be prepared by a combination of vegetation stripping, scarifying, rolling and if necessary application of finer waste materials prior to the placement of a sequence of geo-composites and geomembranes. Finally a soil, which more than likely will be clay based, will be applied as a final restoration cover. The detailed sequence of the capping materials is described below.

The following top down sequence of soil, artificial geo-composites and geo-membranes is to be applied:

a) Clay or other approved soil, comprising a minimum 650mm layer covered by site won sub-dredgings to host a seeded vegetative cover.

b) Pozidrain 7S250D/NW8, which comprises a 7mm cuspated HDPE core with geotextile fused to both the upper and lower surface.

c) 1mm HDPE barrier membrane, comprising GSE 1mm DRS (Double Rough Sided) high density polyethylene acting as the main precipitation ingress and gas egress barrier.

d) Gas Collection and Membrane Protection Geotextile, comprising Pozidrain 7S250D/NW8, which comprises a 7mm cuspated HDPE core with geotextile fused to both the upper and lower surface.

e) Regulating Layer, comprising re-graded and rolled waste surface.

10 THE ECONOMIC CASE FOR CONTINUED WASTE ACCEPTANCE

Continued waste acceptance at this site is not driven by the need to either generate funding for restoration works or to control expenditure. The economic balance of maintaining an operational landfill for such small quantities of waste are marginal at best. Rather, the continuation of waste acceptance offers the opportunity to reduce the quantity of imported materials required for completion of the landform.

Within a relatively short distance of the Llanwern site is the Docks Way landfill, operated by Newport County Council. The gate price for disposal of the wastes considered in this report will be approximately £55 per tonne plus haulage which is only marginally greater than the costs of maintaining and operating the landfill. When the cost of imported material to substitute this waste is considered, an additional £5-6 per tonne could be expected, if the imported material is an inert waste. If the material however has to be sourced from primary aggregates costs of up to £14 per tonne could be expected.

The options available for completing the landfill are therefore either to fill using a combination of site wastes and regraded materials or to ship these waste off site and import external inert wastes or primary aggregates back onto site. The latter option is clearly not a sustainable solution to the need to restore the site. It also makes little economic sense to incur both the cost of off-site disposal for the site wastes and the cost of importing externally sourced materials.

11 CONCLUSIONS

Ongoing waste acceptance for a period of approximately 12 months will allow the landform of the East Waste Management Site to be completed. Putrescible wastes that are currently permitted at the site would be excluded during this period. It is expected that the annual waste production from the Llanwern site will fall short of the total volume of material required and this will be made up of arisings from the re-graded north-eastern slope. This combination will eliminate the need to import materials into the site to complete the landform.

The risk to human health and the environment of continued waste acceptance has been examined in detail by carrying out four risk assessments that are appended to this report. The hydrogeological assessment concludes that the risk to groundwater and receptors via groundwater is currently acceptable and this risk profile will not change as a result of ongoing waste acceptance. The landfill gas risk assessment has shown the need for active gas control within the restoration scheme. The evolution of gases is affected insignificantly by the limited additional wastes. The stability risk assessment shows that continued waste acceptance will provide an appropriate and stable landform and the nuisance risk assessment has not revealed any undue effects as a result of ongoing activities.

This report has shown that the limited duration of ongoing waste acceptance will not present a risk to the environment or human health. It has demonstrated that stability will be improved and an appropriate final restoration landform will be created. The ongoing disposal area comprises a very small part of the site and this offers the opportunity to commence restoration works on other parts of the site whilst the final panel is completed. The use of site generated wastes allows the landform to be created without the importation of externally sourced inert wastes or primary aggregates and therefore offers the most sustainable approach to completing the landform.

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APPENDIX 1
HYDROGEOLOGICAL
RISK ASSESSMENT

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APPENDIX 2
GAS RISK
ASSESSMENT

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APPENDIX 3
STABILITY RISK ASSESSMENT

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LLANWERN EAST WASTE MANAGEMENT SITE LANDFILL CORUS WORKS LLANWERN

APPENDIX 4
NUISANCE RISK ASSESSMENT
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