

DEPARTMENT OF AGRICULTURE AND FOOD
MINIMUM SPECIFICATION FOR OUT WINTERING PADS

This is a minimum specification. Where the word “SHALL” is used, then that standard (at least) must be followed in all out wintering pads 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) under Farm Buildings]. Similarly, references to Standards are to the current edition of the Irish, British or European Standard, as appropriate.

A. INTRODUCTION

An out wintering pad (OWP) is an alternative method to conventional sheds of accommodating livestock (excluding pigs). The OWP provides a drained lying area outdoors for the animals on a bed of woodchips. The OWP is operated at a much lower stocking rate than conventional accommodation, however the effluent produced from an OWP has a high concentration of pollutants. Underneath the drainage system the effluent is contained by a liner (compacted subsoil or a geomembrane) and the effluent is collected and stored before being recycled onto a suitable crop. The woodchip bed retains most of the nutrients produced by the livestock and these woodchips are also recycled onto a suitable crop such as grass.

Because an OWP depends entirely on a liner to prevent leaks, such a structure shall only be built after a “Site Assessment Report” has been completed by a Local Authority approved site assessment expert. The construction of OWPs will, in most cases, require obtaining full planning permission.

Out wintering pads require careful expert construction by a competent contractor. Some locations will be unsuitable for subsoil-lined out wintering pads, 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. An artificially (geomembrane) lined OWP or other conventional accommodation system may be a better choice. However, the suitability of a site will ultimately be determined by the on-site tests and investigations.

A.1 “Guidance Document for the Design, Siting, and Operation of Out Wintering Pads”

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

The Guidance Document is available on the website of the Department of Agriculture and Food, 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 OWP 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 farmer's responsibility to prevent children from playing or spending time in the vicinity of any construction work.

A.2.3 Fencing for OWPs

Standard stock-proof fencing shall be provided around the perimeter of the OWP system, 0.25m outside the footprint of the OWP. Where necessary to sub-divide the OWP for livestock management purposes, the internal fences may be attached to posts which are embedded in 0.1m³ of concrete on top of the drainage stone. Other proprietary systems may be accepted. Tractor access shall be through a gated opening in the surrounding fence, normally 3.6m wide.

A.3 Sizing an OWP

The size of the OWP will be determined by the number of animals requiring accommodation, the type/age of the stock and the feeding system planned. For construction of facilities for feeding off the OWP see Department of Agriculture and Food Specification S123. Minimum space allowances are set out in Table 1 below:

<i>Animal type</i>	<i>Minimum space requirements per animal (m²)</i>	
	On pad feeding	Off pad feeding
Dairy cow	18	12
Suckler cow	16	10
Beef cattle (> 2 years)	16	10
Cattle (1 to 2 years)	12	8
Cattle (< 1 year)	10	6

Table 1: Minimum space allowances for animals accommodated on an OWP system

A.4 Sizing of effluent storage

All the effluent produced on the OWP shall be contained and stored in an appropriate storage facility. The construction of the effluent storage tank shall be in accordance with the requirements of the Department of Agriculture and Food Specifications and any other regulations or conditions. All effluent collected from the underdrainage system or off-pad feeding areas shall be considered to be slurry and shall require management as such.

Where it is planned to feed the animals on the OWP the volume of effluent produced from the OWP shall be calculated using the following equation and the relevant tables in the Nitrates regulations.

$$E = (P \times R) + (N \times V) - (P \times 0.013) \quad \text{Effluent from on-pad feeding OWP}$$

where:

E = effluent produced, (m³.wk⁻¹)

P = pad area, (m²)

R = net rainfall on the pad, (m.wk⁻¹)

N = no. of animals on the pad,

V = neat excreta produced per animal per week. (m³.wk⁻¹)

Where it is planned to feed the stock off the OWP, the volume of effluent produced on the pad shall be calculated from using the following equation:

$$E = (P \times R) + (N \times V \times 0.66) - (P \times 0.013) \quad \text{Effluent from off-pad feeding OWP}$$

Provision must also be made for collection and storage of slurry and net rainfall deposited on off-pad feeding facilities, where incorporated into the OWP system. Volumes shall be calculated as follows:

$$E = (A \times R) + (N \times V \times 0.33) \quad \text{Effluent from OWP off-pad feeding area}$$

where:

E = effluent produced, (m³.wk⁻¹)

A = area of off-pad feeding facilities, (m²)

R = net rainfall on the off-pad feeding facilities, (m.wk⁻¹)

N = no. of animals using the facilities,

V = neat excreta produced per animal per week. (m³.wk⁻¹)

A.5 Feeding area (where appropriate)

A.5.1 On-pad feeding facilities

Where the animals are fed on the OWP this may be achieved by allowing the animals to self-feed silage on top of the OWP surface at the highest point on the OWP. This can be done by placing the silage pit on the edge of the OWP on top of the woodchip layer. In this situation the minimum depth of woodchip underneath the silage pit shall be 300 mm. Care shall be taken in placing the silage on the OWP not to damage the drainage layer. OWP surface area shall be increased to account for the silage pit area on the pad where necessary.

A.5.2 Off-pad feeding facilities

Where the animals are fed off the pad the feed facilities shall be constructed in accordance with the requirements of Department of Agriculture Specifications S101 or S123. Animals may be fed on existing structures provided they are of sound structure and comply with directives on cross compliance and Nitrates. These facilities may include a roofed or unroofed concrete apron or slatted tank. Where the animals are fed off the pad a minimum of 0.3m of head feed space/adult animal is required and 0.6m where restricted allowances of concentrates are offered. Where new concrete head feed aprons are being constructed the subsoil liner shall extend a minimum of 1m under the feed apron. Where existing structures are in place the subsoil liner shall make full contact with the existing facility and shall have a minimum of 0.5m vertical height of the line in contact with the existing facilities.

A.6 Watering facilities

All animals shall have access to water at all times. A minimum of one water trough per 50 livestock units shall be installed. As there is a risk of the water supply freezing on the OWP it would be prudent to use large water troughs supplying a minimum of 80 litres of water per head particularly where high dry matter feeds such as concentrates are fed as a large proportion of the diet.

A.7 Site restrictions

There are a number of restrictions, which shall be satisfied before embarking on the construction of an OWP. A proposed OWP shall not be considered for:

- sites within 60m of any well or spring used for potable water
- sites within either:
 - the inner protection zone of a public water drinking supply source ($>10\text{m}^3.\text{d}^{-1}$ or PE >50) (groundwater) where the vulnerability rating is classified as extreme, or
 - where an inner protection zone has not been identified and the vulnerability rating has been classed as extreme, within 300m up gradient of the abstraction point
- sites where the minimum design requirements cannot be achieved
- sites within 10m of an open watercourse where effluent can enter
- sites within 50m of a lake
- sites within 15m of a karst feature
- sites liable to flooding
- sites where construction of the OWP will damage or destroy a site of potential natural or cultural heritage value
- sites that are steeply sloping.

A.8 Minimum design requirements

- In general all subsoil-lined OWPs shall be underlain by at least 0.5m of moderate to low permeability unsaturated subsoil enhanced by compaction to ensure a permeability of no more than $1 \times 10^{-8}\text{m.s}^{-1}$ is achieved. The clay content of the subsoil being used to form the compacted liner shall be at least 10% as determined in the laboratory using a particle size distribution (PSD) test (BS 1377) and where the particle size distribution is adjusted by excluding materials larger than 20mm. Additionally, the compacted subsoil liner shall be underlain by at least 0.25m of unsaturated subsoil.
- Where a regionally important aquifer is present and the groundwater vulnerability rating is high/extreme or the regionally important aquifer is karstified, or where high permeability sand and gravel is encountered and is in vertical hydraulic continuity with the main water table, the minimum thickness of the compacted unsaturated subsoil liner shall be 0.75m. Suitable subsoil may need to be imported to form the liner. Additionally, the compacted subsoil liner shall be underlain by at least 0.25m of unsaturated subsoil.
- Where the subsoil is at least 1.0m thick below the proposed underdrainage layer and is characterised as moderate to low permeability, unsaturated, impervious, free of preferential flowpaths and has a clay content of at least 13%, the surface of the excavated portion of the OWP will only require plastering with remoulded subsoil.
- All geomembrane-lined OWPs shall be underlain by at least 0.15m of unsaturated subsoil, the upper 0.05m of which may be a protective fine sand layer depending on the requirements of the lining contractor. The geomembrane shall be overlain by subsoil with a minimum thickness of 0.2m of low to moderate permeability and plastered with remoulded subsoil.

A.9 Responsibilities for project

It is recommended that the farmer draw up a contract with the contractor to assume overall responsibility for the management of the project.

A.9.1 Site assessor

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

A.9.2 The contractor

The construction of the lining component of the OWP shall be carried out directly by the contractor. In all cases the construction shall at least meet all of the requirements of this specification.

A.9.3 The lining contractor

If a decision is made to install a geomembrane-lined OWP then a lining contractor shall be appointed. The lining contractor, who shall be a specialist in this form of construction, shall be accepted as such by the Department of Agriculture and Food. The full lining installation shall be carried out directly by the lining contractor. All other works relevant to the installation of the geomembrane shall be completed either by the lining contractor, or in accordance with the lining contractor's instructions. In all cases the installation shall at least meet all of the requirements of this specification. Certificates shall be required from the lining contractor to cover all aspects of the work.

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 OWP 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.

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 OWP design and the data collected shall be used to optimise the construction of the proposed OWP. 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 E.

B.2 Steps in the site assessment

The following steps shall be undertaken:

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

B.2.1 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 OWP. The following information shall be collated and Sections E.1 and E.2 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 and hydrogeological

Available information on the subsoil type and underlying bedrock shall be determined. The aquifer category shall be determined for the site (see appendix 1 of guidance document). Where available, the groundwater interim vulnerability rating, source protection zone, resource protection zone and groundwater protection zone shall be determined.

B.2.1.4 Natural and 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 Local 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 Local Authority offices. The development plan may indicate set back distances that have been decided by the Local Authority.

B.2.1.7 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 wish to progress with the site assessment.

B.2.2 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. Section E.3 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 OWP shall be established.

B.2.2.1 Interpreting the results of the visual assessment

The site restrictions that shall be referenced in the visual assessment are set out in Clause A.7. If any of the restrictions exist then the OWP shall not be developed on the proposed site.

B.2.3 Trial holes and site tests

To avoid any accidental damage, trial hole assessments 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.2.3.1 General

The purpose of the trial hole is to determine:

- the soil and subsoil characteristics,
- the depth of the water table,
- the depth to bedrock.

Section E.4 of the site assessment form shall be completed in full.

B.2.3.2 Excavating and recording the trial hole results

The trial holes shall be dug to at least 1m below the proposed drainage pipe invert level of the OWP. (Excavation shall take account of all Health and Safety requirements for excavations.) Further trial holes may be required on sites where the ground conditions are considered to be variable until the site assessor is satisfied that he/she has sufficient information with which to prepare his/her report. Minimum numbers of trial holes are as follows:

- any OWP at least 3 trial holes
- area of OWP ~ between 0.5ha and 1.0ha: 4 trial holes
- area of OWP ~ between 1.0ha and 1.5ha: 5 trial holes
- area of OWP ~ between 1.5ha and 2.0ha: 6 trial holes
- area of OWP ~ > 2.0ha: 7 trial holes

The holes shall be left open for 48 hours to establish the depth to the water table (if present) and shall be securely fenced in line with all health and safety requirements during this period. Groundwater conditions shall be described, and if necessary the holes shall be left open or fitted with a standpipe to enable groundwater levels to be established. The thickness of the topsoil shall be recorded.

For OWPs an accurate description of all subsoils encountered is required to enable design and re-use to be considered. The subsoils shall be recorded in a professional manner with reference to the BS 5930 standard description method. The most appropriate horizon for use as liner material shall be identified in each trial hole. Representative samples shall be taken from this horizon in each trial hole for laboratory testing.

At this stage, the site assessor will know whether the site is either;

- (a) unsuitable for an OWP system
- (b) suitable for a geomembrane-lined OWP system
- (c) likely to be suitable for a subsoil-lined OWP system

The site assessor will have discussed the various options available to the client/advisor at the different stages of the site assessment. Based on the findings of the site assessment to date, the client may wish to proceed with the laboratory testing phase to accurately determine the clay content of the proposed subsoil liner horizons in the trial holes and consequently to facilitate the site assessor in making a decision as to the suitability of the site for a subsoil-lined OWP. Alternatively, if the site is deemed suitable for a geomembrane-lined OWP and the client decides that he/she wishes to proceed with this system, further laboratory testing is not required. Without this testing, a subsoil-lined OWP cannot be recommended.

Subsoil testing shall be conducted at an approved laboratory and the following test on the samples shall be undertaken to BS 1377; Particle Size Distribution analysis. The results of these tests shall be entered into the site assessment form (Section E.5).

B.2.3.3 Interpretation of trial hole results

The results of testing shall meet the following requirements (see Table 2) and the actual values entered in Section E.5.

<i>Liner type</i>	<i>Minimum acceptable criteria</i>	<i>Subsoil thickness required below OWP underdrainage system</i>
<i>In situ</i> subsoil liner	13% clay or greater Low/moderate permeability unsaturated subsoil, impervious and free of preferential flowpaths	Minimum 1.0m
Compacted subsoil liner	10% clay or greater	Minimum 0.5m compacted subsoil liner underlain by minimum 0.25m unsaturated subsoil
	10% clay or greater Regionally important aquifer present with groundwater vulnerability rating classified as high or extreme or regionally important karstified aquifer present or High permeability sand and gravel is encountered in vertical continuity with the main water table	Minimum 0.75m compacted subsoil liner underlain by minimum 0.25m unsaturated subsoil
Geomembrane liner	At least 0.2m of low/moderate permeability subsoil between drainage layer and geomembrane liner (may be imported if suitable subsoils not encountered) At least 0.15m subsoil beneath geomembrane	See Section A.8

Table 2: Minimum acceptable criteria for OWP

B.2.4 Conclusions and recommendations

The Certificate of Site Assessment shall be completed in full. It is the site assessor's responsibility to state if the site is suitable for the construction of an OWP. The site assessor shall also give details on depth to bedrock, thickness of liner required, depth to suitable layer of subsoil for liner, thickness of suitable layer of subsoil for liner, depth to suitable layers of subsoil for perimeter construction, geomembrane requirements (if applicable) and any other special conditions for the site.

C. CONSTRUCTION

C.1 Construction of subsoil-lined out wintering pad

C.1.1 Working conditions

All works shall be carried out in dry weather conditions where possible. 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.1.2 Site preparation

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 pad construction. All trees within 5m of the OWP footprint shall be removed. All material unsuitable for use as a liner, as encountered, shall be "thrown" to the outside of the OWP footprint.

C.1.3 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, 7m beyond the outside of the footprint 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.1.4 Lowering of water table

The water table at its estimated highest point, or at its cut-off point where groundwater table drainage is to be provided, shall be below the bottom level of all construction works. Where deemed necessary by the site assessor, a groundwater control drainage system shall be installed. This shall be accomplished by the installation of deep cut-off drains 7m outside the OWP footprint and extending at least 600mm and preferably 750mm below the invert of the OWP containment layer. At least 150mm land drainage pipes shall be used in this system. The land drainage pipe shall then be covered by at least 300mm of clean stones (minimum 20mm diameter).

C.1.5 Perimeter construction

The embankments shall be at least 300mm above ground level and be well-compacted. The embankments shall be constructed of suitable excavated material identified during the site assessment. Uncontrolled ingress of surface water or runoff from the OWPs shall not be possible. Soil embankments generally experience 5% settlement. Outer surfaces and the top of the bank shall be covered with 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 5m of the toe of the banks (see Department of Agriculture Specification S135).

C.1.6 Construction of subsoil liner

The base of the OWP shall consist of a mineral layer which satisfies permeability and thickness requirements with a combined effect in terms of protection of soil, groundwater and surface water at least equivalent to a permeability of $1 \times 10^{-8} \text{m.s}^{-1}$ with a minimum thickness of between 0.5m and 0.75m depending on the underlying aquifer classification and subsoil/bedrock conditions. Additionally, the compacted subsoil liner component shall be underlain by 0.25m unsaturated subsoil. At all times, the minimum design requirements shall be adhered to. 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 the OWP area, additional suitable subsoil 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 re-engineered subsoil liner component is thoroughly compacted.

The compacted subsoil liner component shall be built in layers/lifts of 150mm and each layer/lift compacted until the desired permeability has been achieved. The excavator shall make a minimum of four passes per lift (two each in cross directions) over the liner soil so as to compact the material for 0.5m and 0.75m thick compacted liners. Each layer comprising the compacted subsoil liner component shall be fully compacted prior to placement of the next layer.

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

C.1.7 Construction of subsoil ridges

Subsoil ridges shall be at a minimum spacing of 3.0m and at least 0.15m high. The ridges shall be constructed by placing and compacting moderate/low permeability subsoil in ridges perpendicular to the OWP system effluent collection pipe at the rear of the pad. The subsoil shall be free of sharp protuberances, not be comprised of topsoil and be of moderate/low permeability. The ridges shall run the whole length of the pad. A completed ridged system is illustrated in Figure 1 below. Alternatively, the compacted subsoil liner can be installed to the minimum design height and a further 0.15m of moderately compacted subsoil placed on the liner before subsoil ridges are then formed using suitable plant. The ridges should be plastered and their surfaces smoothed off and plastered with remoulded subsoil.



Figure 1: Compacted subsoil ridges in a subsoil-lined OWP effluent collection system

C.1.8 Construction of drainage system

The drainage pipes shall be a minimum of 80mm internal diameter and installed in the trenches formed by the subsoil ridges. They shall be installed at minimum 3.0m spacing. The drainage pipes shall be connected to solid walled pipe for effluent transfer to storage facility. The drainage pipes shall have a slight fall towards the effluent collection pipe and this pipe shall, in turn fall towards the effluent storage facility. A fall of at least 2% (1:50) is recommended. Most perforated solid-walled or flexible-walled land drainage pipes will be suitable for use. It may be preferable in areas of regular trafficking or occasional trafficking by very heavy vehicles to use solid-walled perforated underdrainage pipes and to increase the minimum depth of drainage stone. The drainage stone shall be similar to that used as filter drain material in road works and shall be at least 300mm deep. This material is classified in the Specification for Road Works as follows:

<i>Material</i>	<i>Percentage by Mass Passing Sieve BS Sieve Sizes (mm)</i>					
	63	37.5	20	14	10	5
<i>Type B</i>	100	85 ~ 100	0 ~ 20	-	0 ~ 5	-

Table 3: Range of grading of filter drain material (adapted from Specification for Road Works Volume 1 Series 500)

Alternative underdrainage systems may be used if it can be demonstrated that, at least, equivalent drainage is achieved.

C.2 Construction of geomembrane-lined out wintering pad

C.2.1 Site preparation

(See Section C.1.2)

C.2.2 Drainage system

(see Clause C.1.3)

C.2.3 Installation of water table lowering system

(See Section C.1.4)

C.2.4 Subsoil surface preparation

The excavated and/or made-up ground must be finished uniform and smooth and free of any sharp protuberances. In particular, the surfaces being lined must be free of water, jagged rock, debris, roots or any matter that could damage the lining material. Where subsoil surface conditions are unsuitable, a fine sand layer (50mm minimum thickness) shall be installed to provide underlying protection to the geomembrane. The total minimum subsoil depth beneath the geomembrane (in-situ + sand layer (if required)) shall be 150mm. A protection geotextile may be placed over the geomembrane depending on the lining contractors requirements.

C.2.5 Perimeter construction

(see Clause C.1.5)

C.2.6 Lining and drainage installation

Geomembranes are vulnerable to the underlying and overlying environment. They can be punctured by sharp protuberances such as jagged rock, debris, roots etc. In addition, they may be damaged by excessive loading. Many geomembranes are vulnerable to continual ultraviolet (UV) ray exposure. The geomembrane liner used shall be approved by the Department of Agriculture and Food and installed by an accepted lining contractor. A list of accepted lining contractors for OWP geomembrane liners is available on the website of the Department of Agriculture and Food (www.agriculture.gov.ie) under specification S132A. In all cases the geomembrane shall at least meet all of the requirements of this specification.

C.2.6.1 Installation of the geomembrane liner

The liner shall be installed by the lining contractor strictly in accordance with the manufacturer's instructions and any requirements of the specification. When laid, the liner shall be free of creasing. Liner installation should not take place in temperatures below 5°C or above 30°C. The liner should be securely anchored above the top level of woodchips to ensure that only infiltration through the pad is collected by the underdrainage system. Anchoring systems shall be installed as per the lining contractor's instructions. Any additional protection for the liner as recommended by the lining contractor shall be installed.

C.2.6.2 Construction of subsoil layer

A minimum 0.2m thick subsoil layer shall be installed over the geomembrane system. The site assessment report gives details of the suitable layers of subsoil and only this material shall be used for the subsoil layer. The subsoil shall be of low/moderate permeability and free of sharp protuberances. If there is not enough suitable material present in the OWP area, additional suitable subsoil material may be brought on to the site.

C.2.6.3 Construction of subsoil ridges

Subsoil ridges shall be at a minimum spacing of 3.0m and at least 0.15m high. The ridges shall be constructed by placing and compacting moderate/low permeability subsoil in ridges perpendicular to the OWP system effluent collection pipe at the rear of the pad. The subsoil shall be free of sharp protuberances, not be comprised of topsoil and be of low/moderate permeability. The ridges shall run

the whole length of the pad. A completed ridged system is illustrated in Figure 1. The ridges should be plastered and their surfaces smoothed off and plastered with remoulded subsoil.

C.2.6.4 Installation of underdrainage system

(See Clause C.1.8)

C.3 Woodchip Bedding

There shall be a minimum depth of 200mm of woodchip bedding placed on all OWP's. The woodchip used shall be less than 50mm thick and may be produced from sawmill by-product, chipped logs or recycled timber. In all situations the woodchip bedding shall not contain any material that is not derived from wood. The woodchip shall be placed on the drainage layer taking every reasonable precaution not to disturb the drainage layer underneath. This may be achieved using a tractor loader or an industrial loader and is effected by placing the woodchips on the nearest point initially and gradually covering the pad by driving on the lain woodchip.

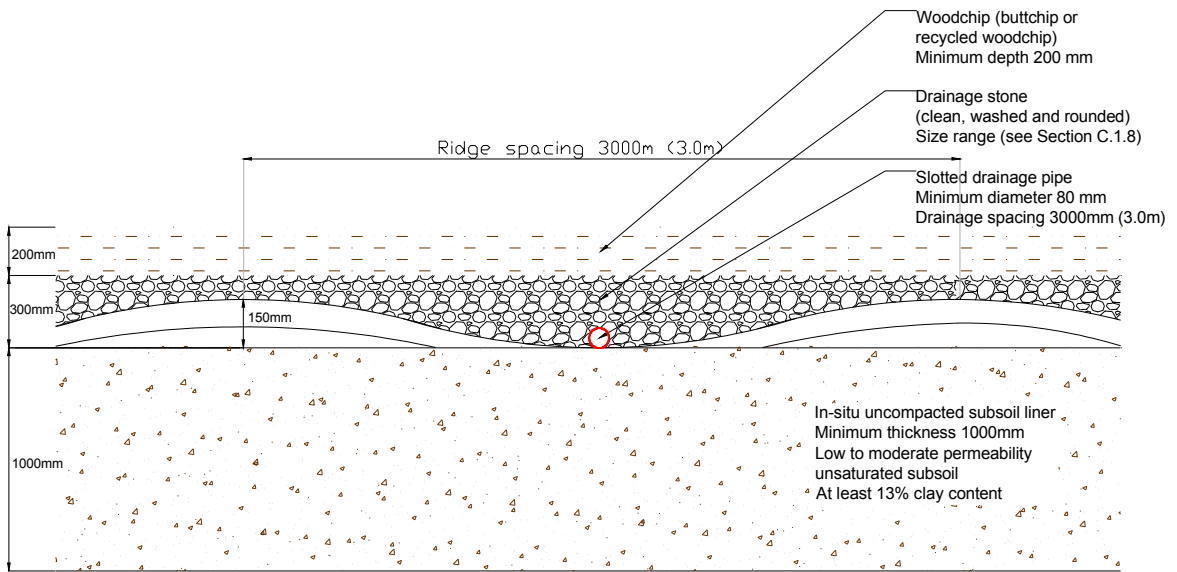
C.4 Certification

The following Certificates shall be provided to the farmer (where applicable) for his retention.

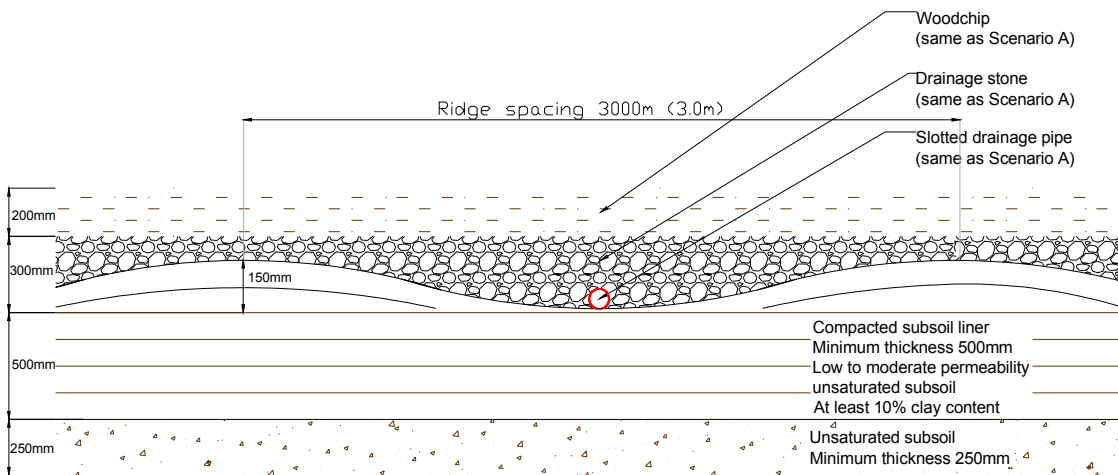
- concrete certificate;
- site assessment report;
- contractors certificate of installation of subsoil-liner for subsoil-lined out wintering pads;
- contractors certificate of ground preparation and leak tightness for geomembrane-lined out wintering pads;
- planning permission documentation.

D. Sections through typical OWPs

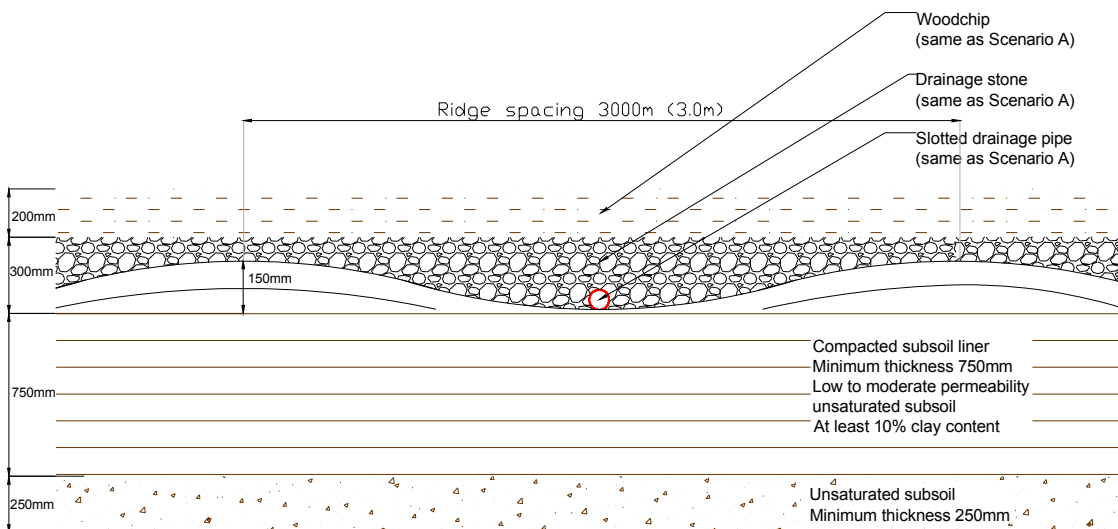
- *In situ* subsoil-lined OWP (scenario A)
- OWP underlain by 0.5m thick compacted subsoil liner (scenario B) and 0.25m unsaturated subsoil
- OWP underlain by 0.75m thick compacted subsoil liner (scenario C) and 0.25m unsaturated subsoil
- Geomembrane-lined OWP



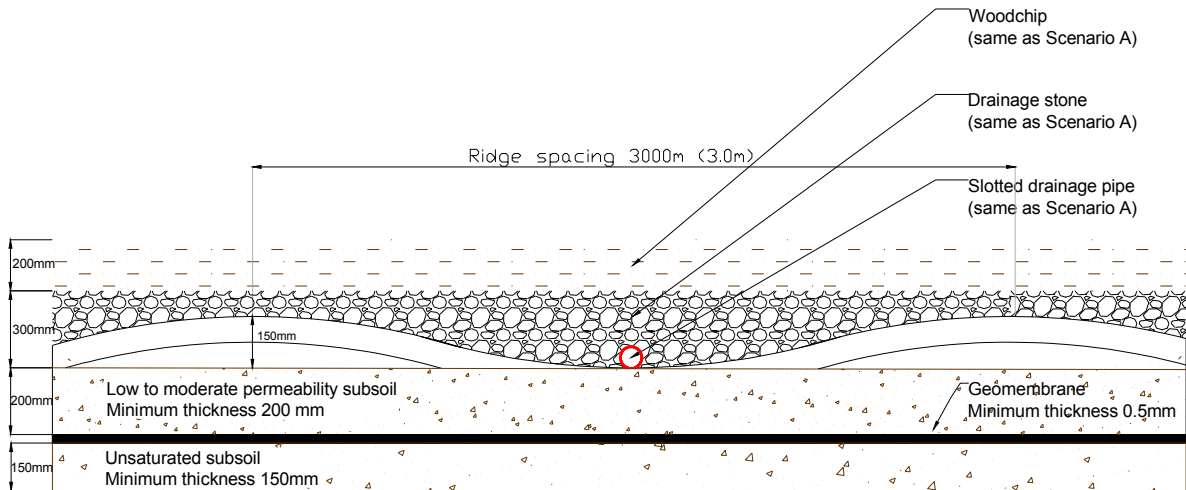
Subsoil Liner Scenario A



Subsoil Liner Scenario B



Subsoil Liner Scenario C



Geomembrane Liner

E. SITE ASSESSMENT FORM

E.1 General details

<i>Name and address of applicant:</i>	
<i>Telephone number:</i>	
<i>Fax number:</i>	
<i>Email address:</i>	
<i>PPS number:</i>	
<i>Herd number:</i>	
<i>Name and address of consultant:</i>	
<i>Telephone number:</i>	
<i>Fax number:</i>	
<i>Email address:</i>	
<i>Site location and townland:</i>	
<i>Grid reference:</i>	

E.2 Background information

<i>Topographical maps as per planning pack to accompany this application:</i>		YES/NO			
<i>Local experience of OWPs (if available):</i>					
<i>Surface water~ Description of surface water features in proximity of the site including designation:</i>					
Geology and Hydrogeology					
<i>Soil (name and type):</i>					
<i>Subsoil:</i>					
<i>Bedrock geology:</i>					
<i>Aquifer category (tick as appropriate):</i>		Regionally important	Locally important	Poor	
<i>Groundwater vulnerability (tick as appropriate where available):</i>		Extreme	High	Moderate	Low
<i>Is there a groundwater protection scheme (Yes/No):</i>		<i>Groundwater protection response for OWP:</i>			
<i>Presence of significant sites (including reference):</i>	Archaeological:				
	Natural:				
<i>Utilities (locations):</i>		<i>Safe</i>		<i>Needs further investigation</i>	
<i>Power lines:</i>	Above ground:				
	Below ground:				
<i>Gas mains:</i>					
<i>Sewerage:</i>					
<i>Water mains:</i>					
<i>County development plan:</i>					
<i>No. and type of animals requiring accommodation:</i>					
<p>Comments: (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)</p>					

E.3 Visual assessment

Slope:	
Density of dwellings, places of gathering within 500m of site (give distance to nearest feature):	
Property boundaries (distance to nearest):	
Roads (distance to):	
Existing land use:	
Outcrops (rock and/or subsoil): Note if any and describe	
Surface water ponding:	
Beaches/shellfish areas/wetlands:	
Karst features:	
Lakes/watercourses/streams*:	
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>Comments: (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 OWP and the location of the proposed system within the site).</p>	

*Note Water Level

E.4 Trial hole

The minimum depth of each trial hole shall be 1.5 m.

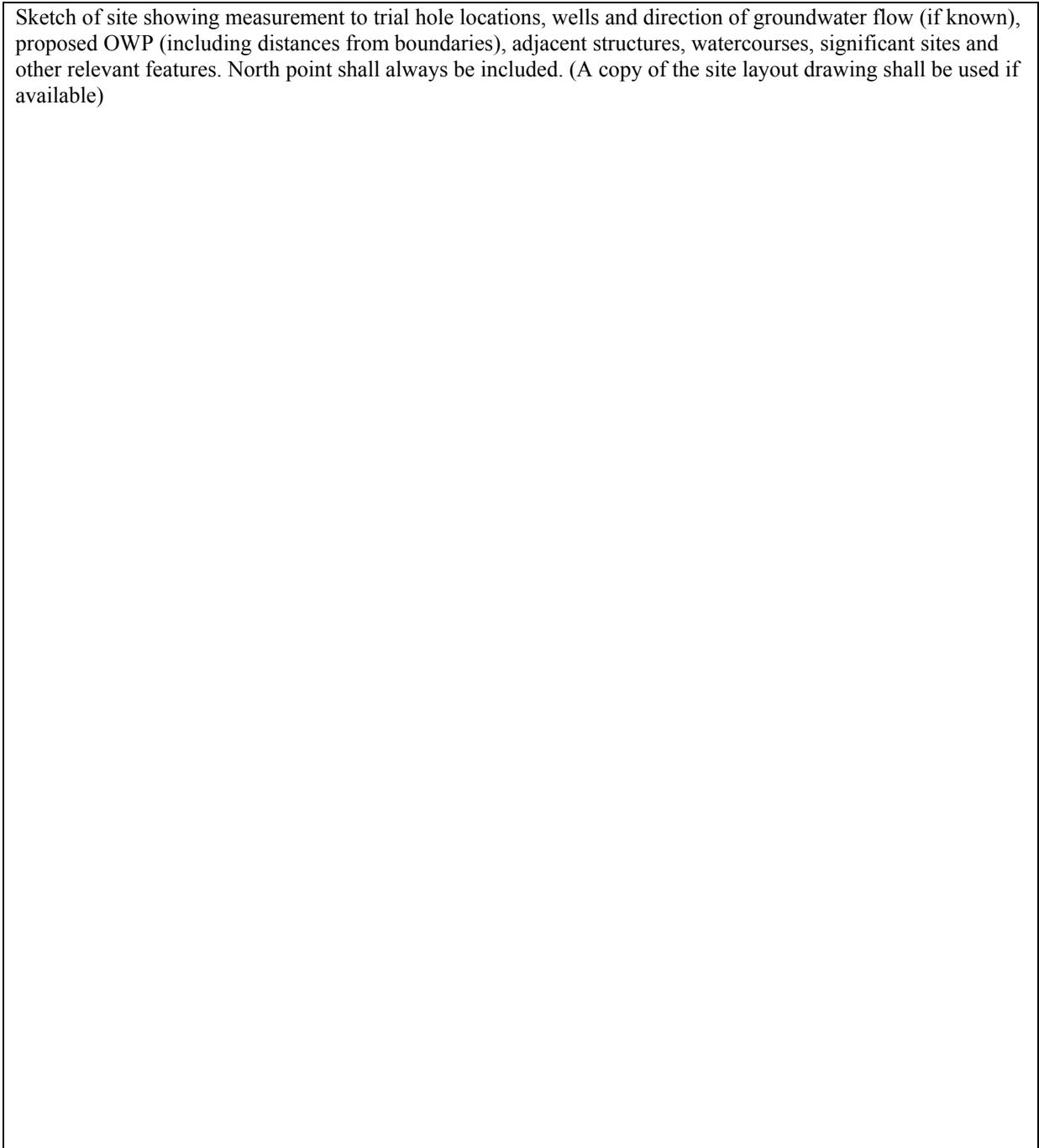
Trial hole number:		Date and time of excavation:		
Depth of trial hole (m):		Date and time of examination:		
Depth from ground surface to bedrock (m) if present:				
Depth from ground surface to water table (m) if present:				
Depth below ground surface (m)	Soil/subsoil texture and classification (note plasticity and dilatancy results)	Density/compactness	Colour	Preferential flowpaths
0.2				
0.4				
0.6				
0.6				
1.0				
1.2				
1.4				
1.6				
1.8				
2.0				
2.2				
2.4				
2.6				
2.8				
3.0				
Other information (where relevant)				
Depth of water ingress (m):		Rock type (if present):		
Sample depth (m):				
Compaction test result (visual description):				
<p>Evaluation: Use the following questions to crystallise the evaluation of the trial hole assessment and make recommendations on the next stage of the assessment (see section 3.6.2 of the Guidance Document):</p> <p>At this stage of the site assessment the following questions can be answered:</p> <p>(a) Is the site unsuitable for an OWP system? (b) Is the site suitable for a geomembrane-lined OWP system? (c) Is the site likely to be suitable for a subsoil-lined OWP system?</p> <p>If the site is suitable only for a geomembrane-lined OWP system, then laboratory testing of the sampled subsoils need not be undertaken and the report can be completed.</p> <p>However, if the assessment thus far has indicated that the site is likely to be suitable for a subsoil-lined OWP and the client/advisor is content to install such a system if site conditions are favourable then laboratory analyses should be undertaken and the results entered in section 12.5.</p>				

E.5 Laboratory soil test results

<i>Trial Hole</i>	<i>% Clay</i>

E.6 Sketch of site

Sketch of site showing measurement to trial hole locations, wells and direction of groundwater flow (if known), proposed OWP (including distances from boundaries), adjacent structures, watercourses, significant sites and other relevant features. North point shall 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 out wintering pad

Name of Owner: _____

Address of Owner: _____

Address of site: _____

Depth to bedrock (if encountered): _____ m

Depth to water table (if encountered): _____ m

Is the site suitable to construct a subsoil-lined OWP: YES NO

Thickness of subsoil liner required: _____ m

Depth to suitable layer for subsoil liner: _____ m

Thickness of suitable layer for subsoil liner: _____ m

Is the site suitable to construct a geomembrane-lined OWP system: YES NO

Depth to suitable layer for subsoil overlying geomembrane: _____ m

Thickness of suitable layer: _____ m

Special Conditions (if any) _____

Name of Site Assessor: _____

Address of Site Assessor: _____

Site Assessor's signature: _____

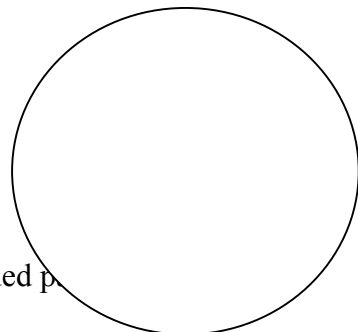
Date: _____

Phone: _____

Fax: _____

Company Stamp:

(Certificate to be typed on contractor's headed p



Contractors certificate of installation of subsoil liner for subsoil-lined out wintering pads

Name of Owner: _____

Address of Owner: _____

I hereby certify that the subsoil liner component of the subsoil-lined out wintering pad was installed in full accordance with the requirements of the 'Site Assessment Report' for the site and at least meeting the requirements of the Department of Agriculture and Food specification S132, 'Minimum specification for out wintering pads.'

Name of contractor installing subsoil liner: _____

Address of contractor installing subsoil liner: _____

Date site certified _____

Name and position of person certifying installation: _____

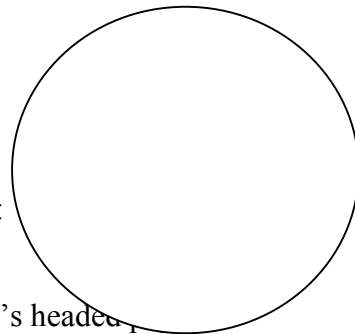
Signature of person certifying installation: _____

Date: _____

Phone: _____

Fax: _____

Company Stamp of Subsoil-Liner Contractor:



(Certificate to be typed on lining contractor's headed paper)

Contractors certificate of ground preparation and leak tightness for geomembrane-lined out wintering pads

Name of Owner: _____

Address of Owner: _____

I hereby certify that the excavation and preparation work performed is of the required standard to at least meet the requirements of the Department of Agriculture and Food specification S132, 'Minimum specification for out wintering pads.'

Name of contractor preparing site: _____

Address of contractor preparing site: _____

Date site certified ready for lining: _____

Name and position of person certifying preparation work: _____

Signature of person certifying preparation work: _____

It is further certified that the geomembrane-lining has been installed to, at least, the standard of specification S132 and is hereby certified as leak tight. It is also certified that all safety features have been installed and that the lining shall remain watertight for a minimum of 30 years.

Date of certification: _____

Name and position of person certifying lining: _____

Signature of person certifying lining: _____

Date: _____

Phone: _____

Fax: _____

Company Stamp of Lining contractor:

