Westwood AD

CIRIA C736 Containment assessment

Biogen

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Prepared by:

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Revision Record

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Basis of Report

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1.0 Introduction

Biogen operates an Anerobic Digestion (AD) facility located at Westwood, to the southeast of Wellingborough: -

Westwood AD
Bedford Road
Rushden
Northamptonshire
NN10 0SQ

Figure 1 Site location and layout

As part of ongoing permitting discussions with the Environment Agency, Biogen have been asked to demonstrate that existing secondary containment arrangements comply with guidance – Improvement Condition (IC) no.7 in permit variation EPR/FP3137GF/V010 refers

Improvement condition for secondary containment design		
IC7	The operator shall submit a written 'secondary and tertiary containment plan' and shall obtain the Environment Agency's written approval to it. The plan shall contain the results of an inspection and program of works undertaken by a competent structural engineer, in accordance with the risk assessment methodology detailed within CIRIA C736 (2014) guidance, of the condition and extent of secondary and tertiary containment systems where all polluting liquids and solids are being stored, treated, and/or handled. The inspection shall consider, but not be limited to, the storage vessels, bunds, loading and unloading areas, transfer pipework/pumps, temporary storage areas, and liners underlying the site. The plan shall include: • an assessment of the physical condition of all secondary and/or tertiary containment systems, using a Written Scheme of Examination and their suitability for providing containment when subjected to the dynamic and static loads caused by catastrophic tank failure;	10/08/2022 or other date as agreed in writing with the Environment Agency

Figure 2 Improvement condition IC7

2.0 Statutory Background

Site owners and operators have an obligation to prevent pollution being caused by the unintentional escape of hazardous materials. Ineffective containment can result in a variety of enforcement measures including financial penalties and potentially legal action against company Directors.

In order to assist owners and operators to comply with good practice, CIRIA produced report C736 – Containment systems for the prevention of pollution. The most recent version of this report (dated 2014) was authored by Mr Ian Walton of SLR Consulting.

It is the Duty Holder (or operators) responsibility to demonstrate the existing facility is appropriate for the risk and, if found to be inadequate (whether that be due to it not being designed as the correct class or because it has over time been allowed to deteriorate so that it no longer functions as designed), establish a program of works to bring bunding and containment up to a specification appropriate to the risk posed.

Containment systems should be regularly reviewed to ensure that they are still fit for purpose and whenever there are changes to the nature of the inventory stored (whether that be volumes stored or changes to compositions) and/or pathways or receptors change.

3.0 Methodology

SLR was appointed by Biogen in 2022 to undertake a review of the existing secondary containment arrangements, which was completed in January 2024[1]. This review identified actions points which are addressed in this report. These cover the following areas: -

- Topographic survey of the existing containment bund and hydraulic modelling to enable its capacity to be accurately determined
- Geotechnical investigation of the earth bund and underlying insitu soils to establish composition and permeability
- Completion of C736 risk assessment for the site to determine required environmental risk rating and design classification

These areas are discussed in the following sections.

[1] 171022_403_064498_00001_Westwood_Containment_bund_report_ISSUE_V02

3.1 Inventory

Biogen are considering carrying out revisions to the site infrastructure, which will result in the inventory volumes described in Table 1 below: -

Table 1 Inventory Volumes

Ref	Description	Volume (brimful) (m3)
a	Digestate Storage tank Nr 1	9,700
b	Digestate Storage tank Nr 2	9,700
c	Digestate Storage tank Nr 2	9,700
d	Digester 1	2,280
e	Digester 2	2,280
f	Digester 3	2,280
g	Digester 4	2,280
h	Digester 5	3,600
i	RWBT	1,140
j	Pasteuriser 1	160
k	Pasteuriser 2	160
l	Pasteuriser Dump Tank	220
	Total Volume	**43,500**

Assumptions

The tanks are not hydraulically linked.
Inventories are not flammable.
The risk of a single tank failure triggering additional tank failure is considered to be extremely low.

C736 guidance recommends that the secondary containment volume is the larger of 25% of the bund capacity or 110% of the largest tank.

25% of 43,500m3 = 10,875m3
110% of 9,700m3 = 10,670m3

In this case 25% of the total inventory dominates and the required secondary containment capacity is **10,875m3**.

3.2 Topographic survey and bund volume modelling

SLR completed a topographic survey of the existing secondary containment bund on 22nd July 2024.

Subsequently this survey was used to model containment volumes within the bund. The topographic survey and containment models are included as Appendix A of this report.

The survey and modelling are summarised in Table 2 Containment volume

Table 2 Containment volume

Ref	Scenario	Containment volume	Notes
1	Bund brimful capacity (bund wall top exceeded at 98.410mAOD)	14,008m3	
2	Bund flooded to required containment volume (10,875m3) – liquid level 98.069mAOD	10,875m3	
3	Bund modelled in current condition – breach occurs at 97.467mAOD - localized low point identified where earth bund meets concrete bund wall in Northwest corner of bund	6,128m3	The low point requires remedial works to be completed to restore the designed level
4	Bund modelled with access gate remaining open – breach occurs at 97.314mAOD	4,861m3	Modelled for information only

The total secondary containment capacity provided by the existing bund of **14,008m3** exceeds the required figure of **10,875m3**, and therefore the secondary containment bund has adequate volume (assuming that the low point identified is remediated).

3.3 Bund permeability assessment

SLR completed an intrusive site investigation on the 7th and 8th August 2024. This comprised advancing 2Nr boreholes through the existing earth bund and into underlying subsoils and recovering samples for laboratory testing. Borehole locations are shown in Figure 3 below;

Figure 3 Borehole locations

The results of the ground investigation are included as Appendix B of this report.

The boreholes identified that the containment bunds are formed from Clay identified predominantly as the Oadby member – Diamicton. Samples were extracted from this material for laboratory permeability testing, which gave results for Coefficients of Permeability of 5.3 x 10^{-11} m/s and 1.2 x 10^{-10} m/s. These Permeability values are

significantly lower than the required threshold of 1 x 10^{-9} m/s contained within C736 and other similar guidance.

Previous site investigation works completed during site construction in 2009 (Rolton Group, 12th February 2009[2]) also proved that the insitu soils were an 'impermeable' clay with measured permeability lower than C736 requirements.

3.4 C736 Risk Assessment

C736 requires that a site-specific risk assessment is completed for each site using a source – pathway – receptor model to determine the overall environmental site hazard. This results in a low, medium or high rating which in turn dictates the permissible secondary containment design and construction options for the site.

SLR have completed a C736 risk assessment for the Westwood site using the Anaerobic Digestion and Bioresources Association (ADBA) methodology.

The C736 risk assessment is included in Appendix C of this report.

The risk assessment indicates that the site is considered to be 'low' risk, and therefore requires class 1 design.

4.0 Discussion

The CIRIA risk assessment results in a 'low' risk classification for the Westwood site, which therefore requires Class 1 design to C736 guidance.

Unlined earth bunds are an allowable design for class 1 sites, with C736 specifying a minimum thickness of 1m of Clay with an impermeability lower than 1x 10^{-09} m/s. The bund at Westwood exceeds these minimum criteria, with a greater thickness of material with significantly lower permeability.

It is noted that there is a localised low spot to the northwest corner of the earth bund. This should be remediated by clearing the area of topsoil / vegetation, exposing the underlying Clay bund and compacting suitable impermeable Clay under Engineering supervision. This should be brought up to match the level of the adjacent concrete bund wall (98.410mAOD).

Assuming the low spot is remediated, the available containment volume for the bund is modelled as 14,008m3 which exceeds the required volume of 10,875m3.

It is noted that SLR previous report (dated January 2024) also recommended additional actions to address issues with the bund including remedial works to a section of precast concrete wall within the bund and repair works to concrete joints.

5.0 Conclusions

The volume of the secondary containment bund at Westwood exceeds that required by C736 guidance, and it is constructed using appropriate materials. Subject to relatively minor repair and remedial works, the bund is considered to be satisfactory for a low risk / class 1 site.

[2] 07-0296 Westwood Biogen Permeability Assessment 12th February 2009

6.0 Closure

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Regards,

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Appendix A Topographic survey and hydraulic models

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Appendix B Site Investigation

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Appendix C C736 Risk Assessment

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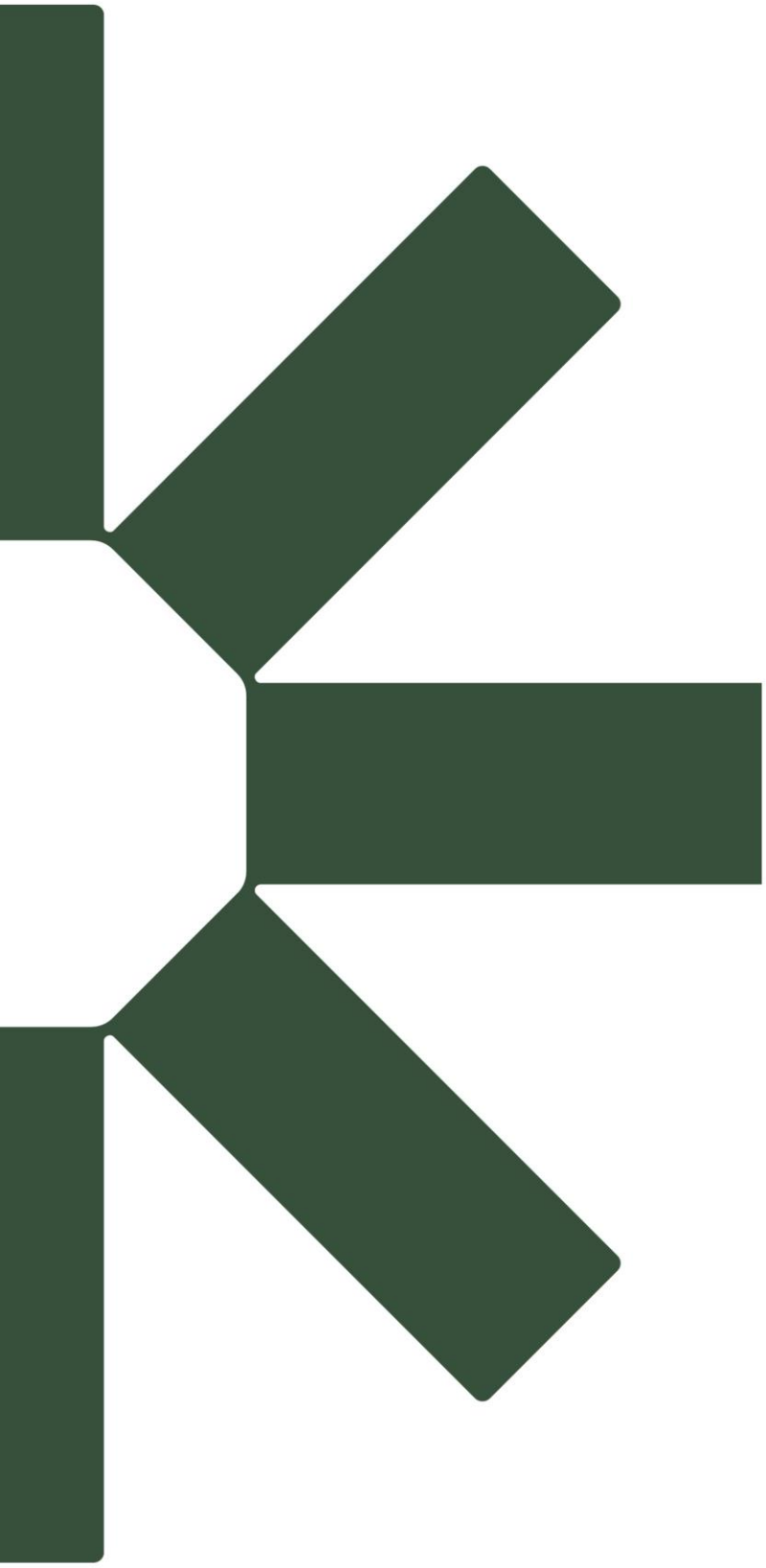

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