Independent Review and Verification of Containment Strategy Report 23073-H-RP-001-R5 For Home Farm Grange Anaerobic Digestion Plant Land east of the A162, Home Farm, Sherburn in Elmet, North Yorkshire, LS25 6FW



ON BEHALF OF

S9 Construction

29th September 2026

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INDEPENDENT TECHNICAL REVIEW
Containment Strategy Report 23073-H-RP-001-R5

Home Farm Grange Anaerobic Digestion Plant
Land east of the A162, Home Farm, Sherburn in Elmet, North Yorkshire, LS25 6FW

Document reviewed	23073-H-RP-001-R5, dated 8 January 2026
Additional information	Final tank schedule supplied by the Client; Biogest tank drawings and site plan supplied for review; current ARP drainage/containment layout; and site finished levels. The revised containment assessment is based on the confirmed single PowerDigest arrangement.
Review purpose	Check consistency of the report with the final tank schedule and drainage layout
Review status	Acceptable on the basis of the revised information and assumptions stated within this review.
Date of review	29th September 2026

1. Executive Summary

Conclusion. This review assumes that the CIRIA C736 Class 2 containment classification adopted within Report 23073-H-RP-001-R5 remains valid. The purpose of this review is to assess whether the original report remains consistent with the final tank schedule and updated drainage layout. The CIRIA C736 containment classification, environmental risk assessment, source–pathway–receptor assessment, hydrogeological assessment and COMAH applicability have not been independently reassessed as part of this commission.

The principal findings are:

The revised tank arrangement comprises 1 No. PowerRing Digester, 1 No. Post-Digester (PowerDigest), 2 No. Liquid Reception Tanks, 1 No. Liquid Separation Tank and 1 No. Dirty Water Tank. The revised total maximum operating liquid inventory is approximately 19,204 m^3.

Biogest has confirmed that the PowerRing Digester and PowerDigest are hydraulically linked through a controlled overflow. Biogest has also confirmed that, in the event of failure of either tank, there will be no additional liquid overflow from the other tank, provided all feeding is stopped. The tanks are therefore considered independently for the secondary containment volume assessment and 110% of the largest tank remains the governing inventory criterion: 14,871 m^3.

The gross plan area within the concrete and earth bund walls has been confirmed as approximately 12,143 m^2.

The report contains inconsistent rainfall depths: it lists 32 mm, 65 mm and 8 mm, but calculates using 29 mm, 54 mm and 7.25 mm. This must be corrected using one defined site-specific rainfall dataset.
The revised gravel storage area is 4,958 m^2, comprising 300 mm depth of gravel with 30% voids.
This provides approximately 446 m^3 of engineered void storage. The top of gravel is at approximately 7.30 m. The drainage design also allows temporary surface-water ponding to 150 mm above the gravel (approximately 7.45 m) prior to controlled discharge.

An independent containment assessment has been updated for the revised one Post-Digester arrangement using the confirmed gross containment area, FEH22 rainfall depths and the Client's adopted 35% climate-change uplift. A level-volume check indicates that the required retained volume is accommodated below 9.50 m. Relative to the highest internal finished level of 7.85 m, the maximum retained liquid depth is therefore 1.65 m. On this basis, a minimum reinforced-concrete wall height of 2.00 m and a minimum lined mass-earth bund height of 2.50 m are required above the highest internal finished level, subject to maintaining continuous impermeable containment at all interfaces.

2. Scope and Information Reviewed

This review is specifically limited to checking whether Report 23073-H-RP-001-R5 is consistent with the final tank schedule provided and the drainage layout for the bunded tank area.

Report 23073-H-RP-001-R5, Containment Strategy Report, dated 8 January 2026.

Revised tank arrangement comprising 1 No. Post-Digester (PowerDigest), with the omitted tank footprint remaining available for containment.

Biogest design information reviewed includes the PowerRing digester, PowerDigest, separation/liquid tank and site-plan drawings supplied for the project. The Biogest PowerDigest information confirms a nominal 34.0 m diameter, 6.0 m tank height and 5.30 m maximum substrate level. Where initial supplier drawings differ from the Client-supplied final tank schedule, the final confirmed project arrangement and operating levels have been adopted for this containment assessment.

Current drainage and containment layout, including the confirmed gross containment area of approximately 12,143 m^2 and 4,958 m^2 gravel storage area at approximately 7.30 m.

Client confirmation that P1004 returns rainfall to the process when required; otherwise Engie checks the water and, only when clean, transfers it to TK1006, the attenuation pond and the watercourse.

Biogest confirmation that the PowerRing Digester and PowerDigest are hydraulically linked through a controlled overflow, but that failure of either tank will not result in additional liquid overflow from the other tank, provided all feeding is stopped.

3. Final Tank Schedule Review

The following schedule has been taken from the final tank information supplied for this review. Volumes are calculated at the stated maximum liquid levels using the internal diameters.

Tank	Internal diameter (m)	Maximum liquid level (m)	Quantity	Calculated maximum liquid volume (m^3)
Digester (PowerRing)	45.0	8.5	1	13,519
Post-Digester (PowerDigest)	34.0	5.3	1	4,812
Liquid Reception Tank	3.5	6.0	2	115
Liquid Separation Tank	9.0	4.0	1	254
Dirty Water Tank	10.7	5.6	1	504
TOTAL				19,204

Calculated revised total maximum operating inventory: 19,204 m^3 (rounded).

3.1 Comparison with Report 23073-H-RP-001-R5

Item	Report basis	Final schedule	Review comment
PowerRing	45 m × 8.5 m	45 m × 8.5 m	Consistent.
Post-Digesters	34 m × 7.3 m (2 No.)	34 m × 5.3 m (1 No.)	Revised arrangement includes 1 No. Post-Digester.
Reception Tanks	4 m × 5.7 m (2 No.)	3.5 m × 6.0 m (2 No.)	Dimensions and volume differ.
Separation Tank	9 m × 4.3 m	9 m × 4.0 m	Report overstates operating volume.
Effluent/Dirty Water Tank	11 m × 5.8 m	10.7 m × 5.6 m	Dimensions and volume differ.
Retention area	12,075 m^2	12,143 m^2	Gross area within the concrete and earth bund walls confirmed as approximately 12,143 m^2.

4. Governing Containment Inventory

Biogest has confirmed that the PowerRing Digester and PowerDigest are hydraulically linked through a controlled overflow. Biogest has further confirmed that, in the event of failure of either tank, there will be no additional liquid overflow from the other tank and vice versa, provided all feeding is stopped. On this confirmed process basis, the tanks are considered independently for the secondary containment volume assessment. The report therefore applies the greater of 110% of the largest tank or 25% of the revised total tank inventory.

Check	Calculation	Result
Largest tank	$\pi \times 45^2 / 4 \times 8.5$	13,519 m^3
110% criterion	1.10 × 13,519	14,871 m^3
25% criterion	0.25 × 19,204	4,801 m^3

Governing inventory allowance: 14,871 m^3 (110% of the PowerRing tank).

5. Drainage and Gravel Storage Review

The drainage layout identifies a 300 mm thick gravel layer with perforated pipework, explicitly described as temporary storage with 30% voids. The pipes drain to sump TK1005 and pump P1004.

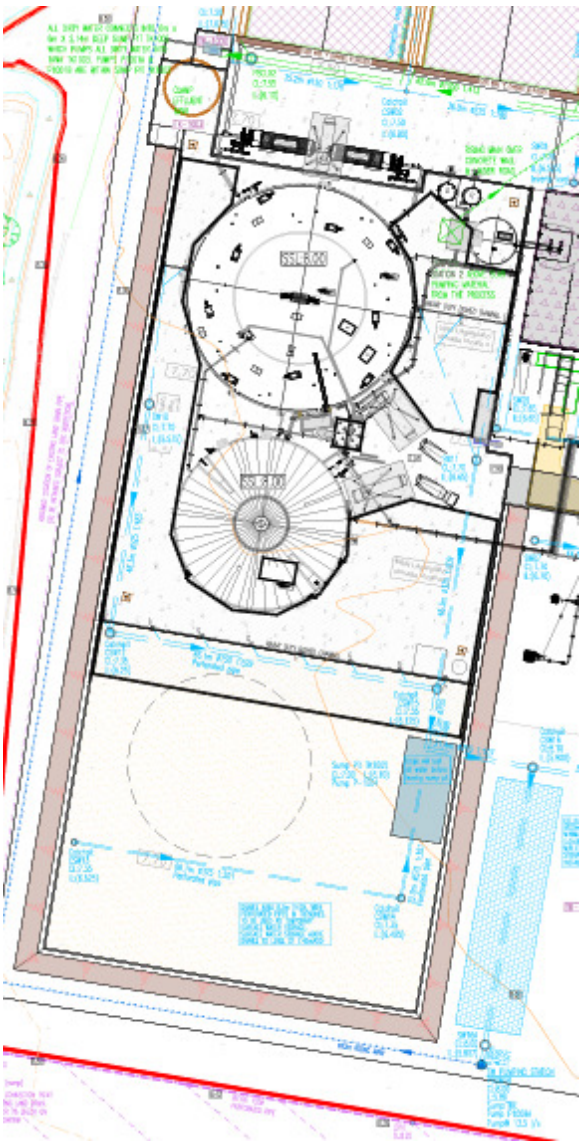


Figure 1 - Current drainage layout for the bunded tank area.

5.1 Gravel Storage Capacity

Confirmed gravel plan area = 4,958 m^2.

Gravel depth = 0.30 m.

Adopted gravel porosity = 30%.

Available void storage = 4,958 × 0.30 × 0.30 = 446 m^3.

The available engineered gravel void storage is therefore approximately 446 m^3.

The top of the gravel storage area is approximately 7.30 m. The drainage design requires temporary surface-water attenuation to a maximum depth of 150 mm above the gravel, corresponding to approximately 7.45

m, as a consequence of the restricted site discharge rate. Over the 4,958 m^2 gravel area this represents approximately 744 m^3 of temporary surface-water storage. This temporary ponding forms part of the surface-water management arrangement within the bunded area and is not credited as additional emergency containment storage. The rainfall contribution to the containment event is accounted for separately within Section 7 and the temporary surface-water storage is therefore not added again as a separate volume. The drainage system shall be operated and maintained to provide controlled discharge of clean surface water and shall be capable of isolation following an incident.

5.2 Confirmed Process Water Control

The confirmed operating philosophy is:

P1004 normally transfers collected rainfall from TK1005 back into the process, because the process requires most of the rainfall collected.
When process demand is unavailable, Engie checks the water quality.
Only water confirmed as clean is transferred to TK1006.
TK1006 discharges to the surface water attenuation pond and thereafter to the watercourse.
On a spill, tank alarm, abnormal sump condition or suspected contamination, the transfer route to TK1006 must be inhibited and the contents retained for controlled recovery.

6. Rainfall Allowance Review

Duration	FEH22 Depth
24 hours before	53.01 mm
Incident (8 hrs)	41.30 mm
8 days after	96.22 mm
Total	190.53 mm

These values replace the inconsistent rainfall depths contained within Report 23073-H-RP-001-R5 and have been used for the independent containment assessment.

A 35% climate-change uplift has been adopted by ARP for the secondary-containment rainfall assessment. CIRIA C736 does not prescribe a specific climate-change uplift for this calculation. The separate surface-water drainage assessment adopts its own climate-change allowance and has been considered separately from this secondary-containment assessment

7. Bund Height Check

An independent containment assessment has been undertaken for the revised arrangement with 1 No. Post-Digester, using the confirmed gross plan area within the containment perimeter of 12,143 m^2 and the rainfall depths adopted within the Client's FEH22-based water-management calculation.

The gross containment area includes the remaining tank footprints. For the level-volume assessment, the external footprints of the remaining tanks have been deducted from the gross area.

- Gross containment area: 12,143 m^2

- Approximate remaining tank footprints: 2,783 m^2
- Effective flooded area: approximately 9,360 m^2

The adopted FEH22 rainfall depths are:

- 24-hour pre-incident rainfall: **53.01 mm**
- 8-hour incident rainfall: **41.30 mm**
- 8-day post-incident rainfall: **96.22 mm**

Total rainfall depth:

53.01 + 41.30 + 96.22 = 190.53mm

Applying ARP's adopted 35% climate-change uplift

190.53 x 1.35 = 257.22mm

The resulting climate-adjusted rainfall volume over the gross containment area is approximately 0.25722 × 12,143 = 3,124 m^3.

110% of largest tank	14,871 m^3
Climate-adjusted rainfall volume	3,124 m^3
Less gravel void storage	−446 m^3
Required open retained volume	17,549 m^3
Effective flooded area	9,360 m^2
Maximum retained liquid depth above highest internal finished level	1.65 m
Concrete wall firefighting allowance	0.10 m
Concrete wall surge allowance	0.25 m
Earth bund freeboard allowance	0.75 m
Minimum wall heights	Concrete 2.00 m / Earth bund 2.50 m

A level-volume check has been undertaken using the actual finished levels. The gravel storage area comprises 4,958 m^2 with the top of gravel at 7.30 m. The remaining containment area includes finished levels of approximately 7.70 m to 7.85 m, as shown on the site information. The drainage design separately allows up to 150 mm of temporary surface-water attenuation above the gravel due to the restricted discharge rate, equivalent to approximately 744 m^3 over the 4,958 m^2 area. This ponding is associated with rainfall already accounted for within the adopted rainfall allowance and is therefore not added separately to the required containment volume. Neither is the 744 m^3 credited as additional available emergency containment capacity. The containment assessment uses these actual finished levels, together with the remaining tank footprints and the revised gravel void storage, to confirm a maximum design retained liquid level not exceeding 9.50 m.

For the reinforced-concrete wall sections, the maximum retained liquid depth above the highest internal finished level is 9.50 - 7.85 = 1.65 m. The original containment assessment basis of 100 mm firefighting allowance and 250 mm surge allowance is retained, giving a combined 350 mm allowance above the design retained liquid depth. This is also greater than the 300 mm minimum freeboard principle applicable to non-

earth-banked slurry stores under SSAFO guidance. The minimum concrete wall height is therefore 1.65 + 0.10 + 0.25 = 2.00 m above the highest internal finished level.

For the lined mass-earth bund sections, the maximum retained liquid depth above the highest internal finished level is 1.65 m. A 750 mm freeboard allowance is adopted, consistent with the SSAFO minimum freeboard principle for earth-banked slurry storage and providing a conservative allowance for the secondary-containment arrangement. The separate 100 mm firefighting allowance is also retained. The minimum lined mass-earth bund height is therefore 1.65 + 0.75 + 0.10 = 2.50 m above the highest internal finished level. The interfaces between the concrete wall and earth bund shall maintain continuous impermeable containment and the stated minimum heights shall be maintained relative to the highest internal finished level.

The reinforced-concrete wall and lined mass-earth bund form parts of the same continuous secondary-containment perimeter and are designed for the same maximum retained liquid level. The difference in minimum physical height results from the different allowances applicable to the respective forms of construction. The use of a 2.00 m minimum concrete wall and 2.50 m minimum lined mass-earth bund within the same containment area is therefore acceptable, provided the stated minimum heights are maintained and continuous impermeable containment is provided at all transitions.

8. Compliance Review and Required Actions

Review item	**Status**	**Required action**
CIRIA C736 containment class	Not independently reviewed	The original Class 2 containment classification adopted within Report 23073-H-RP-001-R5 has been assumed for the purposes of this review. Any outstanding assumptions relating to toxicity, environmental risk or ground permeability remain the responsibility of the author of Report 23073-H-RP-001-R5 and should be confirmed as part of the original containment strategy.
Tank inventory	Updated	Use the revised one Post-Digester arrangement and revised total maximum operating inventory of approximately 19,204 m^3.
Hydraulic linking	Confirmed by Biogest	Biogest has confirmed that the PowerRing Digester and single PowerDigest are hydraulically linked through a controlled overflow. Biogest has also confirmed that, in the event of failure of either tank, there will be no additional liquid overflow from the other tank, provided all feeding is stopped. The tanks are therefore considered independently for the secondary containment volume assessment.

Retention area and displacement	Updated	Use 12,143 m^2 gross containment area. Deduct the remaining tank footprints for the level-volume assessment.
Rainfall	Updated	Use the independent FEH22 rainfall assessment and ARP's adopted 35% climate-change uplift. Climate-adjusted rainfall volume over 12,143 m^2 is approximately 3,124 m^3.
Gravel storage	Updated	Use 4,958 m^2 of 300 mm deep gravel at 30% porosity, giving approximately 446 m^3 void storage. Top of gravel approximately 7.30 m. The drainage design requires up to 150 mm temporary surface-water attenuation above the gravel (approximately 744 m^3) due to the restricted discharge rate. This temporary ponding is associated with rainfall already included within the containment rainfall allowance and is therefore neither added as a separate containment demand nor credited as additional emergency containment capacity.
Bund height	Updated	Actual finished levels from the site have been used in the stage-storage assessment. The approximately 744 m^3 temporary surface-water attenuation is associated with rainfall already included within the adopted rainfall allowance and has not been added as a separate containment demand. The maximum retained liquid depth above the highest internal finished level is 1.65 m. Adopt minimum concrete wall height of 2.00 m and minimum lined mass-earth bund height of 2.50 m above the highest internal finished level, including 750 mm earth-bund freeboard consistent with the SSAFO minimum freeboard principle. Maintain continuous impermeable containment at transitions.
Appendix A drawing	Updated basis	The containment assessment is based on the confirmed single PowerDigest arrangement. Any earlier schedule/drawing showing two PowerDigest tanks is superseded for this assessment. Final construction/record drawings shall show the single PowerDigest arrangement and minimum wall heights above the highest internal finished level: concrete wall 2.00 m; lined earth bund 2.50 m.

Appendix A - supplied Tank Information / Revised Single PowerDigest Basis

Appendix A records the revised tank arrangement used for this containment assessment. The superseded two-PowerDigest arrangement is not used. The current assessment comprises 1 No. PowerRing Digester and 1 No. PowerDigest, together with the ancillary liquid tanks listed below.

Tank	Internal diameter (m)	Maximum liquid level (m)	Quantity	Calculated maximum liquid volume (m^3)
Digester (PowerRing)	45.0	8.5	1	13,519
Post-Digester (PowerDigest)	34.0	5.3	1	4,812
Liquid Reception Tank	3.5	6.0	2	115
Liquid Separation Tank	9.0	4.0	1	254
Dirty Water Tank	10.7	5.6	1	504
TOTAL				19,204

Biogest has confirmed that the PowerRing Digester and PowerDigest are hydraulically linked through a controlled overflow. In the event of failure of either tank, no additional liquid will overflow from the other tank provided all feeding is stopped. The two tanks are therefore assessed independently for secondary containment volume purposes.

Appendix B - Review Limitation

This review has not independently verified the CIRIA C736 containment classification adopted within Report 23073-H-RP-001-R5. The review is limited to assessing whether the conclusions of the original report remain appropriate when compared with the revised tank arrangement, confirmed containment geometry and updated drainage information supplied. Any assumptions relating to toxicity, environmental risk, hydrogeology, ground permeability or source-pathway-receptor assessment remain the responsibility of the original report author. The revised wall-height assessment is based on the actual finished levels, together with the confirmed areas, tank footprints and gravel storage geometry supplied for this review. Initial Biogest supplier drawings have been reviewed as supporting geometric information; where these differ from the Client-confirmed final tank schedule or revised single PowerDigest arrangement, the latter has been taken as governing for this review.