

A Review Of The Slurry Storage Requirement At

**High Farm
Ugglebarnby
Whitby
YO22 5HX**

For R & A Harland

Prepared by:
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I. Recommendations

Recommendation 1

Increase storage capacity by constructing a lagoon in the field where the weeping wall store is situated. The extra volume of storage required to allow for an expansion to 200 cows housed on cubicles and to meet any possible NVZ Regulations is 2,425m³ (533,500 gallons). This would comprise a lagoon with surface dimensions of 40m by 30m by 3.75m deep which allows for a working depth of 3m allowing for a freeboard of 0.75m. Allowing for a 30° slope on the sides the base dimensions would be 30m by 20m.

Recommendation 2

Add guttering to the cubicle shed roof adjacent to the feeding area and diverting the rainwater to clean water drains would save 30m³ of water entering the slurry store.

Recommendation 3

By covering the feed area and diverting the rainwater you would reduce the amount of water which has to be stored by 100m³.

Recommendation 4

Continue to use the power hose when washing down the parlour as the use of a volume washer will increase the amount of water stored by 370m³. This water will also need to be spread at a cost of £2.50m³.

Recommendation 5

A clay lined lagoon would be the least costly option. Contact Andy Tonge at Construction Testing Solutions on 01302 352652 about getting your own clay tested

Recommendation 5

Discuss the options with the Environment Agency to ensure they are on board with the solutions suggested.

Recommendation 6

Speak with your local planning department regarding permission for the proposed lagoon.

2. The Author Of The Report

The report has been produced by Jonathan Hill, who is FACTS and BASIS Soils & Water Qualified.

Jonathan, upon graduating from Harper Adams Agricultural College in 1986, having spent time in practical farming, has been a farm management consultant with Promar International since 1997.

Promar is the largest Agri-Food consultancy company in the Europe employing over 100 staff working in the UK and worldwide.

Promar International is a member of the British Institute of Agricultural Consultants and is ISO 9001 certified.

3. Farm Information

High Farm is situated in Ugglebarnby village five miles SW of Whitby which is in the Esk Catchment.

As the farm is built on a hillside the topography of the land is mostly sloping with some very steep areas.

The farm is run as a dairy farm currently milking a herd of 150 cows. This number has increased considerably since the present weeping wall slurry store was erected in 1986..

The business has increased cow numbers over the past few years, which means the slurry system is now able to hold less than the desired 4 months production.

Only 120 cows are housed on a slurry based system but the capacity of the winter storage needs to be greatly increased.

The liquid from the weeping wall is spread via a sprinkler system during the winter but this increases the risk of run-off.

The farm is not situated in a Nitrate Vulnerable Zone.



Fig. 1 The layout of High Farm

Milking Cow Accommodation

The 120 milking cows are housed on cubicles across three buildings with sawdust being used as bedding. The cubicles are scraped out twice a day along with the collecting yard, cow access areas and the outdoor feeding area.



Fig 2. One of the cubicle sheds adjacent to the parlour.

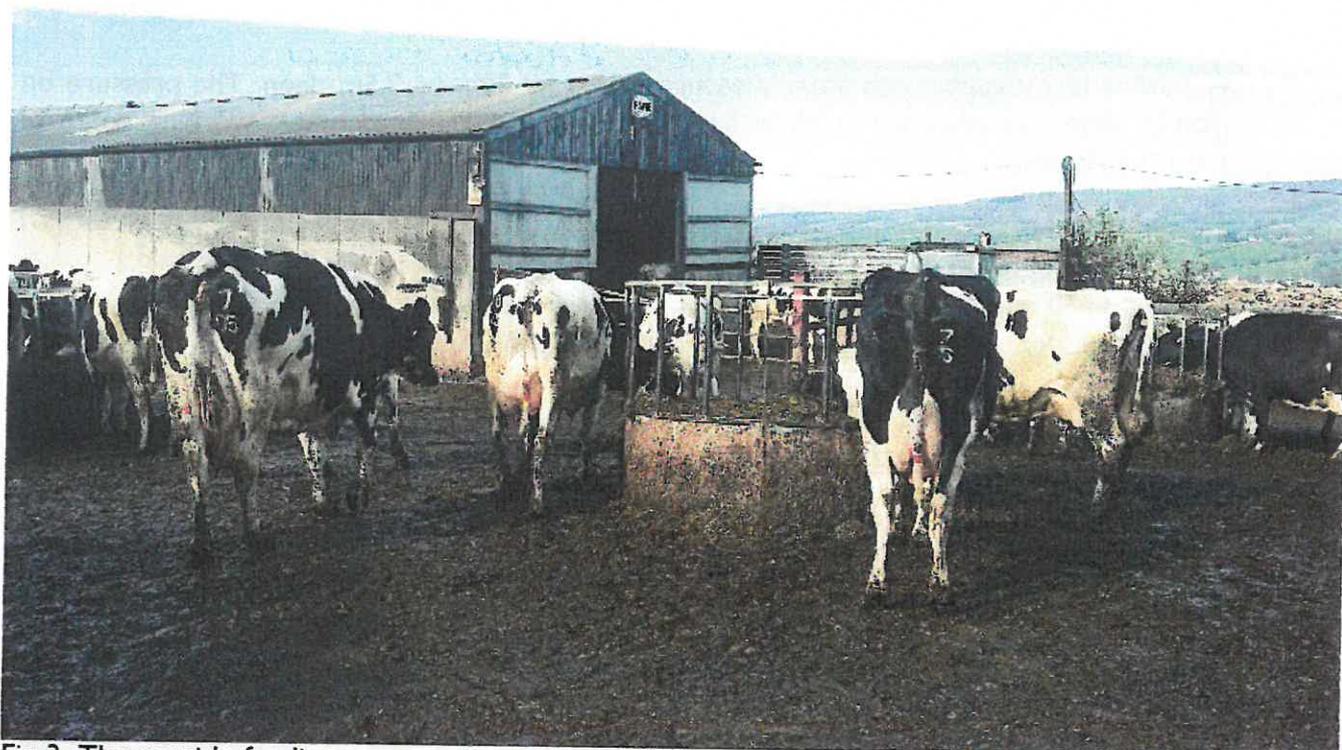


Fig 3. The outside feeding area

4. Review of Slurry Storage Compliance with Regulation

The absolute assessment of whether the structures are compliant with relevant regulations is down to the competent authority to undertake. In the case of the Water Resources (Control of Pollution) (Silage, Slurry, and Agricultural Fuel Oil) Regulations (England) (SSAFO) this is the Environment Agency. This section aims to provide you with an **overview** of the general compliance of the slurry management and storage systems rather than provide an approved inspection report.

The weeping wall store was constructed in 1986 and is exempt from Silage, Slurry and Agricultural Fuel Oil Regulations (SSAFO).

Under the regulations, exempt structures may continue to be used, without alteration, provided that they do not pollute or pose a serious risk of pollution.

If you wish to substantially enlarge or substantially reconstruct an exempt structure, the regulations will apply to the whole structure and not just the extension or newly reconstructed part.

Brief description of slurry store

The store is a weeping wall store measuring 20m by 20m by 2.5m deep. The pressure on storage does not allow for 0.3m of freeboard which is required. At a working depth of 2.2m the store holds 880m³.

All the slurry, wash water and rainwater from the farm enters the store.

From mid February the slurry from the feeding area is stored in the silage pit to increase the storage capacity. This is almost all slurry which makes in “unstackable”.

Rainwater from the silage pit drains onto the open feed area and flows to the weeping wall store, however the precise route of the run-off is unclear. Work needs to be undertaken to improve clean and dirty water separation.

The liquid portion collects in three settlement tanks and is spread via a sprinkler system which runs automatically when the final tank is at capacity.



Fig 4. The weeping wall store

Ref No. Priority	Description of the Operation	Area	Cost & Benefit
1.	Create Extra Slurry Storage Capacity	25m x 25m by 2.5m deep	Cost – clay lined £3-£7/m ³ stored - synthetically lined £8-£14/m ³ Plus security fencing £20/m run
2.	Add Guttering To Roof Adjacent To Feed Area 	12 linear metres	Cost £15-£20/m run If it costs around £2.50 per m ³ of slurry to spread. This could save around £70 per year in spreading costs
3.	Cover Open Feed Area 	Area approx. 23m x 11m = 253m ²	Cost £55-£75/m ² . If it costs around £2.50 per m ³ of slurry to spread – this could save around £300 per year in spreading costs
4.	Improve the efficiency of slurry application by spreading in spring & summer		Slurry application in spring and summer can result in around 5% more of the total Nitrogen being available to the crop in the year of application

Proposal To Increase The Storage Capacity

The easiest option dependent on planning permission is to construct a lagoon adjacent to the weeping wall store as per the diagram below.

The inclusion of a channel to take the extra slurry produced by rainfall directly to the lagoon will reduce the risk of run-off from the open yards.

When the yards are scraped the slurry will be put into the weeping wall as is presently the practice.

A second channel will be added to take the liquor which seeps from the weeping wall into the lagoon.

The storage capacity of the lagoon will be 2,425m³ which is much greater than is presently required but allow for further herd expansion and the potential inclusion of the farm into a Nitrate Vulnerable Zone.

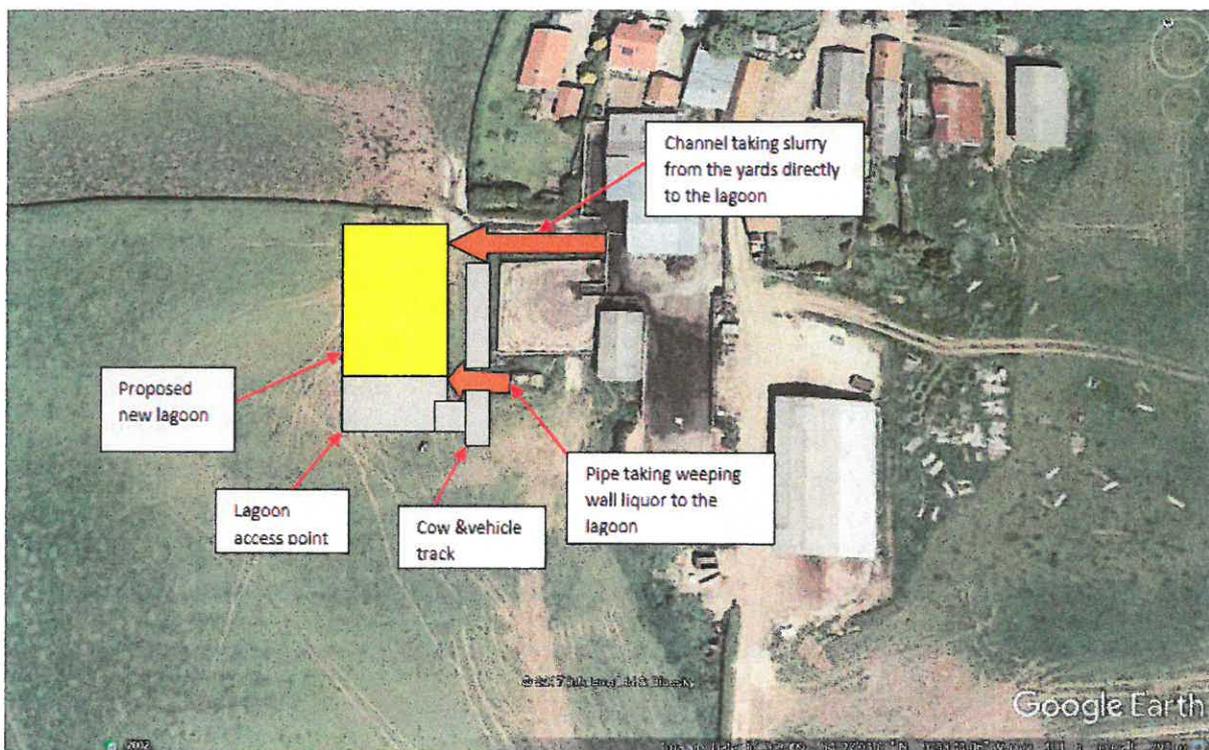


Fig. 5

Annex A

Slurry Production Calculations based on 200 cows housed on a 100% slurry based system and allowing for storage capacity to meet any future NVZ regulations.

SLURRY PRODUCTION

TABLE A - Stock Numbers

Livestock Type	Animals on slurry based system	Volume per livestock type per week m3	Weeks	Volume Produced
Cow	200	0.37	22	1628
Transition Cows	0	0.37	22	0
Dry Cows	0	0.37	22	0
Calf	0	0.05	22	0
Heifer < 1	0	0.14	22	0
Heifer 1-2	0	0.18	22	0
Heifer > 2	0	0.22	22	0
Total				1628

TABLE B - Slurry Storage Reduction

Separation	Exported
	0

TABLE C - Areas Collecting Rainwater

Area of slurry store plus concrete surface area m2	length	width	area m2
Silage pit	37	13	481
Slurry store	20	20	400
Yard 1	21	4	84
Yard 2	22	4	88
Yard 3	11	3	33
New lagoon	40	30	1200
Yard 4	23	11	253
Roof	12	6	72
	Circumference	Radius	
Circular Store	0	0.00	0.00
Total			2611

TABLE D - Rainfall

Month	Jan	Feb	Mar	Oct	Nov	Dec
Rainfall mm	68	49	57	65	78	73
Dirty water from rainfall (m3)	0.068	0.049	0.057	0.065	0.078	0.073
TOTAL						0.39

TABLE E - Parlour Washings

	Number of milking cows	Wash volumes 0.018m3 -power 0.035m3 volume	Day in month	
October	200	0.018	31	111.6
November	200	0.018	30	108.0
December	200	0.018	31	111.6
January	200	0.018	31	111.6
February	200	0.018	28	100.8
March	200	0.018	31	111.6
				655.2

TABLE F - Totals

Cow Slurry (A)	Rainwater (C)	Parlour Washings (D)	Monthly slurry plus dilution (F)
1628	1018	655	3301

PRESENT SLURRY STORAGE CAPACITY

	length m	width m	working height or depth m	Capacity m3
Store 1	20	20	2.2	880
Store 2	0	0	0	0
		Total existing capacity m3		880

STORE CAPACITY VERSUS REQUIREMENT

Present Storage capacity (m3)	Storage required for 5 months (m3)	m3	
880	3301	-2421	(if negative require extra capacity)