1.0 Waste Management

1.1 INTRODUCTION TO WASTE MANAGEMENT

Waste is generated in many different ways. It could be the packaging housing a pair of golf shoes in the pro shop or grass clippings from the cutting of a golf green. Waste in most cases could be avoided or minimised. Although we may think of waste simply as a by-product of life, it is of increasing environmental concern and a major form of unnecessary pollution. The lack of maintenance of a machine resulting in an oil spillage on the course, for example, not only represents a waste of oil, but is a potential pollutant causing unnecessary frustration and cost to the club.

This Waste Management Toolkit is designed to provide an indication of the types of waste generated by golfing facilities and, issue by issue, addresses appropriate management options. It is set out in a way that highlights the legislation that applies to different issues and suggests good or best practice which could be adopted by golf clubs beyond or in the absence of specific legislation.

We all have a serious responsibility to avoid generating waste and to manage what we do create in a sustainable manner. The good news is that implementing an effective waste management strategy can bring about major financial savings and an improved business (and playing) environment.

A waste minimisation management programme can often be achieved at low or no cost via simple operational procedures and changes to existing practices. Minimising waste can save time and financial outlay, improve the efficiency through all aspects of the golfing facility whilst demonstrating a positive commitment to improving the local and global environment.

Benefits

The Environment

- Efficient use and re-use of raw materials, energy and water means that the golf club can help protect our global resources.
- A significant reduction in pollution to local water and air will help create a more pleasant environment in which to live and play golf.

The Golf Club

- Cost savings
- Increased efficiency over all areas of the business
- Time savings
- Elevated status/prestige
- Staff motivation and job diversity
- Potential additional funding
- Reduced liability
- Meet members/stakeholders' expectations

It is essential that in every aspect of golf course management environmental best practices are demonstrated. Only through such measures will golf's social image improve and its contribution to conserving our dwindling countryside resources be fully recognised.

High quality habitat conserved by the presence of Mortonhall Golf Course in the Edinburgh Green Belt.

1.2 PRINCIPLES OF WASTE MANAGEMENT

1.2.1 WASTE HIERARCHY

The Waste Hierarchy model (see below) provides an effective way in which we can prioritise and deal with waste. The top level provides the preferred option with least environmental impact and maximum cost saving potential. Safe waste disposal should form a last resort, **only** when no other option is available.

1. **Eliminate/Minimise (Waste Prevention)** - Careful purchasing and resource monitoring will help prevent waste. Accurately determining the extent of mown turf for example may provide scope to increase the extent of infrequently managed rough, so generating further savings on fuel, labour, grass or other vegetation waste.

2. **Re-use and Refurbishment** - Major re-use and refurbishment opportunities exist in the management of end of life machinery parts and electrical and electronic equipment. The Recycling Advisory Group Scotland (RAGS) promotes these types of activities in small businesses throughout Scotland and can offer advice (see Section 5.3).

3. **Recycle and Compost** - Recycling and composting are the primary means of maintaining the value of end-of-use materials. Within the golf course environment composting is a viable and practical option for reclaiming value from organic waste. As the National Waste Strategy (see Section 1.3.1) is developed throughout Scotland, more and more recycling sites and waste collection services are likely to become available as technologies for retrieving value from waste products improve.

4. **Disposal** - At the bottom end of the Waste Hierarchy is safe disposal. Although this remains the least desirable option and indeed the most costly due to increasing landfill charges, significant progress is being made in developing better engineered landfill sites offering improved recycling and disposal opportunities. Attention is also being given throughout Scotland to managing hazardous waste arriving from small businesses, such as golf clubs, as a means of ensuring that landfill wastes are safer and more sustainable.

1.2.2 RESOURCE CONSUMPTION AND ENERGY EFFICIENCY

Plan for efficiency

The average Scottish golf club spends £15,000 each year on energy in one form or another (2003). It is estimated that around 15-25% of this cost is wasted through inefficient systems and poor planning. Overall the UK golfing sector spends around £56 million per year on energy and this relates to 800,000 tonnes of carbon dioxide (a major pollutant and significant factor in global warming) being released into the atmosphere. It is therefore crucial that we all as individuals, golf clubs and the industry as a whole do our utmost to conserve energy for the good of the global environment and the financial and future well-being of the business.

This can only be done through thinking about the products we buy and how we use them.

A clubhouse is a resource-intensive operation requiring heating and lighting. The office uses power to run computers, copiers and printers and paper to print on. A catering and bar service is often available, both for members and special functions, requiring energy, raw materials and other consumables. Water is needed for toilets, showers and for catering. Food, raw materials and pro shop stock arrive with a considerable amount of packaging which, if not re-used or recycled, generates disposal costs.

Appropriate planning prior to purchasing anything from pesticides to printer paper will be important in preventing waste. This is particularly relevant when considering products that have a limited lifespan such as oils and chemicals and which must be classed as hazardous waste when disposed of. Even simple tasks such as re-using the back of waste printer paper will cut the need for buying note pads; closing external doors will prevent heat loss; water usage can be reduced within the clubhouse by placing volume reducers in cisterns and fixing leaks on taps. Out on the course substantial savings can be made by installing 180° sprinkler heads, modernising irrigation systems to only apply enough water to replace water lost via evapotranspiration or converting inefficient fuel engines to electric.

Cost benefits

Opportunities to save money and help the environment are being realised across the country by focusing on waste minimisation.

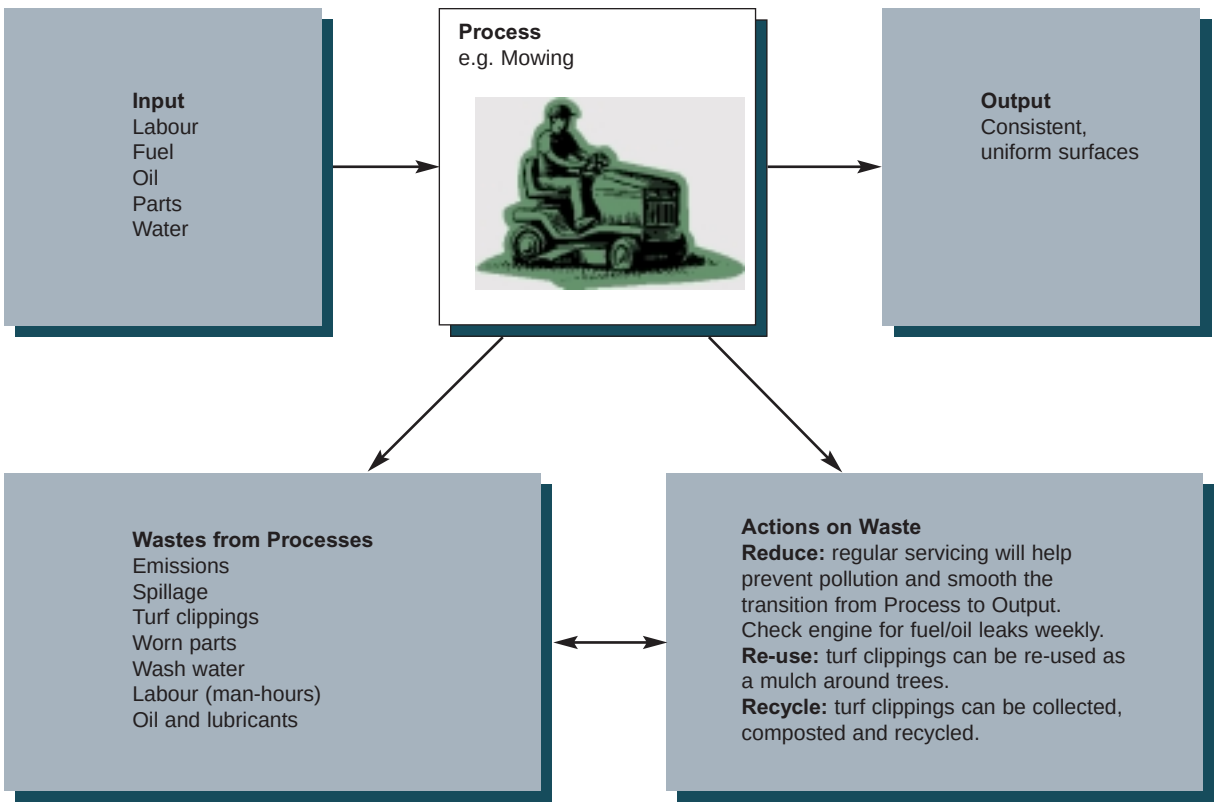
Most golf clubs do not know how much they actually waste and could make considerable savings at little or no cost. When assessing waste, it is important not just to count the disposal cost, but also to include the wasted raw materials, consumables, water, energy and effort. It has been estimated that you can save as much as £1000 per employee through the effective use of raw materials.

Good housekeeping is often all that is needed to make substantial savings in water use, and the more water you use to start with the greater the potential savings through cutting back. If you don't have a water meter it is worth assessing whether installing one would be a viable option towards reducing your water and waste charges and to make sure you get the most benefit from savings you make.

Savings can be made throughout the clubhouse on energy used for lighting, heating and ventilation. In catering operations, simple and cost-effective measures can typically reduce fuel bills by 20% or more. For offices too, the same holds true: taking a few simple steps can lead to big reductions in energy use. For example, it is possible to reduce energy costs for some office equipment by 90% through measures that cost nothing to implement.

1.2.3 INPUTS, PROCESSES AND OUTPUTS – REDUCE / RE-USE / RECYCLE

Every operation must start with an input, i.e. the energy or resources required to do work. The resulting process will (hopefully) lead to a successful and desirable outcome (output). Along the way there will be many possible areas where waste could be generated. A few of these have been shown as 'Wastes from Processes' in the diagram below. These will generate possible "Actions on Waste" either during or after the operation. Such a scheme as represented is easy to follow and it links well into the Waste Hierarchy of "Eliminate, Reduce, Re-use, Recycle, Dispose" illustrated on page 3.



Remember this important model which can be used to assess waste in all operations involved in the running of the golf course facility.

1.3 RELEVANCE TO GOLF

Scotland is recognised as the worldwide home of golf and is a source for inspiration and guidance to the rest of the world. The potential for the Scottish golfing sector to be a leader in sustainable development and waste management is therefore great. Golf brings over 100,000 visitors to Scotland each year and £177 million to the Scottish economy through tourism, employment and merchandising. There are over 580 golf facilities in Scotland (including 80 new courses built between 1990 and 2000) supporting 500,000 players.

Scottish golf is a game that relies on peaceful, beautiful surroundings in order to maintain its standing at the top of the world game. Inappropriate disposal of waste can destroy this environment both locally via direct malpractices, such as tipping oil into water bodies and globally by inefficient machinery emitting excessive levels of harmful pollutants into the atmosphere. It would be a shame indeed if one of the major lures of Scottish golf was damaged through simple bad management practices.

Through positive action on waste all clubs have it in their power to make sure this does not happen.

The waste produced from the golfing industry is significant, and addressing it effectively will require that appropriate planning and management is adopted at each level and with each operation. Another important point can be the bad press golf often receives from good-willed yet often ill-informed members of the public. Efficient waste minimisation and management will not only save the golf club money and ensure compliance with current environmental legislation but should also improve the standing of the entire sector.

1.3.1 THE NATIONAL WASTE STRATEGY

Produced by the Scottish Environment Protection Agency (SEPA), the 'National Waste Strategy: Scotland' is a framework within which Scotland can work to reduce and properly manage the amounts of waste produced. The strategy is also the means by which the waste management planning requirements and targets in a number of European directives are implemented throughout Scotland. 'The Waste Framework Directive', 'The Hazardous Waste Directive' and the 'Packaging and Packaging Waste Directive' are important European legislative documents that must be adhered to.

The National Waste Strategy sets out best practice guidelines to ensure compliance with European and UK law for both the commercial and residential sectors. The main aims of the strategy are to:

1. Ensure that waste is recovered or disposed of without endangering human health and without using processes or methods which could harm the environment;
2. Establish an integrated and adequate network of waste disposal installations taking account of the best available technology not involving excessive costs; and
3. Encourage the prevention or reduction of waste production and its harmfulness.

The aim of the strategy is to encourage more effective use of natural resources through greater efficiency, waste minimisation, recycling and increased value of waste recovery.

1.3.2 POLLUTION PREVENTION

Sustainable waste management is not only about saving money or recovering value through spent products. Efficient purchasing and waste minimisation throughout Scotland (and indeed the world) will play a central role in conserving an environment which people and wildlife can happily share in the future.

Pollution may be **obvious** (oil in water) or **diffuse** (exhaust gases) or may indeed be more subtle and of seemingly little concern to the routine functioning of the golf club.

People sometimes believe that *'the solution to pollution is dilution'*. Although this statement may be true in many scenarios, it does not provide the answer to all problems. For instance, adding copious amounts of water to an oil spillage will not 'dilute' the oil and its effects, it will merely spread them over a wider area. This is also true for exhaust gases where their release into the wider atmosphere is, as we all are starting to appreciate, generating longer term environmental problems.

Some forms of waste are more obvious than others, such as oil leaks. Careful attention to waste prevention will improve the running of the business whilst conserving environmental quality.

1.3.3 CALCULATING YOUR WASTE

A detailed inventory of all **inputs**, **processes** and **outputs** is essential to the efficient running of any business, particularly those run on tight budgets such as golf clubs. Regular, thorough auditing will give a clear picture of expenditure on products, their efficiency and the cost of disposal after use. Checklists of all pesticides, fertilisers, machinery, office supplies and water usage should be produced as standard practice. SEPA estimates that inefficient waste management accounts for an average of a 4% loss in revenue in small businesses throughout Scotland, arising directly from not appraising the resources within the business.

A detailed analysis of the necessity for all purchases should be made prior to acquisition. Pesticide and fertiliser use is an obvious issue here but even with smaller matters such as paper consumption and rechargeable batteries, careful planning can save the club finances in both usage and appropriate disposal.

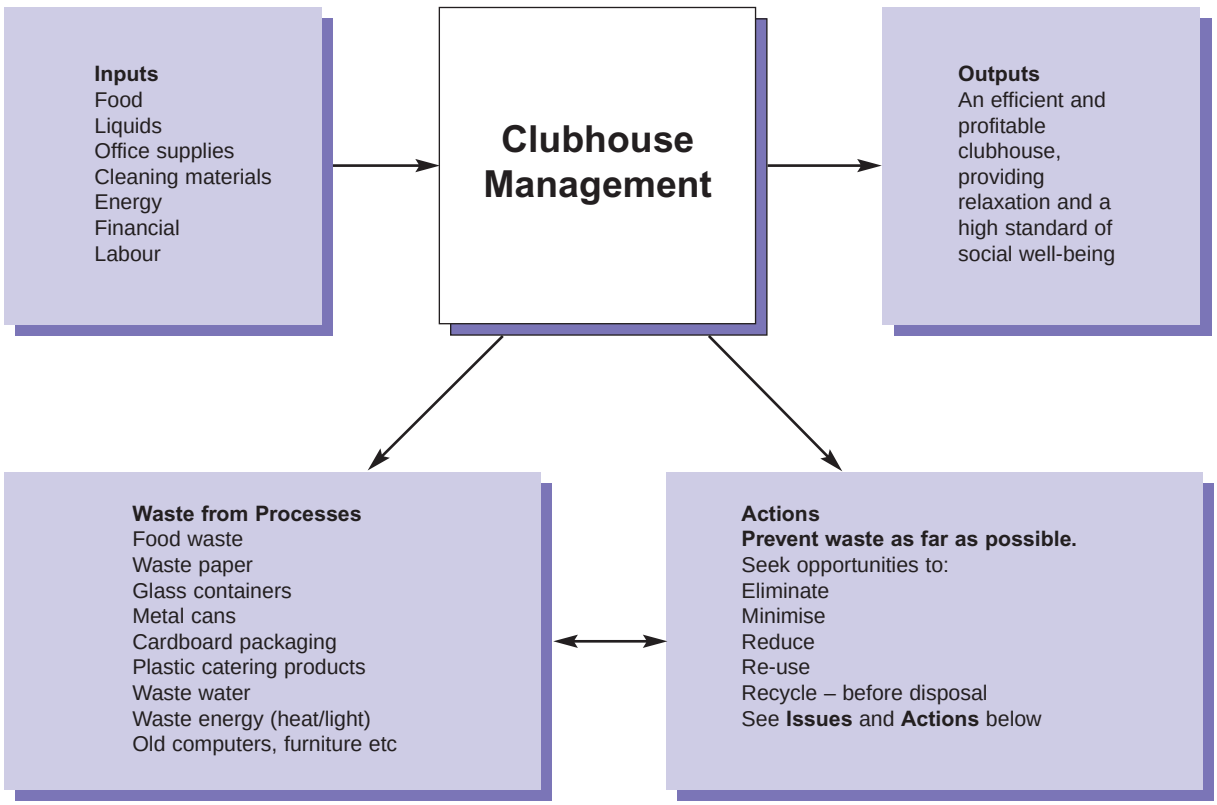
2.0 The Clubhouse

INTRODUCTION

Clubhouses vary enormously in the facilities they include, from small, unoccupied buildings, to large scale facilities and luxury hotels. This section focuses on areas where opportunities to cut waste and reduce energy and water use are most likely to arise in:

- Offices
- Toilets
- Locker rooms
- The kitchen
- Bars and restaurants
- Function suites and conference rooms
- The pro shop

The more resources the clubhouse uses, the more opportunities there will be for savings. However, even if the clubhouse does not include all the facilities listed above, considerable benefit and cost savings can be derived from making best use of your energy, water and raw materials.



2.1 GENERAL WASTES

2.1.1 SOLID AND LIQUID WASTES

Introduction

General waste may, for convenience, be categorised as solid or liquid. In the clubhouse examples of solid waste may include paper and other packaging products and a range of items discarded or used within the kitchens and catering areas. Liquid wastes include a variety of substances ranging from paints to alcohol, milk or contaminated (used) water. Some liquid waste will simply and acceptably be disposed of through the domestic drains and treated in the public sewage system before residual discharge into the wider environment. However, for some liquid wastes, greater consideration and more appropriate actions may be required.

There are many opportunities to reduce all forms of waste and save money in the clubhouse and pro shop. Most golf clubs do not know how much they actually waste. When you consider the value of raw materials, energy and wasted labour, the real cost of waste is often 5-20 times the cost of disposal alone.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

It is illegal to discharge materials such as paint, beer, vegetable oil, etc. directly into public sewers without discharge consent. Non-compliance could lead to enforcement action. If unsure, contact Scottish Water with regard to discharges into public sewers or SEPA for discharges into privately owned treatment works or surface water catchments (see also Section 2.2).

Consider your legal obligations, particularly the *Duty of Care Regulations*.

Duty of Care for Waste

The golf club has a statutory Duty of Care for waste, which means it must take all reasonable measures to:

- Prevent the unauthorised or harmful disposal of its waste by another person;
- Prevent the escape of waste;
- Make sure that when transferring the waste:
    - the transfer is only to an authorised person; and
    - there is transferred a written description of the waste that will enable the other person to comply with their own Duty of Care.

The Duty of Care applies to all waste produced by the club and requires that you ensure all waste is stored and disposed of responsibly, that it is only handled or dealt with by individuals or companies that are authorised to deal with it and that a record is kept of all waste received or transferred through a system of signed Waste Transfer Notes. **You should keep copies of these for <u>two</u> years**. Your disposal company may decide to reduce the paperwork and issue an annual transfer note.

The Duty of Care has no time limit and extends until the waste has either been disposed of or fully recovered.

COSHH (Control of Substances Hazardous to Health) Regulations

Hazardous materials purchased or used must be listed and provided with a hazard data and a safety data sheet - make sure you have a copy of each. You can use these to identify possible concerns about use, disposal or what to do if there is a spillage. For further information, contact your supplier. This data is needed to ensure you comply with health and safety legislation, particularly *COSHH Regulations*.

Special Waste

Additional regulations apply to 'Special Waste', which is potentially hazardous or dangerous and may require extra precautions (*The Special Waste Regulations 1996*). At most a small proportion of waste produced in the clubhouse is likely to come under Special Waste Regulations. Examples of Special Wastes include solvent-based paints, solvents, lead acid batteries, fridges, used oil and oily sludges.

If you have Special Wastes, they must be tracked by SEPA through a consignment note system to ensure that they are responsibly managed from their point of origin until they reach a suitably licensed or exempt facility to be recovered or disposed. **You have to keep the paperwork for <u>three</u> years!**

Currently subject to a number of slight legislative differences, from 1 July 2004, the legal definition of "special" and "hazardous" wastes will be the same.

Issues	*Actions you can take*
Eliminate	**Avoid producing waste in the first place** • Eliminating waste through careful purchasing and better utilisation of materials is the best way to make savings in your waste costs and to reduce the impact on the environment.
Reduce	**Minimise the amount of waste you produce** • Where waste cannot be eliminated completely, try to reduce the amount generated. For example, can you cut the number of sheets of paper used by photocopying on both sides?
Re-use	**Use items as many times as possible** • Don't assume because something has been used once, it's of no more use. For example, can empty bottles be returned to the brewery for re-use?
Recycle	**Recycle what you can only after you have re-used it** • Recycling need not cost you money - it can generate income. Some schemes give money to charity. Either way, it will be cheaper and more environmentally beneficial than disposal. For example, if you have a lot of waste cardboard, check for local companies who will recycle it. **OBLIGATION**: Where materials are recycled by a third party, a Duty of Care applies.
Dispose	**Dispose of what's left in a responsible way** • Know and understand the key legislation and avoid any problems with non-compliance. Be aware of who takes your waste and keep documentation relating to it. **OBLIGATION*:*** You have a legal obligation to follow a Duty of Care, and if you have Special Waste you will have further obligations. See legislation text at the start of this section and in Appendix 1.

2.1.2 PURCHASING

Introduction

There is a strong link between what you buy and the amount of waste you produce. Before you buy any product ask yourself the following questions:

• Do I need to buy it?

• Is there a better or less wasteful approach or alternative?

• Am I buying more than we need?

• Is it heavily packaged?

• Can it and/or the packaging be re-used/returned or recycled?

The store room - a good place to start an assessment of purchasing practice in the clubhouse.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

At the time of writing, no specific legislation applies, although consideration should be given to your *Duty of Care Regulations*.

Issues	*Actions you can take*
Do I need it?	**Perhaps not...** • Before confirming catering arrangements for meetings or functions, confirm the numbers attending - most people over order. • Rather than replacing old or damaged furniture, see if it can be renovated. This can save up to 50% of the cost of new products. • If you have to make presentations, reduce the cost of paper and expensive overhead acetates by using a computer-based package, if you have one.
How much should I order?	**It can be a balance...** • Don't order more than you need. • But if you know you will use it, combining orders or buying in bulk can be cheaper and can also reduce packaging waste.
Consider the product itself	**Choose products with waste minimisation in mind** • Can the photocopier/printer copy/print double-sided? • Does the printer use a refillable/recyclable ink cartridge?

Coffee time	**Avoid disposables** • Use 'real' cups rather than disposable ones. Many vending machines can take china mugs.
Battery powered	**Apart from lead acid (vehicle) batteries, very little battery recycling is available in the UK. The energy needed to make batteries is 50 times greater than the energy they give out.** • Use mains power when possible. • Otherwise, use rechargeable batteries and a charger.
Disposing of batteries	**Refer to Section 3.5**
Buy second-hand	**It can save a lot of money** • It is much cheaper than new, and benefits the environment. • If there is no local second-hand shop, consider buying via the Internet.
Transport miles	**Reduce where possible** • Source locally from local producers and manufacturers. • Restrict regular suppliers to fixed days to reduce the transport miles incurred in frequent or ad hoc deliveries.

2.1.3 PAPER

Introduction

In 1998, the UK used 12.5 million tonnes of paper and cardboard. Contrary to rumours of the 'paperless office', paper consumption is currently rising by 20% each year. The cost of buying and disposing of paper can easily be brought down through reduction, re-use and recycling. Cutting paper waste and using recycled paper wherever possible will also help conserve natural habitat and reduce damage to water tables due to intensive tree farming, high chemical and energy use in manufacture, and the effects of landfill.

Filing made easy!

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

Duty of Care applies to paper waste, as it does to all waste, and therefore will apply to you. The Duty of Care requires that you ensure all waste is stored and disposed of responsibly, that it is handled or dealt with by individuals or companies who are authorised to deal with it and that a record is kept of all waste received or transferred through a system of signed Waste Transfer Notes.

For repetitive transfers, there is provision to use a 'season ticket', in other words, one transfer note which will cover multiple transfers over a given period of time of up to 12 months. The use of a season ticket is permissible where the parties involved in each transfer do not change and where the description of the waste transferred remains the same.

Issues	*Actions you can take*
Don't use more than you have to	**When printing or copying:** • Don't make unnecessary printouts or copies. • Use both sides of the paper if you can. Where you can't print/copy double-sided, keep waste single-sided paper for use as rough paper. • Put posters near printers and photocopiers reminding staff not to print unnecessarily and to use double-sided printing/copying. **Cut the number of copies of documents** • Use a centrally placed board for messages. • Use a central filing system. • If you send documents to a number of staff, use routing slips and/or reusable envelopes rather than several copies. • Avoid overproducing marketing and publicity material by reviewing distribution lists and regularly updating databases. **Let email work for you** • Email can save postage, effort and paper. Make sure your staff are comfortable with new technology and provide training where necessary. • Encourage staff not to print out emails unless absolutely necessary. Use an electronic filing system, and back it up electronically. • Offer club members the chance to get communications by email, and include a statement requesting electronic addresses on written correspondence. **Stop junk mail** • Cancel unwanted publications. • Register with the Mail Preference Service (**www.mpsonline.org.uk**, 020 72913310) to stop junk mail. **Stop unwanted faxes** • Set up fax machines so they don't print unnecessary header or report sheets. • Register with Fax Preference Service to stop junk faxes (**www.fpsonline.org.uk, 020 72913330**). • Get rid of fax cover sheets by using a rubber stamp to specify recipient, etc. • Some computers can send faxes directly, without you having to print them.

Re-use paper to cut purchase costs

Don't bin it: use it!

- Waste paper printed on one side only can make good scrap pads.
- Envelopes can often be used again for internal use within the club.
- Old forms and letterheads can also be used for scrap pads.
- Donate surplus card or paper to your local school or nursery.

Support recycling

Use recycled paper

- Aim to buy paper and envelopes with a 100% recycled content.
- Ask your supplier if they stock locally produced recycled paper. Paper can be recycled up to 5 times, reducing the environmental impact of paper production, and moreso the fewer transport miles involved.
- Make sure service and maintenance warranties are not adversely affected by using recycled paper. There is no valid reason why they should be.
- Buy recycled toilet paper.

Recycle - it can save you money

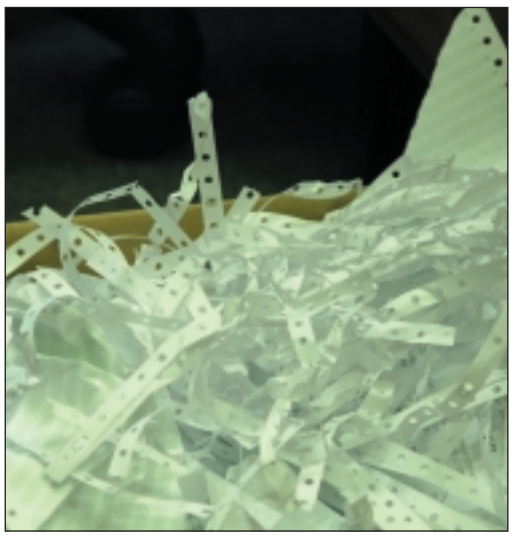
- It is often cheaper to recycle than to pay to have waste disposed of. Check the Yellow Pages for details of paper recycling companies in your area.

Make it easy for people

- Make paper recycling bins widely available in places where paper will be generated (e.g. beside printers and photocopiers).
- Promote the scheme to staff by putting posters around the office and on bins, explaining the types of paper that can be recycled.
- Use paper ream lids as additional desk top collection trays.
- Make sure any cleaning staff support the recycling scheme and that emptying the recycling bins appropriately is part of their contracted work.

Consider what goes into waste bins. Try to get out of the habit of throwing out everything together.

Start with a box next to your desk for temporary storage of paper which can then be transferred to a central storage point for recycling.



Central facility for the temporary storage of paper, card and other packaging waste - St Andrews Links Trust. Well planned collection and storage help minimise uplifts.

Measuring paper consumption

1. How much does the club use (weekly/monthly)?
2. How much could be saved?

2.1.4 PACKAGING

Introduction

A wide variety of packaging materials are encountered in the clubhouse and pro shop, including paper, cardboard and plastics. It is your legal responsibility to dispose of packaging which enters and leaves the clubhouse as waste under your Duty of Care. When looking for opportunities to reduce packaging waste costs, it is important to recognise the true cost of waste. This includes not just the disposal cost, but the cost of the raw material and any other processing and handling costs that have gone into it.

This section contains examples of actions you can take to minimise your packaging waste.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1.*

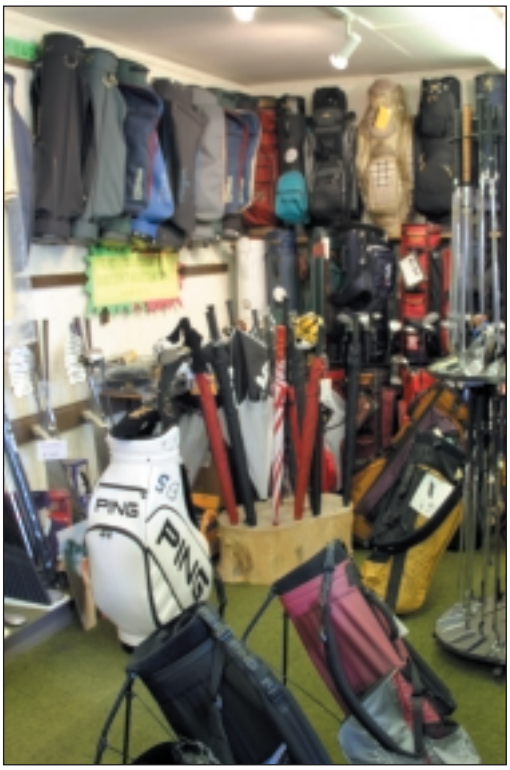
The packaging regulations came into force in 1997 and will apply to you if in the previous year your club handled (= supplied to customer) more than 50 tonnes of packaging or packaging materials (this does not include that disposed of by the club pre-sale) AND your annual turnover was more than £2 million. Whilst it is unlikely that the clubhouse/pro shop will be obligated under the regulations (summarised in Appendix 1 to this report), it is worth being aware of them. Further information can be found at: **http://www.sepa.org.uk**

Issues	*Actions you can take*
Purchasing	**Less packaging**
	• When you receive goods, consider where packaging could be reduced or eliminated, while still maintaining the integrity of the goods.
	Any changes will benefit both the club and your supplier.

	Re-usable packaging
	• Ask your supplier to send goods in returnable containers where possible, and return them.
	• Ask your supplier if they are able to take empty packaging back when they deliver new stock.
	• It may be possible to return empty bottles in the packaging that they were delivered in.
	• Packaging from external sources may be appropriate for re-use internally.
	Is it damaged?
	• Check that neither the goods nor the packaging is damaged. If it is, contact the supplier to discuss transport and handling to make sure it doesn't happen again.
Unpacking	**Remove packaging carefully**
	• Opening packages carelessly can damage potentially re-usable packing cases.
	Is it difficult to unpack?
	• You should be able to remove the contents easily. If problems occur, discuss them with your supplier.
Manufacturer's Instructions	• Always follow the manufacturer's instructions for storing, re-using, recycling or disposing of packaging.
	• If you don't have enough information, contact your suppliers.
Re-use	**Consider options for re-use**
	• Always follow the manufacturer's instructions for re-using.
	Keep records
	• Monitor how much packaging arriving at the club is being re-used and how much is being sent for disposal.
Recycle	**Recycle what you can only after you have re-used it**
	• Recycling need not cost you money - it can generate income. Some schemes give money to charity. Either way, it will be cheaper than disposal.
	OBLIGATION: A Duty of Care applies.
Dispose	**Compress materials such as cardboard**
	• Flatten these to fit more in your bins. Empty boxes can easily take up over 20 times more volume than squashed or folded ones. Don't pay to dispose of fresh air!
	Dispose of what's left in a responsible way
	• Know the key legislation and avoid any problems with non-compliance.
	OBLIGATION: A Duty of Care applies.
Pro shop	**"Outbound" packaging at point of sale**
	• Use most appropriate types of packaging to minimise excess.
	• Ask the customer whether packaging is actually required. Does a packaged item need a carrier bag too?
	• Purchase recycled or sustainably-produced packaging and consider its decomposability.

Recoup provide an easily navigable website offering valuable information on regional plastic recycling and reprocessing facilities, buying and selling bottles together with a resource library of information and advisory leaflet downloads.

Contact: www.recoup.org



Assess options for minimising packaging and other wastes through all areas of the clubhouse and associated facilities. The pro shop can be particularly pro-active on this action.

2.1.5 RECYCLING

Introduction

Recycling is an increasingly popular option for dealing with waste. However, while it is definitely preferable to landfilling waste, it should only be considered after elimination, reduction and re-use options have been considered. Re-use cuts purchase and disposal costs. Recycling primarily cuts the cost of disposal.

By recycling as much as possible you can reduce your office disposal costs significantly, particularly as the cost of disposal is increasing due to increases in landfill tax. Recycling often costs less than disposal to landfill, particularly if you segregate your waste. There are recycling opportunities throughout the clubhouse, including redundant furniture, glass, cans, office equipment, paper and cardboard from packaging in the pro shop. This section and the links at the end of it can help you get started.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

As with all waste a Duty of Care applies. See also legislation pertaining to the recycling of lead acid batteries.

Issues	*Actions you can take*
Purchase with recycling in mind 	**Can it be recycled?** • Does it display a recycling logo? • Are its components easy to separate for recycling? • Is its packaging easily recyclable? **Is it made of recycled material?** • What % of recycled material does it contain? • Are 100% recycled goods available?
Paper	**See Section 2.1.3 on paper for guidance.**
Toner cartridges	**Buy recycled** • High quality re-manufactured toner cartridges are available with the same performance as new ones, at a lower price. **Return cartridges** • Return your toner cartridges for re-manufacture. This can be done by pre-paid envelope or delivery/uplift arrangements through specialist companies (check Yellow Pages). This is free and often schemes either pay you or give money to charity.
Mobile phones	**Recycle handsets, chargers and batteries** • All can be returned for recycling, although sometimes only if accompanied by the operating manual. Again, often schemes either pay you or give money to charity.
Lead acid batteries	**As used to power golf trolleys, buggies and vehicles** • Purchase buggies with capacity to use rechargeable batteries. • Lead acid batteries can be recycled. Consider using clubhouse noticeboards to advise members of local facilities and services through which they could recycle their own lead acid batteries. • Store safely and upright in a dry area before removal to a local registered amenity waste facility.
Glass	**Collect and separate glass by colour - Section 2.1.6 on Catering and the Bar has more tips** • There is often a local market for used glass. Check Yellow Pages for local recycling companies.
Cardboard	**Separate and flatten cardboard - Section 2.1.4 on Packaging also has more tips** • Cardboard can usually be recycled through local recycling and local authority services. Check Yellow Pages for local recycling companies.
Computers	• Some companies specialise in selling used computers - rather than disposing of old equipment, see if it has a residual value or consider offering it to a local school or community group.
Furniture and fittings	• If the furniture is still serviceable, it is worth seeing if it has a second-hand value, either through a local shop, furniture initiative or via the web. Similarly, if you are refitting part of your club and have fittings to dispose of, don't just assume they are worthless. For example, if you have high quality wooden fittings they may well attract considerable interest. Check Yellow pages for suitable companies. • Companies that recycle furniture sometimes promote FSC certification - a global standards and product-labelling system from the Forest Stewardship Council denoting sustainable forestry management practices and products. Look for products bearing the little tree logo with the letters FSC printed below.

Recycling point recently set up at Downfield Golf Course, Dundee for green, brown and clear glass, aluminium cans, cardboard and paper as the golf club's contribution to Dundee's recycling strategy. The clear labelling will help effective operation. The Club is in discussion with the city council about uplifting grass clippings for recycling as compost as well as further expansion of the recycling system.

Recycled courtyard at Ratho Park Golf Club near Edinburgh. During recent refurbishment of the A-listed clubhouse, the walls of the raised flower beds were built using stones recycled from an old derelict outside toilet. The bench, made by a local craftsman, was recycled from a fallen tree on the golf course.

Useful Recycling Links

Information from the industry	Information on recycling, backed by the waste recycling industry: **www.letsrecycle.com**
Recycling	For information on recycling banks and centres in the UK for householders, businesses and schools, including: • Which products to recycle and how to get them recycled • Waste legislation • Management of waste and waste minimisation, and • Environmental Management Systems **www.recycle-more.co.uk** **www.rags.org.uk** **www.crn.org.uk** **www.remade.org.uk** **www.wrap.org.uk** **www.wascot.org.uk** Also try **www.recoup.org** for information and downloads on plastics recycling, regional and national recycling, and reprocessing facilities.
Where to buy recycled products	For information on where to buy recycled products: **www.recycledproducts.org.uk**
Buying recycled	For information on the National Buy Recycled Campaign: **www.larac.org.uk/buy.htm**

2.1.6 CATERING AND THE BAR

Introduction

There are many opportunities to reduce waste in catering and bar operations. Consider the Waste Hierarchy approach of: Eliminate, Reduce, Re-use, Recycle before Disposal.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

Storage

At the time of writing, a consultative paper covering the *Control of Pollution (Oil Storage) (Scotland) Regulations 2003* is being debated that is likely to set minimum standards for all new and existing oil storage facilities located above ground, outside and within buildings. Although emphasis will largely be given to bunding, the regulations will apply to anybody who has custody or control of oil storage facilities. More information can be found at www.netregs.gov.uk

Liquid waste discharge to water

It is illegal to make any discharge of materials to public sewers or watercourses, waterways, canals and groundwater without prior consent. For example, it is against the law to pour waste paint or vegetable oil down a drain without an appropriate discharge consent from the appropriate authority (SEPA for controlled waters, Scottish Water for the public sewer). To make a discharge without a consent may be an offence and could lead to enforcement action. More information on legislation is given in Section 2.2 on Water.

Food quality and hygiene

The Food Safety Act (1990) prohibits the sale of food that could be bad for health or is unfit for human consumption. Food must be of a sort or quality demanded by the purchaser and must not be falsely described as something it is not. It is necessary that good hygiene practices are followed. These are regulated by the *Food Safety (General Hygiene) Regulations*, together with specific regulations relating to particular products and aspects of food preparation and storage. Further details can be found on the Food Standards Agency website: http://**www.food.gov.uk/scotland/regulations**.

Issues	*Actions you can take*
Cut wasted food or drink	• Check numbers for functions, to try and avoid over-catering. • Purchase efficiently and store correctly to minimise wastage. • Use filters in fryers to optimise the life of the cooking oil. • If you sell wine by the glass, don't leave the bottles uncorked with the contents oxidising. **Obligations:** Cooking oil must not be disposed of down surface water or foul drains. It should be removed to a site authorised to take it. Ensure that staff do not pour beer, spirits or cider into surface water drains.
Reduce consumable waste	**Avoid disposable cups and plates** * Use of disposable cups and plates may be more convenient but will result in higher quantities of waste. **Avoid disposable coffee filters** * Use metal or plastic ones instead.

	Say no to sachets • Use dispensers: these work for solids (sugar shakers) and liquids (squeezy ketchup dispensers) and are often preferred by club members. • Wrapped individual portions of butter, milk, etc. should be avoided too. **Napkins** • Don't over-use paper napkins for decoration. • Consider cloth napkins instead, particularly for functions. **Tablecloths** • Use washable tablecloths and place mats, rather than disposables. **Coasters and beer mats** • Don't over-use paper or card coasters and beer mats. • Coasters and beer mats will recycle.
Waste systems	**Label containers for segregating waste** • Make it clear to everyone which waste type should be disposed of in what container. Plan workable distribution of collection points within clubhouse. **Is composting for you?** • Consider composting your non-meat food wastes. Seek specialist advice as it is important to comply with regulations. If the clubhouse has a surrounding garden it could benefit. The compost may or may not be suitable for use on the course: it is particularly important that the acidity is correct. Depending upon the type and quantity of waste, it may be possible to dispose of it at a commercial or municipal composting facility. More information can be obtained from your Local Authority. **OBLIGATION:** Composting of catering wastes must comply with the Animal By-Products (Scotland) Regulations 2003. For further information see **http://www.environment-agency.giv.uk/netregs/275207/587394/?version=l&lang=e**
Glass	**Re-use if you can** • If possible use returnable bottles - re-using is better than recycling. **Or, if not, recycle** • Most glass bottles and containers are suitable for recycling. • Some recyclers require the glass to be sorted by colour: usually green, brown and clear. • Remove any lids and other fittings, empty the contents and rinse if necessary. Sort by colour if required. Check with your recycler where occasional other colours (eg blue, red) should go and any particular constraints on what they accept: many cannot take broken glass or drinking glasses.
Metal cans	**Recycle** • Drinks cans made of aluminium and food cans will recycle. • Make sure the cans are empty and clean - do not include cans which have held toxic chemicals. • Check with your recycler: you may have to separate aluminium and steel.
Plastic containers	**A wide range of plastics are recyclable. Check with your local companies. Typical examples include:** • Plastic bottles and tubs. • Clean plastic film (used to package goods).

All recycling of glass is good practice, but separation by colour leads to more efficient recovery

2.2 WATER

Introduction

Water and its disposal costs the club money

Good housekeeping is often all that is needed to achieve savings. The more water used in the first place, the greater the potential for savings.

Develop a plan of action to focus effort effectively.

Determine where you are starting from

Determine the amount of water used and the quantities involved. Check your invoices from Scottish Water. By understanding how much and where you use water it may be possible to maximise savings by taking the most appropriate action in targeted areas.

Meter it

If you have a water meter, check your readings and make sure they agree with the bill - do not pay for someone else's mistake. Regular monthly meter readings will show your pattern of usage. If you do not have a water meter, Scottish Water can help you assess whether installing one would be a viable option in helping reduce the club's water and waste charges.

Waste water

Check the amount of waste water discharged. This should be estimated on your water bill. If you have a water meter fitted it will give an exact charge on the bill relating to the volume of water you use. Carry out a 'water balance', comparing the consumption and discharge volumes. This could save costs, particularly if separate meters for the clubhouse and irrigation sources could be installed. (When doing this you may need to check whether your discharge volume includes significant rainfall or contaminant.)

Prioritise

If the meter covers water used in the clubhouse and course irrigation, estimate the amount and/or proportion of water used in the different activities (even if you don't have a meter and cannot get one, this is still worthwhile). Focus on the priority areas first. If you irrigate the course, it is likely that this will be your major water use. If not, the clubhouse probably is.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

Your water supply

Most golf clubs use mains water supplied by Scottish Water. However, it may be that you use water that is abstracted from a nearby borehole or a river, burn or loch. If this is the case, then you should have (in line with the *Water Resources Act 1991*) an abstraction licence from the Scottish Environment Protection Agency.

If abstracted water is being used for drinking, cooking or food production, it must meet health and hygiene standards to comply with the *Private Water Supplies Regulations 1991*. Contact your local council for advice.

In addition, if you are plumbing in new fittings or installations then you must use approved fittings to avoid waste and backflow contamination of the water supply under the *Water Supply (Water Fittings) Regulations 1999*. Contact a qualified plumber or reputable supplier.

Water that leaves the club

Two types of drains can remove water from the club:

- ***Foul water drains***, which take dirty water from kitchen sinks, toilets, washbasins, showers, etc. to the water authority's sewage treatment works, in locations where a public sewer is available. These are the responsibility of Scottish Water. However, given that many clubhouses are in remote areas, relatively speaking, it is possible that the clubhouse has its own private treatment works, ultimately discharging to either a watercourse or a soakaway. Consent to discharge effluent from such plants into the environment **must** be obtained from SEPA.
- ***Surface water drains***, which remove rainwater from your premises and which discharge into local rivers and burns. Consent to discharge this surface water **may** be controlled by SEPA. For clarification contact your local SEPA office.

The disposal of liquids into drains must comply with a trade effluent consent from the appropriate regulator - either SEPA or Scottish Water. This is necessary under the *Control of Pollution Act 1974 as amended* in order to prevent pollution of rivers and burns, contamination of drinking water and problems occurring at the sewage treatment works. Aim to use environmentally-friendly washing and cleaning products. Look for "biodegradable" and "phosphate-free" on the label.

Disposal Options

A trade effluent consent would be required if any form of effluent is likely to enter drainage systems. For discharges to the public sewer, contact Scottish Water and for discharges to a privately owned treatment works or for surface water discharge, contact SEPA.

You are liable to be prosecuted if you dispose liquids anywhere without proper consent. Instead it may be possible to obtain a discharge consent or alternatively you can arrange for the liquids to be collected by a licensed waste carrier. It is important to use a reputable company as under Duty of Care you may be held responsible if a company 'fly tips' your waste.

Accidents!

If you have an accidental spill (of, for example, vegetable oil, beer or fuel oil), try and stop as much as possible from going down the drain (use sand or earth) and contact SEPA or Scottish Water immediately.

Issues	*Actions you can take*
Find where you are starting from	**Conduct walk arounds** • This is a good way to see where water is being used in the clubhouse, when and how. **Check meters regularly** • While leaks in visible pipes are obvious, leaks in hidden sections can go undetected for years. However, leaks can show up as sudden, unexplained jumps in consumption. Regularly check your water meter.

What are the main water users?	**Estimate the water used on different activities**
	• Focus on the main water users first.
Follow the Water Hierarchy	**Stop leaks and spills**
	• Dripping taps and leaking pipes cost a lot of money in terms of water use, but may only take a few minutes to fix. Do routine checks; ask users to report faults.
	• Ensure your pipes are safe in the winter by insulating them against the frost.
	Eliminate unnecessary water use
	• Is the process/activity really necessary?
	• Do you need to use water for a process, or is there a better alternative?
	Reduce water use
	• Could water be used more efficiently? Is there an alternative, better method?
	Re-use water
	• Could the water be treated or filtered and re-used?
	Re-cycle the water
	• Can the water be recycled for use elsewhere? If surface water can be collected and stored it can be used for watering greens and fairways, for which no permission is required from SEPA. Treated grey water or sewage effluent from private sewage treatment works serving the clubhouse can also be used for irrigation. For such undertakings contact your local SEPA office for advice.
Purchasing	**'Eco Labels'**
	• When buying new equipment, specify water (and energy efficient) devices where possible. Look for 'Eco Labels' which grade water efficiency.

2.2.1 WATER USE: CHANGING ROOMS, TOILETS AND TAPS

Introduction

There are a number of opportunities to save water in the changing rooms, toilets and wherever taps are used. Most cost little and are easy to implement.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

Use approved fittings to avoid waste and backflow contamination of the water supply (see *Waste Supply (Water Fittings) Regulations 1999*). A reputable plumber will be familiar with the requirements.

Apart from issues of potability, there is no legislation affecting water supply to or water use in these parts of the clubhouse. There may be limits on overall quantities of water used if water is abstracted from the ground or a surface water source and a maximum abstraction quantity is in place.

Issues	*Actions you can take*
Taps	**Stop dripping taps**
	• Dripping taps waste a lot of money. This often only needs a new washer - keep a stock handy - they only cost pence. Ask members and staff to report dripping or constantly running taps and showerheads.
	Turn them off when you're finished
	• Consider buying self-closing taps, which close slowly if left running. They usually fit existing tap bodies so you don't have to change the pipework.
	Typical cost: £20 each.
	Don't make a splash!
	• Many taps give a very high flow after only a slight turn. Fitting a flow restrictor reduces this.
	Typical cost: £3 each.
Toilets	**Use less water per flush**
	• Cut the amount of water you flush away by fitting a cistern volume reducer. (Note you should not use a cistern volume reducer with dual flush systems.)
	Typical cost: £3 to £5 each.
	• If installing new toilets, variable/dual flush toilets can mean a significant reduction in water use. Advisory notices may help in their correct use.
	Water efficient urinals
	• Consider installing a flush control system. These are often fitted as standard in new buildings.
	Typical cost: £150 per controller.
	• It may also be possible to install dry urinals.
Showers	**Installing new showers?**
	• Choose a low flow, high velocity shower which is refreshing to use but uses less water than a standard power shower.

2.2.2 THE KITCHEN AND CLEANING

Introduction

There are a number of opportunities to save water in the kitchen. The more water you use to start with, the more opportunities there are to make savings. See also Appendix 1: Current Overview relating to Food and Hygiene Regulations.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

There is no specific legislation relating to water use for such facilities beyond that discussed in Section 2.2. There may be limits on overall quantities of water used if water is abstracted from the ground or a surface water source and a maximum abstraction quantity is in place.

Issues	*Actions you can take*
Sinks	**Plug it**
	• Make sure plugs are available and encourage their use for hand washing, dishes and food.
	Don't use more than you need
	• If you need a certain depth of water to wash something small but only have a very large sink, use a bowl.
	Dishwashing: by hand
	• Pre-soak utensils and dishes if needed.
	• Wash in a bowl, rather than under a running tap.
	Dishwashers
	• If you need a new one, buy a water - (and energy) - saving model.
	• Only use the dishwasher when you have a full load.
Food preparation	**Washing fruit or vegetables**
	• Use a bowl or sink, always in line with food regulations, rather than a running tap.
	Frozen food
	• Where possible, avoid using water to melt ice or thaw frozen food. Do not use running water. Ensure thawing is always done strictly in line with food regulations.
Laundry	**Minimise and reduce**
	• If you need a new washing machine, choose a water-saving, energy-efficient model.
	• Only wash full loads or select half load option.
	• Reduce water levels to the minimum required per programme.

Efficient water use avoids waste - use bowls and sink plugs to reduce water consumption.

2.2.3 RE-USING WATER AND GREY WATER

Introduction

You can reduce your water use by looking for opportunities to re-use water. These should be chosen with care and you must ensure that the water is appropriate to its purpose. This would definitely not mean using it for drinking or cooking, but could mean using it for flushing toilets, vehicle washing or irrigation.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

If surface water is collected, stored and re-used you do not require permission from SEPA. If grey water is re-used within the clubhouse, e.g. for toilet flushing, etc., you do not require permission from SEPA. Should grey water be used for irrigation, SEPA has discretionary powers which it can exercise under Amendments to the *Control of Pollution Act 1974* via Schedule 16 of the *Environment Act 1995* to control such activities. Contact with the local SEPA office should be made to clarify the situation on a site-by-site basis.

Issues	*Actions you can take*
Rainwater	**A natural resource** • Can be collected and used, for example, for flushing toilets, laundry or watering plants.
Grey water	**What is grey water?** • Waste water from non-toilet plumbing fixtures such as showers, basins and taps. **What can I use it for?** • Suitably treated grey water can be re-used indoors for toilet flushing and perhaps even clothes washing, both of which are significant consumers of water, or outdoors for washing vehicles or machinery. • Grey water can also be suitable for irrigation. However, you should make sure that it is chemically compatible, checking chemical composition and acidity, and ensure that treatments applied achieve required quality standards.

2.3 ENERGY

Introduction

Most golf clubs could save energy in their clubhouses by a few simple actions, which need not take a lot of either time or money. You are most likely to succeed if you have a systematic plan of action. This section tells you how to make a start and subsequent sub-sections focus on individual opportunities where most clubhouse energy is used: heating, lighting, office equipment and the kitchen. Energy is covered in greater depth in the sister publication to this Toolkit, entitled **"Practical Ways to Improve Energy Efficiency in Golf Facilities"** published and available through the Scottish Golf Environment Group.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

The Climate Change Levy (CCL) is a recent tax on energy use in industry, commerce, agriculture and the public sector. As from April 2001, all energy bills feature a climate change levy, apart from small businesses on domestic tariffs. The tax varies in its effect as some organisations are eligible for discount and some energy sources or uses of energy are exempt.

The CCL adds approximately 10% extra to the amount businesses pay for electricity and around 20% for gas. Fuel oils do not attract the levy as they are already subject to excise duty. The levy is recycled principally by a 0.3% point reduction in employers' National Insurance contributions.

Issues	*Actions you can take*
Determine your starting point	**Check your meters regularly** • Determine your current consumption so you can see how much you have saved. Measure in both units and costs. Aim to reduce both. • Check that you are being billed correctly.
Where, how and when?	**Walk around the clubhouse and pro shop** • There is nothing like walking around the building at different hours of the day (and night!) to see where, how and when energy is being used. • As you do so, use the examples of Best Management Practice in the following sections to highlight opportunities for saving. • In particular, look for examples of equipment that is switched on but not being used, or lighting that is illuminating empty rooms. **Energy use at night** • Golf clubs are essentially day time operators, so it is worth making sure you are not using a lot of electricity when the premises are unoccupied. For example, lights left on, heating left on, etc.
Raise awareness	**Get the staff on board** • It is important that staff members are committed to the initiative: provide training if necessary and ask for their help identifying savings. • Use of stickers and posters near to lights and computer screens can help to remind people to turn equipment off when it is not in use.
Sustainable/renewable energy sources	**Could alternative energy sources be an option?** • Solar panels • Wind turbines • Photo-voltaic cells

2.3.1 ENERGY AND PURCHASING

Introduction

When purchasing equipment that uses energy, you can often influence both the type of energy it will consume, and/or its energy efficiency. Whilst an energy-efficient piece of equipment may cost more to buy, if it uses less energy throughout its life this will lead to long-term cost savings.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

There is no legislation governing the quantity of energy used or specifying the equipment that must be purchased. Energy labelling of some products gives the consumer guidance and minimum standards may also apply. Good practice will involve a reduction in energy use as far as is possible.

Issues	Actions you can take
Specify efficiency	**Include energy efficiency in the specifications for buying supplies and equipment** • The lifetime costs of running equipment can exceed the original cost many times over. For example, for light bulbs considerable savings can be made by using high efficiency bulbs. • If you are buying a product that carries an energy label, study this. Alternatively, for information on the energy efficiency of white goods, see the UK Environmental Product Consortium website http://**www.ukepic.co.uk/productinformationbase.aspx** • Factors to consider include energy efficiency, durability, performance and servicing requirements. • Make sure all staff responsible for purchasing have relevant training.
Check your tariffs	**You could save money** • It is worth checking each year to make sure you are on the best energy tariff. • If your energy use pattern changes, a different tariff may be more attractive. • Energywatch, the independent gas and electricity watchdog, lists a number of websites which allow you to compare business supplier prices. You do not have to use your 'local' supplier. See **www.energywatch.org.uk** for details. **Should you use off peak electricity?** • If more than 15% of your electricity usage (including any other buildings such as a driving range) takes place in off-peak periods, it is worth considering switching to a day/night tariff.
Check your bills	**Do not assume the supplier is right** • Check all bills against meter readings.
Heating oil	**Buy in bulk if possible** • Oil companies offer better prices for larger deliveries. • Oil purchasing groups enable users to combine to get better deals. Consider joining forces with other clubs in your area. **Take advantage of seasonal prices** • Oil is usually cheaper in the summer. If cash flow allows, consider filling up then.

2.3.2 A COMFORTABLE TEMPERATURE

Introduction

Heating is usually a significant part of the clubhouse and pro shop's energy bills. Cutting consumption need not involve capital expenditure - often a few simple low or no cost actions are all that are required.

Legislation

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The Workplace (Health, Safety and Welfare) Regulation 7 (1992) deals with the temperature in indoor workplaces and states that during working hours, the temperature in all workplaces inside buildings should provide reasonable comfort without the need for special clothing. The temperature in workrooms should normally be at least 16°C unless much of the work involves severe physical effort in which case the temperature should be at least 13°C. HSE guidance is that acceptable temperatures for most people in the UK lie roughly between 13°C (56°F) and 23°C (74°F), with temperatures for more strenuous activities towards the bottom end of the range, and more sedentary activities towards the higher end.

Issues	*Actions you can take*
Make the most of your heating system	**Maintain and insulate**
	• If you are installing a new boiler, buy an energy-efficient model.
	• Service your boiler annually so that it operates efficiently. Heating costs can rise by 30% or more for poorly maintained systems.
	• Make sure the boiler is well ventilated for optimum efficiency.
	• Uninsulated pipework wastes heat and can lead to overheating.
	• Use the timing facility to ensure the heating goes off at night if the building is unoccupied, other than in exceptionally cold weather to prevent burst pipes.
Cut heat losses	**Stop heat escaping.**
	• Draught proof windows and external doors.
	• Consider replacing blinds with thermally lined curtains to cut heat loss through windows.
	• If you have curtains, use them.
	• Don't open windows or doors if the heating is on. Turn the heating down instead.
Portable heating	**Eliminate need for portables**
	• Avoid portable electric heaters if you can as electric heating can be very expensive to run. Only use them as a last resort and add a timer to switch them off automatically. If staff regularly use portable heaters, find out why - it may mean the permanent heating system is inefficient or that bad practices such as opening windows and doors for cooling are taking place.
Don't overheat	**Regulate and control temperatures**
	• Obtain an office thermometer (currently available free from SEEO).
	• For every extra °C of heating, your costs go up by 8% on average.
	• If a room is unoccupied, turn down the heat to a minimum.
	• If you have a radiator system, install thermostatic valves.
	• Make sure thermostats and radiator valves are used correctly and are in a representative location.
	• Don't obstruct radiators with furniture.

2.3.3 LIGHTING

Introduction

Lighting can cost a surprising amount of money: often 50% of your clubhouse electricity bill. Energy saving mechanisms (light-related) need not cost much and moreover costs can easily be offset through reduced bills.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

There is no legislation governing quantities of energy used, or specifying lighting equipment that must be used. Good practice would involve the use of energy efficient lighting appliances as far as is possible.

Issues	*Actions you can take*
Unnecessary lighting	**Switch off or reduce** • Encourage staff to turn off the lights when they leave a room and at the end of the day. Reminder signs can be very effective. • Don't light unused rooms. • You may be able to reduce lighting in places such as corridors. One way to do this is to remove tubes from alternate fluorescent fittings. • A fluorescent light uses over 500 times more energy in 15 minutes than it takes to restart it - therefore switch it off if it's not needed. • It may be appropriate to install lights that turn themselves off after a given time, e.g. in some corridors.
Switches	**Gain control** • Label switches to show which lights they control. Label lights which must not be switched off when the building is in use (e.g. stair lights). • Do you have enough switches? Installing more pull cord switches can give improved control of individual light fittings. Typical cost: £15 per switch.
Available light	**Don't block the light** • Clean your windows and any skylights regularly - at least once a year. • Clean light fittings regularly. • People often prefer natural light: don't cut it out with closed blinds.
Outside lighting	**Fit time-clocks** • Only use outside lighting after dark. • You may not need outside lighting to be on all night - fit a time-clock with a photocell to cut costs, or fit movement sensors for security lighting. Typical cost: £60 per photocell.
Use the right lighting	• Some lighting is much more efficient than others. A smart choice of light bulb can cut your energy use. See the sister booklet, "**Practical Ways to Improve Energy Efficiency in Golf Facilities**" (SGEG 2003).

2.3.4 OFFICE EQUIPMENT

Introduction

You may be spending considerably more on electricity for your office equipment than it cost to buy originally! This section details a number of opportunities to potentially save hundreds of pounds a year - none of which need cost you anything.

Legislation

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There is no legislation governing quantities of energy used, or specifying office equipment that must be used. Good practice would involve the use of energy efficient appliances as far as is possible.

Issues	*Actions you can take*
Computers	**Switch them off at night and weekends** • This will cut running costs by 75%. For 3 computers and monitors, this would cut costs from £180 a year to less than £50. **Turn off the monitor when not needed** • If you switch the monitor off at lunchtime, and activate standby options, energy consumption can be cut by 90% during that period. **Don't rely on your screensaver** • They don't save energy although they do improve screen longevity thus reducing hardware waste.
Photocopiers	**Switch them off at night** • Leaving a photocopier on overnight uses enough energy to print over 5000 A4 copies. Also consider a photocopier that can be put on standby between uses. **Locate it carefully** • Try to put it somewhere naturally ventilated, so that air conditioning doesn't have to work against the heat the copiers releases. **OBLIGATION:** Health and Safety regulations state that photocopiers should not be closer than 3 metres from anyone's desk.
Other equipment	**Can you switch them off at night and weekends?** • Switching off other equipment at night and weekends can greatly cut consumption. Examples include laser printers, water coolers and vending machines which cost much the same to run, whether they are being used or not. If the equipment only runs from 8:30 am to 5:00 pm and not at weekends, this will give a saving of about 75% compared to running 24 hours a day, seven days a week.

2.3.5 THE KITCHEN

Introduction

There are a number of places where energy can be saved in the kitchen. Best management practices also help promote good health and safety so make sure that you don't compromise these. Ask staff members to come up with their own suggestions.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

There is no legislation governing the quantity of energy used, or specifying the equipment that must be purchased. Good practice would involve a reduction in energy use as far as is possible.

Issues	*Actions you can take*
Refrigerators and freezers	**Locate them wisely**
	• Refrigerators should be located in unheated, well ventilated areas.
	• Ensure they are the correct distance from the wall and are not placed in direct sunlight.
	• Where space allows, develop separate areas for hot and cold equipment and put insulation between the chiller units and the cookers.
	• Check the setting points for refrigerators/chillers regularly and adjust to optimum temperatures or as required by food regulations.
	Maximise their efficiency
	• Don't set them too cold. Chilling by 5°C more than you need increases your costs by 15%.
	• Regularly check the door seals. Replacing damaged seals will reduce the amount of energy used.
	• Ensure that the pipes on chiller units are property insulated.
	• Regularly clean the heat transfer surfaces on the refrigerated units.
Cooking	• Cover pans where possible - this can reduce energy consumption by 7%.
	• Simmer vegetables rather than boiling them rapidly. They will not take any longer to cook, but will use less energy.
	• Avoid opening oven doors if you can. Use viewing windows to check food when possible. Clean the windows regularly.
	• Check heat up times for your equipment and make sure you do not turn the equipment on too soon. Remember to switch it off when not required.
Dishwashers	• If you are buying a new dishwasher, choose an energy-(and water)- efficient one.
	• Only wash with a full load.

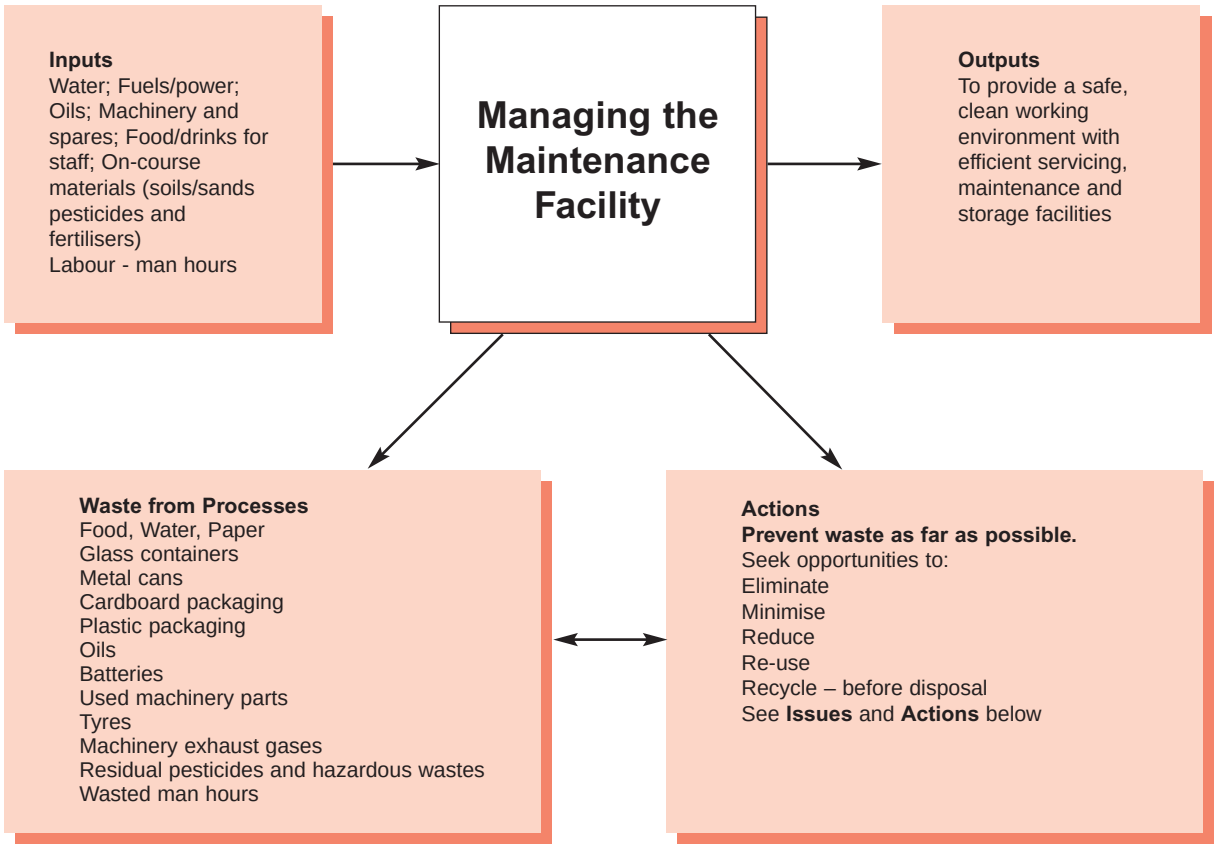
3.0 The Maintenance Facility

INTRODUCTION

Maintenance facilities vary enormously, not just in size but in the type of equipment they house and facilities contained. Consideration here should be given to:

- Staff room and kitchen
- Locker rooms, toilets and showers
- Offices
- Servicing areas
- Machinery/materials storage areas

The more resources the maintenance facility uses, the more opportunies there will be for savings. These can be best derived from making good use of your energy, water and raw materials together with servicing of machinery.



3.1 GENERAL WASTE MANAGEMENT (STAFF QUARTERS)

Introduction

Many of the issues with regard to waste and recycling in the greenstaff quarters are similar to those for domestic and office situations and the clubhouse. The main issues relate to the use of heat and light; reducing waste water and recycling of products/packaging used by staff. For more information see Section 2 and the SGEG guide **"Practical Ways to Improve Energy Efficiency in Golf Facilities"**.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

Although no specific legislation is in place, Duty of Care will apply.

Issues	*Actions you can take*
Recycling waste paper	**Transport to municipal recycling centre** • Take newspapers and general scrap paper to a local municipal recycling centre or arrange for uplift by a recycling contractor. This should preferably be done in conjunction with waste paper collection from the clubhouse. **Composting** • You can use well shredded newspaper as an addition for compost manufacture. The fact that it is a dry material helps absorb the large amount of liquid produced from decomposing grass cuttings. See Box on Composting, Section 4.1.
Recycling glass	**Transport to municipal recycling centre** • Take any empty glass bottles and jars to recycling centre or arrange uplift by a recycling contractor. Carry out in conjunction with glass waste from the clubhouse and course.
Recycling cans	**Transport to municipal recycling centre** • Take empty metal cans to recycling centre or arrange uplift by a recycling contractor. Carry out in conjunction with recycling of cans from the clubhouse and course.
Recycling systems	**Source recycling opportunities** • Investigate with Local Authority or other responsible body opportunities to establish recycling centres at the club for scheduled uplifts of separated waste materials at source. • Make waste separation easy for staff.
Saving heat	**Insulation measures** • Encourage staff to close doors and windows to conserve heat. • Draught-proof all external windows and doors. • Where practicable, take a look to see if extra loft insulation is a possibility. **Control of heating** • Only heat the staff quarters when in use. At other times turn the heating off or keep to a minimum.
Lighting	**Reducing requirement for lighting** • Turn off lights when staff quarters are not in use.

	• Ensure that there are no obstructions to natural light from windows or skylights.
	Low energy lighting
	• Use low energy light bulbs.
Water use	**Reducing leakage**
	• Make sure that there are no leaky taps or showerheads.
	• Ensure that pipes are insulated against frost.
	• Staff should be aware of the position of stopcocks.

3.2 MACHINERY, ENGINES AND MECHANICAL PARTS

3.2.1 ENGINE EFFICIENCY

Introduction

Heavy machinery (such as tractors and other maintenance equipment) is widely recognised as a significant contributor to local and global environmental pollution. This is due to the vast array of gaseous emissions arising from the internal combustion engine.

The emissions vary in their importance. Some, such as carbon dioxide, may not immediately damage the local environment, but contribute significantly to global environmental effects, such as climate change. Others, such as hydrocarbons, may impact directly on nearby water bodies.

Government climate change emissions data have been published for the UK for the years 1990 to 1995 and have revealed that Scotland's emissions of CO_2 rose by 0.7% in this time period whereas England's fell over 10%. Total emissions for a range of 6 gaseous pollutants fell by 0.6% in Scotland and 11.6% in England over the same time period. It is therefore imperative that we seek every opportunity to ensure that all of us on a local basis do everything possible to improve the Scottish situation.

Engine Emissions

During the combustion process, internal combustion engines of all types generally produce, in varying quantities, the following substances:

- Oxides of Nitrogen (NO_X), a contributor to photochemical smog and to ozone layer damage
- Carbon Monoxide (CO), a toxic gas (harmful to humans, animals and plants)
- Carbon Dioxide (CO_2), the most significant cumulative 'greenhouse gas'
- Hydrocarbons (HC), a constituent of photochemical smog
- Sulphur Dioxide (SO_2), an element in acid rain formation
- Lead (Pb), a toxic heavy metal
- Particulate matter, a potential carcinogen and inhibitor of photosynthesis in plants
- Water (H_2O)

Types of Engines

The vast majority of maintenance machinery use one of the following engine types:

- Two stroke engine fuelled by a petrol/oil mix or converted to propane
- Four stroke engine fuelled by petrol, diesel or propane

Four stroke engines generally produce higher CO, CO_2 and NO_X but lower HC than two stroke engines. Two stroke engines emit relatively high levels of HC in both burnt and unburnt forms, but low levels of NO_X. Diesel engines are more fuel-efficient than four stroke or two stroke petrol engines and therefore emit lower overall CO and CO_2. However they produce greater quantities of SO_2, NO_X and particulates.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

The Scottish Executive has introduced the *Road Traffic (Vehicle Emissions)(Fixed Penalty)(Scotland) Regulations 2002* which allow local authorities to undertake vehicle emissions testing at the roadside. Although these powers do not affect untaxed maintenance machinery, compliance to the *Clean Air Act 1993* must be ensured.

The Environmental Protection Act 1990 is enforced jointly by SEPA and local authorities. Importantly, it allows local authority Environmental Health departments to take reasonable practical steps to prevent statutory nuisance problems (i.e. excessive smoke, dust, smell or noise from engines).

The End-of-Life Vehicles (ELVs) Directive (2000/53/EC) passed into European law in October 2000 and is transposed into Scottish law via the *End-of-Life Vehicles (Storage and Treatment) (Scotland) Regulations 2003*. It is concerned with cars and vans but, as yet, does not affect agricultural and other heavy machinery. The main relevant aim of the directive is to ensure that all ELVs and their component parts are recycled or reconditioned by 2015.

Regular servicing and maintenance of machinery and equipment will help minimise waste and pollution

Issues	Actions you can take
Machinery purchase/selection	**Apply "green thinking"** to purchasing of all machinery and equipment to be used on the course.
Engine condition/ machinery maintenance	**Regular servicing to maintain maximum efficiency and prolong lifespan of equipment (see Box on Machinery maintenance below).** • Thorough servicing of all road and maintenance machinery should be carried out by a qualified mechanic as a matter of routine. • Proper servicing of equipment will ensure engine emissions are kept to a minimum. **You could save money** • A well maintained engine will run far more efficiently than an unserviced equivalent, thereby saving fuel and lubricant costs, and operator time.
Petrol or diesel powered maintenance fleet/golf buggies	**Investigate and purchase alternative sources** • Investigate the possibility of conversion to a cost and emission saving fuel such as LPG or biodiesel. • The Scottish Energy Efficiency Office may offer grant support for such work. • Conversion to electrically driven vehicles reduces local pollution and can save money as batteries can be recharged during off-peak hours. Making electricity still produces pollution at source (i.e. power plant). However this is strictly monitored and is less damaging than individual engines. **OBLIGATION:** Taxed vehicles used on roads must have a full MOT which will ensure emission levels are within the parameters of the *Road Traffic (Vehicle Emissions) (Fixed Penalty) (Scotland) Regulations 2002*.
Develop a machinery plan and budget	**Machinery programme** • A properly funded machinery programme helps achieve higher operational efficiency and effectiveness and provides an informative basis for review.

Machinery maintenance

1. OIL

Oil acts as a lubricant and a coolant. Parts will wear very quickly if oil levels fall.

a. Always check the oil level of any machine before use and maintain between 'minimum and maximum' guidelines.
b. Look for leaky pipes, joints or tell-tale drip marks under machine storage areas.
c. Repair or replace faulty parts immediately. Oil spillages can not only destroy delicate playing surfaces on the golf course but are also a potential health and safety disaster if an operative is sprayed with hot oil.

2. AIR

All combustion engines need the right proportion of air to fuel in order to run. If the air is contaminated with fumes, dust or liquids, combustion may not be efficient or may halt altogether causing damage to machinery parts. Air also acts as an important coolant in an engine.

a. Regularly change air filters; frequency of change will be increased in hot, dry periods when more dust is airborne.
b. Clear air intakes of grass and any other blockages each time the machinery is put away.

3. WATER

Water is an essential engine coolant. Inefficient water-cooling systems will cause an engine to overheat and possibly set on fire.

a. Check water levels in all engines on a weekly basis. Top-up as required.
b. Top-up will be needed more in summer months as water evaporates at a greater rate then.

4. FUEL

An engine will not start or will run inefficiently if the fuel supply is dirty. Abrasive dirt such as sand or dust will damage internal components. Spillages of fuel on the golf course can be environmentally disastrous (see Section 3.3 Oil and Fuel Storage and Disposal).

a. Store fuel in a clean, dry and uncontaminated container.
b. Do not store modern fuels past their sell-by date.
c. Ensure machinery that is not used for long periods does not contain fuels that will perish.

5. SPARK PLUGS

Virtually all engines (even modern electronic ignition engines) still rely on the spark plug for ignition. If the gap in the plug becomes large through wear on the electrode, a greater strain is placed on the engine when starting.

a. Change spark plugs as directed in the manufacturer's guidelines.

6. MOWER BLADES

Blunt blades are not only dangerous but also place additional stress on the mower's engine and its components. Turf will be damaged by blunt blades and a simple job will take inordinately long, both wasteful.

a. Rotary blades should be checked regularly for signs of damage or wear. They do not show as easily as a cylinder mower.
b. Set and check reels and bedknives on a cylinder mower each time they are used. Incorrectly set blades will not only give a poor quality cut but will also generate extra wear on the parts.
c. Acquire an in-house grinder for undertaking routine sharpening. Sending parts away to be sharpened often leads to running mowers with blades that would have been dealt with much sooner had the club possessed the grinder.

7. CLEANLINESS

Machines used on golf courses invariably get wet and dirty on a regular basis. A build-up of dirt can lead to contamination of fuel, air and oil and also inhibit moving parts.

a. A daily clean-down programme of all machinery used that day should be an integral part of the greenstaff's workload.
b. Hosing down a machine is often not enough. Jet washers, compressed air and hand-held brushes are required to remove dirt from intricate parts of the machine.

3.2.2 USED MACHINERY PARTS

Introduction

With the number of machines used in the day-to-day management of the average golf course increasing on a yearly basis, the amount of broken, faulty or worn parts to be disposed of is also rising rapidly. It is no longer sustainable or acceptable to simply throw used machinery parts into the nearest dustbin and give them no further thought. All golf clubs have a legal and moral responsibility to ensure that any contaminated parts are disposed of by a licensed handler and as many metal/plastic components are recycled as possible.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

The Control of Pollution (Oil Storage) (Scotland) Regulations 2003 outlaw the unlicensed disposal of used oil filters or other parts contaminated with oil.

Issues	*Actions you can take*
Disposal of machinery oils, air and water filters	**Oil filters are predominantly steel and are therefore easily recycled** • Remove the filter from the engine to "hot-drain" it while the engine is still warm. Hot-draining is defined as draining the oil filter at or near engine operating temperature (i.e. above 20°C). • Remove and drain the oil filter into a container marked "Used oil - Recycle". Allow the filter to drain overnight (or a minimum of 12 hours) to remove all the oil. • Store oils safely prior to recycling in a safe, hazard-free, designated area in line with regulations (See Section 3.3 Oil and Fuel Storage and Disposal.) • Recycle used oil and drained oil filters at your local garage or special waste recycling centre. Check with your local authority for information about collection centres. Some auto parts stores also accept drained filters for recycling. **Air filters and water filters are made from a variety of materials** • After removal, air and water filters should be stored in a covered area. • Contact your local authority for location of nearest licensed recycling facility. Some auto parts stores also accept used air and water filters for recycling.
Broken down machinery engines	**Engine breakdown is usually the fault of only one or two parts** • Many parts of a seemingly defunct engine can be salvaged for spares in other machines. • Salvage merchants may pay for usable engine parts - look in the Yellow Pages for your nearest dealers. • Repairing broken machinery is often far more cost effective than buying new. • When cleaning any oily machine parts, ensure run-off is passed through a water treatment area and separated oily residues dealt with as 'special waste'.

Repair and re-use broken machinery if possible rather than dispose and replace. Alternatively, recycle salvaged parts for use as spares for other machinery.

3.2.3 TWO STROKE ENGINES/SUSTAINABLE LUBRICANTS

Introduction

Two stroke engines use a method of combustion resulting in unburned/partially burnt residual oils entering the environment, often evident as small patches of oil forming on nearby water where two stroke engines are being run.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

Legislation is being considered in Scotland and in many other countries to severely restrict two stroke emissions.

Issues

Improve efficiency, reduce waste

Actions you can take

Source alternatives

- Refrain from purchasing two stroke equipment if equivalent four stroke or other more efficient equipment is available.
- Source a local supplier of biodegradable oils.
- When acquiring new machinery, ensure that sustainable lubricants are used from the beginning.

Biodegradable Lubricants

Although commonly used mineral oils eventually degrade, the process is very slow and such oils would not normally be defined as biodegradable. Non-mineral biodegradable oils from vegetable sources and manufactured esters are available with similar properties to non-biodegradable sources. These break down into carbon dioxide, water and biomass through the biological activity of micro-organisms. The quantity of biomass formation depends on the extent of biodegradation while the speed of the biodegradation process depends on temperature. In colder environments biodegradation takes longer.

More and more machinery companies are recommending totally natural lubricants such as oils derived from rape, sunflower, corn or other plant sources which can give better lubricity, albeit at a higher price. Vegetable oils have good environmental characteristics. They are inherently biodegradable, of low eco-toxicity and toxicity to humans, derived from renewable resources, and have no net carbon dioxide contribution to the atmosphere. However, the use of vegetable oils as lubricant base oils is restricted by some technical disadvantages constraining their use particularly at high and/or low temperatures.

Although still relatively small in tonnage terms (60,000 tonnes vegetable oil per annum in Europe), production of bio-lubricants is one of the fastest growing uses of vegetable oils. They are becoming increasingly used in 'total loss' applications, such as chainsaws, in which all the lubricant is lost to the environment and therefore biodegradability is paramount. Legislation is now being introduced in some countries, Germany for example, which prevents use of conventional non-biodegradable lubricants in these situations.

3.2.4 ALTERNATIVE FUELS/ELECTRIC MOTORS

Introduction

With current concerns regarding the supply and environmental impact of petrol and diesel for transport, there is a significant interest in using plant-derived renewable fuels such as ethanol and biodiesel. The use of electric motors reduces exhaust emissions (and noise pollution) on the golf course and provides the potential for using an energy supply that will increasingly be derived from renewable resources.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

At the time of writing, there is no specific legislation with regard to the use of alternative fuels.

Biodiesel

Biodiesel is a renewable substitute fuel for traditional fossil fuels. Made from vegetable or animal fats, it has similar characteristics to petrol and diesel but generates lower exhaust emissions.

Advantages of using Biodiesel:

- Offers improved lubricity over petroleum diesel
- Runs in existing unmodified diesel engines
- Higher octane rating than petroleum diesel for better engine performance
- Higher flashpoint than petroleum diesel makes it safer to handle
- Exhaust emissions are reduced, particularly carbon dioxide
- Integrates with the existing fuelling infrastructure
- Low-risk - simple to phase in and out of use
- Local renewable source of energy
- Reduced toxicity to plants, animals and humans
- Biodegradable

Liquid Petroleum Gas (LPG)

Vehicle emissions are recognised as one of the main contributors to global warming and air pollution and the internal combustion engine, as found in road vehicles and maintenance machinery, is by far the largest single producer of particulate pollution in the UK today. It is estimated that over 24,000 people die prematurely in the UK each year directly due to air pollution from this source.

It is therefore of the utmost importance that efforts are made to ensure vehicle energy sources are as environmentally sound as possible. Both petrol and diesel engines have become much cleaner in recent years. However, there is a limit on how much their emissions can be reduced. Therefore, along with Biodiesel, another environmentally friendly fuel is LPG. Vehicle fuel LPG, also known as autogas, is a mixture of propane and butane, produced as a by-product of North Sea oil extraction.

Recent studies have shown that engines running on LPG emit up to 99.8% less particulate matter (high concentrations of which contribute to respiratory problems such as asthma and are also carcinogenic) than an equivalent diesel engine.

LPG engines run on average 50% quieter than a petrol or diesel version and it has been widely proven that there is no discernable difference between engine performance in cars or heavy machinery between standard and LPG run engines.

LPG refuelling sites are increasing at a rate of one every working day throughout the UK with currently over 1,300 sites, over 120 of which are in Scotland.

The UK is the world's second largest producer and exporter of LPG but, ironically, we still remain one of the world's lowest consumers of it.

3.3 OIL AND FUEL STORAGE AND DISPOSAL

Introduction

Oils including petrol, diesel, two stroke oil and lubricants are used extensively within the golf facility. Use of oils inevitably creates wastage in a variety of forms, the most prevalent of which are spillage and leakage of unburned fuel oils (petrol/diesel) and run-off of lubricating oils from washing maintenance machinery. Some 95,000 tonnes of oil were disposed of in Scotland during 2002 which makes oil one of the largest hazardous waste products.

All forms of oil are classed as 'Special Waste' and must be disposed of in accordance with the *Special Waste Regulations 1996*. Oil and water are immiscible and even a small spillage can cause significant pollution. Its four main effects are:

• It will form a film on the surface of water reducing the level of oxygen causing hypertrophication.

• Five litres of oil will completely cover a pond measuring 0.5 hectares.

• It will easily coat plants and animals that come into contact.

• It will make water sources unfit for drinking.

There has been a rising trend in oil-related water pollution incidents in Scotland in recent years. Every year in Scotland there are over 500 recorded water pollution incidents caused by oil, of which approximately 70 are serious. Indeed, according to SEPA's annual report in 1999/2000, oil pollution is the second most common source of pollution in Scotland and accounts for more than one third of all pollution incidents.

Emergency spill kit – ensure you always have one on hand wherever there is potential risk of spillage of hazardous substances. Make sure relevant staff are properly trained in its usage.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

The Control of Pollution (Oil Storage) (Scotland) Regulations 2003 have been introduced in order to prevent the pollution of groundwater, rivers and coastal waters, particularly those listed in Section 31a of the *Control of Pollution Act 1974 (as amended)*. They set out minimum standards for all new and existing oil storage facilities both outside and within buildings. The regulations apply to all oil storage containers that have a storage capacity more than 200 litres and apply to any kind of oil including petrol, diesel, vegetable and waste oil. In addition the *Waste Management Licensing Regulations 1994 (as amended)* also apply to handling and storage of waste oil whilst the *Special Waste Regulations 1996* legislate against unlicensed movement of waste oils.

The *Dangerous Substances and Explosive Atmospheres Regulations 2002* (DSEAR) cover purchasing, storing and using petrol. There is an obligation to provide a risk assessment addressing how petrol is purchased, transported and where and how it is stored. It covers the specifications of storage containers (e.g. small tanks must incorporate pouring spouts) and staff competency for handling and use.

Issues	*Actions you can take*
Storage	**Ensure oils are correctly and legally stored** • Locate the store where it is unlikely to be damaged, e.g. away from tractors, mowers and other moving vehicles, and incorporate crash barriers where necessary. • Use automatic cut-off nozzles. • Make sure all containers (tanks, drums, etc.) are set on an impervious base. • Do not allow any other waste substances to enter waste oil storage facilities as it makes the oil extremely difficult to recycle. • Do not allow water to accumulate in bunds as this will become contaminated, increasing the amount and the cost of disposing of the "Special Waste". **OBLIGATION:** The primary storage facility must have a secondary bund or catch pit capable of holding 110% of the oil store. The facility must be a minimum of 10m from a water body and 50m from a well or borehole.

Waste Action Helpline (SEPA) 0800 3895270

Spillage	**Risk assessment** • Undertake a risk assessment covering: - all risks of oil spillage on the premises; and - spillage risk during delivery or removal. **Materials to contain and minimise spillage** • Keep a stock of materials such as sand or commercially available absorbent materials at specified locations to deal with spillages. **Avoid detergents** • Detergents should never be used to clean up oil spills as they reduce the surface tension of the oil and aid dispersion. **OBLIGATION:** If a spillage should occur, take immediate action to contain it and prevent it from entering any drains or watercourses. SEPA should be contacted immediately on their Emergency Hotline.

EMERGENCY HOTLINE (SEPA) 0800 807060

Disposal	**Collect and recycle** • Recycle waste oils. • Collection should be arranged through a licensed company who will be registered with the Oil Recycling Association (ORA). They may charge a fee to cover the consignment note costs. • Your nearest oil recycling bank can be found by dialling 0800 663366 - these sites will only accept small amounts of oil that do not require transporting licences. • Only designated licensed landfill operators can accept waste oil. **OBLIGATION:** Oil must never be disposed into drains or other watercourses. Oil must be removed by a licensed contractor Oil that is due for recycling must not be mixed with other substances, i.e. solvents, paint thinners, etc.

Oil/Water Separators

Waste water from wash bays, car parks, etc. will normally be removed from site via surface water drains discharging into nearby watercourses or indirectly into groundwater via soakaways. Contamination of this water by fuel oils and lubricants from maintenance machinery or cars can have a serious polluting impact on the receiving water. Methods to combat this may include the installation of an oil/water separator, ideally incorporated into a wider sustainable drainage system (see Section 4.6).

There are basically two types of oil separators according to EC regulations:

- **Class 1 oil separators are designed to achieve a concentration of less than 5 mg/l of oil after separation and should be used when the separator is required to remove very small oil droplets such as those arising from car park run-off.**
- **Class 2 oil separators are designed to achieve a concentration of less than 100 mg/l of oil in water and are suitable for dealing with discharges where a lower quality requirement applies and for trapping large-scale spillages.**

Both of the above are available as either "bypass" or "full retention" separators which are designed to deal with different amounts of discharge. A bypass separator is more useful for treating flows generated by average rainfall, whereas a full retention system will be more suitable to the golf club environment as these systems can handle the short-term flooding generated by machinery washdown.

Detailed information regarding the use, installation and maintenance of oil separators is available from SEPA in their Pollution Prevention Guideline No 3 "Use and Design of Oil Separators in Surface Water Drainage Systems".

Temporary storage tray for oil containers. This tray must be able to capture at least 110% of the volume placed upon it.

Machinery wash bays must comply with Groundwater Regulations. Oil/water separators or water treatment systems can be used to improve waste water management to best practice standards.

3.4 WASTE TYRES

Introduction

The disposal of used tyres in the UK is a significant issue that could literally be costing us the Earth. Every day in Britain over 100,000 worn tyres are taken off cars, vans and trucks accounting for a total of around 40 million tyres (440,000 tonnes) per year of which around 32,000 tonnes is generated in Scotland. Although golf clubs are not recognised as a major producer of tyre waste, the safe disposal of used tyres is an important issue, especially given the high polluting effect of improper disposal and the implications of stringent legislation in place.

Presently the UK re-uses, recycles or recovers around 70% of the tyres discarded, the remainder being disposed of through landfill. Recovery must increase to 100% by mid-2006 when the landfill ban takes full effect (see below).

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

The Duty of Care is a legal requirement under the *Environmental Protection Act 1990*. It applies if you produce, import, carry, keep, treat or dispose of waste tyres (even small amounts such as those arising from the day-to-day running of maintenance equipment). All reasonable steps must be taken to ensure that waste tyres are not handled illegally and that they are transferred through an authorised person carrying a waste transfer note.

The EU Landfill Directive will ban the disposal of tyres to landfill. In brief, whole tyres were banned from July 2003 and shredded tyres will be from July 2006. The ban applies to almost all tyres including car, commercial, motorbike, aircraft and industrial (including solid tyres). Note that tyres above 1.4 metres outside diameter (e.g. larger agricultural and earthmover tyres) will not be subject to the ban.

Issues	*Actions you can take*
Storage	**Store correctly** • Temporary storage of used tyres prior to disposal should be indoors, on a hard standing with an impervious base, safely stacked in a secure area.
Disposal	**Ensure authorisation** • Ensure that the contractor employed to collect tyres is authorised to take them. • All authorised waste carriers are registered with SEPA and have a certificate of registration. • A list of licensed waste tyre handlers is available at **www.tyredisposal.co.uk** • Ensure that your waste tyres will be re-used, recycled or recovered. **OBLIGATION:** If you handle waste tyres you have a legal responsibility for their disposal. Any business wishing to dispose of waste tyres must follow the legal requirements contained in the *Duty of Care*. If handling waste tyres to a licensed carrier, you must complete a waste transfer note giving a written description of the waste. You must keep copies of all waste transfer notes for a minimum of **two** years. SEPA officials who visit your premises will need to see these.

3.5 WASTE BATTERIES

Introduction

Batteries are used in a wide variety of applications. They range in size from tiny watch batteries through to large lead acid batteries.

General purpose - These are the common batteries used in many household items such as torches, walkmans, etc. They are made from zinc, manganese steel, carbon, oxygen, water and chlorides. Using present technology about 55% of these batteries are 'recyclable' and 65% 'recoverable' depending on the specific battery.

Button cells - These are the small batteries in watches, cameras, etc. and make up less than 2% of the battery market.

Rechargeables - These range from the larger lead acid batteries for cars, electric golf buggies and maintenance equipment through to the small rechargeable energy packs for mobile phones, CB radios and laptops. Although these are the most sustainable form of battery, they make up less than 8% of the UK market.

Lead acid batteries - store upright in dry conditions prior to collection or disposal.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

The European Commission (EC) has proposed new legislation which will require the collection and recycling of all portable batteries when implemented. At present around 90% of lead acid batteries (i.e. car batteries) throughout the UK are recycled via best practice techniques (although this figure is slightly lower in Scotland). Of the general purpose batteries less than 2% are recycled due to limitations in technology (typical cost of over £2000 per tonne!).

Issues

Disposing of batteries

Actions you can take

Batteries - a small but regular part of golf club waste

- Use rechargeable batteries wherever possible. The initial cost may be higher but this should be recouped.
- Used lead acid batteries should be stored upright in a dry area prior to recycling or safe disposal.
- At present there are no general purpose battery recycling sites in Scotland. Therefore, it is imperative that attention is given to using mains electricity/rechargeable batteries where possible.
- Many battery manufacturers such as Panasonic and Energizer will accept used batteries back for recycling, without charge. Waste batteries can therefore be stockpiled and returned. See individual packs for further information.
- When purchasing golf buggies look to buy rechargeable battery run versions rather than petrol or other fossil fuel driven vehicles.

Tape before disposal

- Insulate batteries prior to disposal. Seal positive and negative ends of smaller batteries to prevent accidental fires.

OBLIGATION: Currently no dedicated legislation covers the disposal of batteries beyond that applying to waste or special waste generally. Proposed EU regulations will ensure all batteries are recovered or recycled.

3.6 PESTICIDES, FERTILISERS AND OTHER CHEMICALS

Introduction

Users may generate four types of waste: Surplus Spray and Washings, Empty Containers, Waste from Spills and Unwanted Pesticides

Using pesticides according to the label instructions and following best practice guidelines should ensure their impact on the environment is minimised. However, bad practice when handling, mixing, cleaning up and disposing of wastes after spraying can pollute surface and groundwater. To protect the environment, more legal controls are being introduced. Since 1999 any disposal to land of surplus spray and washings that does not take place "in the crop" (i.e. turf) requires a "Groundwater Authorisation" from the local office of SEPA.

Minimise waste production

To reduce difficulties with disposal the best approach is to minimise waste production.

- **Order enough product to do the job in hand and no more;**
- **Buy products in the largest practical container sizes;**
- **Store products in good order;**
- **Use internal sprayer, tank-cleaning units and container rinsing devices;**
- **Choose products which minimise or eliminate contaminated packaging waste, such as returnable packs;**
- **Ensure that products are stored within recommended temperature range;**
- **Avoid pesticides exceeding their expiry date;**
- **Keep careful records of the movement of stock in and out of the agrochemical store, rotate stock on the "first-in, first-out" principle;**
- **Carefully calculate required quantities needed and mix just enough to complete a task, no more; and**
- **Ensure long-term weather forecasts are checked in advance of works in order to plan accordingly.**

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

The disposal of waste pesticides, the disposal of waste water from washing down and the cleaning of pesticide storage or application equipment require authorisation from SEPA in the form of a Groundwater Authorisation Certificate under the *Groundwater Regulations 1998*. The storage and use of pesticides will not normally require authorisation if carried out in accordance with any necessary product approval under:

- The *Control of Pesticides Regulations 1986 (as amended)*, the *Plant Protection Products Regulations 1995 (as amended)*, the *Plant Protection Products (Basic Conditions) Regulations 1997*, and the *Biocidal Products Regulations 2001*
- Label instructions
- Codes of Practice for the Safe Use of Pesticides (Green Code) and *Control of Substances Hazardous to Health (COSHH)*

Issues	*Actions you can take*
Purchase, storage and record-keeping	**Purchasing** • Do not purchase in excess. • Purchase products in the largest practical container sizes. • Choose products which minimise or eliminate contaminated packaging wastes.

Storage

- Store products in good order.
- Rotate stock on a first-in, first-out basis.
- Store products at recommended temperature.

Record-keeping

- Maintain records of movement of stock.
- Carefully calculate required quantities needed and mix just enough to complete the task in hand.

Disposal of surplus spray and washings

Eliminate surplus

- Ensure long-term weather forecasts are checked in advance of spraying.
- Order and mix only as much as can be used.
- Surplus spray and contaminated wash water should be treated using a fully contained waste water treatment plant.

OBLIGATION: SEPA should be contacted when constructing wash bays in order to ensure compliance with the Groundwater Regulations.

Disposal of empty containers

Cleaning before storage

- Always empty and clean containers before disposal.
- Do not rinse containers that have held sodium cyanide or aluminium, magnesium or zinc phosphides; fill these containers with dry earth, sand or other suitable inert material instead of rinsing.
- Clean all containers thoroughly and drain the washings into the spray tank.
- Use pressure rinsing devices or triple rinsing with water to reduce any pesticide residues in the container to minute levels.
- Store empty containers upright with lids in place awaiting disposal in a dedicated secure compound.
- Licensed disposal sites will generally accept cleaned containers, subject to the site's conditions allowing acceptance of such waste. Waste disposal contractors will also take cleaned containers, although there will be a charge for this service.

OBLIGATION: Ensure any contractor/landfill site used has the appropriate licence.

Disposal of spillage wastes

Contain and collect spillage

- Spillages should be cleaned up thoroughly with absorbent material (e.g. sand).
- All contaminated wastes should be treated as unwanted pesticide and sent for professional disposal via a reputable waste disposal contractor.

OBLIGATION: If a spillage should occur you should take immediate action to contain it and prevent it from entering drains or watercourses.

SEPA should be contacted immediately on their Emergency Hotline.

EMERGENCY HOTLINE (SEPA) 0800 807060

Disposal of unwanted or obsolete pesticides

Monitor regularly

- Check agrochemical stores twice per year, if not more frequently. Look for containers that are losing their labels, products which are no longer needed, part-filled or deteriorating containers, and products that are no longer approved or beyond their expiry date.
- Check the label and company customer care policies as some companies will take back unused products.
- In all other cases, contact a licensed waste disposal contractor.

OBLIGATION: Unwanted chemicals should never be disposed of into watercourses or unspecialised drains, nor dumped on any way.

The Voluntary Initiative

The Voluntary Initiative was accepted by the Government on the 1st April 2001, in place of a proposed tax on pesticides used in agriculture and horticulture. The Initiative has been put forward by seven signatory organisations led by the Crop Protection Association. The Initiative encourages best practice with regard to spraying and pesticide management.

The National Register of Sprayer Operators (NRoSO)

The NRoSO is a central register of certificated spray operators which uses Continuing Professional Development (CPD) as a means of ensuring ongoing training. The scheme is administered by the National Proficiency Testing Council (NPTC).

It is an industry initiative intended to demonstrate to the Government that only responsible users apply pesticides and thereby minimise environmental risk.

By registering on NRoSO, employers and operators are showing their commitment to professionalism and ongoing training. It will reinforce the responsible image of operators to the regulators and the public.

Further details of the NRoSO are available from www.nptc.org.uk or via the helpline on 024 7685 7300.

The National Sprayer Testing Scheme (NSTS)

The NSTS is an independent annual, testing scheme which is supported by the Voluntary Initiative. The scheme is open to all users of any spraying equipment within the amenity sector including hand-held apparatus.

Compliance with the scheme will ensure maximum efficiency of spraying equipment, reduce costly downtime whilst aiding traceability and retention of second-hand values. Furthermore, more consistent spray results will be obtained as a result of the testing scheme. The tests can be carried out at any golf club by an approved technician, for which there may be a small charge.

3.7 WATER RESOURCE MANAGEMENT

Introduction

There is likely to be a significant use of water within the maintenance facility, in which case there are bound to be many opportunities for making savings. The largest consumer of water within the maintenance facility is likely to be washing and cleaning activities, although tank mixing of pesticides could be a further regular bulk use. Beyond that, water will be used in the staff showers, toilets and kitchen and for topping up vehicle radiators, amongst a myriad other low level uses. In seeking to make savings in water use and costs, the Waste Hierarchy of Eliminate, Reduce, Re-use, Recycle, Dispose provides the ideal basis to assess possibilities. This would apply both in the sourcing of the water supply, how efficiently it is used and the safeness of any ultimate discharge to the environment or public drainage system. Consider consolidating waste water collection and treatment from the clubhouse, car parking and maintenance facility into one system. Whether and how this can be achieved will depend on the layout of your golf facility.

3.7.1 SOURCES OF WATER

Introduction

Water to the maintenance facility is most likely to be supplied by mains or borehole (groundwater). Alternative sources could help reduce reliance on these valuable resources. For example, rainwater or recycled washwater would usually be adequate for machinery cleaning.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

Where a private water supply is being used on the golf course the *Private Water Supplies Regulations 1992 and Water Supply Regulations 1999* are relevant. These regulations have been implemented to safeguard water quality.

Issues	Actions you can take
Use alternatives to mains or borehole water	**Identify possible sources** • Rainwater from roofs and run-off from hardstandings • Recycled washbay water • Grey water - filtered, treated or raw **Identify acceptable range of applications for water from these alternative sources** • Quality constraints for certain uses • Legal/licencing constraints **Develop systems for diverting, treating, holding and usage of alternatives** • From the most basic to quite sophisticated, depending on circumstances

3.7.2 MINIMISING WATER CONSUMPTION

Introduction

The primary way to reduce wasting water in the maintenance facility is to minimise water consumption, which can be addressed in many ways.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1.*

There is no specific legislation governing water consumption. There may be practical limits on overall quantities used if water is abstracted from the ground or a surface water source and a maximum abstraction quantity is in place.

Issues	Actions you can take
Water loss from pipes and taps	**Check the system** • Check that water pipes will not be exposed to frost during winter. If they are liable to freezing temperatures, they should be adequately lagged. • Mend dripping taps, leaking pipes and hoses promptly. • Check that taps can be properly closed off. • Ensure that staff know the location of the main stopcock and that access to it is unrestricted.
Reduction in water use	**Washing machinery** • Use hosepipe with water flow control at outlet. • Use hosepipe adaptor to provide small diameter outlet with high pressure jet. • Use compressed air cleaning where appropriate. • Develop efficient cleaning methodologies. **Tank mixing - pesticides, foliar feeds and other applications** • Use minimum volumes of water required for the operation in hand. • Reduce water used in spraying operations by using cultural practices to reduce reliance on pesticide use. **Staff quarters** • Use water saving devices and practices in toilets, showers and kitchens.

3.7.3 MANAGING WASTE WATER AND RUN-OFF: RE-USING AND RECYCLING

Introduction

It is inevitable that within the maintenance facility there will be waste water and surface run-off from hardstandings. Rather than viewing this as waste for immediate disposal, consideration should be given as to whether it can be re-used in any way. Waste water from machinery washing is likely to be contaminated with grass clippings, along with a small amount of oil and possibly pesticide, and thereby a pollution risk to the wider environment. Rather than allowing the water to drain away directly from the machinery wash bay, it should at least be cleaned first, using appropriate systems derived from various combinations of oil/water separation, clippings removal, managed soakaways, silt traps, settlement ponds, reedbeds and, if appropriate, storage ponds for its re-use. Technology also now exists to recycle wash water in fully self-contained water treatment units. There may also be opportunities to divert grey water from clubhouse and the rest of the maintenance facility for appropriate treatment and re-use.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

The Water Environment and Water Services (Scotland) Act 2003 is in place to protect both surface and groundwater from pollution.

Issues	*Actions you can take*
Re-using rainwater	**Collection and storage of rainwater** • Investigate potential for the collection of rainwater from roof areas to be used for general washing purposes, watering plants etc. If clean enough, it might be usable for tank mixing and irrigation. • Water butts that can be attached to drain downpipes can be purchased from garden centres and other outlets. • The approximate volume of water that will be collected from rainfall can be calculated as follows: Litres water collected = rainfall (in millimetres) x area of roof (in square metres)
Re-using run-off from car parks and hard standings	**Collection and storage of run-off** • Investigate potential for the collection of run-off from car parks and hard standings which is usually dirtier than roof rainwater and therefore more likely to require subsequent treatment - with potential to be used thereafter for general washing purposes, watering plants, tank mixing and irrigation etc. • Consider diverting run-off to an appropriate holding and treatment area, eg. reedbed/wetland or self-contained water treatment unit. (See additional information in Section 4.6.3.)
Washbay water	**Collecting and treating waste water from washbays** • Divert drainage water outflow from wash area so that water does not flow directly to an urban or field drainage system. This may: - involve creation of grass filter strips, swales or reedbeds/wetlands (reedbed filtration being where any residues are absorbed and degraded by soil microbial activity) with potential to link into irrigation storage; or - use an on-site self-contained waste water treatment unit to remove oil (and possibly pesticide residues) from water used for washing.

If you are unable to collect and treat washbay water through a reedbed system or water treatment unit, it may be acceptable, subject to SEPA approval, to:

- Discharge through a well-designed soakaway and/or naturally vegetated drainage ditches at appropriately calculated distance from any watercourses. Oil/water separators and grass filters will help in this process.

Do not allow washbay water to discharge directly into watercourses.

Grey water

Identify acceptable sources of grey water

- Possibilities include showers, wash-hand basins, "clean-water" sinks, washing machines etc.
- ***Warning*****:** not all grey water will be suitable for re-use and recycling, depending on its make-up.

Identify target uses

- The potential re-uses of grey water will be dependent on the sources and level of treatment, eg. lightly treated grey water from showers, wash-hand basins and washing machines should be suitable for washing equipment, but may need more thorough treatment if to be used for irrigation or tank mixing.

Identify appropriate separation, storage and treatment if required

- Expert advice will ensure that an appropriate system is designed for your site, which should allow you to distinguish between re-usable grey water and that which must still go into the foul drain system.
- The success of such a system will be dependent on staff and members using the system correctly.
- Ensure that no-one pours beer, spirits or cider into grey water that is to be recycled.
- It is against the law to pour waste paint or vegetable oil down any drain without an appropriate discharge consent from the appropriate authority (SEPA for controlled waters, Scottish Water for the public sewer).
- Appropriate storage and treatment of grey water is essential in order to avoid contamination of ground and surface water.

RECOMMENDATION: due to the range of obligations relating to managing waste water and run-off, seek expect advice and confer with SEPA to ensure compliance and best practice.

4.0 The Golf Course

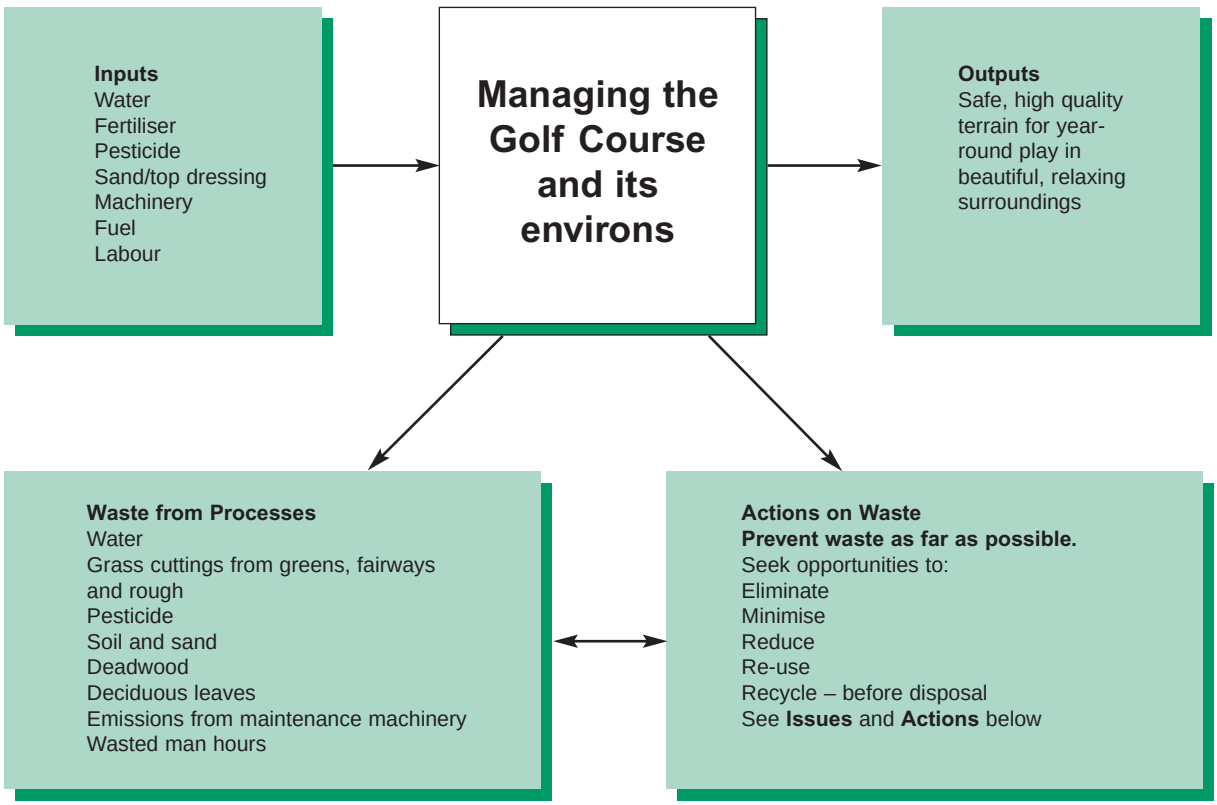
INTRODUCTION

The golf course provides a varied landscape requiring different management inputs. Whilst the main emphasis must be to maintain the playing quality of the principal putting and playing surfaces, the management of the out-of-play areas must not be neglected. Whilst the intensity of management will be greatest on the tees, greens and, to a lesser extent, the fairways, waste issues will arise through all stages including the infrequent management of the out-of-play "ecological" rough.

Waste issues must be considered from:

- **The greens**
- **The tees**
- **The fairways and associated in-play semi- and cut rough**
- **All out-of-play areas be it the wider grasslands, heath, woodland or the ditches, ponds and water features**

Course furniture including waste bins, artificial surfaces, etc. must also be considered.



4.1 GRASS WASTE

Introduction

The amount of grass clippings produced on a golf course will be determined by: (a) soil nutrient status, (b) amount of fertiliser applied, (c) local climate, (d) type/variety of grass, (e) size of greens and tees and (f) mowing regimes. As an approximation, for an 18 hole golf course the total clippings weight per annum will be in the range of 8-10 tonnes (equivalent to 16,000-20,000 litres) of fresh cuttings. The greatest production will be between April and September, with peaks towards both ends of this period. On a weekly basis the amounts produced will be between 300 and 500 kg (equivalent to between 600 and 1,000 litres). As the grass clippings decompose, the volume of material is reduced substantially, due to loss of the liquid fraction which comprises 70-80% of the leaf material. This solution may scorch or kill the turf. Moreover, if it enters waterways it may kill aquatic life, and so should be retained/captured before this happens.

For these reasons it is important that care is taken with accumulated clippings and that they are disposed of in a safe manner. It should be noted that fresh clippings contain a significant quantity of plant nutrient, at approximately 0.75% N, 0.5% K and 0.05% P, some of which is removed with the liquid fraction.

In seeking to manage grass for least waste, the Waste Hierarchy of Eliminate, Reduce, Re-use, Recycle, Dispose provides the ideal basis to assess possibilities.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

There is an exemption from waste management licensing which encompasses certain types of composting activities. The waste must be biodegradable and the composting process must occur at the place where it was produced, the place where it is to be used or another place occupied by the producer or user of the compost. In addition, the maximum quantity of compost at any one time is 1000 cubic metres. If these conditions are met, the exemption should be registered with SEPA utilising a standard form available from any of their offices. There is currently no fee for this registration.

Issues	*Actions you can take*
Grass growth and clippings production	**Minimise by preventing surplus growth** • Consider the resource consumption and resource implications of moving to sand-based greens. • Ensure that the fertiliser application programme is within the optimum range for fine turf (guidelines are available: eg Fertilisers for Turf, STRI). • If using conventional inorganic granular fertiliser, do not apply any more than 4 g/m^2 of nitrogen (N) in any single application. • Select species and cultivars supporting a low nutrient requirement. • Where greens are long established and on a soil rootzone, there is little, if any, need for nitrogen fertiliser after the end of August.
Collection of clippings	**Limit area of clippings uplifted** • Collection of grass clippings is likely to be essential on golf greens, tees, collars, surrounds and possibly aprons.

Unacceptable grass deposition causing nutrient enriching effects and potential wider pollution.

Temporary bay for storing grass clippings – Old Course St. Andrews.

Issues	*Actions you can take*
Re-use of grass clippings	**Dispersal of clippings through amenity turf and other areas** • Use a grass clipping spreader to disperse clippings lightly and randomly over fairways. Ensure even spread. • Apply clippings locally over weak or drought-prone areas. No more than 500 g/m^2 (approx. 1 litre/m^2) should be applied at any one time. It is advisable to avoid areas prone to worm casting. • Use clippings as mulch round the base of young plants in new tree and shrub plantings. • Avoid spreading or dumping clippings over ecologically or botanically rich areas and ensure drift into still or moving water bodies is avoided.
Recycling grass clippings	**Composting clippings** • Investigate opportunities and feasibility of composting some or all clippings and other grass waste either on-site, off-site or a combination of both.
On-site	**In-house composting of grass clippings** • Develop an on-site composting programme for grass clippings (see Box below). • Throughout the process, aim to manage and contain effluent to avoid pollution and retain as reserve of leached nutrients. - Prior to composting, store clippings on soil or turf piles. Soil/turf containing absorbed effluent must also be composted at some point; or - Store collected clippings on a hard standing or in a compost bin where effluent can be collected. *Note:* Amount of effluent collected from decomposing grass clippings may be approximately 20-30 ml per litre of fresh grass clippings. Ingress of rain can both increase volumes of effluent and dilute nutrient concentration.

Develop liquid fertiliser from effluent

- Collected effluent typically contains high concentrations of potassium and can be used as liquid K fertiliser for turf. Dilute concentrated effluent 1:10 in water prior to spraying at 50 ml/m^2.

Disposal of unwanted/surplus effluent

- Collected unwanted effluent must be carefully disposed of by diluting 1 volume to 10 volumes water and spraying on spare turf areas. Such areas should be at least 10 metres from watercourses.

Off-site

Off-site commercial or municipal composting

- Contact your local authority to ascertain what composting facilities are available locally.
- Clippings used as "feedstock" to commercial or municipal recycling facilities for co-composting should be transported weekly to prevent decomposition of clippings to mush prior to transfer and to minimise effluent production on site.

OBLIGATION: Ensure that liquid does not enter waterways. Avoid leaching.

Compost Manufacture

The aim of compost production is to transform bulky organic-based residues to a light, friable organic material which can be re-used as a soil conditioner and fertiliser. The transformation occurs through biological and chemical processes which release heat. The heat kills most weed seeds present along with a proportion of fungal spores. Production of a well decomposed material requires air within the material. The quality of compost produced will be highly dependent on the initial materials used and the extent of aeration.

The traditional method of production entailed construction of a layered heap using organic residues and soil. However, several systems are now available for the large scale composting of organic materials. These include in-vessel systems where, in essence, organic material is taken in at one end and compost produced at the other end. Mechanical turning of the material takes place to allow aeration.

Alternatively, large scale windrows are used for bigger quantities with mechanical turning by tractor or dedicated machinery.

• Composting on the golf course

The main input to compost production on the golf course will almost certainly be grass cuttings. Unfortunately, cuttings from greens have a very high moisture content, approximately 70% by weight. As they decompose, the liquid is released and, if left unattended, the residual grass soon forms a sludge. Because of this, air cannot penetrate the material and so composting does not take place. Two strategies can be used to overcome the problem:

- ***By allowing grass cuttings to dry out prior to composting*. This can be done outside, if weather permits, or within a covered area. In the latter case, some provision can and should be made for collection and disposal of effluent from the cuttings. This can be accomplished by emptying the cuttings into a covered container with a perforated bottom.**
- ***By inclusion of dry materials within the compost in order to absorb the liquid produced by the grass cuttings*. In the traditional method of a layered heap mentioned above, the soil layers absorb liquid from the cuttings. Besides soil, other materials which could be used for this purpose include layers of well shredded newspaper and stemmy cuttings/brash/leaf litter from "rough" maintenance operations. Sand will help to keep the material open, thus allowing better penetration of air, but may retain less liquid than other more absorbent substances.**

Given the availability of sufficient grass clippings and starting materials, such as those mentioned above, a number of procedures can be used to produce compost.

Traditional layer method

In the traditional layered method, the materials should be built up on a hard standing with some effluent catchment provision and preferably covered. Failing this, a tarpaulin can be used to prevent rainwater penetration. Alternate layers of grass cuttings (approximately 150 mm thick) and dry material (soil, brash/leaf litter, sand, shredded paper) to approximately 15 mm depth should be built up until the heap is, at most, 2.5 metres in height.

The pile should be turned on at least one occasion using a tractor with a front-end loader. After 18 months to 2 years the pile can be broken up and allowed to further dry out under cover. Once in a friable state, the material should be passed through a soil shredder which will remove any coarse matter present. The material should be stored in dry conditions.

Enclosed systems

In an enclosed system the materials for composting are emptied into large volume containers. The contents can be turned, manually or by motor depending on the container size, in order to achieve the required aeration. A total capacity of approximately 3000-4000 litres would be adequate for an 18-hole golf course. Whilst this could be centralised at one point, on some golf courses it may be possible to place several containers at points over the course where they can receive cuttings direct from the greens and other mown areas. Because of the large volume of liquid produced by cut grass, it is advisable to have provision for liquid to flow from the container. Any effluent issuing from the container can be absorbed by situating it on a soil heap, which itself could be composted at a later time. Additions of dry material to the composting grass would be similar to that for a compost heap and should help retain the liquid fraction within the bulk material. For every 10 litres of grass clippings added, approximately 1 litre of additions such as soil, brash/leaf litter, paper or sand would be added. These need only be added on a monthly basis. In a centralised system, the effluent could be more easily collected and used (diluted) as a liquid fertiliser.

Some turning/mixing of the material in composting containers will be required on at least a monthly basis. This is especially important if grass cuttings are being composted on their own. After approximately 12 months the material should be emptied from the container(s), taken to a covered area, mixed and allowed to dry to a friable consistency. The material should then be passed through a soil shredder and stored under dry conditions.

Compost should reach a temperature of at least 55°C in order to kill any weed seeds and pathogens. It is advisable to monitor the compost temperature on a weekly basis. This should be done at varying depths in the heap or within the container.

The finished compost product should be chemically analysed for nutrient content (N, P, K) and pH value at a recognised laboratory. The material can be used as a fertiliser/soil conditioner on fairways or heavily worn walk-off areas. With regard to greens maintenance, the particle size of the product would play an important role in its suitability for use within a top dressing mixture. If there are facilities available for further drying and crushing of the compost, it could be crushed to a particle size of 3 mm or less for use in greens mixes.

• Supplying materials to off-site composting facilities

For some golf courses the potential exists for transporting clippings to municipal or commercial composting facilities and this is likely to increase in the future. The clippings (and other organic waste

material including the cuttings from rough management) will then be added to the urban green waste feedstock for compost production. The feasibility of such a scheme for golf clubs will depend largely on their proximity to large scale composting facilities.

Where there are several golf clubs in the vicinity of a waste recycling centre, the possibility exists for a co-operative scheme to provide regular collection and transport of clippings to the facilities through liaison with the recycling site operator.

One of the major advantages to off-site composters of grass waste from golf courses is the assurance that there will be virtually no physical contaminants present. This is in contrast to municipal/domestic green waste where there is a much greater potential for glass, plastic or other contaminants to be present. The purity of material obtained from golf courses would be advantageous where use of the compost produced was for public facilities. The one potential drawback in using golf green clippings as feedstock for commercial/municipal composting is the likelihood that on occasion there will be some fungicide contamination. Although fungicides used for fine turf are biodegradable in soil, the producer may have to provide assurance to the compost user that no trace of fungicide is present in the end product.

Where compost is produced by an off-site composter, the potential will then exist for the golf club(s) to import the finished product back to the course. The material can then be used for tee/fairway top dressing and other uses around the golf club facilities, e.g. mulching flower beds. Some assurance of the product quality would be necessary. To this end, it should meet the BSI PAS 100 specification for compost manufacture. Information on the standard is available from the Composting Association.

Useful links: www.wrap.org.uk and **www.compost.org.uk**

A perfect opportunity for composting – dumped corings, turves, leaf litter and soil, both unsightly and going to waste.

Covered hard standing for composting grass and other organic wastes.

Beautiful, friable compost produced using golf course waste.

4.2 ROUGH GRASSLAND - PROBLEMS AND SOLUTIONS TO MANAGEMENT

Introduction

Very few areas of rough within the golf course can be left totally without management over time as the majority of rough grasslands in Scotland (with the exception of a few poorly fertile coastal and upland sites) have the potential to become overgrown with highly competitive broad-leaved grasses and weed species. Despite the ecological interest for over-wintering invertebrates and seed-feeding birds given by scrub and thick grasses, there will be a balance between what can be 'left to nature' and what the club wishes to manage in some way either for golf or specific habitat reasons. Grassland swards dominated by broad-leaved weeds and grasses tend to be thick in character hence trapping golf balls that stray away from the playing line, potentially slowing throughput and ball retrieval. Further away from the playing line unmanaged rough will eventually follow the pattern of natural succession, becoming dominated by low scrub, taller trees and eventually woodland. Frequency of management is directly related to position with respect to play and to the ecological interest which should be determined in conjunction with an ecological specialist. A common theme with almost all grassland management is the removal of cut vegetation.

Allowing cut vegetation to decompose *in situ* will increase the nutrient content of the soil and accelerate the process of succession. Light scarification followed by collection of the disturbed thatch layer can often be a useful tool just off the playing line in thinning particularly dense grassland. Both cutting and scarifying will result in large amounts of organic waste which must be disposed of correctly if the ecology and aesthetic value of the golf course is to be retained.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

At the time of writing, no specific legislation is relevant to waste from rough grassland management.

Issues	*Actions you can take*
Local areas generating small amounts of rough requiring cutting once or twice per year, carefully timed for wildlife and habitat reasons	**Compost** • Cut rough with a heavy duty flail with a fitted hopper. • Keep a tractor and trailer nearby for periodically emptying the hopper. • Rough grass clippings make the perfect addition to fine turf clippings in creating a high quality, usable compost (see Section 4.1, Box on Compost Manufacture). • Invariably more litter is produced than can be used in an in-house compost programme. Surplus could be sent off site to commercial composters or stockpiled and "with consent" burnt.
Larger areas of rough requiring cutting annually or less frequently	**Compost** • As above, with more perhaps going off-site. **Bale** • Contact your local farmer. Good quality hay can be valuable. Farmers have no use for hay that contains ragwort, thistle and dock. Weed control may be required if baling for animal feed. • Farmers may bale poor quality rough for a fee if it is not required by them for animal feed or bedding. • Investigate purchase of a hand or small ATV driven baler. Baled hay can then be sold or given to members for gardening purposes. • Source opportunities for partnerships with private composters or local authorities (collection by these may be cheaper than landfill).

Grazing management

- Survey the course for large out of play areas of rough that are difficult to manage.
- At some sites a small flock of specialist sheep can negate the need for manual management.
- Contact Scottish Natural Heritage, SGEG or STRI regarding the most appropriate breeds and their husbandry.
- Appoint a member of the club or greenstaff to control the day-to-day husbandry of the sheep and move them around the course to cover all relevant grasslands.
- Erect temporary, low, electric fencing to prevent escape. This can be easily moved when rotating the grazing location of the sheep.

Dense areas of rough have been scarified to thin out the sward

Compost

- Mix the removed thatch layer with fine turf clippings. Scarifying will break up a dense thatch layer creating air spaces which will aid in the composting of other materials.

Identify which areas can be managed less frequently. Here at the Dukes Course in Fife time saved by mowing less creates a very naturalised course with excellent habitat linkage.

Neat and tidy but less mowing would offer more in terms of natural landscape, protected habitats and savings in labour and machinery costs .

Simple action, instant reward: North Lanarkshire Council left this part of Coatbridge Golf Course (previously intensively managed semi rough) to grow rough in 2003, and was presented with unexpected carpets of cuckoo flower.

4.3 TURF, HOLLOW TINE CORES AND OTHER SAND/SOIL WASTES

Introduction

The amount of soils, cores and waste turf will vary substantially within and between golf facilities. For guidance purposes, the amount of soil removed by hollow tining a 500 m^2 golf green will be in the range of 1800-2000 litres (approx. 1800-2000 kg). Therefore for an 18-hole golf course and practice green the amount produced would be 32-36 m^3 (32-36 tonnes).

Over time bunker sands will become contaminated with the underlying soil and other debris, resulting in the need for removal and replacement. Because of the contamination and particle size range, it is unlikely that old bunker sand will be suitable for the top dressing of greens. However, mixed with suitable organic material, it can be used as an excellent medium for divot repair.

Where golf course redevelopment work is taking place, waste turf is likely to be produced. In some instances during green reconstruction work the amounts produced could be substantial (amounting to around 7000-8000 litres (7-8 tonnes) per green).

The likely environmental impact from waste turf, soils or sands will be dependent on how it is disposed of. Discarding within the woodland fringe or within areas of rough grassland must be avoided as this will impact negatively on the indigenous vegetation, the naturalness and the botanical composition of the site.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

At the time of writing, no dedicated legislation is relevant to sand or soil waste beyond that applying to waste or special waste generally and soils contaminated with hazardous vegetation. (See Section 4.10.)

Issues	*Actions you can take*
Re-use of turf for new construction	**Good turf care** • Strip turf from area. Lay out flat. Maintain adequate moisture content during dry weather. Once new rootzone is prepared, relay turf. Aim to minimise turnaround time to about two weeks.
Disposing of hollow cores	**Recover and re-use** • Collect hollow cores as part of the aeration process. Develop a temporary storage area preferably near to the main compost facility. Leave uncovered to allow weathering to break down cores. Utilise the materials before decomposition commences. • Once cores have disintegrated they can be used for general repair work on the golf course, e.g. divot repair on fairways, drip lines under trees. • Use for landscaping fill in construction work on the golf course. **Recycle as compost** • Integrate cores into the main compost heap. Layer to 150-200 mm depth. Occasional turning of the heap will be required (see Section 4.1, Box on Compost Manufacture). The proportion of soil to clippings (by volume) should be about 1:10. • Use as a relatively dry soil source for composting in conjunction with the grass clippings and other wastes, to aid effluent absorption/retention.
Disposal of turf	**Recover, re-use and recycle** • Use old turf to construct temporary storage bays on the course. Place a number of turves at the base of each bay to collect any liquid effluent from clippings. Bay and contents can all eventually be composted.

- Use for revetting in bunker construction or reconstruction.
- Construct turf stacks within suitable areas and allow natural degradation to take place.
- Do not dump indiscriminately

Disposal of bunker sand

Re-use and recycle

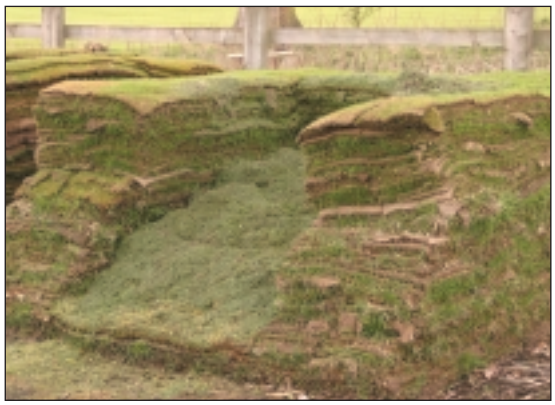
- Old bunker sand can be dug out and stored in empty 25 kg fertiliser bags or stockpiled for inclusion in the compost process.
- Use old bunker sand as an inorganic substrate for compost manufacture. Where compost is manufactured from grass clippings, add at a rate of 1 part sand : 10 parts clippings by volume.
- Mix bunker sand with compost at 5 parts sand : 1 part compost by volume for general top dressing and divoting use.
- Disposing of sand in woodland areas should generally be avoided, although on some sites sand can be of ecological benefit for reptiles (if present), mining bees and certain species of fungi and could be used to benefit these species providing the areas chosen do not support important ground flora and will not be adversely affected by this operation.

Cores re-used at Downfield Golf Course in Dundee on drip lines and weak areas.

Hollow cores will form an important component of any composting system. Give careful consideration to where they are temporarily stored. Dumping them will reduce their value, damage the surrounding vegetation and look unsightly.

A well managed stockpile of cores, turves, soil and sand awaiting re-use at Muirfield Golf Course, East Lothian.

Dumped sand and turves damaging dune vegetation.



Excellent re-use of unwanted turves.

4.4 DEADWOOD

Introduction

Felling, lopping, topping, pruning, coppicing or pollarding of trees will inevitably result in waste wood for which most golf clubs may often have no perceived use. Disposal of young trees arising from regular woodland thinning and restocking can prove a major issue to the greenstaff. Often clubs will look to source a contractor to remove deadwood who will usually charge a fee for the privilege. Preferably, wood should be chipped, chopped into logs, stockpiled or re-used in various ways on the course in preference to disposal off site.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

- Tree removal is strictly legislated and guidance should be sourced through the Forestry Commission (local Conservancy Offices). Procedures for tree felling can be sourced from the free Forestry Commission booklet "Tree Felling - Getting Permission" available from any Forestry Commission Conservancy Office (see website **www.forestry.gov.uk**)
- Certain trees are afforded even greater protection from damage or harm by a Tree Preservation Order (TPO). TPOs are established under the *Town and Country Planning (Scotland) Act 1997*. Contact your Local Authority before carrying out any tree management on the golf course in order to determine if any TPOs are present on your golf course.
- Trees in Conservation Areas are also subject to management permission from the Local Authority.

See also:

* *Environmental Protection Act 1990*
* *Waste Management Licensing Regulations (Scotland)1994*
* *Clean Air Act 1993*

Issues	*Actions you can take*
Does the tree in question need felling?	**Retain dead trees** • Retain as many dead trees as possible for their ecological interest. Standing dead trees are particularly valuable to wildlife and may often be just as or more important dead as when alive. • If they cannot be left standing, leave felled or fallen timber *in situ*.
Cut branches and scrub thinnings	**Re-use and recycle, disposing of a little as possible** • Stockpile small branches, brambles and young, thin trees within areas of retained woodland for invertebrates, fungi, birds and small mammals.

- If no scope exists for stockpiling then shredding/chipping is preferred. Woodchip can be used as a weed retardant (mulch) around the base of young trees and shrubs as an alternative to herbicides and in path restoration work. Small amounts may be located as small piles or scattered in layers not more than 50 mm deep in pockets within retained woodland as long as it does not threaten the natural ground flora and general soil conditions. Shredded or chipped brashings can be an important component in high quality compost.
- Burning should always be a last resort and only undertaken if other alternatives are not possible. If adopted, burning should take place immediately after cutting to avoid harm to hibernating, sheltering or feeding wildlife.
- Bonfires within woodlands can be extremely damaging to tree roots and important ground flora. Any burning here should take place on a mobile hard standing, and never left unsupervised.

Retain standing deadwood wherever possible, as here at Torwoodlee Golf Club, Scottish Borders ...

... and at Dalmahoy Hotel and Country Club near Edinburgh.

Retain fallen and cut wood as ecopiles within established woodland areas, as done here at Coatbridge Golf Course, North Lanarkshire.

Well established log pile providing excellent wildlife habitat and attractive feature at Deer Park Golf Course in West Lothian.

Large amounts of cut wood

Re-use and recycle

- Large individual trees that necessitate cutting and removal can be apportioned into 2-3 metre length sections and stockpiled in retained areas of woodland. Stockpiled wood should be in an easily accessible place for wildlife and if newts, frogs or toads are known to frequent ponds on the golf course then wood piles provide the perfect hibernating habitat.
- A licensed timber merchant or arboricultural company may collect larger timber following extensive woodland thinning/clearance. Unfortunately, "home-grown" British timber is no longer an economically viable product due to the cheaper imports from Scandinavia and therefore a charge would usually be levied for collection.
- Alternatively, use it to make attractive, natural looking benches and tables; offer it to local woodturners, furniture makers and other woodworkers free or at a nominal cost; offer it to local community or environmental groups and organisations who could make use of it in many different projects.

Paths

On many golf courses paths are constructed to counter the effects of heavy, intensive use. Construction materials include crushed shell, bark, woodchip, coarse stone and quarry wastes. In some cases, synthetic turf has also been used. However, path surfacing can be a very good way of re-using or recycling a variety of waste materials from the golf course, eg wood chippings or bark from tree thinning and possibly old waste bunker sand.

Path construction entails the excavation of the route to a depth of approximately 150 mm with a slight cross fall to assist drainage. Edging boards or poles straight from forest thinnings can be used to maintain the edge if necessary. The excavated section is then usually filled to a depth of 100 mm with firmed hardcore material. The pathing material (e.g. bark, woodchip) is then laid and firmed to a depth of 50 mm on top of that.

Furniture and shelters

Products made from recycled plastic wood or wood plastic composites could be alternatives to normal wood. These products require no maintenance, do not rot, and require no chemical treatment. They are available in different profiles / colours and can be worked as wood.

At Cardrona Golf Course in the Scottish Borders, it was decided to create paths in as sustainable a way as possible. Materials from woodland management operations were re-used and re-cycled - the edges were made directly from the felled trees and the surface from the chipped wood and bark. This resulted in a very natural finish which blends extremely well in its surroundings and a surface appropriate to the degree of use.

4.5 LEAF LITTER

Introduction

On greens and tees leaf litter is regularly removed to avoid disruption to the playing surfaces. From an environmental point of view, although useful in small amounts, if too many leaves blow into ponds and waterways they can cause an excessive build up of organic matter, with consequent harmful effects on water quality. Fallen leaves elsewhere generally do support a diverse invertebrate fauna with many butterflies and other invertebrates finding valuable shelter within them especially through the colder winter months.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

At the time of writing, no specific legislation is relevant to leaf litter.

Issues	Actions you can take
Disposal of leaves/leaf litter	**Collect and store** • Use leaf blowers to group leaves into piles for subsequent treatment. • Use chicken wire fencing to contain leaves. In time leaves will decompose to leaf mulch with higher density and lower volume. **Recover and return – re-use** • Leaves can be spread back into areas of woodland either by hand or from a chipper, shredder or blower to further their natural decomposition. **Compost leaves – recycling** • Leaf mulch produced after a few weeks storage is suitable for composting along with other organic material. Its relatively low moisture content makes it particularly suitable for composting with grass clippings. **Burning – last resort disposal** • Although burning the dead leaves is not illegal, this should only occur as a last resort.

4.6 WATER RESOURCE MANAGEMENT

Introduction

Irrigation is by far the greatest use of water on golf courses, and therefore is the focus of this section.

Spraying operations and topping up ponds could be further regular bulk uses of water where savings could be made.

In seeking to make savings in water use and costs, the Waste Hierarchy of Eliminate, Reduce, Re-use, Recycle, Dispose provides the ideal basis to assess possibilities. This would apply both in the sourcing of the water supply, how efficiently it is used and the safeness of any ultimate discharge to the environment or public drainage system.

Use of mains or borehole water on the golf course could be reduced through waste water collection and treatment from the clubhouse, maintenance facility and car parking. Many courses already capture rainwater and recycle surface run-off and golf course drainage waters for irrigation. See Section 4.6.3 on Sustainable Drainage.

Recycled products can be used for both irrigation and drainage pipework. For more information see www.wrap.org.uk

4.6.1 SOURCES OF WATER

Introduction

Identifying the correct range of sources of water is fundamental to sustainable water management on the golf course.

In recent times, mains-supplied water has become increasingly expensive and conservation of ground and surface water (borehole and watercourses) a greater environmental and public concern. The combination of cost implications and tighter regulation is leading many golf clubs to investigate supplementary sources.

Beyond identifying the ideal range of sources, clubs should consider how they can minimise consumption.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

If water is being abstracted from groundwater or surface water for any purpose, the *Water Environment and Water Services (Scotland) Act 2003* applies. Advice should be obtained from SEPA.

Issues	*Actions you can take*
Traditional sources of water	**Mains** • Investigate potential to utilise pre treatment mains supply with Scottish Water. **Boreholes** • Obtain appropriate specialist advice and permissions in relation to borehole water as an irrigation source. **Watercourses** • Obtain specialist advice and permissions in relation to the use of local burns or river water as an irrigation source.
Alternative/ sustainable sources of water	**Rainfall collection and storage** • Investigate the potential for the collection and storage of rainfall in butts or purpose-built detention ponds and wetlands. **Recycled run-off and drainage waters** • Consider intercepting and detaining surface run-off and drainage waters in purpose-built detention ponds and wetlands. See Section 4.6.3 on Sustainable Drainage. **Treated grey water** • Consider diverting suitable grey water for appropriate treatment and subsequent re-use on the course. See Section 4.6.3 on Sustainable Drainage.

Note: obtain chemical analysis of all water sources for salinity and pH values.

4.6.2 MINIMISING WATER CONSUMPTION

Introduction

There is huge potential to reduce the amount of water applied to the golf course. This can only be achieved by identifying and implementing a wide range of practical actions as highlighted below. ***Remember - excessive irrigation can lead to a deterioration of turf quality.***

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

If groundwater or surface water is being used on the golf course, minimising consumption will be of importance. Abstraction and pricing of water comes under the *Water Environment and Water Services (Scotland) Act 2003*.

Issues	*Actions you can take*
Minimising water need	**Develop a turf policy with the aim of minimising irrigation and spraying** • Utilise appropriate drought-tolerant turfgrass species and varieties. • Emphasis on aeration and anti-compaction (cultural) practices to improve turf health (root depth = drought tolerance). • Reduce turf stress by avoiding too low mowing heights and always cutting with sharp blades. • Reduce area of intensively managed turfgrass, and increase naturalised rough grassland. ***Avoid over-watering turf. As well as being wasteful, this can lead to deterioration of turf quality through increased compaction, increased thatch, surface moisture retention, disease and changes in species composition.*** **Other areas** • Use drought tolerant plants and mulch in landscaping areas.
Minimising water use	**Effective and efficient irrigation** • Adopt and develop an irrigation policy geared to minimising water use. • The irrigation system should have the capability of applying the equivalent of 25 mm water per week, i.e. 25 litres/m^2. • Water to replace evapotranspiration losses only. Calibrate your system appropriately. Maximum ET from the turf surface in the UK is 3.6 mm, therefore the absolute maximum irrigation requirement within one day is 3.6 mm (3.6 litres/m^2). • Take measurements of daily rainfall. Values obtained can be used to estimate actual irrigation requirements to replace ET losses. • Check irrigation system for leaks and blockages and repair promptly. • Check actual water application rate from system by placing receptacles of known dimensions on turf surface. Measure volume collected after a timed irrigation cycle. • Monitor all automated pop-up heads on a regular basis during the period that they are in operation. This is important to ensure appropriate coverage and optimum spread. • Use targeted heads of up to 180° spread wherever possible. 360° heads may be acceptable if running along the centre line of a fairway but are likely to water the rough if positioned in the green surround. • Irrigate in the evening or overnight to minimise evaporation losses. • Identify priority areas for essential watering. • Identify non-priority areas which can be watered less frequently, or not at all. • Undertake localised hand watering, particularly low areas which may receive sufficient natural watering and high spots which may require some topping up. • Consider the careful use of wetting agents to ensure maximum infiltration of water.

Properly record and monitor water use	**Assess need and set thresholds** • Don't rely on computer information alone and remember there is no substitute for inspection of turf. • Define acceptable playing characteristics for various parts of the course. **Recording** • Start to record all water use - by week, month and year, so that trends in consumption can be measured and opportunities for future savings identified.

4.6.3 SUSTAINABLE DRAINAGE: RE-USING AND RECYCLING WASTE WATER

Introduction

Sustainable drainage is all about the effective drainage of playing surfaces, which at the same time reduces the volume and speed of water that reaches piped drains and discharges into watercourses. A course which incorporates the necessary piped drainage to tees, greens and fairways, alongside open ditches, swales, soakaways, reedbeds, detention ponds and wetlands, can slow run-off and allow greater percolation of surface water into groundwater - thus helping to alleviate flooding within catchments.

As well as helping to reduce flood risk, a golf course drainage scheme based on this principle will allow for the collection, storage, treatment and re-use of waste waters such as rainwater, surface run-off and grey water.

The re-use and re-cycling of waste water can take the following forms:

- Collecting and detaining rainwater in ponds and wetlands
- Collecting and detaining surface run-off in ponds and wetlands
- Diverting and detaining golf course drainage in ponds and wetlands
- Diverting, collecting and appropriately treating grey water from clubhouse, maintenance facility and car parking

A well designed golf course drainage scheme can provide many opportunities for the above. A golf facility which can integrate such elements will maximise the potential for re-using what would otherwise be waste water. In so doing the club can: save money by reducing their dependence on charged mains or borehole supplies; create new pond and wetland habitats; add new challenges and naturalistic character to the course in the form of water hazards; and considerably benefit the wider community.

Maximising the use of re-cycled waters, particularly on courses heavily reliant on borehole systems, will help replenish groundwater supplies.

Sample drainage water used for irrigation on a monthly basis.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

The *Water Environment and Water Services (Scotland) Act 2003* promotes sustainable water use.

The *Flood Prevention and Land Drainage (Scotland) Act 1997* requires that local authorities assess watercourses in their area for the likelihood of their causing flooding on non-agricultural land within or outwith their area.

Issues	*Actions you can take*
Collecting and detaining rainwater	**Intercept and direct** • Your golf course is a catchment. Rainwater which falls on the course or runs onto your course from adjacent land can be stored. Interception via ditches and swales, which channel water into wetlands and ponds, can in turn supply irrigation ponds.
Collecting and detaining surface run-off from the golf course	**Intercept and direct** • As above, all water which lands on and runs off the playing surface can be intercepted and directed to detention ponds and wetlands. These in turn can act as irrigation ponds in themselves, or may feed more formal irrigation reservoirs.
Diverting and detaining golf course drainage waters	**Redirect and store** • Water which has passed through the soil profile into golf course piped drainage can be intercepted, redirected and stored in detention ponds and wetlands, via open ditches and swales. These in turn can act as irrigation ponds in themselves, or may feed more formal irrigation reservoirs. **Drainage from fairways** • During wet weather conditions, make observations of any evident surface water run-off from fairways to adjacent burns or rivers. • Where surface water flow is evident, install filter strips or catchwater drains. Direct these into low-lying filter beds or holding areas prior to issuing into ditches or other water features. • If a fairway drainage system has been installed, investigate the possibility of redirecting outflow from directly entering a natural watercourse to a swale, ditch or detention pond / wetland. **Re-circulating drainage water from greens** • Investigate the potential for the interception of water from the greens drainage systems to holding ponds. Note: greens drainage will probably carry more contaminant residues (eg pesticides and fertiliser) than drainage from fairways. • Investigate the possibility of rerouting existing drainage if the outlet empties directly into a watercourse. The flow may be redirected into ditches, areas of rough, swales and holding areas before issuing into major water systems. **New golf green construction** • At the design and construction phases of a new golf green opportunities exist to direct drainage to surface water collection and storage areas for re-use in irrigation. Reedbeds should be established at the pond edge to capture sediment and break down pesticide and fertiliser contaminants in the drainage water.
Diverting, collecting and appropriately treating grey water from clubhouse, maintenance facility and car parking	**Grey water from clubhouse and maintenance facilities** • Investigate the potential for re-circulating wash water from clubhouse and maintenance facilities for irrigation purposes. Prior to use this may require some pre-treatment through soakaways or settlement ponds to separate out particulate matter. Waste water should then pass through a reedbed or vegetated wetland for further physical and biological treatment. The water can then feed into detention ponds and wetlands via open ditches and swales. These in turn can act as irrigation ponds in themselves, or may feed more formal irrigation reservoirs.

Collection of water from roofs

- Investigate the possibility of diverting water from roofs and hard surfaces (clubhouse and maintenance facilities) to holding ponds. This uses the principle of sustainable urban drainage systems (SUDS) in which water from hard surfaces is drained to ground rather than to municipal drainage systems.

Case Study

Golf courses, sustainable drainage and habitat enhancement

A well thought out golf course drainage infrastructure will require some piped drainage to tees, greens and fairways. The degree of this will depend on geographical location, slope and soil type. However, pipe work should be kept short and lead into positive outlets as soon as possible. Natural soakaways, ditches, swales and wetlands are all useful positive outlets which can collect outfall from pipes and intercept, divert and hold surface and subsurface run-off.

These features should in turn feed detention ponds and wetlands / reedbeds which will act as a store and source of treatment for water which can feed the irrigation system during summer months. If the design of these detention pond and wetland features is correct the summer draw-down will be hardly noticeable due to their dense marginal vegetation.

This is the essence of sustainable drainage for golf courses in the future, and represents a major opportunity for golf clubs to create aquatic habitats which in turn contribute to the conservation of local and national biodiversity.

On a small scale, features such as open ditches, swales, soakaways and wetlands can provide inexpensive and effective local solutions to localised problems. Eg. short sections of ditch and wetlands can intercept run-off; soakaways and swales can contain and divert surface run-off; wet grasslands can be allowed to grow up in problem areas (eg low lying carries). By incorporating such features you can markedly reduce the extent of pipework on the course, resulting in less awkward and costly investigation of poorly performing subsurface drains.

Golf courses should take care not to install overly elaborate, expensive and often inefficient piped drainage schemes, paying little regard to the range of other options. Given predictions for climate change, (wetter autumns and winters; more frequent heavy rainfall events; and drier summers) golf facilities should be diversifying their drainage to be able to cope with heavier bursts of prolonged rainfall, more surface run-off onto and across the course and rising ground-waters in autumn and winter. Open ditches, wetlands and swales are more effective than piped drainage at intercepting and channelling fast run-off, particularly under compacted soil conditions. They also have greater carrying and holding capacity than a standard pipe.

Such features allow golf clubs to redirect this "excess" water from playing areas but detain it in suitable out-of-play areas for use during the drier summer months.

Ditches, swales, soakaways, wetlands and ponds are also important habitats. They should be designed to ensure the best possible combination of ecological and landscape value with drainage function. In the case of ponds and wetlands, the more natural the design-with gentle, convoluted edges, shallow margins, varied depths and islands-the greater the effect on naturalising the course and contribution to the conservation of biodiversity.

A scheme at Haddington Golf Club is striving to do just that. The club has created three large attenuation ponds with associated wetland margins, connected by open ditches and some pipework. This scheme has delivered far more drainage benefit to the club than a traditional piped scheme, and at about 20% of the cost.

One of three ponds at Haddington Golf Club in East Lothian just after construction, with varied edge profile and depths. This is part of a large backwater area connected to the next pond by an open ditch. It is hoped this will contribute to the water vole habitat within East Lothian.

The Dukes Course in Fife, in which the whole drainage scheme is based on piped drainage of fairways, leading into a soakaways, which feed open ditches that run into a series of detention ponds and wetlands. These strip nutrients before the water leaves the course via further ditches.

Swales like this example at Cardrona Golf Course in the Scottish Borders, provide valuable water holding capacity and, when vegetated naturally or through planting, create valuable wildlife corridors which can be used to link different habitats round the course.

Reedbed filtration is becoming increasingly common on golf courses, as here at Brighouse Bay, Dumfries and Galloway where it is used to treat all the waste water and sewage effluent from the holiday park as well as the golf course .

More information on sustainable drainage is available from SEPA (Sustainable Urban Drainage Scottish Working Party) and the Scottish Golf Environment Group.

4.7 SUSTAINABLE TOP DRESSINGS

Introduction

Top dressing materials for greens are generally sand based along with a proportion of organic matter from soil, compost or peat. The physical nature of the product is determined by porosity and hydraulic conductivity. This in turn determines the particle size range of the sand used, along with the amount of organic matter within the product. Any top dressing material used should have particle size range and porosity as measured by laboratory analysis appropriate to its use. Normally, this would conform to the USGA (United States Greenkeeper Association) standard. Most commercial top dressings conform to required standards but questions are often raised as to their sustainability. It is possible to obtain sustainably produced top dressings which contain green waste compost as the organic fraction rather than unsustainable peat or topsoil. It should however also be noted that much of the sand used for commercial top dressings is normally derived from quarried sources, ie it is a non-renewable natural resource. ***Research is currently underway into the effects and applications of a by-product from recycled glass to assess its potential for use as a sand substitute in the future.***

For heavily worn walk-off areas around tees and greens it would be possible to use top dressing materials which do not necessarily conform to the standards required for greens. In such situations it may be possible to use site-made products from composting.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

There is no specific legislation relevant to the use of golf course top dressings.

Issues	*Actions you can take*
Non-renewable materials in commercial top dressings	**Selecting products** • Choose top dressing products in which the organic fraction is derived from compost rather than peat.
Use of recycled materials to produce top dressings	**Producing top dressing/divot repair mix** • Where obtainable, use old bunker sand for sand fraction and compost as organic fraction of top dressing. Mix at 5 parts sand to 1 part compost by volume. This can be used for divot repairs and applied to worn areas on fairways.

Avoid the use of peat. This is a finite depleting resource. Its extraction is resulting in major ecological damage.

Permitted sourcing of sand locally can sometimes help improve habitat diversity whilst reducing the need for external sources. Here, a new sand dune slack (wetland) helps mitigate against the removal of sand.

4.8 LITTER MANAGEMENT

Introduction

Litter can be a real problem out on the golf course – even the most well meaning golfers can accidentally produce some form of waste such as broken tees, food and drinks packaging and old scorecards etc. Significant amounts of litter can also arrive on the golf course from external sources such as nearby footpaths, roads and houses. This litter can take many forms ranging from garden waste tipped over a fence, drinks cans, bottles etc through to mattresses, TVs and other large items illegally dumped. Whatever the source or form of the litter, it all has one thing in common - it is the golf club's responsibility to safely dispose of it.

Fly tipping can be a major issue.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

General litter management, i.e. food packaging, old golf equipment, etc. does not require any special licensing or compliance with environmental legislation. However, if the golf club is unfortunate enough to suffer from fly tipping of larger household, electrical waste or waste classed as hazardous for any reason then a Waste Carrier Registration is required before removal as outlined in the *Environmental Protection (Duty of Care) Regulations 1991* (see Appendix 1).

Issues	*Actions you can take*
On-course waste following regular golf	**Education/management** • Express to members the importance of not discarding litter on the golf course. • Stress the need to bring back to the clubhouse any waste food or drink containers for recycling. • Ensure a recycling system is in place to accommodate the above. • Remove litter bins from the course and put the onus back on the golfers to retain their waste until back in the clubhouse. • Place separate bins in the changing rooms for paper, metal, glass and plastic waste where golfers can place rubbish after each round. This is preferable to having several waste bins located around the golf course and preferable to sifting through general waste bags at the end of each day. • Undertake a regular course walk carrying three or four bin bags. Litter collected can then be sorted into categories. If a right of way transects, or runs parallel to, the course then allow enough time to sufficiently collect litter in this area before it disperses more widely across the course. • Use National Spring Clean Week or similar initiatives to invite members and juniors to help with litter sweeps or clean-ups. Ensure safe practices followed.

Fly tipping of large and potentially hazardous material

Prevention

- Investigate the possibility of erecting a hedgerow (if suitable) along the course boundary. Hawthorn, blackthorn and gorse dominated hedges will not only deter entry but will form an important ecological habitat.
- Discrete signage or CCTV cameras may help deter would-be tippers.

Separation and disposal

- Identify the form of the waste.
- Separate electrical or potentially harmful or hazardous wastes and contact a licensed waste handler for disposal.

Care and consideration

- Take extreme care when dealing with bagged or otherwise concealed waste, the form of which will be unknown. Broken glass, syringes and other dangerous items may be hidden within. Wear protective gloves and other clothing.
- If in doubt contact a licensed waste handler immediately. Although a fee may be charged, this is a preferable option to a staff member being harmed by concealed items.

Consider removing litter bins off the course and encourage golfers to return wastes to the clubhouse for recycling where possible.

Which is best from an environmental point of view - wood, plastic or biodegradable?
Surprisingly, might the answer be plastic? The production process may consume and waste more resources, but each tee lasts a lot longer.

4.9 LERAPS

Introduction

The *Local Environment Risk Assessment for Pesticide (LERAP)* legislation came into effect in March 1999, the principle behind it being to allow users a greater degree of flexibility in the way buffer zones are applied than under the former fixed-width arrangements, whilst still maintaining the high level of environmental protection that existed previously. It basically cover three major topics in relation to waterbodies:

1. Certain pesticides have buffer zone requirements. This means that there is a minimum distance from the water body within which the pesticide in question must not be directly applied - a no-spray zone. This distance will be notified on the product label. For some pesticides, it can be permissible to reduce the width of the buffer zone by up to four metres dependent on certain key factors, (although generally speaking, the wider the buffer zone, the better it is from an environmental point of view). If you wish to reduce a buffer zone for these eligible pesticides, there is a legal obligation to carry out and record the results of a LERAP for each application in accordance with the procedures set out in the MAFF (now DEFRA) booklet 'LERAPS a Practical Guide' available from the Pesticide Safety Directorate - Tel: 01904 640500. If you just want to operate to the label buffer zone, you don't have to carry out a LERAP, but you are still legally obliged to record this decision as usual in your spray records. LERAP eligibility only applies to products that do not contain organophosphates or synthetic pyrethroid insecticides which therefore cannot be used with reduced buffer zones.

2. Calculating buffer zones. The width of the buffer zone should be measured from the top of the bank of the watercourse, not the edge of the water. This arrangement applies to all pesticide products with a buffer zone requirement which are applied using hand-held or boom sprayers.

3. Dry ditches. A new standard buffer zone has been introduced which specifically applies to ditches which are dry at the time of application. Previous arrangements did not differentiate between the buffer zone required for a dry ditch and for other types of watercourse. The new standard buffer zone for a dry ditch is 1 metre from the top of the ditch's bank.

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

Pesticides with a buffer zone requirement are now divided into two categories A and B, updates of which are produced monthly and can be obtained via the Pesticide Safety Directorate's web page at **www.pesticides.gov.uk**. Monthly updates are also published in the Pesticide Register. For "Category A" pesticides, the standard minimum 5 metre buffer strip applies at all times and must be recorded in the spray record accordingly. Only "Category B" pesticides are eligible for the LERAP scheme. It should be noted that manufacturers can and often do apply to have Category A products switched to the Category B list if they are shown to meet certain criteria, whereafter reduced buffer zones may be permissible for them.

A LERAP must be undertaken by a golf club for every spray operation involving a Category B product applied via a boom sprayer if it wishes to reduce the buffer zone width. It is of course acceptable (and usually desirable) for users to choose to retain the standard 5 metre buffer zone with Category B pesticides but a written record must still be kept to that effect in the spray book.

The LERAP can be undertaken by the spray operator, their employer or whoever has contracted the work. It may also be undertaken by a professional consultant or adviser. The important point is that it must be undertaken and an adequate written report be kept which can be made available for inspection by enforcement authorities. It is the legal responsibility of the person using the pesticide to carry out the LERAP or to check that it is being properly carried out. In practice the course manager will be best placed to ensure the LERAP has been completed and it should be noted that failure to comply may result in enforcement action, i.e. prosecution. Such action could be taken against individual operators or alternatively against the golf club as a whole.

Issues	*Actions you can take*
Carry out an audit	**Keep up to date** • Check the Pesticides Register at least quarterly in order to keep up-to-date with any changes in categories of certain pesticides. All purchases and usage of pesticides should be thoroughly recorded and the need for LERAPS ascertained. **OBLIGATION:** Before any spraying is undertaken a thorough audit should be carried out in order to determine which pesticides fall into Category A and which into Category B at that time.

Is spraying necessary?	**Adopt cultural practices** • Adopt cultural and holistic methods of pest control. Spraying of pesticides should always be considered as a last resort. Lowering reliance on pesticides would also help save water too. • Unnecessary use of pesticides increases risk to the health of humans and in particular the local ecology. It is also uneconomic and can lead to poor quality turf. **OBLIGATION:** Spraying unnecessarily close to water bodies or applying excessive amounts can lead to prosecution.
Is your sprayer a recognised LERAP "low drift" sprayer?	**Use modern equipment** • Apply to have equipment officially recognised as having LERAP low drift status. • Adhere to label buffer zone recommendations. **OBLIGATION:** Using recognised low drift sprayers can reduce the obligatory minimum width of the buffer zone to be left unsprayed around water bodies.
Recording of LERAP conclusions	**Evaluate, record and monitor** • Much of this information will have been recorded as part of the normal operating procedure for applying pesticide under in the Code of Practice for the Safe Use of Pesticides (The Green Code). • Assess and survey nearby grasslands and water features for resident wildlife, wind speed and direction, and explore cultural alternatives before applying pesticides. **OBLIGATION:** It is a legal requirement that a written record of each LERAP is kept, even if users comply to label recommendation buffer zones. The following information must be included: • Date of final assessment • Type of spray used (including star rating) • The product being applied • The dose at which the product is to be applied • The size of the watercourse adjacent to the spraying area • The date of the spraying operation • The result of the LERAP (i.e. the size of the buffer zone applied) • The identity of the person carrying out the LERAP
Spraying	**"Care" when spraying** • Spray only when wind conditions are suitable, i.e. light breeze, and when wind direction is away from nearby watercourses or any other ecologically important or vulnerable habitats. **OBLIGATION:** Ensure that the spraying operation complies with the result of the LERAP and that the operator is informed of the appropriate buffer zone. If the buffer zone has been reduced as a result of using LERAP low drift equipment then that equipment should be used for the whole of the application (i.e. minimum of 12 metres from the bank of the watercourse).

Allowing buffer zones to develop heavy vegetation, as on this pond at Cardrona Golf Course in the Scottish Borders, will increase the protection of the water feature and improve its habitat value significantly.

4.10 HAZARDOUS VEGETATION WASTE

Introduction

There are a number of non-native invasive weeds which have been introduced to Scotland either accidentally or that have escaped from botanical collections/gardens. Species such as giant hogweed, Japanese knotweed and Himalayan balsam have all seen a massive increase in range during the latter part of the last century. Non-native species are recognised worldwide as an important contributing factor to the loss of global and local biodiversity. The primary species of concern are:

- Japanese knotweed
- Himalayan balsam
- Giant hogweed

There are also a number of native species which in large quantities in the "wrong" places can be problematic in management terms although still have their place in ecological terms. These include:

- Spear thistle
- Creeping thistle
- Curled dock
- Broad leaved dock
- Common ragwort

Legislation

Please bear in mind that legislation changes regularly and you must keep up to date with new requirements, as ignorance is not a defence in the eyes of the law. Links to websites giving up to date information on current legislation and guidance are provided under *Section 5.1 Sources of Advice* and *Appendix 1*.

Scotland has international obligations to address non-native species issues, principally via the Convention on Biological Diversity (CBD), the International Plant Protection Convention (IPPC), the Bern Convention on Conservation of European Wildlife and Habitats and the EEC Habitats Directive.

The Wildlife and Countryside Act 1981 (Scotland) (as amended) is the principal legislation which prevents the illegal spread of species listed in Part 2 of Schedule 9 (which include Japanese knotweed and giant hogweed). Section 14 of the Act states that it is an "offence to plant or otherwise cause to grow in the wild any plant listed on Schedule 9 part 2". This not only prevents individuals from purposely introducing such species but also ensures that proper management is undertaken in order to prevent their further spread.

The *Injurious Weeds Act 1959* makes it a legal obligation of a landowner to control and prevent the spread of five injurious weeds which are considered a serious threat to agricultural production. These are spear thistle, creeping thistle, curled dock, broad-leaved dock and common ragwort. A number of more invasive, non-native weeds, including Japanese knotweed, Himalayan balsam and giant hogweed, have also been included for completeness.

Issues	*Actions you can take*
Surveys/identification	**Develop an action plan** • Designate an interested member, official or greenstaff as an invasive weeds monitor. This person should become aware of the identification of these weeds in all their life forms, eg seed, seedling and flowering stages. • Conduct thorough surveys of the course on a twice per year basis in order to identify any emergent individuals. • Particular attention should be given to watercourses and any roads/maintenance tracks in and out of the course. Many weeds such as Himalayan balsam spread via seeds that are easily transported on car wheels or via moving water. • Any individuals of Japanese knotweed, giant hogweed or Himalayan balsam will constitute an immediate and serious threat and will require immediate management intervention. **Monitor** • Almost all golf courses will support a few individuals of thistle, dock or ragwort and in small proportions these are not considered problematic. Indeed, seed-eating birds such as siskin and goldfinch will thrive on these plants and the cinnabar moth lives on no other plant except ragwort. • Carry out annual monitoring. This will form an integral part of an ongoing management programme.

- Action must be taken if populations of thistle, dock or ragwort increase significantly or become a nuisance to neighbouring landuses.

OBLIGATION: The above legislation applies to any landowners/managers and ignorance of the presence of these weeds whill not be accepted as an excuse.

Presence of Japanese knotweed

Eliminate

- Eradicate any developing Japanese knotweed or giant hogweed from the course as soon as they are noted.

Control

- Where larger stands of these species are identified, then eradication may not be a realistic goal and merely control of spread and a slight reduction in size may be a better target.
- Cut below the first node (i.e. less than 50 mm above ground level) as the developing plant begins to emerge during May/June. This will give reasonable control if combined with an application of a foliar herbicide such as glyphosate to regrowth during July/August. Glyphosate can be mixed with an adjuvant such as Mixture B in order to give more effective control.
- Do not allow to seed.

Form a barrier

- Create an intensively managed "barrier" around larger stands which will involve regular mowing/herbicide application in order to impede further spread.

Dispose of vegetation

- Cut stems can either be left on a hard standing surface to desiccate, or can be buried to a depth in excess of 5 m. (It is important that non-persistent herbicides such as glyphosate be used if treated materials are to be buried).
- Bury soil that is known to be contaminated with vegetation material or burnt remains to a depth of at least 5 m with a geotextile layer or heavy polythene used to cover the material before infilling.
- If the option to bury or otherwise dispose of vegetation on site is not available then licensed landfill operators must be contracted to remove and dispose of materials. A charge will be levied for this service.

OBLIGATION: The 1981 Act prohibits the spread of Japanese knotweed which includes transporting contaminated soils or other materials. Therefore after any management has been undertaken, machinery should be washed *in situ* along with footwear and other protective clothing. To avoid the risk of contamination, vehicles should be restricted from entering knotweed (or giant hogweed) stands as they are difficult to rid of vegetation.

The *Wildlife and Countryside Act 1981 (Scotland) (as amended)* makes it a legal obligation of the land manager to prevent the spread of this species. The legislation does not specify eradication, merely control.

Presence of Himalayan balsam

Management

- As Himalayan balsam is an annual plant, physical cutting on a 2 or 3 times per year basis to a height of less than 50 mm above ground level will be sufficient to control its vigour. Do this before seeding occurs.
- Application of a non-selective herbicide such as glyphosate can be undertaken, although this will give few additional benefits to physical control.
- Treat emerging seedlings once photosynthetic leaves have developed with an approved non-residual herbicide.

Form a barrier

- Form a barrier of intensively managed vegetation around the perimeters of large stands via regular mowing/flailing.

Properly dispose of cut stems

- Stockpile cut vegetation before drying and burning in accordance with local by-laws and bury to a depth in excess of 5 m.

OBLIGATION: As yet Himalayan balsam is not incorporated in Schedule 9 of the 1981 Act. However, due to its incredible pernicity and massive extention in range during the last few years it may well be included during the next review of the document.

Removal of problem injurious weeds (ragwort, thistles and docks)

Physically remove weeds

- Use protective gloves and physically pull weeds.
- Develop "weed pull" days issuing members with protective clothing prior to commencing. Do this before seeding stage.

Burn or bury

- Disposal of injurious weeds will involve burying in accordance with the guidance given above for Japanese knotweed, giant hogweed and Himalayan balsam, or burning within the Code of Practice for the Protection of Air. Injurious weeds should not be added to organic compost as incorrectly gestated compost will retain viable seeds and therefore aid spreading.

Chemical control

- Pedestrian or machinery pulled weed wipers are available which can be set at a height of around 50-60 cm which will apply a non-selective herbicide such as glyphosate only to the tallest weeds in a sward, i.e. usually thistles, dock and ragwort.
- Spot treatment is more reliable but labour intensive for large numbers of target weeds.

OBLIGATION: The *Injurious Weeds Act 1959* empowers SEERAD (Scottish Executive Environment and Rural Affairs Department) and SEPA to serve notice requiring an occupier of land to take action to prevent the weeds from spreading. This is in practice unlikely to occur unless the golf course has a serious infestation or is adjacent to important agricultural land.

Ragwort with caterpillars of the cinnabar moth.

Himalayan balsam.

Giant hogweed.

5.0 Helping you to take action

5.1 EMBEDDING THE CULTURE

5.1.1 GETTING STARTED

Waste management is a continuous process. It may start off in a relatively simple way but with a bit of planning and commitment will build and develop to good effect over time.

A good basis for encouraging a positive approach to waste management at the golf club is for it to be seen as something which is becoming increasingly commonplace in all walks of life and will continue to do so over the coming years, whether enforced or voluntary. Many people involved in the golf club will already be implementing waste management activities at home - recycling glass, re-using plastic bags, composting in the garden. The key will be to raise awareness, provide opportunity and encourage them to do likewise at the golf club.

The importance of minimising resource and energy consumption can further be brought home to staff by pointing out the financial benefits and potential reallocation of those finances. Composting, recycling and other simple tasks can also increase job diversity and satisfaction whilst ensuring compliance with environmental legislation and an improved working environment.

Decide who is responsible

- Invite an interested member to champion best waste practices within the clubhouse. The club may wish to nominate an overall "waste champion" for the whole facility with head greenkeepers/senior managers retaining responsibility for their own departments or sections.
- The waste champion would be responsible for the development and running of the waste minimisation and sustainable management programme, covering everything from studying water consumption in the clubhouse to recycling drinks cans and grass clippings on the golf course.
- A ***'top down' approach*** should be adopted to ensure that ***a culture of waste minimisation*** is embodied at management level and percolates down through the club, i.e. from the secretary through to the greenstaff and players.

Establish the facts

- Assess how much waste is being generated? How could this be minimised, re-used or recycled?
- ***Assessment and auditing*** provides essential information on the quantities and costs of inputs, processes and outputs related to all areas of work. This will allow the ***true costs*** of waste to be calculated. SEPA estimate that this is usually 5 to 20 times higher than small businesses think. There is lots of literature, posters and other informational material available to help with this, whilst independent and confidential waste and energy audits are currently available free of charge through the initiative of the National Waste and Energy Strategies. An outsider's eye can be a very useful resource.
- Areas where waste can be reduced should be highlighted and ranked in accordance of ***importance, cost*** and ***ease of implementation***.

Implement

- Develop a ***policy statement*** providing a basic reasoning for why the club is implementing waste management policies. Communication within and outside the club will be important.
- Develop and implement a ***Waste Management Action Plan*** covering the various component areas, i.e. the clubhouse, pro shop, maintenance facility, golf course.
- A Waste Management Action Plan will help ensure that all targets are met in a prioritised and achievable manner. Monitoring and continued reassessment of targets will form an important part of this process.

Monitor

- Strive for continual improvement, monitoring to determine whether the original aims and objectives set are being met.
- ***Feedback*** between the club membership and management will raise the profile of this work and highlight successes.

5.1.2 MEMBERS/VISITORS/STAFF

It is the players at each club that hold the key to success or failure in the day-to-day running of an holistic waste management plan. The members at your golf club are visitors at another.

Evening lectures and notice boards are good ways of improving awareness within the membership. It may only take a small group of members to become interested to stimulate conversation and generate further action within the membership as a whole. When undertaken by a group of 600 members, effortless tasks such as reducing energy/resource wastage within the clubhouse and recycling food and drinks packaging on the golf course will give rise to significant financial and environmental gains.

Golfers will always enjoy playing golf in an unpolluted and wildlife-rich environment which can best be achieved with co-operation between all users and managers of the golf course and clubhouse.

The location of the greenstaff notice board in such a prominent position in the maintenance facility of Downfield Golf Club in Dundee, has made it a really effective mode of communication.

5.1.3 EXTERNAL COMMUNICATION

Golf courses do play an extremely vital role in protecting and conserving important features within our diminishing countryside. Whether or not all golfers see it in that way, golf courses both function and are often viewed by the public as a sort of nature reserve. Limiting pesticide and water use and managing with conservation in mind is helping to improve general perceptions and opinions and it is now a very good time for golf clubs to take the initiative with regard to portraying golf's positive image further. Responsible waste management is a very achievable and meaningful way of doing this.

- Publicise your good practice by contacting local news groups (newspapers, etc.)
- Liaise with other clubs and communicate your good practice to them.
- Post polite notices on pathways asking users not to drop litter or dump rubbish.
- Actively participate in waste initiatives with local authorities, biodiversity groups, access forums, schools, etc.

5.2 EDUCATION, TRAINING AND RECOGNITION

5.2.1 TRAINING

Some formal training is available through existing college courses (eg Energy Auditing courses at Stow College in Glasgow) and it is envisaged that provision generally will increase in the future. Although limited at present, opportunities for informal training on waste in the form of short courses, events, seminars and conferences are also likely to become more widely available through organisations like SEPA, WRAP, Remade Scotland, SEEO, BIGGA, Business Environment Partnership, local authorities and SGEG. SEEO currently provides a range of courses organised to specifically pinpoint and target local demand with regard to energy efficiency. It is hoped that future training will be extended to cover a hands-on type approach to all aspects of waste management which could be useful to golf club/course managers and appointed champions.

5.2.2 AWARDS AND INCENTIVES

Hopefully this publication has persuaded you of the many good reasons for golf clubs to become more waste aware and adopt good waste management practices. A number of accreditation schemes operate in Scotland which help you to demonstrate waste best practice and these are further detailed below.

SGEG Environmental Excellence Award/Committed to Green

The Scottish Golf Environment Group is a national partnership initiative which runs an Environmental Award Scheme for golf clubs in Scotland, the top level of which entitles the recipient club to certification under the pan-European Committed to Green programme for golf courses. Waste and Energy Management is one of the sections within this scheme through which clubs are able to gain recognition for their environmental efforts.

Scottish golf clubs have been leading the way among European golf clubs in achieving Committed to Green recognition.

The awards are determined and verified by the Steering Group of the Scottish Golf Environment Group, comprising golfing and environmental organisations and statutory agencies. There are no charges for participating in this scheme.

Environmental Management Systems

Some larger golf facilities, primarily in continental Europe but also in Scotland, have achieved accreditation under the European Union's Eco-Management and Audit Scheme (EMAS) or the ISO14001 Standard for Environmental Management. These are general Environmental Management Systems applied across a wide range of sectors and operating internationally.

Properly applied, such Environmental Management Systems can be very effective tools for improving management efficiency and achieving cost-savings in an organisation, but they do require considerable work and some expense. They are not generally suitable for very small entities. Any golf clubs considering seeking EMAS or ISO accreditation should first discuss this with the Scottish Golf Environment Group.

5.3 SOURCES OF ADVICE AND SUPPORT

A wide range of useful and (importantly) free information is available to golf clubs throughout Scotland from a number of governmental and advisory organisations.

The Government free

Environment and Energy Helpline 0800 585794

provides important advice on all aspects of waste management and legislation

Scottish Environment Protection Agency (SEPA)

SEPA should be a first port of call for anyone beginning a waste management programme. SEPA have worked in conjunction with the Environment Agency in England and the Environment and Heritage Service in Northern Ireland in the production of a range of Pollution Prevention Guidance Notes (PPGs). These leaflets are available free of charge from SEPA and cover a wide range of specific waste management issues such as oil disposal and pollution incident control. SEPA also offers advice regarding legislative issues and legal obligations relating to waste management.

Contact: SEPA via their website at **www.sepa.org.uk** or on the Waste Action Helpline on 0800 389 5270.

SEPA also have a website designed to help small businesses navigate through the maze of environmental legislation: **www.netregs.gov.uk**

A number of other non-profit organisations work closely with SEPA in advising private and commercial waste producers including:

The Scottish Waste Awareness Group (SWAG) provides impartial advice on waste reduction, water minimisation and current legislation.
Contact: SWAG at **www.wascot.org.uk** or 01786 471 333, or through the free Environment and Energy Helpline 0800 585794.

Envirowise is a UK government programme providing free advice on practical ways of minimising waste.
Contact: Envirowise at **www.envirowise.gov.uk** or through the free Environment and Energy Helpline 0800 585794.

The Scottish Energy Efficiency Office (SEEO) can help you save energy and minimise your waste. It acts as an information source on what is current in Scotland, and publishes free publications packed with tips to help you save money. This gives links to the Government's Envirowise Programme which can help you minimise waste and reduce your water use and the Action Energy Programme to help you minimise your energy consumption.
Contact: **www.energy-efficiency.org** or through the free Environment and Energy Helpline 0800 587794.

The Waste & Resources Action Programme (WRAP) is a non-profit organisation supported by funding from DEFRA, the DTI and the devolved administrations of Scotland, Wales and Northern Ireland, working to promote sustainable waste management by creating stable and efficient markets for recycled materials and products. WRAP offer good advice about potential commercial markets for recycled products.
Contact: **www.wrap.org.uk** or 0808 100 2040.

Remade Scotland is a major initiative which seeks to stimulate development and strengthen recycling markets through Scotland. Remade are developing recycling strategies for glass, paper, organic wastes, wood and plastics.
Contact: **www.remade.org.uk**, **remade@gcal.ac.uk** or telephone Caledonian Shanks Centre for Waste Management on 0141 582 0450.

The Recycling Advisory Group Scotland (RAGS) is a national organisation, established in 1993, which co-ordinates the promotion of recycling and associated issues in Scotland. This group offers practical advice regarding recycling best practice.
Contact: **www.rags.org.uk** or 0131 226 6666.

The Lothian and Edinburgh Environmental Partnership (LEEP) is a local charity geared toward reducing waste and energy efficiency within the Lothian and Edinburgh regions.
Contact: **www.leep.org.uk** or 0131 555 4010.

Local Enterprise Companies (LECs). Scottish Enterprise and its partners provide a range of services to support small businesses, including golf clubs, in improving performance through ideas, innovations and training. Information may be obtained through their website.
Contact: The Business Gateway link on the Scottish Enterprise Website **www.scottish-enterprise.com**

Waste Watch is an environmental organisation promoting sustainable resource management in the UK by campaigning for all areas of society to:

- reduce resource consumption
- maximise resource re-use
- increase the percentage of waste they recycle

Contact: **www.wastewatch.org** or, alternatively, your local Enterprise Company on 0845 6096611.

The Scottish Golf Environment Group (SGEG) will give free advice regarding waste management that is particularly relevant to golf clubs. Led by the SGU, R&A and Scottish Natural Heritage, SGEG has many years' experience with golf clubs, having worked with over 340 clubs on a wide range of environmental issues since 1996, and has a good understanding of the day-to-day workings and procedures associated with them.
Contact: **www.sgeg.org.uk** or 0131 660 9480.

5.4 FUNDING/OTHER SERVICES

Loan Action Scotland is funded by the Scottish Executive through the Scottish Energy Efficiency Office (as well as receiving additional funding through the European Regional Development Fund) and is operated by the Energy Saving Trust. The scheme provides interest free loans of between £5,000 and £50,000 for smaller companies (up to 250 employees) to invest in energy saving equipment.
Contact: 0800 092 9002, **loanactionscotland@glasleac.co.uk** or **www.energy-efficiency.org.uk**

Autogas+ is funded by the Scottish Energy Efficiency Office and managed by the Energy Saving Trust Scotland and aims to encourage the uptake of liquefied petroleum gas (LPG) by motorists in Scotland. Grants of £800 are available to Scottish motorists towards the conversion of their existing petrol vehicle (cars and light vans) to run on both LPG and petrol (bi-fuel). It can also offer £800 towards the cost of buying a new bi-fuel vehicle. Potential applicants should check with an Approved Installer (a list is available from the Autogas+ Hotline) to see if the vehicle can be converted.

- Applicable to petrol vehicles (cars and light vans) based in Scotland
- Vehicles must be less than five years old
- Conversion of the vehicle to LPG must be carried out by an Autogas+ approved converter
- Vehicles must pass a standard MOT emission test on petrol prior to conversion and on both petrol and LPG after conversion
- The equipment fitted must be approved multi-point

Contact: Autogas+ Hotline: 0870 240 6296 or **www.autogasplus.co.uk**

Enhanced Capital Allowances (ECAs) are available to enable businesses to claim 100% first year capital allowances in investment of water efficiency technologies and products.
Contact: **www.eca.gov.uk**

Clean Up is a programme aimed at reducing exhaust emissions from diesel engines and provides grants up to 75% of the cost of fitting equipment that reduces particulate emissions. The scheme is only open to vehicles above 3.5 tonnes.
Contact: 0845 6021425

The Energy Savings Trust (EST) is one of the UK's leading organisations addressing the damaging effects of climate change. The EST set up an office in Scotland in June 1998. Its aims are to help maximise the impact of UK programmes in Scotland and to develop distinctive Scottish programmes. Priority focus of EST activities covers the domestic sector, small businesses and the road transport sector. Funding for the EST's activities in Scotland is devolved to the Scottish Executive. Within the Executive the EST works with a number of departments, particularly the Scottish Energy Efficiency Office. The EST is based in the Scottish Executive building at Victoria Quay in Edinburgh.
Contact: 0131 244 7683 or **www.est.org.uk**

Glossary

Glossary

GLOSSARY

Aerate: Expose to / introduce / incorporate air.

Aerobic: Uses oxygen.

Aerosol Cans: Aerosol cans are made either from steel or aluminium but only recycle with food and drinks cans if expressly permitted.

Aluminium: Aluminium forms 8% of the earth's crust and is extracted from bauxite. Aluminium is really valuable and can be recycled and used time and time again. 95% less energy is used every time an aluminium can is recycled into a new can, compared to producing a brand new one. This means that twenty recycled aluminium cans can be made with the power it takes to manufacture one brand new one.

Anaerobic: Does not use oxygen.

Anaerobic digestion: The turning of organic waste into soil conditioner using the process of biodegradation without oxygen.

Best Practicable Environmental Option (BPEO): The outcome of a systematic and consultative decision making procedure that emphasises the protection and conservation of the environment across land, air and water. The BPEO procedure establishes, for a given set of objectives, the option that provides the most benefits or the least damage to the environment as a whole, at acceptable costs, in the long term as well as in the short term.

Biodegradable: Material which is capable of being broken down by plants (including fungi) and animals (including worms, other invertebrates and micro-organisms). In municipal solid waste, the property is generally attributed to the following fractions: paper and card, food and garden waste and a proportion of textiles.

Biodegradable Municipal Waste (BMW): The portion of Municipal Solid Waste which can be broken down by bacteria and other microorganisms.

Cardboard: Consists of three layers, a layer of corrugated paper between two layers of smooth paper. This makes the structure strong so that it can be used to make boxes etc. Cardboard can be recycled but is often recycled separately to other paper as it is of a lower quality.

CFCs and HCFCs: CFC (chlorofluorocarbon) and HCFC (hydrochlorofluorocarbon) are compounds known as Ozone Depleting Substances. They are widely used in industry and manufacture as refrigerants and insulating foam. The release of these gases causes a reaction in the atmosphere, which breaks down the naturally occurring protective Ozone Layer.

Civic Amenity Sites: Sites operated by either the Waste Disposal Authority (under the *Environmental Protection Act 1990*) or the local waste authority (under the *Refuse Disposal (Amenity) Act 1978*) where residents within a specified area can dispose of their household waste, in particular bulky waste, free of charge. The focus of these sites is due to change to concentrate on re-use and recycling.

Climate Change: Scientific evidence is growing that man-made greenhouse gas emissions are having a noticeable effect on the earth's climate. In the future, the UK's climate could warm by as much as 3°C over the next 100 years, and incur significant changes in rainfall pattern and extremes of weather. The social, environmental and economic costs associated with this could be huge.

Closed Loop Recycling: Closed loop recycling involves the remanufacture of waste into a new product, which is bought back by the initial waste producer. This holistic approach delivers cost-effective, sustainable, product life cycle management that can simultaneously meet clients' operational, financial, marketing and environmental objectives.

Commercial Waste: Waste arising from premises which are wholly or mainly for trade, business, sport, recreation or entertainment as defined in Schedule 4 of the *Controlled Waste Regulations 1992*.

Compost: To turn organic waste into soil conditioner using the process of biodegradation. Also the name given to the material created by the composting process.

Controlled Waste: Industrial, household and commercial waste, as defined in UK legislation. Controlled waste specifically excludes mine and quarry waste, wastes from premises used for agriculture, some sewage sludge and radioactive waste, as set out in the *Controlled Waste Regulations 1992*.

Duty of Care: The Duty of Care (Section 34 of the *Environmental Protection Act 1990*) places a general duty on waste producers (or anyone else with responsibility for waste) to take all reasonable steps to keep their waste safe. If they transfer their waste to someone else, they must ensure that that person is authorised to take it and can transport (See Registration of Waste Carriers), recycle or dispose of it safely. The Duty of Care does not apply to waste produced by householders in their own homes.

Emissions: Gases, solids and liquids discharged into the air, water or ground.

Energy Recovery: The recovery of useful energy in the form of heat and/or electric power from waste. Includes combined heat and power, combustion of landfill gas and gas produced during anaerobic digestion.

Energy Recovery from Waste (EfW): A recognised term of reference embracing a number of established and emerging technologies, though most energy recovery is through incineration technologies. Many wastes are combustible, with relatively high calorific values - this energy can be recovered through (for instance) incineration with electricity generation.

***Environmental Protection Act 1990 (EPA 90)*:** A new regulatory regime that came into force in 1990. It is designed to implement an approach to prevent harm to human health and the environment by ensuring an integrated (air, land and water) approach to environmental regulation and protection.

EU Directive: A type of law which is issued by the European Union - all EU countries then have to put this into their own legal system.

Exemptions from Licensing: Certain waste reclamation and recycling activities (which are not seen as a threat to human health or the environment) are exempt from waste management licensing requirements. This includes the storage of certain materials for recovery or re-use – although limits on quantities of material apply.

Fly Tipping: Waste which is deposited illegally by householders or businesses. This can be anything from old furniture to bags of waste or even cars. Fly tipping is illegal and can carry a fine, or in some cases a more serious punishment.

Gasification: Turning into gas; thermal treatment of waste to recover energy as gas - the waste is heated to between 800 and 1400 degrees C, in the presence of oxygen.

Green waste: Organic waste from the golf course, landscaped areas and habitats (e.g. chippings, corings and prunings) plus uncooked vegetable waste, tea leaves, coffee grounds and egg shells from the clubhouse.

Greenhouse Effect: A natural occurrence whereby the sun's warmth is trapped in the lower atmosphere of the earth by a number of gases. These gases let solar radiation through but reflect back the warmth radiated from the earth.

Greenhouse Gas: These are gases that are found in the atmosphere such as carbon dioxide and methane. The presence of these gases allows the greenhouse effect to occur. There are however increasing concentrations of these gases due to the activity of humans. It is this increase that is having a negative effect by reflecting more heat back into the atmosphere and consequently leading to global warming and a change in our climate.

Hazardous Waste: Waste materials that when improperly managed may pose a substantial threat to human health or the environment. Hazardous materials include ni-cad batteries, oil-based paint, used motor oil and other automotive fluids, electronics, many pesticides, pool chemicals, solvents, fertilisers, fluorescent lamps and wood preservatives. Usually referred to as 'special waste', it has been controlled in the UK under the *Special Waste Regulations (1996)*. These were reviewed in 2001, because the definition of special waste failed to meet the requirements of the EC Directive on hazardous waste. From 1 July 2004, the legal definition of "hazardous" and "special" waste will be the same.

Heavy Metals: Elements, including cadmium, mercury, lead and arsenic which may be found in the waste stream as part of discarded items (batteries, lighting fixtures, colorants, ink).

Incineration: Normally refers to the controlled burning of waste in the presence of sufficient air to achieve complete combustion. Energy is usually recovered in the form of electric power and/or heat. The emissions are controlled under EU Directive 2000/76/EC. This Directive also applies to other thermal treatment processes such as pyrolysis and gasification, so the term incineration may be applied to a wider range of thermal waste treatment processes.

Inert waste: Waste that is not active, that is, it does not decompose or otherwise change.

Inorganic: In waste management terms, refers to materials not derived from animal or plant sources.

Integrated Waste Management: Involves a number of key elements, including: recognising each step in the waste management process as part of a whole, involving all key players in the decision-making process and utilising a mixture of waste management options within the locally determined sustainable waste management system.

ISO 14001: The international environmental management system standard. It was published in 1996 and is designed to help organisations put in place the necessary structures to ensure that their operations comply with environmental laws and that major environmental risks and liabilities are properly identified, minimised and managed.

Landfill: The method of disposing of waste by burying it under the ground.

Landfill Gas: Landfill gas is naturally produced by anaerobic processes inside a landfill. Methods of collecting landfill gas depend upon the design of a particular landfill. A recent alternative to the two methods of deriving energy from waste through the direct combustion of the organic material is the collection and combustion of "landfill gas". Each tonne of Municipal Solid Waste produces about 70 cubic metres of landfill gas.

Landfill Sites: Areas of land in which waste is deposited and are licensed facilities. Often these sites are located in disused quarries or mines. In areas where there are limited or no ready-made voids, the practice of landraising is sometimes carried out, where some or all of the waste is deposited above ground, and the landscape is contoured.

Landfill Tax: A tax intended to address the environmental costs of landfilling by encouraging the diversion of waste from landfill. The rate of tax for 2002/03 is £2 per tonne for inert waste and £13 per tonne for non-inert waste (and set to rise by £1 per year to £15 per tonne by 2005).

Leachate: In waste management terms, liquid which is drained from a landfill and collected in a leachate pond.

Leaching: Process by which soluble materials are dissolved and carried through the soil by a percolating liquid.

LERAP: Local Environmental Risk Assessment for Pesticides.

Licensed Site: A waste disposal or treatment facility, which is licensed under the *Environmental Protection Act (1990)* for that function.

Life Cycle Analysis/Assessment (LCA): The systematic identification and evaluation of all of the benefits and disbenefits associated with a product or function through its entire life ('cradle to grave'). This can provide a basis for making strategic decisions on the ways in which particular wastes in a given set of circumstances can be most effectively managed, in line with the principles of Best Practicable Environmental Option, the Waste Hierarchy and the Proximity Principle.

Material Reclamation Facility (MRF): These are places where materials collected together in one bag for recycling are sorted for reprocessing. A transfer station for the segregation and storage of recyclable materials. Also sometimes known as Material Recycling Facility or Materials Recovery Facility.

Mechanical Biological Treatment (MBT): Systems consisting of a mechanical stage, where recyclables and rejects (batteries, tyres etc.) are separated to leave an organic fraction. This fraction is then sent, in the biological stage, for treatment using composting and digestion techniques. These systems provide a new generation of integrated waste management technology able to reduce landfill and mass-burn incineration and to increase recycling and composting.

Methane: CH_4, a naturally occurring greenhouse gas. Methane is emitted during the production and transport of coal, natural gas and oil. Methane emissions also result from the decomposition of organic wastes in landfills.

Municipal Solid Waste (MSW): Solid waste that is collected by or on behalf of a Local Authority.

Mulch: A material used to cover the ground for the purpose of inhibiting weed growth and retaining moisture, usually around young trees and in shrub beds. A variety of organic and inorganic materials can be used as mulches - eg compost, chipped bark, leaf litter, grass clippings, old carpet, plastic permeable membranes. These will decompose or disintegrate over time.

Mulching: The process of applying mulch, usually in relatively thin and even layers, to inhibit weed growth and retain moisture round young trees and in shrub beds.

Non-inert waste: Waste that is active; that is, it does change or decompose.

Organic Matter: Unwanted food waste, amenity vegetation and other biodegradable material accounts for about a fifth (20%) of Scotland's waste. Organic waste is a problem if sent to landfill, because it is impossible to separate from other waste once mingled, and will rot producing methane, a greenhouse gas responsible for global warming. By recycling as much organic matter into compost as possible, we can dramatically reduce the amount of waste filling up our landfill sites as well producing a high value soil improver/substitute with a range of uses on golf courses, horticultural and other sites.

Ozone Depletion: Is caused by the release of Ozone Depleting Substances such as CFCs and HCFCs, which are used as refrigerants and insulation foam.

Ozone Layer: A naturally occurring layer of gas in the upper atmosphere which protects the earth by filtering the sun's ultraviolet (UV) radiation. Overexposure to UV rays can lead to skin cancer, cataracts and a weakened immune system

Phone Directories: Phone directories with white pages can often be recycled with your newspapers and magazines. Yellow pages however usually cannot be recycled with your normal paper as the dyes within the paper are difficult to manage. Civic Amenity Sites will normally have a designated recycling point for Yellow Pages.

"Polluter Pays" principle: Principle by which one who produces pollution (including waste) is made responsible for it.

Planning Policy Guidance Notes (PPGs): Government Policy Statements on a variety of planning issues, including waste planning issues, to be taken as material considerations, where relevant, in deciding planning applications.

Plastic: Man-made materials composed of large molecules called "polymers" containing primarily carbon and hydrogen with lesser amounts of oxygen and nitrogen. Plastic is a difficult material to recycle as there are many different types of plastic (often indicated by

an identifying number, or letters such as PP, PET or PVC). The variation in plastic means that different reprocessing techniques are required. The different types of plastic therefore need to be collected separately, or sorted after collection, as reprocessors will specify which type of plastic they will accept.

Pollution: Contamination of air, soil or water with harmful substances.

Processing: The treatment or upgrading of recyclable, compostable or otherwise recoverable materials at a Materials Reclamation Facility (MRF) or other facility, prior to reprocessing. Upgrading operations include sorting, compacting, shredding, bulking.

Proximity Principle: Developed as part of the National Waste Strategy for Scotland, the Proximity Principle seeks to promote the management of wastes as close to their point of production as possible. The transportation of waste itself can have a negative impact on the environment as well as being extremely costly. The Proximity Principle therefore strives to follow environmental best practice as well as offering a cost-effective method for waste disposal.

Pyrolysis: Breakdown by heat; thermal treatment of waste to recover energy - the waste is heated to between 400 and 800 degrees C, in the absence of oxygen, and a mixture of gas, solid and liquid fuel is produced.

Recovery: Defined in National Waste Strategy Scotland as meaning obtaining value from waste through re-use; recycling; composting; other means of material recovery (such as anaerobic digestion); or energy recovery (combustion with direct or indirect use of the energy produced, manufacture of refuse-derived fuel, gasification, pyrolysis and other technologies).

Recyclable: Describing a material or product that has the potential to be recycled.

Recycled: Describing a material or product with a partial or complete recycled content.

Recycling: The act of processing used or abandoned materials for use in creating new products. Most materials such as paper, glass, cardboard, plastics and scrap metals can be recycled. Special wastes such as solvents can also be recycled by specialist companies.

Reduction: Achieving as much waste reduction as possible is a priority action. Reduction can be accomplished by reviewing and optimising utilisation of raw (and secondary) materials and re-circulation processes. It can be very cost effective in terms of lower disposal costs, reduced demand for raw materials and reduced energy use.

Re-use: Involves products able or expressly intended to be used a number of times in the same form, such as glass milk bottles or returnable plastic crates. Carrier bags and cardboard boxes can be used over and over again for a variety of purposes, and some suppliers deliver goods in re-usable plastic drums or on wooden pallets. Such practices contribute to sustainable development and can save raw materials, energy and transport costs.

Salvage: The act of obtaining a secondary material through collection, sorting, etc.

Soil conditioner: A material that improves the structure, fertility, drainage and other production characteristics of soil.

Special Waste: Waste, which because of the risks posed to human health and the environment (ie. is dangerous to life, has a combustion flashpoint of 21°C or less, or is a medical product), is subject to additional controls under the *Special Waste Regulations 1996*. Before such waste can be collected, the waste producer must notify SEPA of the waste's final destination through a Consignment Note system. All those party to the waste transfer must retain copies of the completed note on a register for at least three years. Includes wastes such as scrap tyres, used motor oil or household hazardous wastes. From 1 July 2004, the legal definition of "hazardous" and "special" waste will be the same.

Sustainable: A way of life, behaviour or practice that can be maintained indefinitely, i.e. without exhausting finite resources.

Sustainable Development: Development which is sustainable is that which can meet the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable Waste Management: Using material resources efficiently, to cut down on the amount of waste we produce. And where waste is generated, dealing with it in a way that actively contributes to the economic, social and environmental goals of sustainable development.

Thermal treatment: Treatment by heat - in terms of waste, this includes incineration, pyrolysis and gasification.

Vermiculture: This is the term for worm composting using a wormery.

Virgin Material: Any material which is natural and has not previously been used. Where possible we should avoid using virgin products and use a product which has recycled content such as glass aggregate or recycled content paper.

Volume Reduction: Processing waste materials to decrease the amount of space the materials occupy. It is accomplished by mechanical, thermal or biological means.

Waste: The strict legal definition of waste is extremely complex but it encompasses most unwanted material which has fallen out of the commercial cycle or chain of utility, which the holder discards, or intends to/is required to discard. Such a definition has a highly negative impact on our view and commitment to re-use and recycle those products we may view as waste, many of which can in fact be re-used or recycled.

Waste Collection Authority: A local authority charged with the collection of waste from the household/domestic sector.

Waste Disposal: This is defined by the list of operations that constitute disposal (under Part III of Schedule 4 of the *Waste Management Licensing Regulations*). This includes landfill, land raising, incineration, permanent storage etc.

Waste Disposal Authority: A local authority charged with providing disposal sites to which it directs the Waste Collection Authorities for the disposal of their controlled waste, and with providing civic amenity facilities.

Waste Hierarchy (Minimisation): Suggests that the most effective environmental solution may often be to reduce the amount of waste generated - reduction. Where further reduction is not practicable, products and materials can sometimes be used again, either for the same or different purpose - re-use. Failing that, value should be recovered from the waste, through recycling, composting or energy recovery from waste. Only if none of the above is appropriate should the waste be disposed of.

WISARD (Waste Integrated Systems Assessment for Recovery and Disposal): A tool developed by SEPA and the Environment Agency (in England and Wales) to assist in assessing the Life Cycle of a material or product.

Appendices

APPENDIX 1 THE LEGAL FRAMEWORK

CURRENT OVERVIEW

Introduction

The decision on when an object is or is not waste is often difficult and does not merely rest on its usefulness to you. Neither does monetary value mean that a material is not waste. Soils, including topsoils, stones and road planings, can all be waste. If you have any doubt as to whether any material is or is not waste you should contact your local SEPA office for advice.

This section cites the main acts regulations and codes that may apply to golf facilities. Anyone wanting to find out more detail should refer directly to the Act via the government websites or information desks, etc. listed in Section 5.3. Also visit **www.netregs.com** which is a website aimed at helping small and medium sized businesses navigate through the maze of environmental legislation. For specific information contact the NetRegs team by email: **netregs@sepa.org.uk**

Environmental Protection Act (EPA) 1990

This is the single most important piece of environmental legislation of recent times. It controls many aspects of how the environment is protected and regulated on a day to day basis.

The *EPA 1990 (amended 1995)* provides the main statutory framework in relation to waste. In particular the document:

• Defines waste

• Outlines the roles and functions of the waste collection/disposal authorities and SEPA

• Establishes the criminal offences in relation to waste

• Lays down the waste management licensing system

• Establishes the statutory duty of care in relation to waste

Legal definition of waste

The legal definition of waste comes from Section 75(2) of the *EPA 1990* which defines waste as any substance or object laid down in Schedule 2B of the Act which the holder discards, intends to discard or is required to discard. Substances in Schedule 2B which are pertinent to golf clubs may include:

• Products past their expiry date

• Materials spilt, lost or having undergone mishap including materials, equipment, etc. contaminated as a result

• Contaminated or soiled materials as a result of planned action

• Contaminated or soiled materials as a result of remedial action (on land)

• Unusable parts

• Substances which no longer perform satisfactorily

• Pollution abatement processes

• Machining or finishing

• Residues resulting from:

  - pollution abatement processes

  - machining or finishing

• Contaminated materials

• Any substances, products or material banned by law

• Unwanted products

Categories of waste

Controlled Waste can be split into the following categories:

- **Household**

  General waste associated with the everyday running of a household.

- **Industrial**

  Not usually relevant to golf clubs.

- **Commercial**

  Defined broadly as waste from premises used wholly or mainly for the purposes of trade, business, sport or recreation. It includes waste from offices, hotels, large garages, and clubhouse/ maintenance facilities produced through corporate bodies, markets, fairs and tents not pitched on a campsite.

Waste offences

The EPA makes it an offence to:

- Deposit controlled waste without licence
- Knowingly permit controlled waste to be deposited on site
- Keep, treat or dispose of controlled waste
- Knowingly cause or permit controlled waste to be kept, treated or disposed of unless a waste management licence has been issued
- It is also an offence to keep, treat or dispose of controlled waste in a manner likely to cause pollution of the environment or harm to human health. (This applies whether a waste management licence has been issued or not.)

The Waste Management Licensing Regulations 1994

The Regulations set out the procedure for obtaining a licence and also deal with revocations, suspensions, appeals, public registers and the definition of fit and proper persons.

The Regulations underpin the entire waste management licensing system and provide details on the key concepts outlined under the E*nvironmental Protection Act (EPA) 1990*.

A Waste Management Licence (WML) granted under the Regulations will specify the type and quantity of waste that can be received by the licence owner and may contain special control conditions.

A waste holder should always refer to the *Waste Management Licensing Regulations* to ascertain whether a WML is required. Alternatively, advice should be sought from SEPA.

Failure to comply will also lead to a breach of the duty of care.

Environmental Protection (Duty of Care) Regulations 1991

This regulation concerns the safe disposal of wastes and places responsibilities on both the manufacturer of the waste and the golf club (company producing waste).

The duties and responsibilities laid down below are as much to protect the producer of the waste from disreputable waste disposal firms as they are to protect the environment. This is because the company producing the waste is still responsible for the waste even when someone has removed it from their site. If it turns up in a ditch, the producer of the waste can also be prosecuted, not just the firm fly tipping it.

Waste producer responsibilities:

- Describe the waste fully and accurately
- Store waste safely on site
- Select an appropriate treatment or disposal method
- Ensure waste falls within the terms of the waste contractor's waste management licence

• Pack waste securely

• Check waste carrier's registration documents

• Make reasonable checks on the waste carrier or manager

• Report offences to SEPA

• Complete and sign a waste transfer note of waste to another party

• You may need a *Waste Carrier's Registration* if you are moving waste off your site of work.

Refer to the DEFRA website **www.defra.gov.uk/environment/waste/management** for further information, clicking on the Duty of Care appropriate link.

Waste carrier's responsibilities:

If you (or a third party) wish to transport waste from the golf club to a designated disposal site you must:

• Have a Waste Carrier Registration

• Ensure adequacy of containment of wastes in your control

• Ensure waste does not escape

• Repack waste if necessary

• Make a visual inspection to check accuracy of waste description

• Re-describe waste that is treated or re-packed

• Ensure waste is taken to an appropriate site with a waste management licence or appropriate exemption - make reasonable checks on the waste manager

• Complete and sign transfer notes on any waste transfers to or from another party

• Report offences to SEPA

The Special Waste Regulations 1996

Special Waste is essentially any waste on a hazardous waste list that came out of the Directive. To be on the list, it must contain one or more of 14 hazardous properties, or more than a threshold amount of a "dangerous substance" which if simply buried in landfill would cause environmental pollution or negative health effects. The specific nature of what is special waste is detailed below. However, if in doubt, ask the manufacturer of the product from which the waste arises or SEPA.

The purpose of the 1996 Regulations is to provide control over special waste from the time the waste is produced to its final disposal or recovery, the so-called 'Cradle to Grave' philosophy.

The *Special Waste Regulations* apply to persons who produce, carry, receive, keep, treat (including recovery) or dispose of special waste. Consignment notes must be completed for each movement of special waste.

Waste is defined as 'Special' if:

1. It is any **controlled waste**, other than household waste, which is in the list set out in the *Special Waste Regulations*.

2. It is any **controlled waste** (including waste not on the above lists) other than household waste, if it is:

• Highly flammable

• Irritant

• Harmful

• Toxic/carcinogenic

• Corrosive

'The SEPA guide to the Special Waste Regulations (SWR)' gives guidance to help identify if your waste is 'Special', see **http://www.environment-agency.gov.uk/netregs/275207/276386/?lang=_e**

Consignment notes to pre-notify special waste disposal

There is a requirement to pre-notify SEPA before any special waste is removed from any premises. A copy of the consignment note must be sent to the SEPA team responsible for the area where the waste is destined at least three clear working days in advance of the removal of the waste, but not more than one month before the removal of the waste.

Exemptions from pre-notification

- Repeat consignments of the same waste to the same destination can be notified at the time of the first consignment with no further notification being required for 12 months.
- Waste carriers collecting similar consignments of special waste from various premises need only complete one pre-notification which will last 12 months.
- Certain types of special waste movements - including special waste movements within a company prior to disposal or recovery, products or materials returned to the originator because they don't meet the required specification, and lead acid batteries.

Note on Special and Hazardous Wastes

A European review added more than 200 new wastes to the hazardous waste list and combined it with the European Waste Catalogue (EWC) which came in on 1 January 2002. This full list of hazardous wastes is already implemented under Pollution Prevention and Control Act 1999 and Landfill Regulations. The Special Waste Regulations however do not bring the full list under its control until 1 July 2004.

Until that date the definitions of 'special' and 'hazardous' wastes will be slightly different. For instance under the 1996 Regulations special waste can be any waste (not just on the list) that has a limited number of hazardous properties (mainly on their harm to human health) and also any medicine ordered on prescription (POMs). On 1 July, the definitions will be the same, i.e. POMs will no longer be special and most of the wastes previously thought of as special will be caught.

Notable 'new' special wastes will include diesel, waste electrical and electronic equipment (fridges, computers etc), fluorescent lighting, non-natural farm waste, and some contaminated construction spoils, packaging and soils. Therefore some organisations may find themselves as new producers of special waste. Some waste management facilities such as Civil Amenity sites may also be handling wastes not previously considered special but that will be from 1 July."

Pollution Prevention and Control Act 1999

The Act is written so as to enable the prevention or, where not possible, the reduction of pollution by means of an integrated permitting process based on the application of Best Available Techniques (BAT). The aim is to achieve a high level of environmental protection by taking into account: pollutant emissions to air, water and land; energy efficiency; consumption of raw materials; noise/vibration; heat/light; pollution prevention; waste management; and site restoration.

Integrated Pollution Prevention and Control is required for all activities listed in Annex 1 of the Directive which includes a section called 'waste management' which encompasses any commercial activity that produces waste.

Additional considerations/documentation

Considerations to be taken when determining BAT within the golf club include:

- Use of low waste technology
- Use of less hazardous substances
- Recovery and recycling of waste materials/by-products
- Alternative processes, facilities or operational methods (successfully trialed on industrial scale)
- Technological changes/advances in science
- Nature, effects and volume of emissions; commissioning dates for new or existing installations
- Time needed to introduce BAT
- Nature and consumption of process raw materials (including water and energy efficiency)
- Prevention/reduction to a minimum of the impact of emissions to the environment
- The need to prevent accidents and minimise their consequences to the environment
- Any information published by the European Commission and/or International Organisations.

Clean Air Act 1993

Urban air quality earlier last century was extremely poor with frequent episodes of smog and sulphur fumes from industrial chimneys and stacks. When the London Smog Incident occurred in 1952, lasting for 5 days and contributing to more than 4000 deaths, the Government appointed a committee to study air pollution. The eventual result was the *Clean Air Act 1956*, extended by the *Clean Air Act 1968*. These Acts constituted the operative legislation against pollution by smoke, grit and dust from domestic fires and commercial and industrial processes not covered by other legislation. They also regulated the combustion of solid, liquid and gaseous fuels and controlled the heights of new chimneys.

The 1956 and 1968 Acts have now been consolidated and their provisions re-enacted in the *Clean Air Act 1993*.

Groundwater Regulations 1998

The Regulations complete the implementation of the obligations of the Groundwater Directive. The purpose of this Directive is to prevent the pollution of groundwater by certain named substances. (These substances are on 'List I' and 'List II' of the Directive and are available from SEPA.) The Regulations prohibit discharges of List I substances to groundwater, and limit the discharge of List II substances so as to prevent pollution of groundwater. These requirements apply to all direct and indirect discharges to groundwater. They have put a limit on pollution of 1 part of pesticide to 10,000,000,000 parts of drinking water - equivalent to one drop in an Olympic size swimming pool!

Under the Regulations it is an offence to cause or knowingly permit the disposal, or tipping for the purpose of disposal, of any List I or List II substance in circumstances which might lead to its introduction into groundwater.

What is groundwater?

Groundwater provides drinking water (both public - from Scottish Water - and private supplies), industrial uses (such as mineral water bottling), and is important for the success and sustainability of the wider aquatic environment, including wetlands and rivers.

Groundwater is rainwater that has infiltrated and collected in permeable rocks below the surface. These bodies of groundwater are known as aquifers. Groundwater is water below the surface of the ground in direct contact with the ground or subsoil. The saturated zone is where all the cracks in the rock and all the pore spaces between the grains of rock are totally filled with water. The upper limit of the saturated zone may be thought of as the water table. Above the water table is the unsaturated zone, which is where the cracks and pore spaces in the rock are partly and temporarily filled with water, depending on rainfall patterns.

Pollution of groundwater occurs slowly. It is often unsuspected and it can be many years before the true extent of the problem is known. It is important to protect groundwater since, once polluted, it is very difficult and costly to restore to its natural state and may take many years before it is suitable for use again - in certain cases it may even be technically unfeasible to reinstate it.

The Water Framework Directive (WFD)

The EU Water Framework Directive came into force in December 2000. It is the most substantial piece of EC water legislation to date, introducing far reaching implications for all sectors whose activities impact on, or are impacted by, the water environment. These include the water industry, agriculture, development and all businesses that have discharge consents, trade effluent licences or abstraction licences (e.g. golf clubs). The Directive will also be relevant to local authorities in their role as planning authorities and other agencies that have a direct or indirect role in the management of the water environment.

The primary objectives of the Directive include:

- Preventing deterioration of, and enhancing, ecological water quality
- Ensuring reduction/prevention of groundwater pollution
- Aiming to progressively reduce/eliminate pollution especially from priority hazardous substances
- Promoting sustainable water use
- Contributing to mitigation of floods and droughts

The Directive:

- Adopts an integrated approach
- Adopts River Basin Districts as planning/management units
- Applies to all waters
- Tackles diffuse source pollution
- Requires stakeholder participation/public consultation

Both the objectives of the Directive and the timescales for implementation are very ambitious:

- The Directive was incorporated into UK law by end of 2003
- River Basin Management Plans have to be determined by end of 2009
- Programmes of measures to be operating by end of 2012
- Good water status to be delivered for most waters by end of 2015

Wildlife and Countryside Act, 1981 (as amended)

This is the principal mechanism for the legislative protection of wildlife in Great Britain. This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') and the European Union Directives on the Conservation of Wild Birds (79/409/EEC) and Natural Habitats and Wild Fauna and Flora (92/43/FFC) are implemented in Great Britain.

Golf courses that are situated on specially protected areas such as Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC) or Special Protection Areas (SPA) are even more heavily protected and contact with Scottish Natural Heritage (SNH) is imperative.

COSHH (Control of Substances Hazardous to Health) Regulations

The *COSHH Regulations* concern the listing of all hazardous materials that have been purchased, used or sold. Each should be provided with a hazard data and a safety data sheet - make sure you have a copy of each. You can use these to identify possible concerns about use, disposal, or what to do if there is a spillage. If you need further information, contact your supplier. This information is needed to make sure you comply with health and safety legislation, particularly *COSHH Regulations*.

Producer Responsibility Obligations (Packaging Waste) Regulations 1997 (as amended; they were subject to further significant amendments at the end of 2003)

These Regulations will apply to you if in the previous year your club handled more than 50 tonnes of (onward) packaging or packaging materials AND your annual turnover was more than £2 million. It is unlikely that these criteria will apply in most golf facilities. However, if they do you need to:

1. Register with the relevant environmental regulator or join a registered compliance scheme.
2. Recover/recycle a specified amount of waste.
3. Prove that you have met your annual obligations to recover packaging waste.

Control of Pollution (Oil Storage)

The regulations apply to all types of oil (including oil for catering) if quantities of 200 litres (44 gallons) or more is stored. Few, if any, golf clubs will exceed this limit for cooking oil although if oil is stored for heating then these regulations will apply.

Private Water Supplies Regulations 1992

The *Private Water Supplies (Scotland) Regulations 1992* provide the basis for private water quality.

Water Supply (Water Fittings) Regulations 1999

If you are plumbing in new fittings or installations then you must use approved fittings to avoid waste and backflow contamination of the water supply, under the *Water Supply (Water Fittings) Regulations 1999*.

The Food Safety Act (1990)

This prohibits the sale of food that could be bad for health or is unfit for human consumption. Food must be of a sort or quality demanded by the purchaser, and must not be falsely described as something it is not. It is necessary that good hygiene practices are followed.

Food Safety Regulations, e.g. Food Safety (General Hygiene) Regulations

These are regulated by the *Food Safety (General Hygiene) Regulations*, together with specific regulations relating to particular products and aspects of food preparation and storage. Further details can be found on the Food Standards Agency website: **http://www.food.gov.uk/scotland/regulations**

Town & Country Planning (Scotland) Act 1997

This is the principal legislation consolidating town and country planning issues on a district or area basis. The implementation of 'sustainable' drainage systems is becoming one of the more important requirements of any planning application. The Act is wide ranging covering Tree Preservation Orders through to controls over new and established developments.

THE FUTURE

The main driving force for future legislation on environmental issues is likely to be the European Union, possibly through legislative developments on issues such as waste recycling and water quality.

Although at present energy use does not directly come under specific legislation, it is quite possible that it will in the future. For instance, taxes and/or incentives could be introduced to encourage the greater use of renewable energy sources. On a golf course, there exists a substantial potential for the production of renewable energy from solar power, wind power, as well as biomass energy produced from waste materials such as grass clippings.

Water Framework Directive

The *Water Environment and Water Services (Scotland) Act 2003* transposed the European Water Framework Directive into Scottish law, for which SEPA is the lead authority. New regulations will follow from the Act giving SEPA greater control over "Controlled Activities" and the release of certain "Priority Substances" which affect surface and groundwaters. These activities include: point source pollution, abstractions, impoundments, engineering/building works, discharges to groundwater and diffuse pollution. All are potential activities on golf courses. Fundamentally, the aim of the legislation is to protect the ecological status of surface and groundwaters, and ensure Good Ecological Status by 2012.

Waste Management Licensing

Changes are currently proposed for some of the exemptions to waste management licensing detailed in Schedule 3 to the *Waste Management Licensing Regulations 1994 (as amended)*. One of the paragraphs under consideration is number 12 which deals with composting. However, while tonnage limits and waste types may change, it is unlikely that this will have a major effect on golf courses as the main area of concern is large scale composting of industrial wastes. Nonetheless, a charging system may be brought into force by any review.

Special Waste Regulations

Amendments to these regulations are expected. The main effect will be to harmonise the definition of special waste with the hazardous waste list produced by the EU. This will result in an increase in the number of wastes regarded as special but they will continue to be referred to as "Special Wastes" rather than hazardous wastes.

A European review added more than 200 new wastes to the hazardous waste list and combined it with the European Waste Catalogue (EWC) which came in on 1 January 2002. This full list of hazardous wastes is already implemented under Pollution Prevention and Control Act 1999 and Landfill Regulations. The Special Waste Regulations however do not bring the full list under its control until 1 July 2004.

Until that date the definitions of 'special' and 'hazardous' wastes will be slightly different. For instance under the 1996 Regulations special waste can be any waste (not just on the list) that has a limited number of hazardous properties (mainly on their harm to human health) and also any medicine ordered on prescription (POMs). On 1 July, the definitions will be the same, i.e. POMs will no longer be special and most of the wastes previously thought of as special will be caught.

Notable 'new' special wastes will include diesel, waste electrical and electronic equipment (fridges, computers etc), fluorescent lighting, non-natural farm waste, and some contaminated construction spoils, packaging and soils. Therefore some organisations may find themselves as new producers of special waste. Some waste management facilities such as CA sites may also be handling wastes not previously considered special but that will be from 1 July.

It is likely that the main aspects of pre-notification, timescales and paperwork will remain similar to those already in place.

Waste Electrical and Electronic Equipment (WEEE) Directive Regulations

This Directive must be implemented into UK law by summer 2004 through the introduction of effective regulations. Draft regulations are due out soon for consultation and refinement. The focus at present relates predominantly to the upgrading and expansion of civic amenity sites to enable the separate collection of items classed as WEEE (colloquially termed "electroscrap"). Special support funding arrangements would be made available to help local authorities achieve this. They would then be able to pass WEEE on to producers for recycling. However, local authorities are concerned at this burden on them and wish direct "takeback" by manufacturers and retailers and other accessible collection mechanisms to be adopted as part of an integrated solution to efficient collection.

APPENDIX 2 SELECTED PUBLICATIONS AND FURTHER READING

ENVIROWISE

Saving Money Through Waste Minimisation: Teams and Champions, GG27.

Finding Cost Savings: Navigation for Small Businesses Helping You Get Your Bearings, GG350.

Finding Hidden Profit for Smaller Companies, GG253.

FEDERATION OF SMALL BUSINESSES AND SCOTTISH ENERGY EFFICIENCY OFFICE

Energy and Environment SME Toolkit (Reduce Costs, Maximise Your Profit).

SCOTTISH GOLF ENVIRONMENT GROUP

Practical Ways to Improve Energy Efficiency in Golf Facilities.