

## DEPARTMENT OF AGRICULTURE, AND FOOD

**MINIMUM SPECIFICATION FOR EARTH-LINED SLURRY/EFFLUENT STORES,  
AND ANCILLARY WORKS**

This is a minimum specification. Where the word “SHALL” is used, then that standard (at least) **must** be followed in all earth-lined slurry/effluent stores whether covered by grant-aid schemes (REPS, etc), or not. Where a procedure is “RECOMMENDED”, this is advice only on good practice.

Note that all references to other Department Specifications are to the current edition of that specification [available on the Department of Agriculture and Food Website ([www.agriculture.gov.ie](http://www.agriculture.gov.ie)) under Farm buildings]. Similarly, references to Standards are to the current edition of the Irish, British or European Standard, as appropriate.

**A. Introduction**

An earth-lined slurry/effluent store (ELS) is different from other stores for holding animal slurries and farm effluents. Instead of the slurry being contained by steel, concrete, or plastic-based materials, a liner is formed from either compacted layers of subsoil which will provide an impervious liner or in some situations from naturally occurring impervious material. An ELS is an acceptable way of increasing the slurry storage capacity on farms provided they are properly sited and constructed.

Because an ELS depends entirely on subsoil to prevent leaks, such a store shall only be built after a “Site Assessment Report” has been completed by a Local Authority approved site assessment expert. A planning application is then prepared and, together with the completed and signed site assessment report, is sent to the Local Authority for application for full planning permission.

**All earth-lined slurry/effluent stores require planning permission.**

Earth-Lined stores require careful expert construction by a competent contractor, whose complete work shall be overseen by the Construction Supervisor. If the work is to Specification, they will then sign a “Certificate of Compliance”. As well as the ELS itself, the contractor shall provide safety fences and gates; points for the safe removal of slurry; and safe access points for tractors and other vehicles in accordance with this Specification.

Some locations will be unsuitable for earth-lined slurry/effluent stores, by virtue of the presence of close underlying rock; the presence of unsuitable subsoils such as sand or gravel; high water tables; or other adverse conditions. Trying to remedy these faults may prove to be expensive or impractical. A conventional store may be a better and more economic choice. However, the suitability of a site will ultimately be determined by the on-site tests and investigations.

**A.1 Guidance Document: “The Design, Siting, and Safe Operation of Earth-Lined Slurry/Effluent Stores”**

A Guidance Document has been prepared which gives further and more detailed information on the design, site assessment, and safe operation of ELSs. It is extremely important that this Guidance Document is read by ELS Designers, Local Authority Planners, Site Assessors, Construction Supervisors, Agricultural Consultants, and Farm Advisors.

The Guidance Document is available on the website of the Department of Agriculture and Food, [www.agriculture.gov.ie](http://www.agriculture.gov.ie) [click on “Farm Buildings”].

## **A.2 Safety.**

### **A.2.1 Responsibility for Safety**

Farmers are reminded that they have a duty under the Safety, Health, and Welfare at Work Act 2005 to provide a safe working environment on the farm, including farm buildings, for all people who may work on or enter that farm. There is a further duty to ensure that any contractor, or person hired to do building work, provides and/or works in a safe environment during construction.

### **A.2.2 Safety during Construction**

**Farmer Responsibility:** Please note that neither the Minister nor any official of the Department shall be in any way liable for any damage, loss or injury to persons, animals or property in the event of any occurrence related to the development and the farmer shall fully indemnify the Minister or any official of the Minister in relation to any such damage, loss or injury howsoever occurring during the development works.

**Dangers:** Where the farmer is undertaking any part of the above work, it is his/her responsibility to seek competent advice and to undertake all temporary work required to ensure the stability of excavations and to avoid any other foreseeable risk. It is also his/her responsibility to ensure that any drains, springs or surface water are diverted away from the works.

**Power lines:** An ELS shall not be constructed within 10m of an overhead power supply. If advice is required, or if power lines need to be diverted, it is the applicant’s responsibility to contact, in writing, ESB Networks before construction commences and then to follow the conditions set out by ESB Networks.

**Danger to children:** It is the farmers responsibility to prevent children from playing or spending time in the vicinity of any construction work.

### **A.2.3 Safety Notices**

Warning signs shall be erected at the entrance to the ELS, stating “**SLURRY STORE: DANGER OF DROWNING**”.

It is also recommended that a waterproof list of emergency contact personnel and service phone numbers be fixed securely to the ELS fence. Details of emergency rescue and resuscitation procedures should also be displayed.

### **A.2.4 Toxic Gases and Agitation**

Harmful gases are generated in ELSs, and in confined spaces such gases have been responsible for both human and animal deaths. Some poisonous slurry gases are heavier than air.

### **A.2.5 Safety Fencing for ELSs**

A stock proof and child proof fence, 1.8m high, shall be provided around all ELSs. The fence shall be located not closer than 1m from the outer edge of the bank of the ELS. The fence shall be constructed as follows:

Posts shall be at least 2.3m long of either:-

- a) Reinforced concrete 125mm x 125mm at butt end (to IS 177: 1980)
- b) Galvanised angle iron 60mm x 60mm x 6mm thick
- c) Galvanised tubular steel, 75mm outside diameter, and 3.2mm thick
- d) Treated timber posts as specified in A.2.5.1.

Uprights and strainers shall be embedded 400mm into the soil in 0.5m square concrete bases, not more than 3.0m apart. Four strands of 3.2 mm plain wire shall be strained, and stapled or tied to the uprights with tying wire. Chain link fencing, 2.5mm, (to IS 130:1980), 1.8m high, shall be secured to the outside of the line wires over entire fence. One strand of 2.5mm barbed wire shall be placed along the top of the fence.

A 3.5m wide gate, 1.8m high, of galvanised steel, or preservative treated timber, with closing bolts and locks, shall be fitted at each emptying point. The only horizontal bars shall be at the top and bottom of the gate. Chain-link fencing shall be fitted to the outside of the gate. The gate shall be designed such that neither people nor stock can get through or under when closed. A safety kerb, minimum 300mm x 600mm wide, shall be installed near the edge of the store, across the width of the gate.

Other proprietary fence systems will be acceptable if the above criteria are met.

#### **A.2.5.1 Treated Timber Posts**

Where timber posts are to be used, a straining frame shall be constructed at each end of a run of safety fencing and at each acute change of direction (more than 30°). The frame shall be constructed as described in clause A.2.5.1.2. Intermediate posts shall be 3m long, minimum average diameter 125mm and driven 1m into the ground. They shall be spaced at a maximum distance of 3 metres.

##### **A.2.5.1.1 Timber Treatment**

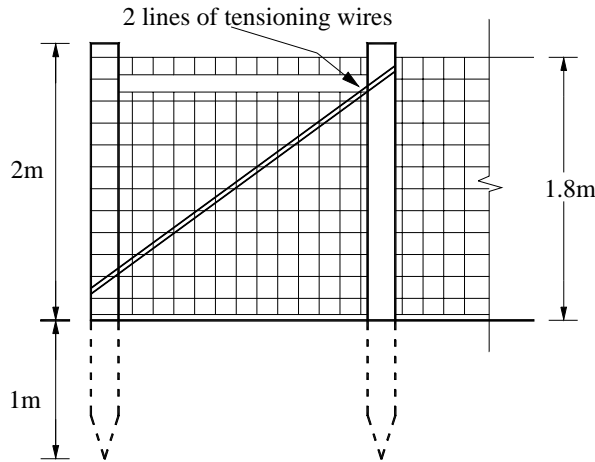
All timber is to be vacuum/pressure treated with an approved preservative. Such treatment shall ensure a preservative loading and concentration to provide a minimum service life of twenty years to satisfy hazard class 4 requirements, as defined in IS EN 335-1:1992. Following treatment, any areas of timber revealed by cross cut, holes, notches etc. shall be brushed with an approved end grain preservative.

Advice on the use and handling of preservative treated timbers shall be sought from preservative manufacturers/suppliers, and followed.

##### **A.2.5.1.2 Straining Frames**

The frames shall be constructed as shown in Figure 1. The vertical posts shall be not less than 3 metres long, and be driven 1m into the ground. They shall have an average diameter of 200mm and be positioned at least 2m apart. The horizontal post shall have an average diameter of 125mm and shall be securely fixed to the verticals by either galvanised steel rods, or by a rebated joint. The diagonal tensioning wire of the straining frame shall be 3.15mm

diameter, and meet the requirements of BS 4102. The horizontal line wires, as specified above, shall be securely fixed to the outer post of the straining frame. Each line wire shall be taken round this post and fastened to itself either by tying, or by a pre-formed fencing connector.



**Figure 1: Straining Frame.**

### **A.3 Storage Capacity**

The storage capacity of the ELS shall be in accordance with the current requirements of the Department of Agriculture and Food, and the Department of Environment, Heritage and Local Government, the Nitrates Regulations (when implemented) and any conditions attached to the granting of Planning Permission by the Local Authority. Design capacity of the store shall allow for a freeboard of 750 mm. In calculating the capacity of the store, the maximum top level of the effluent/slurry (including rainfall) shall be taken at 750 mm below the lowest embankment level or slurry channel invert level, which ever is the lower.

The top level of the ELS bank shall be designed to be at least 600mm above original ground level. The maximum design depth of liquid in the store shall be not greater than 3m.

### **A.4 Minimum Design Requirements**

All ELSs shall be underlain by at least 1.5m of moderate or low permeability subsoil, with the upper 0.5m having a permeability of less than  $1 \times 10^{-9} \text{ ms}^{-1}$ .

Where a regionally important aquifer is present the total thickness shall be at least 1.5m, with the upper 1m having a permeability of less than  $1 \times 10^{-9} \text{ ms}^{-1}$ .

Where the required permeability in the upper 0.5m or 1m, has to be enhanced, this shall be achieved by the construction of a compacted liner as described in Clause C.6.

In cases where the site assessment indicates that the insitu subsoil has a clay content greater than or equal to 18%, is impervious, free from preferential flow paths and that the required depth of subsoil (1.5m minimum) is present, then the excavated portion of the store will require one layer (150mm) of compacted subsoil (4 passes) and plastering with remoulded subsoil.

## **A.5 Planning Permission**

In every case planning permission shall be obtained for an ELS. It shall be clearly stated in the application for permission to the Planning Authority, that the proposed structure is to be an earth-lined slurry/effluent store. When applying for planning permission the site assessment report form, incorporating the trial hole report forms, shall be supplied to the Planning Authority along with all other required documentation.

## **A.6 Responsibilities for Project**

It is recommended that the farmer draw up a contract with either the Construction Supervisor and/or the Contractor (who may be one and the same) to assume overall responsibility for the management of the project.

### **A.6.1 Site Assessor**

The person undertaking the site assessment, shall have an appropriate training and shall be approved by the relevant Planning Authority.

### **A.6.2 Construction Supervisor**

The Construction Supervisor shall be an appropriate Chartered Professional (e.g.: Chartered Civil Engineer, Chartered Structural Engineer or Chartered Geo-technical Engineer), or a person who has successfully completed a specialised training course that has been approved for this purpose by both the Department of Agriculture and Food and the Department of Environment, Heritage and Local Government. The Construction Supervisor shall be required to certify that the works have been designed and completed to the standards required in this specification. Particular attention shall be paid to the liner and bank stability, and the Construction Supervisor shall ensure that any additional conditions of planning permission are complied with. A sample certificate is included in appendix A.

### **A.6.3 The Contractor**

The full construction of the ELS shall be carried out directly by the Contractor, including the construction of the banks, liner, and filling/extraction points. In all cases the construction shall at least meet all of the requirements of this specification.

## **B. Site Assessment**

### ***B.1 Introduction***

This section details the approach that shall be used to assess site suitability with the objective of collecting sufficient information to:

- Determine if an ELS can be developed on the site, without creating a negative impact on the environment.
- Provide adequate data to enable the optimal design to be achieved.

The approach is termed site assessment. Site assessment combines various assessments including desk study, visual assessment and site tests, to satisfy the objectives. The site assessment is the basis of the ELS design and the data collected shall be used to optimise the construction of the proposed ELS. A site assessment form has been developed, for the collation of data and shall act as a check list, and aid in the process of decision making. A copy of this form is included in section D and this form shall be fully completed as part of the site assessment process. Full details on how to complete the site assessment are given in the Guidance Document.

#### **B.1.1 Site Restrictions**

There are a number of restrictions which shall be satisfied before embarking on the construction of an ELS subject to Local Authority planning requirements. A proposed ELS shall not be considered for:

- Sites where the minimum design requirements (clause A.4) cannot be achieved.
- Sites within 10m of an open watercourse.
- Sites within 60m of any well or spring used for potable water.
- Sites within either: a) the inner protection zone of public drinking water supply source (groundwater) where the vulnerability rating is classified as extreme, or b) where an inner protection zone has not been identified and the vulnerability rating is classified as extreme, within 300m up gradient of the abstraction point.
- Sites within 50m of a lake.
- Sites within 15m of a karst feature.
- Sites underlain directly by sand/gravel in vertical hydraulic continuity with the main watertable.
- Sites underlain by peat or other unstable material that is impracticable to remove.
- Sites liable to flooding.
- Sites where construction of the ELS will damage or destroy a site of potential natural or cultural heritage value.
- Sites that are steeply sloping (greater than 1:5).

### **B.1.2 Steps in the Site Assessment**

The following steps shall be undertaken:

- A. Collation of background information
- B. Visual assessment
- C. Site tests
- D. Decision process, and preparation of recommendations

## **B.2 Collation of Background Information**

A desk study involves the assessment of available data pertaining to the site and adjoining area that may determine whether the site has any restrictions to the development of an ELS.

### **B.2.1 Collation of Relevant Environmental Data**

The following information shall be collated and sections D1 and D2 of the site assessment form shall be completed in full.

#### ***B.2.1.1 Topography***

The grid reference for the site shall be determined.

#### ***B.2.1.2 Surface Water***

The location of the nearest surface waters, their distance from the proposed site and where relevant the designation (under National Regulations) of these waters shall be determined.

#### ***B.2.1.3 Geological & Hydrogeological***

The existing source of water on the farm shall be established, whether mains, private or a group scheme.

Available information on the subsoil type and underlying bedrock shall be determined.

The aquifer category shall be determined for the site. Where available the groundwater vulnerability rating, source protection zone, resource protection zone and groundwater protection zone shall be determined (these are available free of charge on the GSI website at [www.gsi.ie](http://www.gsi.ie)).

The data, when compiled shall be compared to the groundwater protection response matrix given in the guidance document.

#### ***B.2.1.4 Natural & Cultural Heritage***

Any protected or listed structures shall be identified and, it shall be determined if the proposed site is in a designated NHA, SPA, or a candidate SAC.

#### ***B.2.1.5 Public Utilities***

The Planning Authority shall be consulted with regard to the location of public water supplies and water mains in the area. Locations of gas lines, electricity cables, and communications networks shall be established in consultation with the relevant utilities.

The status of these shall be assessed at this stage, and the need for further investigation highlighted if necessary.

#### ***B.2.1.6 General Planning***

The county development plan shall be consulted to establish if there are any restrictions to developments of this sort. This will be available for consultation at the Planning Authority offices. The development plan may indicate set back distances that have been decided by the Local Authority.

### **B.2.2 Interpreting the Background Information**

At this stage any potential difficulties and sensitive receptors that have been discovered shall be highlighted so that the developer of the site can determine if they want to progress with the site assessment.

### ***B.3 Visual Assessment***

The visual assessment of the site is undertaken to verify the background information, evaluate the sensitivity of the identified receptors and finalise the selection of the preferred location.

#### **B.3.1 Visual Assessment**

Section D3 of the site assessment form shall be completed in full.

A general overview of topography, density of dwellings, surface water ponding, waterbodies, drainage, vegetation (including trees), rock outcrops and condition of the ground shall be made, and the relative distances of potential receptors (e.g. wells, karst features) from the ELS shall be established.

##### ***B.3.1.1 Interpreting the Results of the Visual Assessment***

The site restrictions that shall be referenced in the visual assessment are set out in clause B.1.1. If any of the restrictions exist then the ELS shall not be developed on the proposed site.



## **B.4 Trial Hole**

To avoid any accidental damage, a trial hole assessment shall not be undertaken in areas, which are at or adjacent to significant sites (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from The Department of Environment, Heritage and Local Government or the relevant Local Authority.

### **B.4.1 General**

The purposes of the trial hole are to determine:

- The soil and subsoil characteristics
- The depth to the water table
- The depth to bedrock

Section D4 of the site assessment form shall be completed in full.

### **B.4.2 Excavating and Recording the Trial Hole Results**

A minimum of 2 No. trial holes shall be dug to at least 2m below the proposed floor level of the ELS (excavation shall take account of all Health and Safety requirements for deep excavations).

These shall be at either end of the store, under the footprint of the banks and not under the inner floor footprint of the proposed store.

On sloping sites they shall be located in line with the up-hill side of the store, where the proposed store excavation will be at its deepest.

In cases where ground conditions in each trial hole are not consistent, then further trial holes shall be dug until the site assessor is satisfied that he/she has sufficient information with which to prepare his/her report.

The trial hole shall be left open for 48 hours to establish the depth to the water table (if present) and shall be securely fenced during this period.

The thickness and nature of topsoil shall be recorded.

An accurate description of all subsoils encountered shall be provided. The subsoils shall be described in a professional manner in accordance with BS 5930 standard description method.

Subsoils suitable for use in embankment construction shall be identified.

The most appropriate horizon for use as liner material shall be identified. The following criteria shall be visually assessed in the trial hole for the chosen horizon:

- That the percentage of material greater than 20 mm is less than 30%
- That the percentage of material greater than 60mm is less than 20%

Representative samples shall be taken from this horizon for laboratory testing at an approved laboratory, and the following tests on the samples shall be undertaken to BS1377: Particle Size Distribution Analysis, plasticity index and liquid limit. The results of these tests shall be put into Section D5.

When assessing the clay fraction of the subsoil being tested, the methodology used shall be that recommended in BS5930:1999 Code of practice for site investigations. The clay fraction value used in the subsoil assessment shall be the percentage of clay present in the fraction of the subsoil sample whose particle size is < 20 mm.

### **B.4.3 Interpretation of Trial Hole Results**

The results of testing shall meet the following requirements (see Table 1) and the actual values entered in Section D5.

**Table 1: Minimum subsoil requirements.**

Liner Type	Minimum Acceptable Criteria	Subsoil Thickness Required
Compacted Liner	the percentage of material greater than 60 mm is less than 20%.	Min. 1.5 m required in all cases
	the percentage of material greater than 20 mm is less than 30%	
	10% Clay or greater	
	Plasticity Index 10% to 60%	
	Liquid Limit 20% to 90%	
Insitu liner	18% Clay or greater	Min. 1.5 m required in all cases

### **B.5 Conclusions and Recommendations**

The Certificate of Site Assessment shall be completed in full. It is the site assessors responsibility to state if the site is suitable for the construction of an ELS. The site assessor shall also give details on depth to bedrock, thickness of liner required, type of liner (insitu or compacted liner) that is required, depth to suitable layer of subsoil for liner, thickness of suitable layer of subsoil for liner, depth to suitable layers of subsoil for embankment construction and any other special conditions for the site.

## **C. Construction**

### **C.1 Working Conditions**

All works shall be carried out in dry weather conditions. Subsoil for the liner shall not be left exposed and allowed to dry out unnecessarily. The subsoil moisture content shall be kept within the recommended plasticity range for optimum compaction of the subsoil liner.

### **C.2 Site Preparation**

On all sites, the topsoil within the store footprint shall be removed and used only as a final cover for the grassed top and outer bank surfaces. All topsoil and any other unsuitable layers (as indicated in the site assessment report) shall be removed completely from the surface leaving only suitable subsoil for store construction. All trees within 10m of the outer toe of the bank of the ELS shall be removed.

All material unsuitable for use as liner, as encountered, shall be “thrown” to the outside of the banks.

### **C.3 Removal of Old Drains**

All existing drains, percolation systems’ pipe-work and associated backfill aggregate encountered during excavation shall be completely removed to, at least, 7 metres beyond the outside of the bank boundary and all exposed vacant channels shall be thoroughly filled and compacted with plastic subsoil.

**Note:** Old farmyards even in naturally dry soils may have generations of land-drain and percolation pipelines beneath the surface.

### **C.4 Lowering of Water Table**

The water table shall be lowered if it is deemed necessary in the site assessment report.

The water table shall be lowered to at least 500 mm below the lowest compacted subsoil floor layer. This shall be undertaken by the installation of deep cut-off drains 7 m outside the lowest part of the banks and extending at least 600 mm and preferably 750 mm below the lowest compacted subsoil floor level of the store. At least 150mm land drainage pipes shall be used in this system. The land drainage pipe shall then be covered by at least 300 mm of clean stones (minimum 20mm diameter). The drain shall be designed to discharge into a suitable watercourse.

### **C.5 Bank Stability and Construction**

The banks shall be constructed so that they, at least, meet the minimum loading requirement set out in BS5502 part 50. The banks shall be excavated to a gradient that will maintain stability in the prevailing ground conditions and with regard to the soil type. The gradient shall not exceed 1 in 1.5 i.e. not more than 33° approx. from horizontal.

The banks of the store shall be not less than 600mm high above ground level and be well-compacted. The banks shall be wide enough on top (min 3 m but preferably 4 m) to allow for a permanent stability factor of safety of the bank and for safe access to emptying points. The excavated and/or made-up ground shall be finished uniform and smooth and free of any sharp protuberances.

The banks shall be constructed of suitable excavated material as identified in the site assessment report. The Construction Supervisor for each individual store shall determine the required gradient and degree of compaction for the banks. In sloping ground extreme care shall be taken to ensure bank stability and strength is achieved.

No loose stone, gravel, sand, topsoil, peat or debris of any sort shall be used to construct the inner banks or floor of the store. Only plastic subsoil shall be used.

### **C.6 Construction of Liner**

Constructed liners shall have, on completion, a permeability of less than  $1 \times 10^{-9} \text{ ms}^{-1}$  and shall be at least 0.5m thick, over at least 1.0m undisturbed subsoil. Where the proposed site is over a regionally important aquifer, the liner shall be constructed at least 1.0m thick over at least 0.5m undisturbed subsoil.

The liner on the banks and floor shall be constructed of suitable excavated dense plastic subsoil material only. The site assessment report gives details of the suitable layers of subsoil and only this material shall be used for the construction of the liner. If there is not enough suitable material present in store area, additional suitable sub-soil material may be brought on to the site. However, this material shall first have been assessed, by the same person who completed the initial soil assessment, to be suitable for the construction of the liner. It is imperative that the liner subsoil in the floor of the store, the inner bank surfaces and the core of the banks are thoroughly compacted.

The liner on the floor and banks shall be built in layers/lifts of 150 mm and each layer/lift compacted until the desired permeability has been achieved (see Figure 2.). The excavator shall make a minimum of 4 passes per lift (two each in cross directions) over the liner soil so as to compact the material for 0.5m thick liners, and a minimum of 6 passes per lift (three each in cross directions) for 1.0m thick liners. Each layer comprising the compacted subsoil liner shall be fully compacted prior to placement of the next layer.

Once the full depth of liner has been constructed the inside floor and bank slopes shall be smoothed off and compacted (plastered) with the track machine using a remoulded subsoil. This is particularly necessary when the store is constructed in dry conditions.

Compaction shall be effected by means of a hydraulic excavator with a minimum weight of 20 tonne capable of exerting a ground pressure of at least 40 kPa ( $40 \text{ kN.m}^{-2}$ ) (e.g. a 20 tonne excavator with tumbler length 3.7 m and track width 0.6 m shall exert a ground pressure of 44.17 kPa). Alternative suitable compaction plant may be used if it can be demonstrated that, at least, equivalent compaction can be effected.

Insitu liners may be used in cases where the site assessment indicates that the insitu subsoil has a clay content greater than or equal to 18%, is impervious, free from preferential flow paths and that the required depth of subsoil is present, then the excavated portion of the store requires the construction of one layer (4 passes with excavator, as above) of compacted subsoil and plastering with remoulded subsoil. In these cases, the topsoil shall be removed as per clause C2 and the banks shall be constructed as per clause C5. Additionally, at least, a 0.5m liner shall be constructed over the banks as described above (see Figure 3).

## **C.7 Agitation**

Agitation may be by the use of a 'simple aeration system', a propeller (whisk) system or by a pumped circulation system.

A 'simple aeration system' consists of a series of plastic pipes spaced evenly across the floor of the store, through which compressed air is blown in sequence. The system is run for approximately 2 hours each night. The slurry is maintained in a continuously homogenous state ready for spreading.

Propeller (whisk) agitators may be used. For these, agitation points shall be constructed at least every 30m around the sides of the store. This system of agitation works best in a confined space, and it can be very difficult to fully agitate a large open store with whisk agitators.

The use of a vertical pump, with jetter, is not permitted.

**Whatever system is used it shall be installed so that no damage can occur to the subsoil liner.**

## **C.8 Agitation/Emptying Points**

During construction, all requirements of the agitation/extraction system shall be incorporated in the structure. Agitation/extraction point(s) shall consist of **a**) a tractor access point; **b**) a concrete footing (reinforced with steel reinforcing mesh, minimum A142) of sufficient size so that at its edges, turbulence will be dissipated to a level which will not endanger the liner, but in all cases at least 2 metres square; and **c**) a concrete apron at least 1m wide and 125mm thick, steel mesh reinforced (min A142), extending from the tractor stand, down the slope to the near edge of the emptying footing. The agitation/extraction point shall be constructed on top of the completed liner. Figure 4 shows an example of an agitation/emptying/filling point.

## **C.9 Filling Points**

It is essential that all inlet channels and pipe connections shall be properly designed and constructed. They shall not leak and they shall not cause erosion of the soil liner or any part of the banks. Two methods are described below for the construction of filling points. Other systems are acceptable, as long as the above mentioned requirements are met.

### **C.9.1 Filling using Flow Channels:**

Where the earth-lined slurry/effluent store is filled using a flow channel, a concrete spillway shall be constructed down the side of the bank. The spillway shall be at least 1m wider than the flow channel (500mm beyond either side of the channel) and shall extend down the entire bank of the store. The spillway shall be at least 100mm thick, and be reinforced using, at least, A142 mesh. At the base of the spillway a concrete apron at least 100mm thick shall be constructed. This apron shall be the same width as the spillway and shall extend at least 2m into along the floor of the store. A lip 50mm high and 50mm wide shall be constructed around the entire spillway and concrete apron. The spillway and base pad shall be constructed on top of the completed liner and be constructed such that it does not cause damage to the liner. Figure 4 shows an example of an emptying/filling point.

### **C.9.2 Filling Store by Pumping Slurry through a Pipe.**

Where the earth-lined slurry/effluent store is filled by pumping the slurry/effluent through a pipe, a concrete spillway shall be constructed from 300mm above the end of the pipe to the base of the store. The spillway shall be at least 1.5m wide (the pipe to be located centrally over the spillway) and shall be at least 100mm thick. The spillway shall be reinforced using, at least, A142 mesh. At the base of the spillway a concrete apron at least 100mm thick shall be constructed. This apron shall be the same width as the spillway and shall extend at least 2m into along the floor of the store. A lip 50mm high and 50mm wide shall be constructed around the entire spillway and concrete apron. The spillway and base pad shall be constructed on top of the completed liner and be constructed such that it does not cause damage to the liner. Figure 4 shows an example of an emptying/filling point.

### **C.10 Tractor Access**

Tractor access for emptying shall be through a gated opening in the surrounding fence, at least 1.8m high and normally 3.6m wide. The access route shall be concreted from the fence line to store edge. The access point and tractor stand shall either be level or shall slope moderately away from the pit edge. Close to the pit edge there shall be a raised kerb (wheel stop), at least 300mm high and 600mm wide, across the whole access point. A tubular steel safety barrier, at least 1.2m high, shall be provided around the access point.

### **C.11 Emergency Ramps/Ladders**

It is recommended that at each corner of the slurry/effluent store there shall be a facility provided which will permit emergency access or escape.

Additionally, it is recommended that an easily freed long rescue pole be suspended on loops on the inside of the fence for emergency use. The pole shall have a grab loop at one end and a blunt hook at the other end to facilitate an unconscious person in the slurry to be hauled to the side. A lifebuoy with attached rope, of suitable length, should also be similarly provided.

### **C.12 External Bank Finish**

Outer surfaces and the top of the bank shall be covered with up to 300 mm of topsoil. Excess topsoil may be placed against the outer toe of the banks. The banks should be sown with highly persistent tiller dense cultivars, with high ground cover scores, of late diploid pasture perennial ryegrasses and a matching white clover cultivar from the Department of Agriculture's "Recommended List". Trees shall not be planted within 10m of the toe of the banks. (See Department of Agriculture and Food minimum specification for screening belts etc—S. 135).

### **C.13 Maintenance**

The banks shall be maintained with a short grass mat thus minimising soil erosion potential and maximising bank stability. Non-pasture species such as bushes, scrub or invasive weeds (e.g. nettles) shall not be allowed to develop on the banks. When the store is emptied the inner bank surfaces shall be examined for any signs or erosion or slippage. Any such damage shall be repaired prior to refilling the store. The top and outside banks of the store should be similarly examined and any significant damage to the integrity of the banks by soil failure or to the grass cover by machinery should also be repaired.

**Note:** Slurry/effluent stores need careful and constant management to ensure correct operation.

## **C.14 Concrete Specification**

### **C.14.1 Certificates**

Concrete shall be produced in an audited plant only: It shall not be produced on site.

A numbered certificate, signed and stamped, shall be required for all concrete delivered to site. The certificate, the "Concrete Manufacturers' Specification Certificate", is produced in triplicate. The top certificate, printed on light blue paper, shall be retained by the applicant for inspection upon completion of the works.

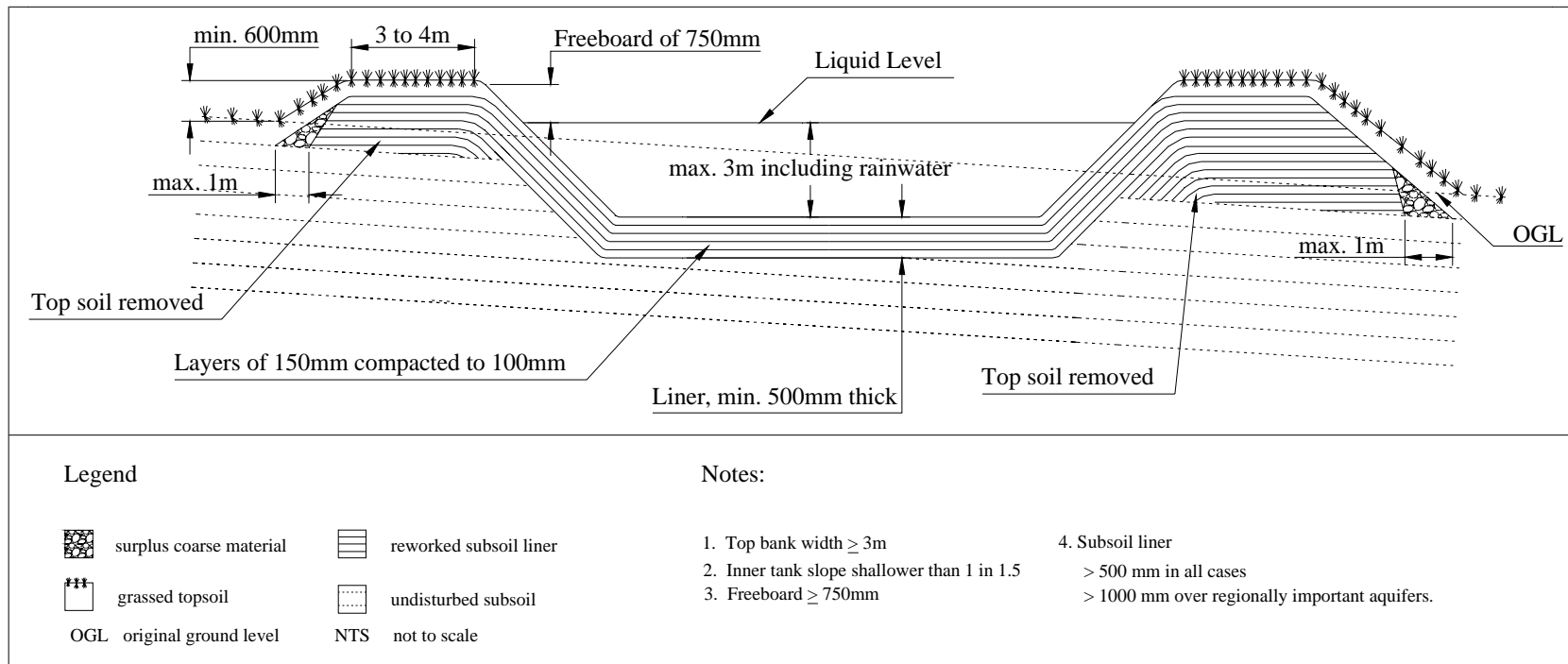
### **C.14.2 Concrete**

All concrete shall be as specified in Department of Agriculture and Food Specification S.126.

## **C.15 Certification**

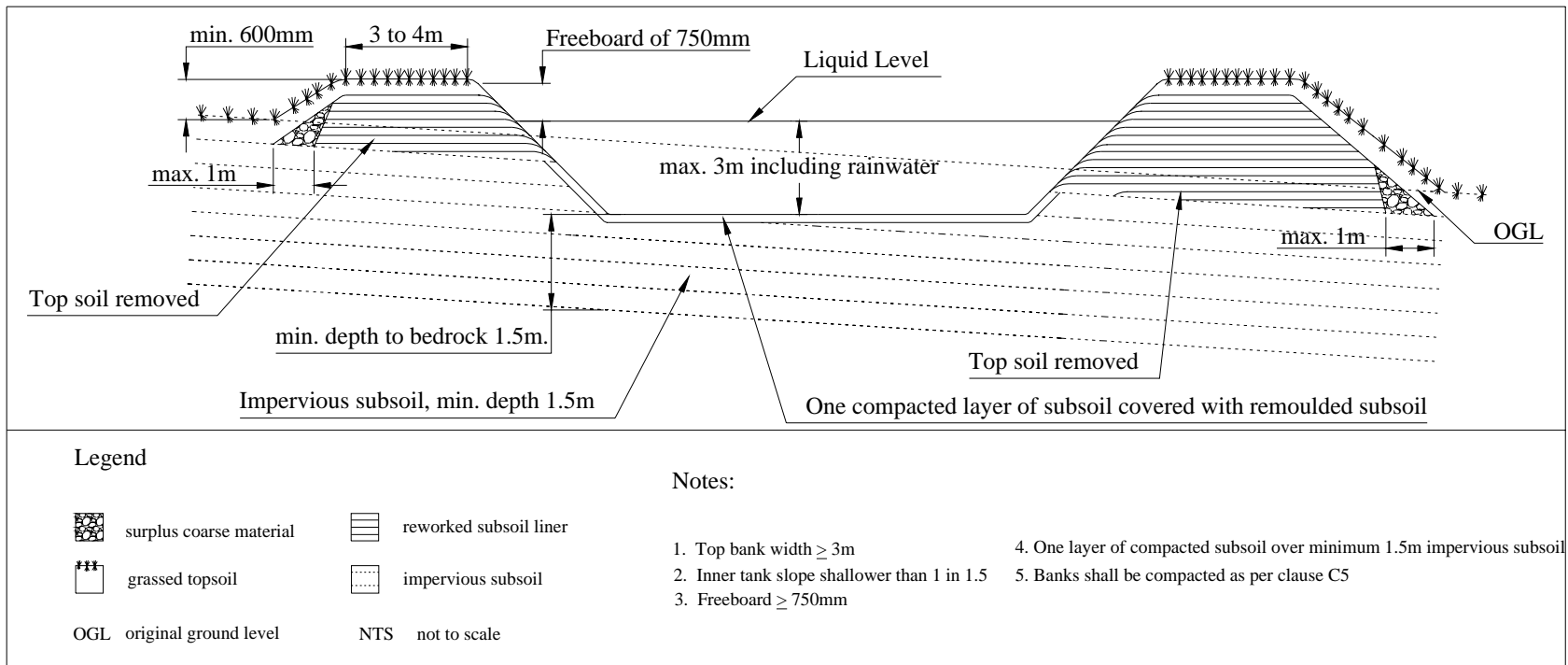
The following Certificates shall be provided to the farmer for his retention.

1. 'Concrete' Certificate
2. Site Assessment report
3. Planning Permission
4. Certificate of completion of earth-lined slurry/effluent store

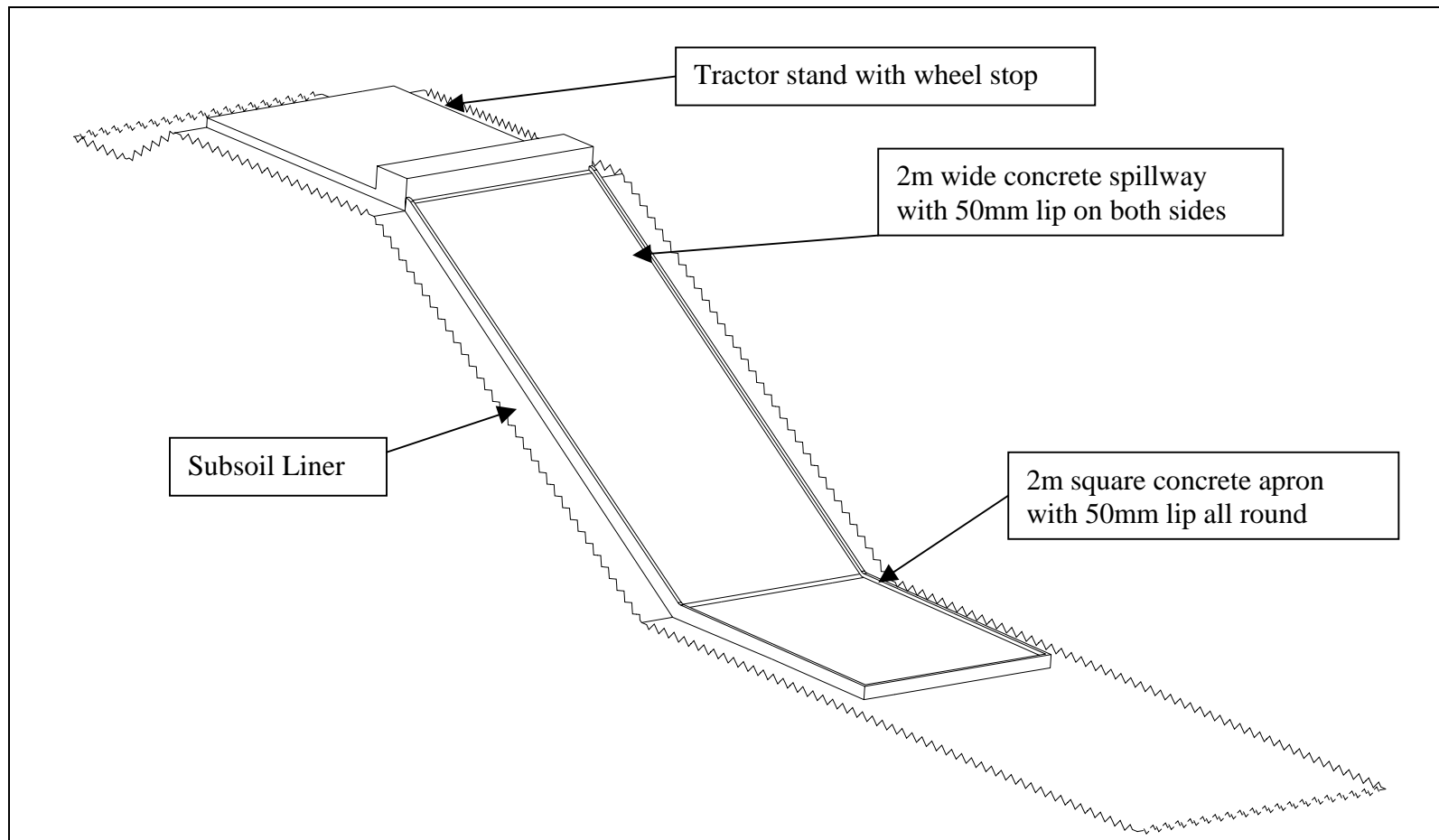


**Figure 2:** Sketch showing minimum dimensions of Earth-lined Store (Not to scale)





**Figure 3:** Sketch of ELS constructed in naturally impervious subsoils.



**Figure 4:** Sketch of spillway and concrete apron for agitation/filling/emptying ELS.

## D. Site Assessment Form

### D.1 GENERAL DETAILS

Name & Address of Applicant:	
Telephone No:	
Fax No:	
E-Mail:	
PPS No.:	
Herd No.:	
Name and address of Consultant:	
Telephone No:	
Fax No:	
E-Mail:	
Site Location and Townland:	
Grid Reference (4,4):	
Proposed Dimensions of ELS:	

**D.2 Background Information** (for detail see guidance document)

Topographical Maps as per Planning Pack to accompany this application.		YES / NO	
Local experience of ELSs (if available):			
SURFACE WATER: Description of surface water features in proximity of the site including designation			
<b>GEOLOGY AND HYDROGEOLOGY</b>			
Water Supply: (tick as appropriate)	Mains	Private Well/Borehole	Group Well/Borehole
Soil (name and type):			
Subsoil:			
Bedrock Geology:			
Aquifer Category:	Regionally Important	Locally Important	Poor
Groundwater Vulnerability (where available):	Extreme	High	Moderate Low
Is there a Groundwater Protection Scheme (Y/N):		Groundwater Protection Response for ELS:	
Presence of Significant Sites (including reference):	Archaeological:		
	Natural:		
UTILITIES (locations)	Safe	Needs Further Investigation	
Power Lines – Above Ground			
– Below Ground			
Gas Mains:			
Sewerage:			
Water Mains:			
County Development Plan:			
Number and type of animals			
Existing slurry storage facilities (slurry storage volume allowing for freeboard)			
Comments: <i>(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, and/or any potential site restrictions).</i>			

**D.3 VISUAL ASSESSMENT** (for detail see guidance document)

Slope:	
Density of Dwellings, Places of Gathering Within 500m of Site: (Give Distance to Nearest Feature)	
Property Boundaries: (Distance in m to nearest)	
Roads: (Distance in m)	
Existing Land Use:	
Outcrops (Rock and/or Subsoil): Note if any and describe	
Surface Water Ponding:	
Beaches / Shellfish Areas / Wetlands:	
Karst Features:	
Lakes/Watercourse/Stream*:	
Drainage Systems*:	Open - Piped -
Wells*:	
Springs*:	
Type of Vegetation: (Note any areas of wetland vegetation)	
Cultural Heritage Assessment (Comment on Potential Risk)	
Natural Heritage Assessment (Comment on Potential Risk)	
<p><b>COMMENTS:</b></p> <p><i>(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, the suitability of the site to construct an ELS and the location of the proposed system within the site).</i></p>	

\* Note Water Level

**D.4 Trial Hole** (for detail see guidance document)

The minimum depth of the trial hole shall be 2.0 m below the lowest level of the proposed ELS.

Trial Hole No.		Date and time of excavation:		
Depth of trial hole (m):		Date and time of examination:		
Depth from ground surface to bedrock (m) (if present):				
Depth from ground surface to water table (m) (if present):				
Depth from ground surface (m)	Soil/Subsoil Texture & Classification (Note Plasticity and Dilatancy results)	Density/ Compactness	Colour	Preferential flowpaths
0.2				
0.4				
0.6				
0.8				
1.0				
1.2				
1.4				
1.6				
1.8				
2.0				
2.2				
2.4				
2.6				
2.8				
3.0				
3.2				
3.4				
3.6				
3.8				
4.0				
4.2				
4.4				
4.6				
4.8				
5.0				
Other information (where relevant)				
Depth of water ingress:		Rock type (if present):		
Sample depth:				
Compaction test result (visual description)				
EVALUATION:				

**D.5 Laboratory soil test results**

Trial Hole	% Clay	Plasticity Index	Liquid Limit

**D.6 Sketch of site**

Sketch of site showing measurement to trial hole locations, wells, and direction of groundwater flow (if known), proposed store (including distances from boundaries) adjacent structures, watercourses, significant sites and other relevant features. North point should always be included. [A copy of the site layout drawing shall be used if available.]

[Certificate to be typed on Site Assessor's headed paper]

**Certificate of completion of site assessment for earth-lined  
slurry/effluent store**

Name of Owner: \_\_\_\_\_

Address of Owner: \_\_\_\_\_

Address of site: \_\_\_\_\_

Is the site suitable to construct an ELS: YES NO

Depth to bedrock: \_\_\_\_\_ m

Thickness of liner required: \_\_\_\_\_ m

Depth to suitable layer for liner: \_\_\_\_\_ m

Thickness of suitable layer for liner: \_\_\_\_\_ m

Type of liner (insitu or compacted liner): \_\_\_\_\_

Depth to suitable layers for embankment construction: \_\_\_\_\_ m

Special Conditions (if any): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name of Site Assessor: \_\_\_\_\_

Address of Site Assessor: \_\_\_\_\_

\_\_\_\_\_

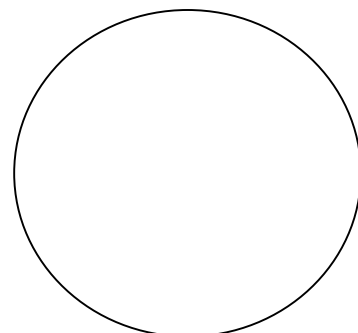
**Site Assessor's signature:** \_\_\_\_\_

Date: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Company Stamp:





[Certificate to be typed on Construction Supervisor's  
headed paper]

**Certificate of completion of earth-lined slurry/effluent store**

Name of Owner: \_\_\_\_\_

PPS No. of Owner: \_\_\_\_\_

Herd No. of Owner: \_\_\_\_\_

Address of Owner: \_\_\_\_\_

Address of site: \_\_\_\_\_

Name of contractor: \_\_\_\_\_

Address of contractor: \_\_\_\_\_

I certify that the subsoil-lined slurry/effluent store has been constructed in strict compliance with Department of Agriculture and Food Specification S. 131 and that all requirements of the site assessment report and all planning conditions have been fully adhered to. Furthermore, I certify that I oversaw the construction of the subsoil liner, and certify that the banks of the store are in compliance with BS5502 part 50 and that the store is of suitable construction to remain in a leak tight nature for a minimum of 20 years.

Planning Ref: \_\_\_\_\_

Name of Construction Supervisor: \_\_\_\_\_

Address of Construction Supervisor: \_\_\_\_\_

Professional Body Membership No. (if applicable): \_\_\_\_\_

**Construction Supervisor's signature:** \_\_\_\_\_

Date: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Company Stamp:

