

## Additional Guidance Notes For LEAF Marque Global Standard 2009

This guidance does not include information on all control points, but aims to help farms to implement IFM and be compliant to LEAF Marque standards. Please refer to the LEAF Audit 2009 for further guidance and useful information and templates where appropriate.

### 1.0 Organisation and Planning

1.2 The LEAF Audit is an on-line self-assessment management tool to help you adopt integrated farm management (IFM). The audit enables the completion of an action plan based on IFM and the environment, it allows you to benchmark your farm against others and against your last years score. To complete the audit firstly join LEAF, whereupon you will be issued with a Username and Password. Enter the Username and Password at [www.leafaudit.org](http://www.leafaudit.org) and you will be ready to start with the LEAF Audit. Think of the LEAF Audit as a tool that you use to target continual environmental improvement of your farm.

1.3 The most widely recognized assurance scheme for Good Agricultural Practice is GLOBALGAP (Formally EUREPGAP). Farms that are aiming for LEAF Marque should already have achieved a certificate for GLOBALGAP or a benchmarked scheme approved by GLOBALGAP for each enterprise on the farm. Any equivalent scheme must involve independent certification from an approved Certification Body.

Equivalent scheme in Spain will be Integrated Production. This is now Nationally Recognised for various crops and also Region recognition for a wide variety of crops. At present there is no Accredited Certification Body authorised for this scheme but is considered as a Good Agricultural Practice Standard.

1.4 Your Environmental Policy is your statement to your commitment to optimize your usage of power, water and other consumables. It is your commitment to reducing the waste that is produced on the farm and increasing the recycling of those materials that can be re-used. It is also your commitment to reducing pollution wherever possible on the farm, greenhouse or production area.

The policy that you have must be at the core of your business and everyone involved with your business must work and operate in accordance with the policy.

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A good starting point is with regional or national legislation. If there is legislation in place, make sure that you understand it and apply it to the everyday activities of your business.

You should then construct your policy to target the optimization of power and water, the reduction of waste through re-cycling and the minimization of air, water and land pollution through the control of waste.

It can look, at first sight, an almost impossible task. But if you break down your policy into these sections, the construction and implementation of your policy is very achievable.

1.5 From this policy, you can construct your forward plan.

### **2.0 Soil Management & Crop Nutrition**

2.1 The advice that you take on crop nutrition, is key advice in the successful production of your crops. A LEAF farmer must take advice from someone who is qualified to give that advice. Specific professional development schemes are open to nutritional advice specialists in various countries and, if this is the case, A LEAF farmer should take advice from someone who is qualified in such a scheme. In the absence of a professional scheme, the equivalent qualification may be gained at degree level, in an Agronomically focussed degree. See 3.14

A LEAF farmer should request and keep on file the up to date and relevant certificate that demonstrates the competence of the individual who delivers nutritional advice.

2.2 A nutrient management plan looks at the equilibrium between the requirements of your crop, the nutrient index of the land, the nutrient content of the plant debris from the previous crop and the type of nutrition being added to grow the crop.

So, a LEAF Farmer will need to know soil nutrition indices, through regular soil analysis. The nutritional requirements of various crops are documented and available for reference. Such a reference document would be Fertiliser Recommendations (RB209) in the UK. Similar documents are produced in other countries. There are also similar guidelines for Phosphate and Potash residues from previous crop trash incorporated into the land. Manures and other organic fertilizers can be analysed for nutritional content.

With all of this information, a farmer can manage the application of applied nutrition so that the equilibrium is managed.

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Enough for growing the crop, not too much so that there is leaching or unnecessary accumulation and an optimization of expenditure correlated to yield output.

Expect to see a nutrient balance for the crop. Starting with the crop extraction quantities and then inputs from: soil, water, organic material and base dressings. This should then be planned for the crop duration and adjusted through observations or foliar analysis.

Consideration of Nitrate vulnerable zones and legal NO<sub>3</sub> for lettuce and spinach must be given.

- 2.3 Soil Mapping should be broken down into the constituent parts of your farm. It is about risk assessing the farm as a whole and using this to manage the problems such as erosion, run-off, soil structure damage in the wet, nutrient leaching and water course contamination prevention.

The easiest way is through the physical drawing of a colour coded map, outlining the different soil structures and gradients of the farm.

This soil mapping is then implanted into your whole farm conservation and production manual. It outlines which activities must and must not be carried out in each of the areas of the farm so that the problems that can be faced, are minimised as much as possible.

Each farm can have a soil map. Some farms will have a whole range of different soils and gradients, some farms will be simply one similar type.

- 2.4 LEAF encourages the use of Green Manures and Composts. Where appropriate, management of formal composting of plant wastes and manures is actively encouraged.

Vermiculture and Vermicomposting is a simple and straightforward way to compost these materials on a small scale basis.

[http://www.organicagcentre.ca/DOCs/Vermiculture\\_FarmersManual\\_gm.pdf](http://www.organicagcentre.ca/DOCs/Vermiculture_FarmersManual_gm.pdf)

Growing of green manures as break crops and returning the plant material back into the land before the commercial crop is sown, is an excellent way of stopping erosion, stopping leaching and putting organic matter back into the land.

In situations where climatic conditions are adverse, hot and low rainfall – Mediterranean and North Africa countries, increasing soil fertility through green manures or similar techniques, may not be viable- water may be scarce, conservation of the little that is there would be the objective. Wind erosion is a potential problem in dry areas.

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- 2.5 As outlined
- 2.6 As outlined
- 2.7 For annual cropping situations, a 3 year cropping rotation plan is a must for a LEAF grower. The rotation strategy should concentrate on the rotation of different crop types, so as to ensure minimum build up of potentially threatening pest and disease levels in the soils and surrounding environment. If mono-cropping is the only option, consider the use of short-term break crops for either cutting and composting or cutting and incorporating.
- 2.8 As outlined
- 2.9 As outlined
- 2.10 As outlined
- 2.11 Training of people working on nutrition application on the farm, is essential. Training should be commensurate with the type of application that is being undertaken. Key training points will include accurate calculations of the amount of nutrition to apply per unit area, placement of nutrition in relation to the crop, control of placement in order to protect the environment. Training is an objective activity. There must be a clearly set out training document with clear records of trainees and successfully completed training sessions.

This should be for all staff, even if they are just following instructions-such as two bags of A, and 1 bag of B every 5 days in the fertigation tank. This is often thought not to be necessary.

### 3.0 Crop Protection

- 3.1 Crop Protection for a LEAF farmer is an integrated system.

Farmers should consider all of the factors which contribute to a Crop Protection Policy. The following all have an influence on crop protection and, when used together, can significantly strengthen a Crop Protection Programme over and above simply using a pesticide.

- Resistant Varieties
- Companion Plants
- Antagonistic/Parasitic Fungus Species
- Rotation
- Soil Structure
- Nutritional Input
- Growing within the 'Right Season'
- Use of predators

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- Use of traps
- Crop Nets
- Correct Irrigation Practices
- Dust Management
- Pesticide Choice
- Application Timing
- Customer Specification
- Use of HOT (mustard) crops for soil BIO disinfection
- Scouting
- Use of weather predictions Temp x °H .

Your Crop Protection Policy should be drawn up with all of these factors being considered.

- 3.2 A sophisticated Crop Protection Policy will have, at the core of its considerations, a pest resistance avoidance strategy.

Farmers should make a plan to rotate applications of active ingredients (where the legislation and customer preference allows), and employ non-chemical techniques wherever practically and economically feasible. Making use of insect barriers is a key point, as well as the introduction of predators. An integrated pest, weed and disease control system, is essential practice in the fight against resistant species. Always think of what can be done to control the problem BEFORE using a pesticide.

- 3.3 Scouting is the method that is used to determine the range and quantities of Pests present in a crop. People on-farm should be trained to identify pests. There should be a structured monitoring procedure in the crop, with a structured and quantifiable recording procedure of problems seen, with a threshold based decision system. Certain pests and disease levels can also be linked into climatic factors such as temperature, free water on the surface of the leaves, humidity and times of the year.

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All of this together, leads to an accountable system of pest, disease and weed identification, target and control.

- 3.4 The use of these counts, conditions and thresholds, provides justification to apply, or not to apply a crop protection product. A properly completed scouting sheet, with the problems found expressed as a percentage of

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what was inspected, cross-correlated against a pre-determined threshold, is the basis of the written record and justification for a crop protection application.

“Official” (Regional Agricultural Office) thresholds may be available and used as a base for P +D controls and modified to local farming conditions. In some cases sampling procedures may be available – number of leaves per plant or plants sampled per m<sup>2</sup>, number of fruits per tree etc.

- 3.5 Training the staff who are employed to monitor pests, disease and weeds, is of key importance.

Training should be relevant to the crop rotation of the farm and should concentrate on the usual pests, diseases and weeds found in and on those crops.

Training should be conducted by an individual who is a professional agronomist and who has a good working knowledge of pest, disease and weed control.

Those being trained should be trained according to a schedule and training should be recorded. A basic exam at the end of training, to demonstrate a level of competence, is encouraged. Use photographs and pictures as much as possible during training, as a useful recognition tool

The agronomist may be the only person responsible for crop scouting in some situations – farm workers may be only seasonal and training may not be a valid option.

- 3.6 Look at the consequences of what you are aiming to do in terms of crop protection and Pest, Disease & Weed control.

If you spray a chemical, as well as treating the problem, what will be the consequences on;

- Bees
- Invertebrate Predators
- Companion Plants
- Field Boundaries
- Potential Water Contamination
- People Safety
- Medium/ Long-Term soil contamination
- Vertebrates in the crop
- The adjacent crop or dwellings
- Beneficial insects – side effects.

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A risk assessment may be a valid option for valuating options for chemical applications based on above list.

If you use physical means to control a problem in a crop, such as weeds, what will the consequences be to;

- Nesting birds and eggs
- Bumble Bees
- Burrowing animals living within the crop root zone,. or vertebrates living in the crop canopy.
- The root system of the crop
- Ground compaction (more passes up and down the field than with a wide boom sprayer)

There are consequences to every situation, some of them very negative to the environment of the farm. LEAF asks us to think about these consequences and mitigate environmental damage through pre-thinking our activities and choosing the most appropriate solution for successful crop growth and good environmental management.

- 3.7 If you are going to reduce the rate of the chemical to be applied, from that of the recommended dose rate, there must be an objective justification made before doing this. For instance, the crop may be at a juvenile stage and a full dose of protectant fungicide is not warranted. The weeds could be non-wax coated and so the contact herbicide rate can be significantly reduced.

Always record the justification for reduced rate application.

- 3.8 Your planned Crop Protection Policy will have outlined the steps that you can take on your farm to minimise the damage to beneficial organisms and the environment. By following these pre-determined plans and recording your activity, you can demonstrate that you have taken all reasonable precautions to target the pest and cause least negative impact to the environment and the 'Beneficials'. Think about;
- Crop Protection Product Choice
  - Which Predators are active in the crop?
  - Timing of Application
  - Where spraying stops and starts at the Headland
  - Wind Speeds
  - Rain Forecasts (run-off into water courses)
  - Persistence of pesticides
  - Side effects on beneficials.
  - Some chemicals have low toxological side effects but may be very dangerous for water pollution.

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- Rotation of different types of herbicides to reduce build up of resistant species to one type of herbicide.

Applications of some pesticides have known non desired side effects – red spider, white fly outbreaks.

By thinking first and acting smart, Beneficials and wildlife can be protected against the detrimental effects of agrochemicals.

- 3.9 Harvest intervals must be recorded, against application dates and cross correlated against proposed harvest dates, before harvest takes place. In line with Global Gap
- 3.10 A LEAF farmer must be able to demonstrate that there is control of the area that is to be sprayed and that the spraying activity does not, mainly through drift, negatively impact of people and the environment surrounding the spray zone. Consideration must be taken about;
- Wind Conditions
  - 6m Buffer Strips between fields and wildlife and residential zones
  - Training of spray teams
  - Spray application types (likely or not likely to drift/go straight to target)
  - Clear field boundaries
- 3.11 It is not permissible to cause contamination of the environment or of water, through the activity of mixing chemicals and filling up/washing out sprayers. Special areas must be constructed to contain any spillages and deal with waste water or tank washings in a safe manner. Digging pits and back filling with charcoal is a good, low cost method of constructing a catchment area which can absorb spillages and overflows. Correct construction will mean that such spillages will remain within the designated area and not migrate through ground water or surface run-off, to sensitive areas. All fill up and mixing areas must have a solid, level surface on which to work and there must be restricted access to the mixing and fill up area.
- Filling areas on large farms may be positioned at various points with no restriction for access – one would expect to see: signage, first aid box (in tractor cabin), emergency/accident procedures and clean water for washing any spillage on operator.
- 3.12 ...
- 3.13 Pesticide Spillages can damage both people and the environment. Even if your farm is in an area where there may be no one in authority to inform in

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the case of an accidental spillage, you must have an action plan which is easy for anyone on the farm to follow. Wherever possible, this action plan should lead you to call on professional help to deal with contamination. If this is not possible, then the action plan must involve those people on the farm who are trained to deal with agrochemicals. Label details on the pesticide container should give good information and direction as to what to do in the event of personal contamination. Larger scale environmental contamination must be dealt with on a case by case basis. Your biggest responsibility is to contain the spillage and stop it contaminating secondary areas.

- 3.14 It is important that your advice on pesticides is given by a trained person. Training can be to a professional standard such as BASIS or suitable training can be given as part of an agricultural engineer's course at university. Suitable training is almost always accompanied by a training certificate and it is important that any person giving a LEAF farmer advice can demonstrate (through a valid, printed certificate) that they are competent to do so. Pesticide recommendations used on the farm can be carried out by a senior crops manager, but there needs to be frequent verification of recommendation and application by the trained agronomist

An agricultural/horticultural degree would be the minimal qualification in some countries. Out of UK demonstration of continual professional development should be recorded – courses, magazines, trade fares, meeting with pesticide companies on release of new products, biological control etc.

- 3.15 All members of the team involved with the application of pesticides, must go through a yearly course/refresher course. This can be carried out by a national or international recognized trainer, or can be carried out by a senior crops manager who has been independently trained in Pesticide handling, application and personal safety. Training must be formal. It must be recorded and must be specific to the individual involved. Training should be accompanied by a basic exam so that the trainees can demonstrate suitable competence in the trained subjects. Training should be relevant to the types and methods of handling and application on the farm. So, for instance, there is no point training people how to use tractor mounted booms, if they are applying the chemical in a plastic house, with a lance.

All spray team members should where available have a recognised national certificate. In absence internal training by a qualified agronomist would be acceptable providing course is planned and details of content are recorded for verification. An agricultural/horticultural degree would be the minimal qualification for training sprayer team members. The exam may not be a viable option in some countries.

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- 3.16 Where schemes exist to have spray application equipment calibrated externally, then a LEAF farmer should manage this as a yearly calibration. Calibration is 'per' machine and a Certificate should be kept to demonstrate that the machine has been successfully calibrated. Where no such scheme exists, then LEAF farmers should calibrate their own machines. Spray volumes should be measured against target and any variation of 5% or over (against the expected spray volume per unit pressure per unit time), should result in a nozzle check and appropriate replacement. Not only does this contribute directly to environmental and residue management, it also saves you money through the control of application dose and the more efficacious use of the pesticide on the target organism.

There are two European Directives for Sprayer verification: UNE-EN 13790 (1 -2) 2003.

- 3.17 All Pesticide applications must be recorded, in line with Global Gap requirements.
- 3.18 Pesticide stores must conform to the minimum standard required by Global gap
- 3.19 Pesticides that you have in your store must have a legal and approved use in that country for on the crops that you grow on your farm. Rules of extrapolation can apply (GLOBALGAP Annex CB.2)
- 3.20 The usage profile for any of the chemicals that are in your store must be in line with the label approval for that chemical. If, in agreement between you the farmer and your client, you have extended harvest intervals, reduced rates, reduced total number of applications allowed or extended the period of time between applications, then this can be a positive thing. You must show accountability for the use of wetters/adjuvants/penetrants as these can DIRECTLY contribute to increased residues in the product and can even lead to residues to exceed the statutory MRL in the country of sale.

Records must indicate pesticide registration number where this exists.

- 3.21 Controlling Drift onto neighbouring properties, fields, crops, residential areas, livestock and people, is a factor of due care and attention. There are many ways to achieve this and each farming situation deserves consideration for its own unique solution.

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The straightforward win is a 6m buffer zone. Practical in some situations, impractical in others. So, a LEAF farmer should consider a number of factors and come up with an appropriate action plan

Some issues to consider in making this plan include;

- Training of spray operators
- Careful/restricted use of mist blowers and air assisted blowers around field margins
- Nozzle choice
- Maximum wind velocities for spraying such areas
- Non-Sprayed boundaries
- Time of day for spraying these areas. The cool of evening generally reduces wind speed and spray volatilization
- Planting of suitable 'Green Barriers' at least 2 m away from the crop, which grow tall enough to limit spray drift .. Maize for instance, if appropriate within the crop rotation strategy. Clearly though, the Green barrier becomes a part of the environment and we do not want to solve one problem whilst at the same time creating another.

Generally, it is the management of a common sense approach to reduce the risk of drift into sensitive areas.

### 4.0 POLLUTION CONTROL & WASTE MANAGEMENT

4.1 It is always a good plan to get professional help with the planning of the Pollution Control Strategies for the whole farm. LEAF recommends that you do so. However, in the absence of any professional help, there is nothing to prevent you from assessing which waste products are produced on the farm and the potential for pollution to contaminate the farm and the environment outside the farm. The planning of your control strategies starts here.

4.2 Waste minimization is not only a key factor in the profitability of the business, it is also a key factor in utilizing resources on the farm and preventing pollution and contamination. Whilst not aimed at farmers outside of the UK, the following document may well give you ideas as to how to minimize waste on your own farms.

<http://www.defra.gov.uk/environment/waste/topics/agwaste/waste-minimisation.pdf>

Like many of the auditable points in the LEAF MARQUE standard, the question that most farmer have is 'where to start with this'?

The waste minimization document helps farmers to break down the categories of their farming and to focus on the key areas.

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A good place to start is looking at costs, purchases and the consequences of some purchases. For instance..

- What have we purchased in what quantity?
- How much of the usable part of the purchase was used?
- How much of the purchase was packaging?
- Could we have minimized waste by buying less quantity a little more frequently?
- Could we have minimized waste by buying the same quantity in ` bigger units?

Or

- How much green waste and manure was produced?
- How much of this was composted?
- What is the nutritional value of the compost?
- How much inorganic fertilizer was purchased?
- How much could we have off-set against this purchase by proper composting?

Water is a most precious of commodities, whether or not you have to pay for it. One of the first areas to look at is the waste of water through leaks and poorly maintained nozzles/jets/sprinklers.

These and many more themes should be explored. Remember, waste is not only bad for the environment, it costs the farm money as well.

### 4.3 The manure management plan is applicable to those farmers who use any form of nutrition other than inorganically synthesized nutrition.

The plan will list the types of manures that will be used on the farm (animal and vegetable), the way in which the manures will be used, the storage conditions for the manures, the controls in place for the prevention of pollution and contamination to other parts of the farm, the controls in place to prevent contamination of crops and the controls in place to prevent contamination of water.

One of the main methods of achieving control is through mapping out the farm into areas of usage, storage, non-usage and critical contamination areas.

All applications, timings and quantities must be recorded.

Manure Management Plans should be integrated into the Nutritional Management Plan, as a whole.

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There could be situations where liquid commercial organic material is used bought in bulk 1000lts tanks and applied through irrigation system. This type of material has an N: P: K content and is used as a soil conditioner. This will need to be recorded and contemplated in nutrient balance and stored correctly.

- 4.4 Bunding of the fuel tanks. If your tanks are less than 200 litres, read no further and move on to the next auditable point!

However, for all tanks above 200 litres a bund must be constructed. There is no rocket science associated with this. A bund is a low(ish) wall that is sealed sufficiently enough to contain liquid (in this case oil & petroleum products). Pretty much all farms which have the need for 200 Litre plus tanks, have the capacity to build walls on the farm.

How high to build the wall depends upon the length and breath of the walls and the corresponding volume that they contain. Aim for around 10% more volume containment than the maximum capacity of the tank/containers. Make sure that all of the taps and outflows from the tank are within the bund boundary.

Where the fuel store is not a permanent tank, but moveable units (such as 40 Gallon Drums), then there needs to be movement of units in and out of the bunded area. In such cases, it is feasible to construct a vertical sluice in the form of an entrance into the bunded area. A properly constructed sluice, slotting into a flanged housing, will make a doorway when removed and seal the bund when slotted in place.

LEAF farmers should ensure that the bunded area is more than 10 metres away from areas of high risk contamination such as open drains and ditches.

There are specially prepared doubled walled 1000 tanks for diesel storage that will not require bunding. These must have a pump with a top unload system-otherwise leakage around the entry point into the tank will still occur,

- 4.5 In Line with Good Agricultural Practice, all application machinery must be maintained & calibrated regularly. Records must be kept for each vehicle or machine.
- 4.6 Through the whole farm map showing water courses and environmentally sensitive areas, it is possible to plan carefully for the disposal of wastes and by-products. It is essential that wastes and by-products do not pollute

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the environment. Farmers should demonstrate that careful planning has gone into the disposal of wastes and by-products

4.7 As outlined

4.8 The action plan on the reduction of the impact of potential pollutants on the environment, should be conducted in the form of a risk assessment.

So,

- Pollutant Name
- Pollutant Type
- Pollution Potential (Air, Soil, Water, People)
- Pollution potential activity (Application, Disposal, Storage, Handling etc)
- Pollution Risk Reduction method employed (or aimed for)
- Monitoring Method Used
- Corrective action sequence to be actioned in the event of a pollution issue.

4.11 As outlined

### 5.0 Energy & Water Efficiency

5.1 The energy efficiency audit should be broken down into the activities on the farm that use energy. This is an audit that can be completed internally on the farm.

Like all audits, it looks at what is currently happening on the farm in terms of energy usage and then looks at ways to improve efficiencies by reducing inputs whilst at least maintaining outputs.

**Definition** – An energy audit identifies and evaluates energy management opportunities on the farm. During an audit, a baseline is developed to characterise and record energy use. Individual unit operations, processes, and major energy-consuming equipment are evaluated to identify energy management opportunities and high-return-on-investment projects. Typically an action report is produced that describes the baseline, each conservation opportunity area, an estimate of the cost to implement the changes, the savings that will be generated, and an estimation of the payback period.

Look at electricity/gas consumption for the farm. Benchmark units used over the last 12 months and put in the action plan to reduce consumption

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over the next 12 months. Tip .. Look at bulb type, insulation, thermostatic settings, timer settings, maintenance of equipment.

Where power, light and heating/cooling is used directly in the production of the crop, correlation can be drawn of units of energy used against volume/weight of product harvested and sold. How can this be made more efficient in a forward looking plan?

Vehicles that are correctly maintained and serviced against a pre-planned schedule, are more likely to be fuel efficient than those that are not. Fuel usage against hours worked, over a period of a year, can form part of a useful guide to the efficiency rating of farm vehicles.

Properly insulated cold rooms, with doors that can and are shut when not being used, are significantly more energy efficient than those that are not.

All of these factors directly contribute to the improvement of energy use and all can be assessed and targeted in your energy audit.

**Hint** .. How about evaluating the potential for the production of energy from the natural resources on the farm? What is the potential for a heat pump? What is the potential for a small Hydro-Power scheme? What is the potential for a wind turbine?

Lighting from solar energy in non working areas – toilets, corridors, archive store, pesticide, fertilizer stores etc.

Solar panels for hot water supply is a possible energy alternative.

- 5.2 As discussed
- 5.3 As outlined
- 5.4 A Yearly Reviewed Water Management plan is an essential tool for the accountable use of water on the farm.

LEAF encourages the farmer to think along the following lines and to act to prevent any unnecessary use of water.

A farmer must be able to demonstrate that the water that is being used on the farm is covered by the appropriate licenses and, if no abstraction licenses are needed, evidence must be kept on file that this is so.

Where crops are watered, farmers must be able to demonstrate that the most appropriate system of irrigation for both the crop and for water efficiency is being used or is in the plan to be used in the near future.

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Irrigation plans should also be drawn up to demonstrate a working plan for irrigation timing that is both Agronomically right for the crop as well as lower risk evaporation potential.

Schedules should be backed up by agronomically acceptable data: tensiometer, evapotranspiration, weather data, and water/soil conductivity for leach of salts. Where possible water consumption should be recorded and bench marked against previous years. (See 5.7)

Water storage in areas where water may not be readily available throughout the year is a factor to be considered to assure compliance to full cropping cycle.

Farmers should be able to demonstrate that there is a working maintenance schedule of irrigation machinery and equipment that actively looks at prevention and repair of leaks in the system.

Irrigation should be timed and controlled so as to cause least risk of run-off and water wastage. Run-off and wastage can be mitigated through slope and contour management, for instance.

The water management plan should also manage discharges of used water back onto the farm. This links in with the pollution control management plan.

**Hint** .. Can discharged water be organically processed through a Reed Bed System? Relatively inexpensive to set up, foul water enters the system and clean water exits the system. This is a natural way of re-introducing water back into the environment.

<http://www.eco-web.com/index/category/2.1.1.html>

[http://en.wikipedia.org/wiki/Constructed\\_wetland](http://en.wikipedia.org/wiki/Constructed_wetland)

<http://www.bio-pro.de/en/region/biolago/magazin/02422/index.html>

5.5 As outlined

5.6 As outlined

5.7 As outlined

5.8 **Helping to improve water efficiency having measured changes?**

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By adopting Integrated Farm Management (IFM) LEAF Marque farmers follow a set of principles across the whole farm in order to deliver a more sustainable business. Water efficiency can be improved by in many ways.

The LEAF Marque standard and the standards that it builds on encompass best practice in an integrated way to help improve the farms water efficiency.

LEAF Marque farmers need to measure water efficiency based on yield and implement a plan that aims to improve sustainable water use (5.7).

Water resource can be defined as natural rainfall, subterranean water (water table) or impounded water. Irrigated water can be from natural sources such as boreholes, rivers etc these would be depleting natural sources, impounded water stored during abundant periods of flow or rainfall are more sustainable and should be encouraged.

Natural water i.e. rainfall, needs to be managed to gain optimum efficiency i.e. ensuring that all natural water is utilised efficiently through maximising soil capacity and reducing runoff, evaporation and transpiration. LEAF Marque growers should maximise water storage of wasted water i.e. capture rainfall, flood water and capture water during abundant periods of flow all within local laws.

It needs an integrated approach, there is no one solution, it's the combination of measures that will ensure optimal use of the water resource, and these are some of the practices that can be considered to help farms improve water efficiency in crops:

- Soil water monitoring and scheduling such as tensiometer, neutron probe or EnviroSCAN
- Best practice in soil management for optimal soil structure for maximising water holding capacity.
- Maximising organic matter content will aid good soil structure and improve water holding capacity
- Variety choice, choosing varieties that utilise water more efficiently.
- Crop systems will impact on the efficiency of natural water and irrigated water
- Nutrient balancing will have an impact on optimal plant condition and growth.
- Water stress will be reduce through good plant husbandry
- Heat stress can be reduce through different practices such as crop covers
- Stress chemicals, anti stress chemicals will aid plant condition during drought periods and maintain root growth

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- Reduce wind evaporation through reducing wind speed by the use of windbreaks
- Use of soil mulches to reduce evaporation
- Soil improvers such as compost
- Ground cover plants used as soil stabiliser and subsequent mulch
- Green manures
- Water footprint embedded water use of inputs
- Canopy management to reduce evaporation and transpiration
- Crop load management for optimal utilisation of natural soil water
- Weather forecasting coupled with soil monitoring to avoid over irrigation
- Field monitoring for plant stress using infrared photography to identify inefficiency of irrigation or natural water availability
- Precision measurement and application of water
- Breeding drought resistance into plants
- Biological activity in soil
- Use of rhizobacteria in dry soils, naturally occurring bacteria
- Cultivation choices i.e. minimum tillage

### 6.0 Wildlife & Landscape

#### 6.1 The Whole Farm Conservation Audit

A fundamental approach to LEAF MARQUE, is through the understanding of the environmental features associated with your farm. LEAF recognizes that there are very many different types of farms around the world, ranging from farms of many thousands of hectares in the Veld of Southern Africa, to small sub hectare parcels of family owned land in South East Asia, to single half hectare greenhouse structures amidst thousands of other greenhouse structures all crammed together in the same area of Southern Europe.

Thus, there cannot be a single blueprint for a whole farm conservation audit, but each farming business can become aware of the distribution of key wildlife habitats, the species of plants and animals that can be found on and around the farm and the key features on the farm. The purpose of the audit is to become aware of these and then use this information to plan a profitable farming business which is in balance with a conservation and environmental enhancement plan.

Farmers and growers can use any or all of the bullet points in the following list to base their audit on. Perhaps one of the best ways to collate the information generated by the audit, is to draw up a scale map of the farm and to mark in the features accordingly.

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Wetlands, Lakes, Ponds, Rivers and Streams. Where are they and how are they associated with the farm? Is there a seasonal rise and fall in water levels? Does outflow from the farm drain into these areas? Is there a drying up period of the year where there is no water?

Associated Flora & Fauna. Which animals, birds and plant-life are associated with these water courses and wetlands? Identification, mapping and number counts are important in your audit.

Species mapping. The same principle of a map based audit can be used for the general mapping of animals, birds and plant-life. A good plan here is to integrate together the mapping of main species. For instance, in non-cropped land such as woodland areas you can integrate the tree species mapping with the main mammal and bird species to be found there. Build into this, the main plant species prevalent there and you have managed an integrated audit of a key area of a farm.

In smaller farming units (even those under one hectare), the boundaries between fields and farms are usually important areas to map during any audit. Boundary areas often contain a diverse mix of plants, trees and wildlife and are an important part of conservation planning for the future.

Greenhouse and plastic house structures can often be stand alone and completely un-associated with the natural features and natural flora and fauna associated with open field production. However, it is still possible to look at conservation here. Consider water catchment during rains. Consider non-cropped areas that can be planted. Consider water run off areas, from in-greenhouse watering. Think also about the encouragement of raptor species as an integrated control measure for rodents. These and many other factors can be included in an audit. It matters not that there may be nothing in place at the time of the audit. What matters is that you are considering these areas of conservation and environmental enhancement and the result of the audit can be positively used in the whole farm conservation plan.

It is expected and understood that some concentrated agronomic units will have little or no boundaries, or area of known conservation interest. However these areas will not be excluded from this section; and instead efforts should be clearly made to demonstrate that management and staff maintain a proactive approach to conservation, and help manage another local area that is suitable and notable for conservation interest. This can take the form of donating time and or money in supporting this initiative; or supporting an existing local conservation group. In some cases it may also be possible for a local area to be developed to maintain local flora and fauna; with a long term plan on how to develop this site. This could be shared with other local Leaf Growers. Whichever strategy is followed it is

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expected that local expert advice is sort to ensure resources used are for the best purpose to enhance the conservation value of the area.

### 6.2/6.3

The Whole Farm Conservation Plan is firmly based on the results of the audit. The audit shows, from an environmental perspective, the natural species and landscape of the farm. The conservation plan that is put in place is a one to five year plan outlining the farm's policy and plan for conservation and enhancement of the biodiversity on the farm.

Clearly, all farms are different. There is no one plan that fits all situations. The plan that you put in place will cover the whole farm.

Some things to consider include;

- Maintaining the habitats that are already on the farm, so as to keep the farm's indigenous diversity of species intact.
- Managing these existing habitats so that invasive species do not take over and destroy the natural balance.
- Maintenance of fire breaks, so that wild fires in the dry seasons do not destroy large non-cropped areas of the farm
- Careful maintenance of ditches, dykes, drains and watercourses so that these important areas allow for the development of diverse flora and fauna, but are not allowed to silt up or clog up and become ineffective in taking water away from cropped and non-cropped areas.
- A phased plantation programme of indigenous species. It is especially important to understand the likely consequences of planting certain species of plants and trees, before embarking on a planting programme. Think about the invertebrate species attracted to plant and tree species. Are these likely to be pests that cause damage crops, or predators that help you manage the pests that are there. You should also consider the growth habits and water usage/root habits of large shrubs and trees. Is the tree likely to shade out the crop? Is the tree deep vertical rooted or shallow lateral rooted? How will this effect crops? Is there any toxicity linked in with the plant or tree being considered for planting. How does this sit with your livestock management? What can be planted at and around outflow areas, which efficiently utilize outflow water leading to less 'pooling'? How can outflow areas been

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landscaped to achieve the same result? Less pooling leads to fewer mosquitoes, so leading to Malaria reduction in many parts of the world.

- Thoughts about a plantation programme that will encourage beneficial indigenous animal species to come on to and multiply on the farm. Use of indigenous species is ideal – consideration can be given for species that are also host plants for beneficial insects.
- Farming activities that, as far as possible, work to conserve the indigenous species on the farm. For instance; spraying activity that ensures insects such as bees are not foraging when sprays are being applied. Land tillage that is delayed until ground nests have been vacated at the end of the breeding season. Solarization as opposed to fumigation.
- In situations where there are reduced possibilities, bird life and use of artificial nests is recommendable. This occupies very little space and has a low cost. Some species may be protected and this is a positive contribution for their survival. Bats and owls are examples of a beneficial species on the farm and can be encouraged using bat boxes and artificial nests.

Where possible, LEAF encourages farmers to use the services of specialist advisors. The input from these experts when the conservation plan is being drawn up, can be invaluable.

- 6.4 Environmental Impact Assessments (EIA) are a prerequisite prior to bringing in virgin or semi-reverted land into your cropping programme. For those farmers who are farming in regions that are governed by legislation that covers conversion of such land into cropping land, then the relevant authorities must be informed and the necessary permissions must be obtained.

All LEAF farmers are required to assess the impact of the conversion of non-cropped land into cropping land. The key is to minimise the negative impact of such a change. There will inevitably be clearance of vegetation and some destruction of vertebrate and invertebrate habitats. There will be the addition of fertilizers, the potential drainage of the site and the exposure of the site to mechanization and tillage.

Farmers can mitigate the impact of such changes, through conservation planning for the new site (Note that all plans for virgin and reverted land that is earmarked to be changed to cropping land, must be approved by the LEAF Technical & Advisory committee PRIOR TO the commencement

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of any activities on the site). The EIA should highlight the conservation disadvantages to the change of use plan. Farmers can then plan to replace and integrate some of the lost habitat, so that the overall impact on the site is significantly less than would have been with the complete removal of the natural habitat.

LEAF recognizes that new lands have to be brought in to the farming plan. However LEAF encourages the promotion of biodiversity on these new lands, as opposed to a complete clearance into a monoculture environment.

- 6.5 It is very important that traditional field boundaries and existing landscape features are neither removed nor destroyed to make way for farming activities.
- 6.6 Aggressive field boundary management must be timed to ensure minimum negative impact on the wildlife species that inhabit those field boundaries.

Examples of how to manage this include:

- The audit of the species that inhabit these boundaries
- The understanding of the importance of the boundaries to these species, at the various stages of the year. So, does a key beneficial invertebrate use this boundary as part of its life-cycle? If so, does cutting back the boundary destroy the invertebrate or its key environment and so limit its effectiveness for you, against economically damaging pests, on your farm?
- The understanding of the importance of the boundary to provide nesting cover for a certain period of the year. Will the activity at the boundary adversely affect that?
- The understanding of the invasion of toxic plants to that boundary and the negative impact that this will have on your livestock if there is no timed control.
- The understanding of the impact of cutting back the boundary, on the food source provided by that boundary; seeds, berries, insects, pollen, nectar etc
- The understanding of the role that boundary has on wind protection and the seasons where wind can damage crops and the quality of the produce from those crops.

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- The role that the boundaries have at the time of flowering, offering a more attractive source of nectar for bees and the dramatic negative impact that this can have on the pollination of the commercial crop.

Impact studies of aggressive boundary management must be made and the appropriate timings and restrictions put in place, before the work is done. This forms part of the conservation management plan and is very much an Integrated Farming Policy.

- 6.7 Water Course Management must also be assessed and timed. Both natural and artificial water courses are natural habitats for wildlife. By dint of the fact that there is usually plenty of water associated with the water course, there is often a rapid growth of vegetation which in turn forms a good natural habitat. Using the same approach that was used to aggressive field boundary management, farmers should understand the impact of water course clearance, dredging and habitat destruction. This must be integrated with the sensible and practical approach to keeping watercourses functional for the prevention of flooding. The most balanced approach involves regular maintenance in line with good water management. Farmers must not burn vegetation to clear the banks of waterways. Wherever possible, waterways should not be completely cleared of vegetation and, where appropriate, vegetation should be allowed to drop seed before it is cut back.

Dried river courses should be considered in the management plan. These areas often are habitats for animal and plant life and should be correctly managed and protected from farming activities.

- 6.8 Mature trees should, wherever possible, be left in situ on the farm. If older trees must be felled, then appropriate licenses must be obtained from the relevant authorities wherever such restrictions are in place. As part of the whole farm conservation management plan, there can be a planned removal of non-indigenous trees, which disrupt the environmental balance, which is offset by an indigenous tree planting programme. Semi-Mature and Mature trees that grow in areas of reverted/virgin land that are being converted to cropped land must be left untouched unless the position of the tree clearly conflicts with the planned farming operation. A clearly written impact assessment must be produced to justify the removal of the tree and provision must be made to at least replace the tree on a one for one basis. Photographic evidence to support the justification to remove a tree would be a sound idea. Protected trees in regional or national conservation areas must not be felled.

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LEAF encourages the planned planting of indigenous tree species on LEAF farms.

- 6.10 Deep cultivations around trees, damage the roots and can lead to the death of the tree. Approximately 90% of a tree's root system (feeder roots etc) is in the top 36 inches of soil. You can get an idea of the radius of the roots on a mature tree from a simple calculation called the Critical Root Radius. So; at a height of 4½ feet (135 cm) from the ground, measure the diameter of the tree (in inches .. where 1 inch is 2.5 cm). Take the result as a figure in inches and multiply the result by 1.5 feet. This gives the Critical Root Zone radius from the centre of the tree. As an example, a tree that is 12 inches in diameter should have  $12 \times 1.5 = 18$  feet radius of critical root zone protection, or a circular diameter around the tree of 36 feet. (1 foot is 12 inches or 30 cm).

With this knowledge a farmer can plan the limit of the cultivations in proximity to the tree. Not all trees are the same, but this general rule gives general guidelines for root protection and should lead to the preservation of a healthy tree in a farming environment. Trees that have been deliberately planted as shade or hedgerow trees can sometimes be a great deal closer to cultivations than this guideline allows for. Identification of these trees in the whole farm conservation plan will lead to planned management of these 'utility' trees.

- 6.11 LEAF farmers must aim to develop and maintain two metre wide undisturbed field margins around all of their field boundaries. However, this is not always a practical option for all farmers. LEAF recognizes that there may be a need to be offer derogations to this 'Must' Requirement.

For Smallholder Farmers who farm in a very traditional way, there can often be no more than the width of a man's foot between fields. In areas of intensive protected production in Southern Europe, very often the only boundary between different farmer's production units are the plastic walls of the two plastic houses.

So, for farmers who have fields no larger than 2 Hectares, there is no need to create this 2 metre boundary.

Where fields are more than 2 Ha, this field margin does need to be created.

The aim of the 2 metre margin is to protect the natural boundary feature from agrochemical and fertilizer contamination, and protect the natural flora and fauna associated with the natural boundary from being disturbed. The margin also provides a 'corridor' for natural wildlife to travel between different areas of the farm.

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This situation is common in South east Spain, where field boundaries are evident on large farms but due to extremely low rainfall no or very little vegetation exists to protect. Irrigation of these areas would not be viable as **water is scarce**. Normally man made reservoirs are present for water storage and may be considered as a conservation area (birds/fish/reptiles plantings on side walls) in substitution of the 2 meter strip. However where there **is something to protect** – example of boundary with dried river course, the 2 meter strip is obligatory.

LEAF requires a farmer to preserve the natural boundary and, where appropriate, plant new boundaries and tree-lines.

However, there will be some farms, for instance in North Africa, where there are no natural boundaries to fields over 2 Hectares. Whilst LEAF encourages a farmer to create natural boundaries and the associated boundary strips (as part of the conservation development plan) it may often be inappropriate to do so. LEAF can, in these cases, consider issuing a derogation to the rule (Margin Offset) if the farmer can demonstrate that a suitably sized conservation area, planted with indigenous species, has been created and managed elsewhere on the farm. A target area for a suitable sized conservation area should be equivalent to the area that would have been put aside to the 2 metre strip along the margin of each field in excess of 2 Hectares.

- 6.12 Where field margin strips exist, they should be managed naturally. There should be no additions of pesticide or fertilizer. Irrigation can be applied if it is appropriate to do so. If the natural growth of grasses in the wet season, leads to a fire hazard in the dry season, then grasses and other dried plant material should be cut back and bundled after seed has been shed. Noxious plants growing in these areas can be dealt with through spot treatment using an approved herbicide, but LEAF farmers are encouraged to use other methods where at all possible, BEFORE reaching for a herbicide.
- 6.14 As outlined
- 6.15 As prescribed
- 6.16 The 2 metre field boundary and the boundary itself, is designed to be a non-interfered with area (other than the general maintenance previously mentioned). This must be clearly indicated and clearly communicated in the Whole Farm Conservation Management Plan that you have undertaken at the farm.

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This should take the form of a clear directive from the farm management to all people who work on the farm.

- 6.17 LEAF farmers are encouraged to be sympathetic towards features of historical importance on their farms. In some countries, the local, regional or national authorities will have placed restrictions on the farming activities that can take place at or around these features. LEAF expects farmers to abide by these restrictions. In other countries, LEAF farmers are expected to recognize and map out these features and make reference to them in the Whole Farm Conservation plan. These features must not be destroyed or interfered with in any way.

Examples include historical; water channels, buildings/ruins, settlements. Historical could be interpreted as more than three generations back.

- 6.18 LEAF farmers are encouraged to allow flora and fauna to thrive on non-cropped land, rather than take the option of land clearance. This has the benefit of encouraging a bio-diverse environment as well as holding soils together to limit erosion.
- 6.19 If, as part of your conservation plan, you map out the bird and animal species that live on your farm, you can get an idea of when these species will be fixed to one spot for nesting, breeding etc. LEAF requires that you recognize this and adjust/modify farming activities as much as possible to avoid disturbing/killing these species. It is a question of identification, marking up and avoiding areas of the farm at any given, critical time. Through the provision of suitable habitats in non-cropped areas of the farm, this issue can be mitigated

Some annual crops may be present during the nesting period or are been harvested, this should be documented (crop planning) and included in the conservation plan and compensated using the provision of other suitable habitats in non-cropped areas of the farm. Pruning of some Fruit Tree crop species should be considered and adjusted to avoid disturbance of nesting species as orchards provide a valuable habitat of all bird species.

- 6.20 As recommended  
6.21 As recommended  
6.22 As recommended

- 6.23 On the basis that few landlords will be LEAF MARQUE accredited, it will generally fall to you the farmer to carry out the environmental assessment of the land. The land should be brought into your Conservation Management Plan, but the activities that you plan should be commensurate with the length of the lease. So, the land should be farmed sympathetically with your whole farm Integrated Farm Management plan,

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but LEAF encourages you to be pragmatic with expenditure. When the land reverts back to the landlord, it should be in an enhanced environmental state compared to when it was leased out.

- 6.24 LEAF farmers should not restrict nor prohibit the movement of people across their land, where the people have a traditional or legal right to move across that land.
- 6.25 As recommended
- 6.26 As recommended
- 6.27 As recommended. Clearly, if you have adopted IFM and have become LEAF MARQUE accredited, you need to clearly direct the IFM policies that need to be adopted by any tenant for the period of the lease.

### 7.0 Animal Husbandry and the Environment

- 7. 1 The efficient utilisation of grassland and forage crops is a key element affecting grazing livestock productivity and profitability. Planned grazing management should help to ensure a supply of good quality forage while helping to minimising poaching and soil erosion/runoff. Particular attention should be given to strip grazing where regular movement of an electric fencing is required so as to reduce poaching and the risk of soil erosion/run off. Grazing under wet conditions can result in poaching, increasing sward deterioration, increasing the risk of compaction, generating runoff and soil erosion. The removal of livestock either temporarily or permanently from areas, which are sensitive to erosion should be considered. This could include fencing riparian areas, relocating feed/water troughs to hardened areas and provision of shelter away from steep slopes or wet areas. The installation of purpose-built livestock tracks can also reduce the amount of poaching and provide improved access to grazing areas.
- 7.3 To reduce the risk to wildlife, cutting operations should be undertaken from one side of the field to the other or cutting form the middle of the field outwards. Try and reduce the number of operations so as to reduce disturbance to wildlife, particularly ground nesting birds.
- 7.4 Slurry storage facilities should be capable of storing a minimum of 4 months including rainwater. (this maybe greater within nitrate vulnerable zones) Slurry tanks must have a minimum freeboard of 300mm while earth banked slurry lagoons must have a freeboard requirement of 750mm. Storage capacity must be sufficient to avoid pollution. All new stores In the UK new or substantially enlarged or altered structures since Sept 1991 must meet the requirements of the Control of Pollution (Silage Slurry and Agricultural Fuel Oil) Regulations 1991 (as amended).

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or relevant legislation in other countries.

Even small amounts of silage effluent has the potential to cause significant pollution. All silage effluent should be stored and disposed of safely. For silage made in silos, a silage liquor tank with a capacity 20 litres per cubic metre of silo capacity (up to 1500 cubic metres and then an additional 6.7 litres per cubic metre thereafter) should be provided.

It is essential to plan the handling and use of manures on a farm. This will ensure that good use is made of the nutrient content and organic matter in manures and that the risks of causing environmental pollution are minimised. Defra's Code of Good Agricultural Practice for the Protection of Water provides guidance on how to prepare a Manure Management Plan. This plan will help in deciding when, where and at what rate to apply solid manures, slurry and dirty water thereby reducing the risks of causing water pollution and transfer of pathogens to water. You should regularly review and refer to your manure management plan before applying manures.

When planning manure and slurry systems, information is needed on the quantity and nutrient content of animal manures produced on a farm. Exact specifications and design depends on a number of factors, including the number and type of livestock, the diet and feeding system, the volume of dirty water and rainwater entering storage facilities, and the amount of bedding used. Although the volume of manure to be managed will vary considerably with the amount of water introduced into the system (often doubling the volume of slurry to be handled), estimates of the quantities of excreta produced by livestock is a useful basis for planning purposes.

- 7.5 Adequate storage of animal manures and slurries is essential so as to avoid polluting surface and groundwaters. Where less than 4 months storage is provided, a manure management plan should be prepared to make sure that the lower capacity is sufficient to avoid pollution. Organic manures can present a considerable environmental risk if not handled carefully, however they are valuable sources of organic matter and plant nutrients which can result in large fertiliser savings. Manure management plans should be used in conjunction with a nutrient management plan and regularly reviewed.
- 7.6 Dirty water is an effluent consisting of water contaminated by manure, urine, cleaning material, crop seepage and other waste products. It is potentially up to 10 times more polluting than domestic sewage and causes a large proportion of farm pollution incidents. It must be collected and disposed of without causing pollution. Water pollution by dirty water

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can be avoided by ensuring sufficient storage and choosing the correct system for its disposal. One of the guiding principles of slurry and manure management is to cut down on the volume of dirty water and the need to handle it. Buildings that are not fitted with gutters result in clean water discharges onto dirty yards. Run-off from clean areas needs to be intercepted prior to flowing onto dirty areas. Many farms have drainage systems taking both clean and dirty water, increasing the volume that needs to be collected, stored and disposed of safely. Action taken to separate clean and dirty water will help reduce both the costs of storage and application.

- 7.7 Grazing livestock and associated activities play a key role in the maintenance of many semi-natural habitats including grassland, heathland and pasture-woodland. The avoidance of under or over-grazing (well managed grazing) in general can deliver environmental benefits. Cattle and mixed grazing will produce a more diverse sward structure of plants, invertebrates and birds. Sensitive habitats that can be damaged by livestock access and grazing e.g. woodland and riparian areas should be identified in your Whole Farm Conservation Plan and appropriate action taken to protect these areas.
- 7.8 A health plan demonstrates how you intend to manage your animals health. The health plan should demonstrate how to prevent, reduce the risk of introducing disease and recognise, treat and control existing conditions so as to keep livestock healthy. A health plan should be developed in conjunction with your vet. It is important to keep records and review the progress of the health plan at regular intervals. Further information can be found at [www.defra.gov.uk/fhp](http://www.defra.gov.uk/fhp)
- 7.9 It is important to regularly review (at least on an annual basis) animal health and welfare issues with your vet. Good records form the basis for reviewing any herd/flock health plan, these may be recorded in a diary or preferably as computer records. A good farmer-vet relationship is important as this will help to make sure progress against the initial targets set out in the health plan are being achieved. This will help to ensure herd/flock performance is improving. The review also presents an opportunity to amend the existing plan in the presence of new challenges.