

ANNEX B

REGULATORY IMPACT ASSESSMENT FOR THE LANDFILL DIRECTIVE IN SCOTLAND

Declaration

I have read the regulatory Impact Assessment and am satisfied that the balance between cost and benefit is the right one in the circumstances.

Minister for Environment and Rural Development

February 2003

REGULATORY IMPACT ASSESSMENT FOR THE LANDFILL DIRECTIVE IN SCOTLAND

This Regulatory Impact Assessment is concerned with the transposition into legislation in Scotland of EC Directive 1999/31/EC on the landfill of waste (the Directive). It updates a previous Regulatory Impact Assessment undertaken at the draft Directive stage¹ and also the version included in the previous consultation on implementation options².

The Directive introduces progressive restrictions on the landfilling of biodegradable municipal wastes. These restrictions will necessitate significant changes to the local authority management of household waste. This aspect of the Directive has been considered in a previous consultation paper.

This regulatory impact assessment examines alternative options for transposition of the remainder of the Directive in terms of their equity and fairness, benefits and compliance costs.

PURPOSE AND INTENDED EFFECT OF THE MEASURE

ISSUE AND OBJECTIVE

Landfilling is the most common means by which waste is disposed of across Europe. However, differences in technical standards and operating practices between member states have led to numerous incidents of gross land and water pollution. In response, the European Commission has introduced a number of measures to regulate landfill disposal and to establish a common framework for waste management that promotes waste prevention, minimisation, re-use and recycling above disposal³. The Landfill Directive now brings forward further measures to strengthen the protection of human health and the environment contained within current regulatory regimes.

The principal additional measures resulting from the Directive are:

- the classification of landfills into three categories (hazardous, non-hazardous and inert) and the setting of strict criteria under which wastes may be deposited at each
- a ban on the disposal of all liquids to landfill, both hazardous and non-hazardous
- a ban on infectious hospital, clinical and veterinary wastes, and on wastes that might be corrosive, oxidising, flammable or explosive within a landfill
- a progressive ban on landfill of tyres, other than when used as part of the landfill engineering works
- a requirement for waste to be treated prior to landfilling (other than for some inert wastes and where pre-treatment would not reduce hazard to human health or the environment)⁴

¹ Regulatory Impact Assessment for the Landfill Directive, DETR 16/4/99

² The Implementation of Council Directive 1999/31/EC on the Landfill of Waste, SE Feb2001

³ In particular EC Directive 91/156/EEC on waste (the Waste Framework Directive – transposed into law in Scotland through the Waste Management Licensing Regulations 1994, SI 1994 No 1056) and EC Directive 96/61/EC concerning integrated pollution prevention and control (the IPPC Directive – to be transposed into law in Scotland through regulations made under the Pollution Prevention and Control Act 1999)

⁴ Treatment is defined as physical, chemical or biological processes, including sorting, that change the characteristics of the waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery

- a requirement to re-permit or cease operations at existing sites on the basis of conditioning plans to be submitted by operators that identify remedial actions to meet the Directive requirements
- a requirement for ongoing training and development of those involved in operating landfills
- a requirement to utilise, or otherwise flare, landfill gas from sites receiving biodegradable waste.

The Directive was adopted on 26 April 1999. It is required to be transposed by member states into national legislation by 16 July 2001, with its provisions being phased in within the subsequent eight years. The overall effect of the additional measures within the Directive will be to:

- increase disposal costs, and hence provide greater impetus to minimise, recycle and re-use waste
- prohibit the long-established practice of co-disposing both solid and liquid hazardous wastes with non-hazardous wastes
- require the development of additional treatment facilities
- increase landfill gas utilisation, and so reduce global warming impacts.

RISK ASSESSMENT

The process of disposing of waste by landfill is associated with a wide range of risks and potential impacts. These include:

- contributing to global warming through the emission of methane, a powerful greenhouse gas
- surface and groundwater pollution, through the release of landfill leachate
- nuisance from odours, and human health impacts from trace gases, fumes and spores released during landfill operations, and seepage of landfill gas post-closure
- vermin and litter
- noise during landfill operations, and the operation of landfill gas flares and engines
- loss of amenity and blight by the location of a site.

The impacts of many of these risks are not readily quantifiable, and even where they are, tend to be prone to significant uncertainty⁵. Health impacts tend to be chronic, the result of long-term exposure to low level emissions⁶, whilst disamenity impacts tend to be reflected in property prices and public complaints. The Directive requirements for treating waste prior to landfill, particularly where this reduces the biodegradable content of the waste, may significantly reduce a number of these impacts.

⁵ For a discussion on uncertainty, see, for example, Broom L, et al “Beyond the bin: the economics of waste management options”, Friends of the Earth 2000

⁶ Redfearn A, et al “Assessment of health effects associated with landfills” IWM Scientific & Technical Review (April 2000) pp 14-28

However, some treatment facilities, notably simple windrow compost systems, may themselves have significant odour and other local impacts, which would off-set some of the environmental benefits of pre-treatment.

A key risk indicator is the aftercare requirement for closed landfills. Under the existing regulatory regimes, liability for the landfill remains with the operator until the waste is stabilised and poses no further hazard to the environment (potential impact on groundwater is generally taken as an indicator of this). The Directive now requires a financial contingency to be provided for at least 30 years of aftercare. However, there is considerable uncertainty over the time-span for different wastes to achieve final stability⁷ and over the rate at which the overall risk reduces throughout this period.

The impact of the Directive requirements on after care requirements for the different classes of landfill will be:

- for inert landfills, the Directive will restrict acceptance to strictly inert wastes only, such that stabilisation may be achieved rapidly.
- for non-hazardous landfills, the requirement to pre-treat wastes is intended to reduce both initial and long-term impact of the waste. However, some treatments, such as bailing to reduce void requirements, may reduce the rate of biological stabilisation, thereby extending the period of post-closure aftercare. Similarly, the ban on liquids may affect the moisture balance within the landfill, thereby reducing the initial rate of degradation; and reductions in the intake of readily degradable components may reduce the initial climate for microbial activity within the landfill. Such factors may again extend the period of post-closure aftercare.
- for hazardous waste landfills, the time-span to achieve full stability may be significant, especially where the rate of stabilisation is dependent on the rate at which heavy metal and inorganic species are released and removed from the waste mass. However, there is little published information from which to infer probable controlling parameters and leachate flow requirements. For these wastes, the Directive poses an essentially open-ended liability and financial risk to the landfill operator. The acceptability of this to operators will be a company decision taken on commercial grounds. Alternatively, waste producers and waste management companies may invest in facilities to further treat these hazardous wastes to reduce their hazard potential and render them suitable for disposal to non-hazardous landfill. This will be influenced strongly by future costs.

OPTIONS

The regulation of the landfilling of wastes in Scotland currently falls under two regimes:

- Landfills receiving over 10 tonnes a day with a total capacity exceeding 25,000 tonnes, excluding inert waste landfills, are regulated under the Pollution Prevention and Control regime (PPC)⁸

⁷ Knox, K "Sustainable landfill: a review of current knowledge and R&D needs" Norlands Foundation and ESART 2000

⁸ This applies to new applications or applications for substantial change from October 1999. Existing landfills will transfer from the WML regime to PPC from 2003 onwards

- Other sites, including inert sites, are regulated through the Waste Management Licensing regime under Part II of the Environmental Protection Act 1990 (WML)

There are currently estimated to be some 367 licensed landfills⁹ divided between the two licensing regimes. In addition, there are there some 6 landfills licensed for in-house use by industry. A breakdown of these sites is indicated in

Three options for transposing the Directive were considered within the initial consultation:

Option 1: Do nothing

This represents the base case of business as usual against which all other options are compared. The Directive is not implemented. Landfills therefore continue to be regulated under the existing WML and PPC regimes, with existing larger and non-inert landfills still requiring re-authorisation under PPC to implement the requirements of the IPPC Directive.

Option 2: Implement separately for PPC and WML sites

This would fully implement the Directive requirements through modifications to the PPC and WML regulations and licences, thereby maintaining separate regimes for small and large sites.

Option 3: Bringing WML sites within PPC and implementing a single regime, with the withdrawal of the WML regime for landfilling and the issue of new PPC licences for all existing landfill operations.

The impact of these options is essentially on the future cost of waste disposal, although administrative differences would also impact on SEPA as regulator.

Option 1 implies no change to any party over and above the changes resulting from the implementation of the PPC regulations (ie is the baseline), but implies non-compliance with the Directive. Such non-compliance would cause the EC to instigate infraction proceedings and ultimately impose a fine of tens of thousands of Euros per day until compliance is achieved.

Option 2 requires both the PPC and WML regulations to be amended to accommodate the requirements of the Directive, incurring costs in drafting separate legislation and guidance documents. SEPA would also need to maintain two charging regimes and reporting systems for landfills. As separate regimes would in any case be maintained for non-PPC waste management operations (such as transfer stations), the administrative implications of the dual system would be marginal.

Option 3 WML sites would move to a new regulatory regime, which may incur additional one-off costs compared with the variation in authorisations under Option 2¹⁰. However, this would give SEPA a single regulatory framework for landfill licensing, with transparency of administration, reporting and record keeping. This offers potential long run administrative

⁹ SEPA estimate, Feb 2001

¹⁰ The PPC charging regime has yet to be decided. However, for illustration, the application charge for a waste management licence for a small non-special waste landfill is currently £3738

savings to SEPA, which may be reflected in lower subsistence charges to landfill operators (although these may not in all cases offset the increase in one-off costs).

The PPC regime differs from the WML regime in terms of definitions, the processing of applications, variations and surrender of licences. These include:

- definition of the person to whom the permit is granted
- under PPC applicants for a permit must advertise their application, and the regulator is obliged to take into consideration representations made
- under PPC there are a number of statutory consultees to be consulted on permit applications and applications for substantial change
- PPC allows for appeals against enforcement notices
- PPC allows the partial transfer or surrender of a permit.

The transfer of WML sites to PPC therefore represents elements of both potentially increased regulatory burden (first three bullets) and potentially reduced regulatory burden (last two bullets). The impact of these would only be on new applications and applications for significant change to a site. However, future numbers of sites in these categories are likely to be very small, and hence differences between the regulatory regimes may have relatively little impact in practice.

It should be noted that these are differences in administration. The same technical requirements and levels of technical competence would be required under both the PPC and WML regimes.

ISSUES OF EQUITY AND FAIRNESS

The additional cost of waste management resulting from the implementation of the Directive will generally be reflected back to the waste producer through the disposal charges levied by the waste management service provider. This is consistent with the Polluter Pays Principle, and provides an incentive for the waste producer to reuse or recycle the waste, or otherwise minimise waste production.

Option 3 would potentially place some additional administrative requirements on very small and inert landfills than those required by the Directive. Limited consultation with the industry, however, indicates that the overriding majority of small operators will withdraw from the sector to avoid the burden of preparing and implementing conditioning plans.

Closure of small sites will result in loss of income to operators. Also, many small sites are associated with a company's business (for example, owned by a building contractor for the occasional deposit of demolition waste). In this case, the loss of a site may increase transport and disposal costs, and this may not be considered fair.

Increased cost of waste disposal will increase the incentive for unscrupulous waste producers and waste management contractors to dispose of waste through unregulated / illegal routes. Responsibility and costs for removing such tipped wastes generally falls on the local authority or the landowner as an inequitable burden. The principal option for countering would be more pro-active monitoring of waste arisings and disposals by SEPA under an amended duty of

care, but this would significantly increase SEPA's manpower requirements and regulation costs.

BENEFITS

The principal benefits of the Directive accrue to health and the environment by reducing risks, such as those identified in Section 2.2, and by promoting waste reduction, recycling and reuse. A number of these benefits may be significant, and especially of local significance where they result in a reduced impact of existing landfills. However, many of these benefits cannot be quantified.

In addition, the Directive requirements will bring forward benefits from investment in treatment technologies, rising landfill standards and ongoing staff development, which could result in new opportunities across the semi-skilled, skilled and managerial employment range.

The facilities required as a result of implementing the Directive will be:

- (i) to treat wastes to meet landfill acceptance criteria;
- (ii) for the treatment/alternative disposal of prohibited wastes;
- (iii) as an economic alternative to landfill disposal, either the result of limited landfill availability (especially for hazardous wastes) or as a consequence of increased landfill disposal costs. This will include additional capacity for high temperature incineration, chemical and physical stabilisation and a range of aerobic and anaerobic treatment systems. An estimate of the required capacity is presented in Appendix A.

The Directive requirement for landfill gas to be utilised has environmental benefits. Landfill gas is a powerful contributor to global warming, as well as having local health and hazard impacts. Current regulations require control over its release, which is generally achieved by flaring.

Landfill gas utilisation is well established in Scotland, with support particularly through the Scottish Renewables obligation scheme introduced under the Electricity Act 1990¹¹. The biogas industry estimates that despite measures to reduce the landfilling of biodegradable municipal waste, an additional 10 MWe of gas is exploitable. This may now be brought forward from 2002 under the requirements of the Directive at an additional investment cost above simple flaring of £0.75m to £1m per MWe (ie a total additional investment of £7.5m to £10.0m)¹². The phasing of this investment will be as set out in individual site conditioning plans, but in any case will need to be complete by for all sites by July 2009. This could generate an income to landfill operators of some £1.95m per year¹³, giving a pay-back period of between 5 and 7 years (at 8 per cent discount rate) for scheme operators.

Landfill gas utilisation is also beneficial in that, in Scotland, it would displace 85,000 tonnes

¹¹ Under this scheme, electricity generated from landfill gas and other renewable energy sources may receive a premium price, thereby providing an incentive for exploitation. To date, 22 individual landfill gas schemes have been awarded SRO contracts. There is currently no data available for the amount of electricity that could be generated from unutilised landfill gas in Scotland. The last available data suggested that Scotland had 10% of the UK's landfill gas resource. This assumption has been used in generating the above estimates.

¹² All costs are at current prices

¹³ Based on 100 MW electricity sales at 2.6 p/kWh, less £65,000 per site per annum additional operating costs (50 sites at typically 2MWe each)

per year of carbon dioxide from conventional electricity generation, saving between £0.65m and £2.6m per year in global warming impacts and contributing to meeting the challenge of tackling climate change. In addition, utilisation in gas engines would save approximately 100 tonnes per year of oxides of nitrogen otherwise emitted from flare stacks¹⁴, saving of the order of £0.46m per year in damage cost (mainly health impacts)¹⁵ and contributing to targets under National Emission Ceilings Directive.

COMPLIANCE COST FOR BUSINESS, CHARITIES AND VOLUNTARY ORGANISATIONS

BUSINESS SECTORS EFFECTED

The Directive will impact on waste producers, private sector waste management contractors and organisations involved in the management of wastes, and landfill operators. It will also impact on Scottish Executive and SEPA as regulator, and these impacts are discussed in Section 6.

Waste producers. The direct impact of the Directive on charities, voluntary organisations and businesses, as waste producers will be through increased costs for waste management and disposal, including increased transport costs where wastes must be transported to treatment facilities. Indicative costs are given in Section 5.3. This will provide a further incentive to re-use and recycle or otherwise minimise waste arisings, including the installation of in-house treatment capacity to reduce the quantity or hazard potential of their waste. Producers will also be required to provide more detailed descriptions of their waste to comply with revised landfill acceptance criteria.

Agriculture. The costs of the Landfill Directive to farmers in Scotland have to be seen in the context of the wider developments in the regulation of agricultural waste. As agricultural waste is currently outwith the mainstream system of waste regulation, there is limited information on the quantities and types of waste that are produced. When the Regulations are implemented, farmers who operate farm dumps will face the choice of either sending their waste off farm, or continuing to manage their own dumps with a landfill permit. The cost of sending off farm the waste that is currently placed in the farm dump will therefore represent a ceiling on what any individual farmer will have to pay as a result of these Regulations.

Merchant recyclers are well established for recovery, treatment and reprocessing of solvents, oily wastes, food processing residues and the like. Additional treatment capacity will be required, which will provide new investment and employment opportunities. In addition, there is significant potential to increase the recycling of general industrial and commercial waste, particularly through the mechanism of waste exchanges – where waste from one producer is traded as a feedstock to another process. The Directive will be to stimulate further waste exchanges, resulting in increased recycling and further employment opportunities.

Charities and voluntary organisations as waste recyclers. Charities, voluntary organisations and NGOs make a significant contribution to local schemes for recycling and re-use of certain household and commercial wastes, and are increasingly consulted in

¹⁴ Assuming lean burn engines operating at 250 mg/m³ NO_x and gas flares at 150 mg/m³ at 20 times excess air

¹⁵ Based on £4.60 per kg NO_x. Berry J, et al “Power generation and the environment – a UK perspective” DGXII and the Environment Agency (1998)

developing waste reduction programmes under Local Agenda 21. These may have an increasing role in niche markets, such as through not for profit companies in commercial waste recycling and local networks of waste exchanges with resultant additional paid and voluntary employment opportunities.

Waste management contractors. The Directive will require significant investment in new treatment and disposal facilities, which will be brought forward largely by private sector waste management contractors.

This assessment (Appendix A) indicates that some 130000 tonnes per year of special solid and liquid wastes (Table A4) and 7.9m tonnes of non-special solid wastes (other than construction and demolition waste) (Table A5) may require treatment or otherwise be diverted from landfill. This will require major investment in a range of new facilities, especially for treating liquid wastes and hazardous solid wastes, and some facilities may be developed to co-treat municipal wastes, eg. sorting facilities, composting and anaerobic digestion plants, and combustion facilities. Most of the investment is likely to be brought forward by increasingly consolidated waste management companies who have the resources to pursue the necessary developments through the planning process.

Investment decisions, however, will be based on their commercial views of risk and return. Currently there is much uncertainty within the waste industry over future capacity needs and most companies are awaiting detailed clarification of how the Directive will be implemented before making significant investment decisions. This may hinder the rate at which new facilities are brought forward which, in turn, may result in a short fall in capacity.

In the interim, there is some residual treatment capacity available in existing works which may be utilised to provide some buffer capacity whilst decisions on future treatment facilities are made¹⁶. These facilities may not be in convenient locations, which may result in additional transport of waste contrary to the proximity principle during the transitional phase. Any long-term shortfall in treatment capacity is likely to drive up disposal charges and lead to further transport of waste. However, this will also provide a stimulus to waste producers to further reduce waste arisings and/or the extent to which their wastes require treatment prior to disposal.

Brownfield site developers. Brownfield site developments can be particularly cost sensitive, and the additional costs involved in treating and/or disposing of contaminated soils may be inhibitory, especially where off-site treatment is required of soils that are classed as special wastes. The analysis in Appendix A includes an assessment of the overall additional cost of £1 million per year (high estimate) for treating some 33000 tonnes of brownfield-derived special wastes. However, higher per tonne costs may be incurred for particular treatments (e.g. vitrification), although in other cases, improved segregation of soils may result in net savings. These higher costs however, must be considered alongside the long term environmental benefits of implementation of this Directive.

Landfill industry. The initial impact on the landfill industry is through the need, by July 2002, to prepare conditioning plans for individual sites. In these, operators will need to decide

¹⁶ Marcouse T, et al "Implications of the Landfill Directive: effects on the disposal of hazardous and liquid wastes in the UK". Report BFP 013874 by Babbie Group Ltd for DETR (July 2000)

in which category (inert, non-hazardous, hazardous) to seek re-permitting. The number of sites which will transfer or close is uncertain.

As noted above, for non-PPC sites the burden of preparing and subsequently implementing conditioning plans may prove to be uneconomic. Indications are that closure and consolidation at this smaller end of the market is likely, with some small sites being bought up by larger companies, especially where there is scope for extending the site and increasing the scale of operations. This will represent a loss or a transfer of income for some companies.

The loss of small sites may require the diversion of up to 10000 tonnes per year of waste¹⁷, with potential impact through additional transport burdens and disposal costs - especially where these sites served local requirements. The effect of these additional burdens is not analysed in this RIA.

Much of the waste regulated outside the PPC regime is inert. The landfill tax (£2/t) has significantly stimulated efforts to recycle and reuse this waste as a substitute raw material. This will be further stimulated by the levy on virgin aggregates (£1.60/t) to be introduced in April 2002. At the same time, the general requirements of the Directive for landfill engineering for the protection of soil and water will increase demand for inert waste in the construction, redevelopment and restoration of landfills. The demand for future inert waste landfill capacity is therefore likely to be reduced significantly, with a consequent reduction in future landfill numbers and licensing requirements.

The main impact of the conditioning plan requirements will be on current co-disposal sites. Within the plan, an operator will need to elect whether to seek permitting within the hazardous or non-hazardous category. This will be an entirely commercial decision by individual operators.

Indications are that operators will only seek permits as hazardous waste sites for those landfills considered of strategic importance to the company's interests, such as for ultimate residues from their own treatment processes. There may only be a few such sites. Moreover, few waste management companies would accept the planning difficulties and long-term liability associated with establishing hazardous waste landfills at new sites. Sparingly few new hazardous waste landfills are therefore likely to be developed in the future.

A key factor in this decision will be whether a hazardous waste landfill may be co-located with a non-hazardous waste landfill¹⁸. The Scottish Executive's initial view that, provided the two (or more) landfills could be properly regarded as completely separate landfills, with complete engineered separation between the landfills and, as far as is possible, separate management of the sites, along with separate landfill permits for each site, this could be permissible. However, such a proposal would have to be considered very carefully to ensure that this separation of sites was not simply an attempt at circumventing the Directive's requirements. Given the small number of sites likely to be able to meet the requirements for

¹⁷ An extreme figure, which assumes WML sites operate at 10 tonnes per day, 5 days per week (ie 50 tonnes a week, or 2600 tonnes a year), assuming there are 50 such sites in Scotland. If 80 per cent of sites close, around 100000 tonnes would need to be diverted

¹⁸ Co-disposal refers to established practice of the controlled deposition of hazardous solid or liquid wastes within a biologically active non-hazardous landfill, such that the microbial processes within the landfill help stabilise the hazardous components. This is banned under the Directive. Co-location refers to engineering a separate hazardous landfill adjacent to a non-hazardous landfill on a single site

separate sites, the Scottish Executive considers that while this is possible this situation will be rare.

Landfill gas utilisation. The Directive introduces a requirement to recover landfill gas for utilisation, which may bring forward additional schemes (Section 4). These may be developed by landfill operators themselves, but more usually by specialist development companies.

Professional bodies. The Directive introduces a requirement for landfill operators and staff to receive ongoing training and development. This will place an additional cost and administrative burden on landfill operators¹⁹, but provide increased opportunities professional institutions and qualified bodies to provide training.

COMPLIANCE COST FOR A TYPICAL SMALL BUSINESS

Small waste producers. The cost impact on waste producers will be through increased disposal costs, which will provide further stimulus to reuse, recycle or otherwise minimise waste production. This stimulus may result in significant savings to the company. Alternatively, the company may wish to bear the additional cost of disposal, which may vary from £0 to £120/t depending on the nature of the waste and the cost of pre-treatment required (Table A3, Appendix A). Note that these additional costs are a direct consequence of the Directive requirements, and will not be influenced by the option chosen for its implementation.

For example, a typical small business producing two tonnes of mainly office waste per month could expect an increase of £200 to £650 per year²⁰.

An engineering works producing eight tonnes per week of mixed wastes, including some solid special waste, could expect an increase of around £1150 to £7000 per year²¹.

A construction company disposing of 200 tonnes per week of demolition wastes, including 20 per cent non-inert wastes, could expect an increase of up to £54,000 per year as a result of treatment requirements for the non-inert component²².

In each case, the potential cost increase should provide a stimulus to reducing waste arisings or otherwise seek opportunities for reuse or recycling. This is particularly the case with the construction waste, where appropriate sorting and recycling have potential to result in a net cost saving.

Farmers

The cost to farmers of the Landfill Regulations who currently dispose of some of their waste into farm dumps will be either the cost of applying for and complying with a landfill permit for the dump, or the cost of sending off site the waste that they would have placed into their

¹⁹ A typical one day training course costs £300 per person. Full training to a Certificate of Technical Competence may cost £5000 to £10,000 per person

²⁰ Based on cost range for treatment of paper and card in Table A5. Costs may be significantly lower if paper & card segregated for collection and recycling

²¹ Based on pooled data from Table A4 and A5

²² Based on high cost of non-inert C&D waste treatment in Table A5. A net saving may be achieved if this material if the non-inert waste was fully segregated and the inert component recycled

own dump. The cost of this latter option per farm will depend on the volume that they currently place in their own dump, which can be expected to vary with the size of the farm. This cost can be expected to lie in a range of £100 - £1000 per year for the majority of farms.

Operator of a small landfill site. The compliance costs for an existing operator of a small landfill will comprise a number of elements. These costs will be broadly equivalent regardless of whether such a site deals exclusively with inert waste, or with active waste.

By July 2002 a conditioning plan is required to be submitted, at an estimated cost of some £5000, which identifies any remedial works to be undertaken. The timetable for these works will be established on a case by case basis by the Agency as regulator, but in any case will need to be completed by July 2009 at the latest. Costs will depend on the extent of remedial works required, and may include both technical requirements (such as additional leachate or gas control) and non-technical requirements (such as additional staff training and increased financial provision).

On a timescale yet to be agreed, re-authorisation will be required. If this is done under Option 2 (amendment to the existing waste management licence), this will entail a modification to the existing licence. The current modification charge is £1944 for a small non-hazardous landfill, and this may be indicative of the level of future charge incurred. Under Option 3 (re-authorisation under PPC), a new PPC licence will be required. Again, as an indication, the current charge for a waste management licence for a small non-hazardous landfill is £3738. However the annual subsistence charge under Option 3 may be lower than under Option 2 (Section 3).

By taking up the derogation for isolated and island sites, the Executive aims to minimise the costs and impact of the directive for these operators.

The implications for health risks from excluded sites were taken into consideration at the drafting stage of the directive and the Executive is satisfied that the level of regulation required by these sites is sufficient.

OTHER COMPLIANCE COSTS

The Directive will introduce additional administrative burdens on SEPA in three principal areas:

- the processing of conditioning plans and the consequent permitting / re- permitting and closure of landfills
- the licensing and permitting of additional facilities for the recycling and/or treatment of wastes prior to landfill
- the enforcement of prohibitions and of waste characterisation and acceptance criteria.

In addition SEPA may have a substantial role in the regulation of biodegradable municipal waste management. This is outside the scope of this assessment.

Following consideration of the conditioning plan, the Agency will need to issue a revised permit or undertake inspections to enable the closure of the landfill. Much of the information required for these purposes will be contained in the conditioning plan, so this should be a less

onerous task than the current issuing of site licences. However, the effort may still be of the order of that required for the processing of conditioning plans. The charging regimes have not yet been decided.

Both the costs of processing conditioning plans and issuing permits would be recovered through licensing charges on landfill operators.

In addition new facilities will be required for the recycling or treatment of wastes. The associated costs would be recovered through licensing and maintenance charges on facility operators.

The enforcement waste characterisation and acceptance criteria in Article 11 of the Directive will be given effect by amendments to the Duty of Care regime. The extent of effort and scale of additional costs will depend on how pro-active SEPA will be. The same is true for prohibitions set out in Articles 5(3) and 6. This has not yet been determined.

The different regulatory regimes under which the Directive may be transposed will have some impact on administrative burdens and costs.

There are marginal differences in benefits between the options for transposing the Directive. Option 3 would give SEPA a single regulatory framework for landfill licensing, with transparency of administration, reporting and record keeping, and thus offers potential administrative savings to SEPA. This may be reflected in lower subsistence charges to landfill operators. However, WML sites would need to move to a new regulatory regime, which may incur additional one-off costs compared with the variation in authorisations under Option 2.

These changes have not been costed for this document.

1.1

2. TOTAL COMPLIANCE COST

The additional cost to waste producers arising from the treatment requirements of the Directive is estimated to lie in the range £17.5m to £112m per year. This is a wide range, reflecting the wide range of estimates of additional unit costs. Full details are given in the annex to this RIA. In addition, preparation of conditioning plans will place a one-off cost of between £0.65m and £3.5m on the landfill industry²³. SEPA's costs in assessing these plans are subsequent re-permitting will be passed to landfill operators through cost recovery charges. Both costs are likely to be passed back to waste producers through waste disposal charges.

Investment in additional gas utilisation is likely to be of the order of £7.5 to £10m over 8 years, but would be expected to break even over the project life through the sale of electricity. In addition, disbenefits may also arise as a result of the impact of additional processing,

²³ Assumes 10% of. Additional cost of preparing conditioning plans over PPC requirements is possibly in the range £5,000 to £25,000 depending on the nature of the site and the extent of monitoring works required in preparing the plan. Low range based on 20% of WML sites (Table 2) remaining open @ £5k each + 80% PPC sites remaining open @ £5k each. High range based on 40% of WML sites remaining open @ £5k each + 90% of PPC sites remaining open @ £25k each.

recycling and transport of wastes, plus from possible health impacts of workers that undertaken additional sorting. It was not possible to quantify these disbenefits.

Different options for transposing the Directive will impact costs. Option 3 potentially provides some reduction to landfill operators, in recurring regulation costs compared with Option 2, although the difference is likely to be small compared to the other costs in future landfill disposal. However, Option 3 may provide some cost savings over Option 2 to SEPA as regulator, although since it goes beyond the current regime, in some respects this may increase SEPA's costs relative to their current costs. These changes have not been costed for this document.

CONSULTATION WITH SMALL BUSINESSES

Small businesses have been brought into the consultation process through their representative business and trade organisations. Competition between waste management companies is high, and the steady trend over recent years has been towards greater consolidation to achieve cost saving. Previous consultation with the industry suggests that the Directive will accelerate this process. In particular, the need for new treatment facilities will require major investment, especially in treating liquid wastes and hazardous solid wastes, and it is the larger companies who have the resources to pursue the necessary developments through the planning process (Section 5.1).

Detailed consultations have been carried out with representatives of farmers, landowners and crofters.

SUMMARY AND RECOMMENDATIONS

The Directive brings forward a number of requirements which will add between £2.25 and £40 per tonne to the mean cost of waste disposal (Appendix A), with costs ranging from £0 to £120 per tonne for specific waste streams. These costs will largely be passed back to the waste producers, reflecting the polluter pays principle, and will provide a further incentive to waste producers to reuse, recycling or otherwise minimise their waste production.

The Directive will require significant investment in new treatment and disposal facilities, particularly for liquid wastes and hazardous solid wastes. This investment may be largely brought forward by increasingly consolidated waste management companies based on commercial views of risk and return. However, companies are awaiting detailed clarification of how the Directive will be implemented before making significant investment decisions, and this consultation should provide further details, but this may delay the rate at which the Directive provisions can be implemented.

Of the alternative regimes under which the Directive may be transposed, Option 3 has the potential for increasing the regulatory burden of non-PPC sites, but this assessment suggests that this will have little practical impact. This option is therefore preferred for its potential to provide a consistent regulatory regime with common reporting requirement and data systems. This has the potential to accrue savings in recurring costs to SEPA as regulator, which may be reflected in reduced charges to operators, and these benefits are judged to outweigh the effects of one-off costs incurred due to changes in the regulatory regime. However, it should be noted that the potential savings have not been costed.

APPENDIX A: DIRECTIVE IMPACT ON WASTE MANAGEMENT COSTS

Waste arisings

The Scottish Office and SEPA commissioned Environment Resources Management (ERM) to undertake a comprehensive survey of household, industrial and commercial waste arisings in Scotland. Data for 1998 indicates:

- Total controlled waste landfilled as 11.9 million tonnes

Of the total 11.9 million tonnes landfilled

- 3.0 mt was household waste
- 0.9 mt was special waste
- 5.1 mt was construction waste
- 2.9 mt was waste from other sources

Of the 933,000 tonnes of special waste sent to landfill 843,000 tonnes were contaminated soil from the Ravenscraig site. The remainder is made up of 47,300 of special liquid waste and 40,900 tonnes of other special wastes.

WASTE TREATMENT COSTS

Under the Directive, liquid wastes (both special and non-special liquid wastes) will be banned from landfill, and most solid wastes will require treatment prior to landfill. This represents a wide range of wastes, including:

- contaminated packaging
- alkaline and acidic wash liquors
- fats and greases
- spent solvents and solvent recovery wastes
- oily wastes and sludges
- asbestos-bearing wastes
- slags, ashes and gas cleaning residues
- organic contaminated soils
- metal bearing wastes
- filter cakes

Some currently landfilled wastes may be amenable to further treatment to enable their reuse or recycling. Others are the residual end products of other treatment processes (eg. filter cakes from effluent treatment and sludges from solvent recovery processes) with little potential for further recovery. For these, landfill disposal may represent the best practicable environmental option. However, the Directive may now require their further treatment in order to meet acceptance criteria for the different classes of landfill.

Table A1: Estimated annual waste arisings and disposals to landfill

Figures are calculated using the total Scottish waste data landfilled for 1998, spilt into the various types of waste identified below, using the proportions used in the English and Welsh version of this paper.	Total Arising Mt	Quantity currently landfilled			
		Special solid	Non-special solid	Special liquid	Non-special liquid
		Kt	kt	Kt	Kt
Inert, in-house	0.1	1.10	151.96	0	0.71
Paper and card	0.2	0	215.89	0	0
Food	0.1	0	27.76	0.17	1.96
Other general and biodegradable	0.3	0.72	315.00	0.67	12.27
Metals and scrap equipment	0.1	1.13	79.49	0	0
Contaminated and healthcare	0.3	10.83	246.17	1.04	4.10
Mineral waste and residues	0.5	1.79	511.26	0	3.73
Chemicals	0.2	23.15	109.20	44.77	16.18
General commercial	2.5	1.89	2507.08	0	0
General industrial	1.6	0.38	1562.23	3.31	1.10
Construction & demolition waste	2.2		2242.97		
Contaminated soil (not included in above)	0.0	4			
Total	8.1	41	7969	50	40

Treatment options exist for most waste streams both for in-house and merchant use. In addition, more novel options (often employing high technology solutions, for example high temperature plasma melting) are increasingly available, often from overseas suppliers, and will increasingly be deployed depending on market conditions.

The impact assessment now requires consideration of the overall treatment costs under the different options for implementation. A comprehensive assessment would require detailed knowledge of the composition of the various waste streams coupled with capital and operating costs for each treatment option. Information is not available at this level of detail, especially on the arisings of non-hazardous general commercial and industrial wastes, for which only pooled figures are available. Rather, an assessment has been made of likely cost ranges based on a qualitative understanding of the various waste streams, coupled with in-house indicative cost data for treatment, transport, disposal and income from revenues. An illustration of the assessment for special solid wastes is provided in Table A2

This analysis has been used to derive representative treatment cost ranges for the generic waste streams. These are presented as marginal additional costs above typical current landfill costs in Table A3. The high/low figures indicate the expected range of costs for most waste streams.

Table A2: Qualitative cost assessment for solid special wastes²⁴

In house and Merchant recycling	<p>Inorganics: metals mainly will be recovered in house with the maximum cost going up to notional cost of solidification, PLUS a small increase for transport element since solidification will only be available in a few locations. Some inorganics will go to merchant facilities, but these will be only occasional. Generally, in house and merchant recycling < solidification + £5</p> <p>Specific processes for fluorescent tubes/lead acid batteries will be done at merchant facilities.</p> <p>Solid organics: not a lot except waste to land, which is reasonably cheap. Some organics will require breaking of bonds, and some sludges/solids could be heat to allow separation of two liquid phases or liquid/solid separation. This will be in the order of £50-90/te depending upon value of materials.</p> <p>Recovery of oil from oil sludges or filter clays may be feasible as well. Maybe 30% content at around £40/t to treat</p> <p>Waste exchanges will come in as well, but mainly done by producer, not merchant.</p>
Medium cost separation	<p>This is mainly a treatment to reduce the hazardous content, but not necessarily to go to non-hazardous landfill. Example could be centrifuging oil sludge to remove some of the oil giving it a "treated" status, but retaining enough oil to make it a hazardous waste for disposal.</p> <p>Occasionally, could improve the system and undertake steam injection or pH control to break oil/residue and clean up material to allow majority into non-hazardous landfill plus a small proportion to high temperature incineration (eg acid tars). Additional treatment cost paid for by reduction in landfill costs.</p>
High cost separation	<p>This is going to be within the process as an end of pipe treatment for one of the waste flows to avoid the final waste containing the element that makes it a hazardous waste.</p> <p>Alternatively, could be complex treatment of sludges and filter media to remove all of the hazardous components for recycling, combustion or solidification and render residual material suitable for non-hazardous landfill</p>
Wet oxidation/DEM	<p>Will be used occasionally, but not on final solid waste: on one of the component waste streams to remove a hazardous component: e.g. halogenated solvent residues. The high cost is because this is pre-treatment + another process, but pre-treatment will be on PART of the waste stream only. Slightly lower per tonne than for liquid special waste</p>
Composting	<p>N/a, although some companies are exploring its potential from treating organically contaminated soils as an alternative to remediation</p>
Aerobic treatment	<p>Only as secondary process</p>
Anaerobic treatment	<p>Easily digestible materials such as fats, could be same price as landfill or even less than landfill, but these are not special wastes. These could go into sewage work digesters with no pre-treatment. Assuming that companies with continual suitable streams will do in-house AD with heat recovery, the majority of material leaving sites will be occasional materials requiring testing and blending to go into merchant systems and a slightly higher price. AD also been used for complex wastes such as pharmaceuticals: much longer residence time and specialist facilities needed. Costs for AD are in the order of £12-28/te for simple wastes; £15-35 for high COD; £65 for wastes requiring pre-treatment</p>
Remediation	<p>Off-site remediation: two journeys, no reduction in <u>tonnage</u>, hopefully going down from hazardous to non-hazardous landfill charges saving £15/te, but maybe no saving. Treatment costs are probably at the high: £10- 30/t level. However, likely to leave material in the ground if overall costs too high. Overall costs £0-35</p>
Neutralisation – other chemical options	<p>Not an obvious treatment outlet, but may have to be used if solidification is not available on the market. Could provide neutralisation to lime rich flue gas treatment wastes; take mobile metal wastes back into acid conditions to strip out metals into solution and then convert to hydroxide. If used, this will be quite expensive and with high landfill costs.</p>
Solidification (merchant)	<p>Current solidification in UK and Europe ranging from £75- 100/tonne. Some <u>screened</u> lime wastes are taken in for much lower prices as an alkali and for pozzelanic properties, but this is considered as reuse.</p>
Combustion	<p>Very variable: combustion can be used for hydrocarbon sludges with a calorific value, some with halogenated fraction in the waste. Also used for mixed laboratory chemicals and surplus chemicals with no calorific value (CV). Price varies with CV, numbers of items for pre-sorting and checking, difficult materials requiring slow feed through the plant. It is assumed that very high cost waste for incineration, such as PCBs, is not going to landfill at present and therefore the highest rates have been excluded.</p>
Pyrolysis/gasification	<p>Thermal systems, usually for high calorific value waste. On site energy recovery reduces cost compared to combustion systems, partly because the wastes are chosen to be suitable for the process. Savings to be made are in collection and transport costs and use of energy by producer, rather than by the waste management company. Gasification probably being used in conjunction with on-</p>

²⁴ after Marcouse ref 32, pers comm

	site use of liquid wastes. Pyrolysis needs a use for residues.
Plasma/ vitrification	These are other thermal systems. Prices very variable, partly to do with ability to use final products. Costs are for whole process, including secondary treatment or landfill of vitrified product. Lowest costs will be for plasma systems with high value metal recovery and vitrification with product recycled as building materials. Highest costs are for vitrification + landfill of residues. Example vitrification prices are 60-120/t for fly ash including assumption that wastes will be recycled and that existing flue gas treatment can be used. If assumptions incorrect, final cost is higher to reflect cost of non-haz landfill: £50-110 incremental cost.

Table A3: Marginal cost of alternative treatments over current landfilling (net of landfill tax)¹

	Special solid		Non-special solid		Special liquid	
Landfill costs ²	35		20		40	
	low	High	low	high	low	high
In house recycling/re-use	0	50	0	20	0	60
Merchant recycling	20	100	5	20	0	50
Simple sorting, liquid screening / phase separation	n/s		0	5	0	10
Medium cost centrifugation / assisted settling	0	10	n/s		5	15
Complex sorting & treatment, high cost phase / stream separation (eg UF)	5	35	5	35	5	15
Wet oxidation	n/s		n/s		20	50
Composting	5	35	0	25	n/s	
Aerobic treatment	n/s		n/s		0	25
Pre-treatment + biological	n/s		n/s		5	40
Remediation	0	35	0	30	n/s	
Anaerobic digestion / treatment	5	55	10	30	0	30
Neutralisation / precipitation of metals	n/s		n/s		0	30
Solidification (merchant)	40	60	0	10	40	60
Combustion	45	120	20	40	40	100
Pyrolysis / gasification	40	120	n/s		40	80
Plasma / vitrification (merchant)	50	110	n/s		n/s	

1 low / high indicates range of costs for typical waste streams. More extreme values may be obtained for particular waste streams

2 current baseline average costs for UK

n/s not generally suitable / available for this waste stream

IMPACT COST MODELLING

A top-down approach has been adopted to modelling the treatment cost impacts for all waste streams. This involves assigning likely percentages of the various waste quantities currently disposed to landfill which may in future be treated by the treatment options identified in Table A3. For example, for the paper/card fraction of non-special solid waste (Table A5), of which much is already recycled or otherwise diverted from landfill, it is assumed that a further 10% may be diverted to reuse, 30% to merchant recycling, 20% to composting, with the balance (40%), representing the largely unrecoverable fraction, going to combustion and anaerobic digestion.

As seen from the example above, this top-down analysis still requires a considerable understanding of the nature of the waste components and their likely treatment routes.

For non-special solid wastes, the same methodology has been applied to grossed up data from the Environment Agency's national waste survey. The methodology and results are presented in Table A5.

1. MODELLING RESULTS AND INTERPRETATION

The modelling results, summarised in Table A6²⁵, indicate an additional cost to waste producers of treatment and disposal resulting from the Directive in the range £97 to £696m per year. This extreme range reflects the range of low to high per tonne treatment costs given in Table A3. Probability analysis (Appendix B) indicates that the *mean* additional cost is likely to be £400m per year, with a range of £290m to £500m per year at the 90 per cent confidence interval. The probability distribution is shown in Figure A1.

Table A6: Assessment of annual additional cost of landfill disposal

	cost of change (£k/y)		cost (£/t)	
	low	high	low	high
Non special solid	16261	107916	2.04	13.54
Special solid	496	1554	12.40	38.85
Special liquid	515	2100	10.30	42.00
Non special liquid	274	678	6.87	16.95
Totals £m	17.5	112.2		

The largest contribution to these costs, both in absolute terms and to the range, stems from the 34 million tonnes per year of non-special solid waste. However, this assessment excludes wastes from the construction and demolition sector (Table A1), which may contribute up to a further £104m (high estimate), but for which waste minimisation and beneficial use as a construction material (including in landfill design) may result in a significant cost saving (saving of £48m, low estimate).

²⁵ Note that costs are based on landfill prices net of landfill tax

Table A5: Additional treatment and costs for non-special solid wastes

	amount kt/y	Waste min	In house reuse	Merchant recycling	Simple Sorting	complex sorting/ treatment	compost	anerobic	combustion	solid
Inert	152									
Construction and demolition	2243									
Paper and Card	216		10%	30%			20%	20%	20%	
Food	28		10%				40%	50%		
General Commercial	2507	10%	20%	15%	15%		30%		10%	
General Industrial	1562	10%	20%	15%	15%		30%	5%	5%	
Other General & Biodegradable	315		10%				40%	30%		
Metals & Scrap Equipment	80		10%	30%		40%			10%	
Contaminated general	206			10%	10%	30%	10%		20%	
Healthcare Risk	40								100%	
Mineral wastes & residues	511		30%	20%	50%					
Chemical & other	109		10%			30%				
Totals	7969									
	amount kt/y	Waste min	In house reuse	Merchant recycling	Simple Sorting	complex sorting/ treatment	compost	anerobic	combustion	solid
Inert	152									
Construction and demolition	2243									
Paper and Card	216		22	65			43	43	43	
Food	28		3				11	14		
General Commercial	2507	251	501	376	376		752		251	
General Industrial	1562	156	312	234	234		469	78	78	
Other General & Biodegradable	315		32				126	95		
Metals & Scrap Equipment	79		8	24		32			8	
Contaminated general	206			21	21	62	21		41	
Healthcare Risk	40								40	
Mineral wastes & residues	511		153	102	256					
Chemical & other	109		11			33				
Totals	7969	407	1042	822	887	126	1422	230	461	
Average plant capacity					5	15	20	40	100	
No of plants required					177	8	71	6	5	

