



Our Waste



Our Challenge



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Wales 3 Regional Waste Plans 1st Review

Final Strategic Health Impact Assessment

Non-Technical Summary

March 2008

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Acknowledgements

This strategic health impact assessment has been a collaborative project and would not have been possible without the support, advice and feedback of key people and organisations. In particular the members of the Project Steering Group:

- Martha Savage and Mike Pender, Denbighshire County Council
- Liz Green, Welsh Health Impact Assessment Support Unit (WHIASU)
- Rhiannon Jones, Environment Agency
- Janet Williams, Ty AVOW, Association of Voluntary Organisations in Wrexham
- Angela Tinkler and Jackie James, National Public Health Service
- Ceri Morris, Neath Port Talbot Council
- Stuart Newland, Caerphilly Council
- Simon Cottrill, Conwy County Council
- Adrian Jones, Welsh Assembly Government

Please note that the report does not necessarily reflect the personal or organisational views of the members of the Project Steering Group or of the other key people and organisations that have provided advice and information for this Strategic HIA.

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1 Introduction

1.1 Background

- 1.1.1 This is the Final Non-Technical Summary (NTS) of the Full Final Strategic Health Impact Assessment (HIA) of the Wales 3 Regional Waste Plans 1st Reviews (RWPRs). This Strategic HIA supports and informs the 3 RWPRs and ensures that health is considered and safeguarded during the regional waste planning process.
- 1.1.2 It incorporates the feedback from the Public Consultation of the 3 RWPRs that took place between October and December 2007.
- 1.1.3 Wise About Waste: The National Waste Strategy for Wales and Technical Advice Note (TAN) 21 sets out the framework for regional waste planning in Wales. Regional Waste Plans (RWPs) are required for each of the three waste regions (North, South West and South East Wales). The first plans were published in 2003-4 by the three Regional Waste Groups. These Groups are made up of a Regional Technical Group and a Regional Member Group (see Glossary on page 16 for an explanation of key terms).
- 1.1.4 TAN 21 requires the RWPs to be reviewed every three years. The Regional Waste Groups are currently producing these Draft RWPR Reports.
- 1.1.5 This HIA process is being supported by the Welsh Health Impact Assessment Support Unit and draws on information contained in the 3 RWPR Sustainability Appraisals (SAs) and Life Cycle Assessments (LCAs) undertaken by the Environment Agency as well as the Areas of Search (AoS) Study undertaken by RPS.
- 1.1.6 This HIA has been produced by Peter Brett Associates and has been commissioned by Denbighshire County Council on behalf of the three Regional Waste Groups.

1.2 Health Impact Assessment (HIA)

- 1.2.1 HIA is a systematic approach to identifying the potential positive and negative health and wellbeing impacts of plans (and projects). It focuses on the wider determinants of health and how through them a plan (or project) might affect health and wellbeing. It therefore has a wider scope than Health Risk Assessment (HRA) which focuses solely on the potential direct negative health impacts from air, water and soil pollution. HIA is also concerned with the distribution of impacts within a population and looks at how health and social inequalities might be widened by a proposed plan (or project).

- 1.2.2 This HIA assesses the potential positive and negative health impacts of the Strategic Waste Management Options (SWMOs or Strategic Options and Sub-Options) and the Spatial Options described in the 3 RWPRs. The SWMOs are the different combinations of waste management technologies which would enable Wales to deal sustainably with its waste. The Spatial Options are the different places where waste facilities might be located after taking into account key environmental and health criteria.
- 1.2.3 A large number of primary research studies have been carried out to determine the likely health impacts of different waste treatment technologies/facilities as well as SWMOs. This research has taken place over decades, in a range of different settings, and has studied a range of different waste treatment technologies many of which have been superseded by better and more safer designs. Because of this complexity, this HIA is based on evidence from recent review reports, on waste facilities and their potential health impacts, which have collated and analysed primary research studies.
- 1.2.4 The 3 RWPRs are strategic in nature and do not discuss where waste facilities will be sited (these site specific issues will be determined by local authorities in consultation with local residents). This has meant that the findings of this HIA are general and qualitative in nature. A quantitative assessment would need the locations of all the new waste facility to have already been identified and agreed upon.

1.3 Consultation

- 1.3.1 This HIA has a Project Steering Group (PSG) made up of a wide range of stakeholders who have played an active part in the development of the Full Final Strategic HIA Report and this NTS. A wider group of stakeholders, including Directors of Public Health and Heads of Environmental Health, have also been involved in the process.
- 1.3.2 The Full Draft Strategic HIA Report and NTS was also reviewed by the Regional Technical and Regional Member Groups. The Wrexham County Over 50's Forum also reviewed the Draft NTS for clarity and ease of reading. All the various comments and suggestions from these stakeholders have been considered and, where appropriate, incorporated into the Full Draft Strategic HIA Report and this NTS.
- 1.3.3 A full public consultation, across Wales, on the 3 RWPRs took place between October and December 2007. The feedback from this public consultation was considered and incorporated into the Full Final Strategic HIA Report and Final NTS.

2 Current Health and Wellbeing

2.1 Wales

- 2.1.1 Wales has a generally higher level of health and wellbeing than Scotland, a similar level as Northern Ireland but a poorer level of health and wellbeing than England. ¹⁻⁷
- 2.1.2 Overall, the residents of the South East Waste Region have poorer levels of health and wellbeing than those of North and South West Wales.

2.2 North Wales Waste Region⁸

- 2.2.1 North Wales has better than average levels of health compared to Wales as a whole. However, this hides significant inequalities between local authorities and between wards within local authorities. Residents of Powys and Flintshire have significantly better levels of health than the residents of the Isle of Anglesey and Gwynedd.

2.3 South West Wales Waste Region

- 2.3.1 The South West Waste Region has average levels of health; however, residents of Ceredigion and Swansea have significantly better levels of health than the residents of Neath Port Talbot and Bridgend.

2.4 South East Wales Waste Region

- 2.4.1 The South East Wales Waste Region has worse than average levels of health. However, residents of Monmouthshire and the Vale of Glamorgan have significantly better levels of health than residents of Blaenau Gwent, Merthyr Tydfil, Caerphilly and Rhondda Cynon Taf.

3 Health Impacts of Waste Management

3.1 Introduction

3.1.1 In relation to the health impacts of waste management and waste treatment facilities interpreting the evidence from epidemiological studies⁹ is difficult. This is because of methodological and biological issues i.e. the way this research is carried out and people's age, genetic make-up and existing state of health.

3.1.2 All waste, particularly biological; radioactive and chemical waste can be hazardous if not collected and managed appropriately (e.g. food, drink, animal remains, x-ray equipment, domestic cleaning fluids, batteries, industrial chemicals, plastics).

3.1.3 The potential human health impacts associated with the accumulation and decay of untreated waste, both non-hazardous and hazardous, include¹⁰:

- emissions into the air, water and soil;
- odour;
- dust;
- an increase in pests and vermin;
- detraction from the visual aesthetics of the local environment;
- impacts on greenspace;
- impacts on flora and fauna;
- fire hazard;
- infectious and chronic diseases e.g. pneumonia, diarrhoea, bronchitis.

3.1.4 Although these hazards are also found in waste facilities the negative health impacts of uncollected and untreated waste is significantly greater. It is against this background that the potential health impacts of the different Strategic Waste Management Options (SWMOs) and the different waste treatment technologies/ facilities has been compared.¹¹

3.1.5 In Wales there is a legal duty for waste to be disposed of properly in an official authorised site. Waste operations are regulated to ensure that they pose little or no harm to human health and the environment. The regulatory framework, called Integrated Pollution Prevention and Control (IPPC), ensures that the potential health impacts from emissions into the air, water and soil as well as nuisance effects from waste facilities are reduced to levels that are considered safe. These safe levels are based on current evidence of the potential health impacts of waste facilities and their associated activities. The regulatory authority in Wales is the Environment Agency Wales who are responsible for the licensing and monitoring of sites.

3.2 Health impacts of strategic waste management options (SWMOs or Strategic Options including Sub-Options) ¹²⁻²³

3.2.1 A number of assessments of SWMOs have been conducted at a regional and national level in the UK. They broadly agree that:

- Any potential strategic waste management option will have strengths and weaknesses from an economic, social, environmental and health perspective.
- All types of waste treatment facilities are likely to have both positive and negative health and wellbeing impacts.
- From both public health and environmental perspectives, high rates of reducing, re-using and recycling waste is likely to form the core of a good SWMO.

3.3 Health impacts of waste treatment facilities ¹²⁻³⁶

3.3.1 The different types of waste facilities, including those dealing with hazardous waste, give rise to broadly similar kinds of potential positive and negative health impacts.

3.3.2 The main potential positive health impacts arise from:

- the collection and treatment of waste;
- employment opportunities;
- the stimulus to the wider local economy; and
- the minimisation of potential climate change impacts (global warming) through reduction in the use of landfills and the associated production of greenhouse gases.

3.3.3 The main potential negative health impacts arise from:

- odour;
- noise;
- pests;
- dust and litter;
- quality of life effects;
- emissions given off by waste facilities into the air, water and soil (air, water and soil pollution); and
- concern and worry about the potential negative health impacts of waste facilities (these include both the direct mental health effects of worry and concern e.g. about the chemicals given off/emitted by waste facilities into the

air, water and soil as well as the indirect effects on social capital and community cohesion).

3.3.4 The main potential direct positive health impacts of incineration with energy recovery facilities are:

- Employment
- Energy and heat from burning waste (combined heat and power)
- Safe disposal of waste

3.3.5 The main potential indirect positive health impacts of incineration with energy recovery facilities are:

- Stimulation of the wider economy through recycling and energy recovery
- Reducing climate change through reductions in greenhouse gases by offsetting the need for fossil fuels, reducing the amount of waste going to landfill and reducing the amount of methane¹ produced.

3.3.6 The main potential indirect negative health impacts of incineration with energy recovery facilities are:

- Odour
- Noise
- Reduced quality of life, annoyance and nuisance
- Psychological e.g. concern, stress, worry, stigma
- Fire and explosion

3.3.7 The other less likely potential negative health impacts that are identified in the literature are: cancers; adverse, or changes, to reproductive outcomes (such as birth defects and an increase in twins); and cardiovascular and respiratory symptoms (such as difficulty in breathing and wheezing).

3.3.8 The collection and movement of waste can also give rise to positive and negative health impacts. The main potential positive health impacts are again the collection and treatment of waste and the associated employment opportunities. The main potential negative health impacts are air pollution, noise, odour, dust, congestion, road traffic injuries and community severance.

¹ Methane is 21 times more powerful a greenhouse gas than carbon dioxide

3.4 Conclusion

- 3.4.1 Overall, the review of the evidence on health impacts shows that there is no single best SWMO from a public health perspective and that well designed, operated and regulated waste treatment facilities are likely to have mainly positive and little or no negative impacts on the health and wellbeing of local communities and waste facility employees.
- 3.4.2 In terms of the different types of waste treatment technologies/facilities the potential positive and negative impacts are generally dependent on:
- the material being treated (e.g. waste all mixed together or sorted and segregated waste),
 - the type of technology/facility and emission controls,
 - the management of the facility and
 - regulatory control.
- 3.4.3 Additionally, those waste treatment technologies which further separate and segregate waste for recycling before treatment and have closed treatment processes are likely to have the most positive and the fewest negative health impacts.

4 Strategic Waste Management Options for 2013

4.1 Introduction

- 4.1.1 The overarching aim of Wise About Waste: The National Waste Strategy for Wales: and the 3 RWPRs is to reduce, re-use and recycle waste as much as possible. However, this will take some time to achieve and so there will be a need to appropriately treat and dispose of this waste.⁴⁶
- 4.1.2 The 3 RWPRs have identified 4 Main Strategic Waste Management Options (SWMOs) and 19 Strategic Sub-Options for assessment. They have also forecast that the amount of waste that is likely to be generated in Wales will continue to increase up to 2013.
- 4.1.3 Overall, the Environment Agency's Sustainability Appraisals and Life Cycle Assessments (SAs and LCAs) estimates that 1,278 facilities are likely to be needed across Wales, of which 320 are likely to be in North Wales, 417 in South West Wales and 541 in South East Wales. It is important to note that these figures are indicative and include facilities that are already currently in operation.

4.2 Strategic Waste Management Options (SWMOs)

- 4.2.1 Fig. 4.1 provides a summary of the 4 Main SWMOs and 19 Sub-Options.
- 4.2.2 The SWMOs were developed by the three Regional Waste Groups, Welsh Assembly Government (WAG), Welsh Local Government Association (WLGA) and the Environment Agency (EA). It was agreed that, for each Option apart from Option 0, the 2020 landfill directive target to reduce the biodegradable municipal waste landfilled to 35% of that produced in 1995 would be used.
- 4.2.3 For Option 1, there are likely to be between 6–26 new residual waste treatment facilities with between 2–10 new facilities in each region
- 4.2.4 For Option 2, there are likely to be between 17–41 new residual waste treatment facilities with between 6–14 new facilities in each region
- 4.2.5 For Option 3, there are likely to be between 16–39 new residual waste treatment facilities with between 6–14 new facilities in each region
- 4.2.6 For Option 4, there are likely to be between 12–16 new residual waste treatment facilities with between 4–7 new facilities in each region.

Fig. 4.1: Outline Description of the SWMOs (Strategic Options and Sub-Options) ^{47 48}

Option 0: ‘Do Nothing’ strategy⁴⁹

This option is included for assessment purposes only – as a baseline to compare the other Options against. Same front end levels of recycling and composting (e.g. kerbside collection) from the other options but with no further treatment.

Option 1: A Landfill-led Strategy for residual waste

High recycling and composting levels followed by low levels of thermal treatment of residual waste using either:

- Pyrolysis (Option 1A), or
- Gasification (Option 1B), or
- Incineration with energy recovery (Option 1C)

All remaining residual waste would then be sent to landfill.

[Recycling/ treatment levels are those required to achieve the 2020 (Biodegradable Municipal Waste (BMW) Landfill Directive target in 2013 where possible.]

Option 2: An Energy from Waste-led Strategy for residual waste

High recycling and composting levels with all remaining residual wastes, where possible, being treated by high levels of thermal treatment using either:

- Pyrolysis (Option 2A), or
- Gasification (Option 2B), or
- Incineration with energy recovery (Option 2C)
- Anaerobic digestion (Option 2D)

Any remaining residual waste would then be sent to landfill.

[Recycling/treatment levels are those required to achieve the 2020 BMW Landfill Directive target in 2013. Energy from Waste levels aim to minimise waste to landfill].

Option 3: A Mechanical-Biological Treatment or Biological-Mechanical Treatment (MBT/BMT)-led Strategy for residual waste

High recycling and composting levels, all remaining residual wastes being sent to MBT/BMT with the output recovered / disposed of using either:

- Pyrolysis (Option 3A), or
- Gasification (Option 3B), or
- Incineration with energy recovery (Option 3C), or
- Refuse Derived Fuel (RDF) to off-site energy use (Option 3D), or
- On-site Anaerobic digestion (Option 3E), or
- Landfill (Option 3F)

For Options 3A–3E, any remaining residual waste would then be sent to landfill.

[Recycling/treatment levels are the maximum possible – may exceed those required to achieve the 2020 BMW Landfill Directive target in 2013.]

Option 4: A Mechanical-Heat Treatment (MHT)/Autoclave-led Strategy for residual waste

High recycling and composting levels, all remaining residual wastes being sent to autoclave with the output recovered / disposed of using either:

- Pyrolysis (Option 4A), or
- Gasification (Option 4B), or
- Incineration with energy recovery (Option 4C), or
- Refuse Derived Fuel (RDF) to off-site energy use (Option 4D), or
- Landfill (Option 4E)

For Options 4A to 4E, any remaining residual waste would then be sent to landfill.

[Recycling/treatment levels are the maximum possible – may exceed those required to achieve the 2020 BMW Landfill Directive target in 2013.]

5 Health Impacts of the Strategic Waste Management and Spatial Options

5.1 Introduction

5.1.1 The following sections provide a summary of the potential health impacts of the SWMOs and the Spatial Options. The Full Draft Strategic HIA Report provides a more detailed description of the impacts and how the impacts were assessed.

5.1.2 The Strategic Options Analysis used an analytical matrix to analyse the potential impacts on the wider determinants of health and wellbeing for each of the four SWMOs and 19 Sub-Options. This was done using a combination of the matrix described in Improving Health and Reducing Inequalities and the PBA Comprehensive Health Assessment Toolbox. Impacts were classified using the levels defined in Table 5.1 below.

Table 5.1: Criteria used for assessing the significance levels of the potential health impacts

Significance Level	Criteria
Severe ---- (negative only)	Only adverse effects are assigned this level of importance as they represent key factors in the decision-making process, and may threaten the viability of the project. These effects are generally, but not exclusively, associated with sites and features of international, national or regional importance. A change at a regional or district scale site or feature may also enter this category. Typically, mitigation measures are unlikely to remove severe adverse effects.
Major +++/-- (positive or negative)	These effects are likely to be important considerations at a local or district scale. If adverse, potential concerns to the project may become key factors in the decision-making process. Mitigation measures and detailed design work are unlikely to remove all of the adverse effects upon the affected communities or interests.
Moderate ++/-- (positive or negative)	These effects, if adverse, while important at a local scale, are unlikely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource. They represent issues where effects will be experienced but mitigation measures and detailed design work may ameliorate or enhance some of the consequences upon affected communities or interests. Some residual effects will still arise.
Minor/Mild +/- (positive or negative)	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless they are of relevance in enhancing the subsequent design of the project and the consideration of mitigation and/or compensation measures.
Neutral/No Effect ~	No effect or effects which are beneath the level of perception or within normal bounds of variation.

5.2 Potential impacts of the SWMOs (Strategic Options and Sub-Options)

5.2.1 There are likely to be **three main potential positive health impacts** of the waste management options:

- Employment in the waste treatment facilities.
- Stimulation of the wider economy through employment and work for associated businesses.
- Recycling, energy recovery and the safe disposal of waste.

5.2.2 There are likely to be **five main potential negative health impacts**:

- Physical injuries to waste workers e.g. injuries from equipment failure or failure to follow health and safety guidelines.
- Mental health effects due to individual worry and concern, during the planning and operation of waste facilities if they are sited near a residential neighbourhood.
- Disruption of local roads and neighbourhoods due to waste lorry movements to and from a waste facility and increased potential for road traffic injuries.
- Housing pressures potentially through construction workers moving into the area and renting local accommodation.
- Disruption of lifestyles and daily routines due to nuisance effects e.g. traffic, noise and dust.

5.2.3 There are likely to be **four main potential uncertain health impacts** that could be either positive or negative:

- Changes to neighbourhood social capital and community cohesion (sense of community and the quality of social relationships) as siting and planning processes can become divisive both between residents; as some residents are likely to be opposed, some likely to be supportive and some unconcerned or unaware; and between residents, local authorities and waste management companies.
- Energy and waste effects during the construction phase in terms of whether sustainable energy sources are used; whether materials are reused and recycled; and whether contaminated soil and hazardous materials are disposed of appropriately.
- Education and learning effects through the education, training and learning opportunities available to waste facility workers, the potential provision of community education facilities and the development of an environmental

education and awareness programme involving school and group visits to a waste facility.

- Land and spatial effects through the size, design, construction and visual aesthetics of a waste treatment facility and its surroundings.

5.3 Overall impact of the SWMOs

5.3.1 Option 0, is likely to have an overall minor to moderate negative health impact

at the level of Wales and each of the three waste regions. This is because the strategy plans for landfill as the only significant method of treating and disposing of waste after front end recycling and composting (e.g. kerbside collection). This will mean the creation of a large number of new landfill sites in each of the three waste regions and will provide no flexibility in the waste management system at regional and national levels.

5.3.2 Option 1, is likely to have an overall minor positive health impact.

This is because the strategy plans for a small number of facilities to help to recover energy from some of the residual waste remaining after front-end recycling and composting. This will create a small number of jobs, a small number of education and learning opportunities, help mitigate climate change effects from activity in Wales to a small extent and provide a small degree of flexibility in the waste management system at regional and national levels.

5.3.3 Option 2, is likely to have an overall moderate positive health impact.

This is because the strategy plans for a larger number of facilities, compared to Option 1, to help to recover energy from the majority of the residual waste remaining after front-end recycling and composting. This will create jobs, education and learning opportunities, help significantly mitigate climate change effects arising from activity in Wales and provide a greater degree of flexibility in the waste management system at regional and national levels.

5.3.4 Option 3, is likely to have an overall moderate to major positive health impact.

This is because the strategy plans for a large number of Mechanical-Biological Treatment or Biological-Mechanical Treatment (MBT/BMT) facilities with associated thermal treatment facilities to help further recycle waste as well as recover energy from the majority the residual waste remaining after front-end recycling and composting. This will create jobs, education and learning opportunities, help to considerably mitigate climate change effects arising from activity in Wales and provide a considerable degree of flexibility in the waste management system at regional and national levels.

- 5.3.5 **Option 4, is likely to also have an overall moderate to major positive health impact.** This is because the strategy plans for a large number of mechanical Heat Treatment (MHT)/Autoclave facilities with associated thermal treatment facilities to help further recycle waste as well as recover energy from the majority of the residual waste remaining after front-end recycling and composting. This will create jobs, education and learning opportunities, help mitigate climate change effects arising from activity in Wales and provide a considerable flexibility in the waste management system at regional and national levels.
- 5.3.6 On balance, there are no significant differences in the potential positive and negative health impacts within each of the SWMOs in relation to whether an SWMO is implemented in a rural or an urban area or between regional and national levels.
- 5.3.7 It has not been possible to identify any differences in the potential impacts between each of the three waste regions.
- 5.3.8 It has also not been possible to identify any differences between the various Sub-Options within each of the Strategic Options 1-4 except that there is likely to be greater potential negative health impacts if thermal treatment facilities are sited near residential neighbourhoods due to their greater potential to generate worry and concern.

5.4 Potential impact of the Spatial Options

- 5.4.1 The Area of Search (AoS) Study developed environmental criteria to identify the possible areas where waste treatment facilities might best be sited. The majority of environmental criteria used also relate, directly and indirectly, to the protection of public health.
- 5.4.2 One important public health criteria that has not been included in the AoS Study is the level of deprivation and health inequalities of an area. Residents of deprived areas tend to face higher environmental and health burdens than residents who live in less deprived areas.
- 5.4.3 Therefore, when waste facilities are being sited taking into account whether an area is deprived or not is an important public health consideration because of the potential for health and environmental inequalities to be widened. This issue will therefore need consideration at local authority level.
- 5.4.4 In general, the more facilities that are sited in a particular area the greater the potential concern among local residents. Similarly, the larger a waste facility/site the greater the potential concern that is likely to be generated.

- 5.4.5 It is difficult to predict the implications of co-location at a regional level as this is dependent on the specific types of waste facilities that are co-located. However, well planned co-location tends to reduce the overall waste movements, thus reducing the potential negative health impacts.
- 5.4.6 Analysis of the Spatial Options shows that, Options 0 and 1, because they would undertake the least amount of residual waste treatment, are likely to have the lowest number of potential new facilities and waste vehicle journeys between facilities (vehicle kilometres).
- 5.4.7 While Options 2 and 3 are likely to generate similar numbers of potential new waste facilities, nationally and regionally, but Option 2, overall, generates less vehicle kilometres per year than Option 3.
- 5.4.8 With Option 4 likely to generate the second-lowest number of potential new waste facilities, nationally and regionally, but the highest number of vehicle kilometres per year.
- 5.4.9 There also seems to be little difference in the potential health impacts between urban and rural areas.
- 5.4.10 Overall, the Spatial Options Analysis shows that in contrast to the findings of the Strategic Options Analysis, from a spatial perspective, Option 2 is on balance a better SWMO from a public health perspective than Options 3 and 4. Though, it also shows that the impact of the Spatial Options is likely to vary depending on local circumstances such as the availability of other modes of transport for waste e.g. rail and water and the particular combination of facilities that are sited. Therefore, like the SWMOs (the Strategic Options) the Spatial Options will need further consideration at local authority level.

6 Mitigation and Enhancement Measures

6.1 Introduction

6.1.1 The following sections provide a general overview of the recommended mitigation and enhancement measures. Mitigation measures are ways of minimising any potential negative impacts and enhancement measures are ways of maximising potential positive impacts. The Full Draft Strategic HIA Report provides a detailed description of these measures.

6.2 General

6.2.1 Waste treatment facilities need to be sensitively, imaginatively and aesthetically designed so that they maintain social capital and community cohesion, if they are sited near a residential neighbourhood.

6.2.2 Facilities need to become part of their local neighbourhoods by bringing people into the facility and becoming a community resource.

6.2.3 New facilities could also include an environmental improvement programme possibly linked to a neighbourhood fund controlled by local residents.

6.2.4 Waste transport issues should feed into the emerging national, regional and local transport strategies and plans.

6.2.5 The previous track records of prospective waste operators should be used as an explicit criteria by waste authorities when choosing a preferred provider.

6.3 Planning

6.3.1 Consultation and engagement is vital to reduce the potential negative health impacts of proposed waste management facilities. Key to this are:

- Early and active involvement of local communities and local Public Health Departments and Environmental Health Departments.
- Further local level site-specific, consideration of the health and wellbeing impacts including a baseline health study of the local community and a baseline assessment of existing levels of key pollutants.

6.3.2 A strategic and transparent approach to identifying and communicating potential sites will help ensure local residents understand why certain sites are chosen rather than others. This approach is likely to develop greater trust between residents, local

authorities and waste facility operators as well as reduce worry and concern about potential negative health impacts.

6.4 Construction and operation

6.4.1 In addition to meeting the requirements of health and safety legislation and environmental regulations e.g. Construction (Design & Management) Regulations 2007, IPPC, and so on, the following measures should be considered:

- Having a named community liaison person and well publicised channels of communication with local residents.
- Setting up a community liaison group or oversight committee to provide a recognised and long term locally owned channel of communication between waste facility management, the local authority, the local Health Board and the Environment Agency.
- Developing a site specific Code of Construction Practice (CoCP) to ensure best practice is used.
- Ensuring employee recruitment starts locally before being advertised more widely and, where possible, the setting up of a local training programme to enable local people to take up jobs in any proposed facility and businesses.
- Developing a plan for dealing with the accommodation and healthcare needs of workers coming from outside the local area.
- Encouraging construction and waste facility workers to walk, cycle and use public transport to get to and from their workplace.
- Encouraging a strong health and safety culture among workers.

6.5 Decommissioning phase

6.5.1 The decommissioning of waste facilities should be considered and developed in detail during the design stage before the facility is built.

6.5.2 During decommissioning the following mitigation and enhancement measures should be considered:

- Remediation of the site and reuse and recycling of the materials and equipment.
- Local residents' involvement in the decommissioning programme.
- The health and safety of decommissioning workers.

7 Conclusion

- 7.1.1 Untreated waste, in and of itself, has negative health and wellbeing impacts. Therefore, the overarching aim of the National Waste Strategy and the 3 RWPRs is to significantly reduce the total amount of waste being treated and disposed of in Wales by reducing, re-using and recycling waste i.e. moving up the waste hierarchy. This goal will take some time to achieve and in the meantime waste treatment facilities will be needed to appropriately treat and dispose of this waste.
- 7.1.2 Overall, this strategic HIA concludes that there is no single best public health Strategic Waste Management Option (SWMO). Options 2, 3 and 4, are all good from a public health perspective though each has specific strengths and weaknesses.
- 7.1.3 The Strategic Options Analysis points to further residual waste recycling rather than just energy recovery as the better option i.e. Options 3 and 4 rather than Option 2. In contrast, the Spatial Options Analysis - because of the numbers of facilities, size of sites, and the need for more waste lorry movements - points to Option 2 (fewer sites, though larger, and less waste lorry movements overall) on balance being better than Options 3 and 4.
- 7.1.4 Decisions will therefore need to be made at local authority level with further local consideration of the health and wellbeing issues when a specific site is chosen to host a particular waste treatment facility. Local site-specific HIAs, either separate or integrated within Strategic Environmental Assessments (SEA) of Local Development Plans (LDPs) or Environmental Impact Assessments (EIAs) at the planning application stage, are likely to be worthwhile in addressing specific local community concerns. Additionally, any planning and siting process should involve local Public Health and Environmental Health Departments from the outset.

Glossary of Terms

Anaerobic Digestion	A process where biodegradable material is encouraged to break down in the absence of oxygen. Material is placed into an enclosed vessel and in controlled conditions the waste breaks down typically into a digestate, liquor and biogas.
Area of Search (AoS) Study	This is a study looking at how the best possible locations for new waste treatment facilities in Wales can be identified using a set of explicit environmental and health criteria.
Autoclave	A pressurised steam treatment process. See Mechanical Heat Treatment.
Biological Treatment	Any biological process that changes the properties of waste (e.g. anaerobic digestion, composting). Biological treatment includes landspreading activities that are licensed.
Biodegradable Municipal Waste (BMW)	The component of Municipal Solid Waste capable of being degraded by plants and animals.
Climate Change	Long terms changes to the climate, the length of the seasons and weather patterns due to it is currently thought due to global warming brought about by increases in atmospheric concentrations of carbon dioxide.
Community Severance	The separation of residents from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows.
Cohesion	See Social capital and community cohesion.
Composting	A resource recovery process where biodegradable waste (such as garden and kitchen waste) is converted, in the presence of oxygen from the air, into a stable granular material which, applied to land, improves soil structure and enriches the nutrient content.
Deprivation	Deprivation refers to problems caused by a general lack of resources and opportunities (not just money). It is a wider concept than poverty and includes health status, level of education, access to services, living conditions and the state of the local environment.
Determinants of Health (or Wider Determinants of Health)	Income, education, employment, housing, the local neighbourhood, family and friends, social support and the wider natural environment all indirectly influence individual and community health and wellbeing. These factors are collectively termed the wider determinants of health and overall have a greater influence on health than health and social care services.
Energy from Waste (EfW)	Includes a number of established and emerging technologies to recover energy from waste. Some of these are direct through 'mass burn' incineration (where waste is directly combusted without pre-treatment) whereas others are indirect where the waste is processed into a fuel before energy is recovered (e.g. gasification, pyrolysis or conversion into refuse derived fuel).
Environment Agency (EA)	The principal environmental regulator in England and Wales. Established in April 1996 to combine the functions of former waste regulation authorities, the National Rivers Authority and Her Majesty's Inspectorate of Pollution. Intended to promote improved waste management and consistency in waste regulation across England and Wales.

Environmental Impact Assessment (EIA)	A procedure for considering the potential environmental effects of land use change. EIA helps to inform decision-making and enables decisions on land use change to be taken with full knowledge of the likely environmental consequences.
Gasification	A process whereby carbon based wastes are heated in the presence of air or steam to produce fuel-rich gases.
Greenhouse Gas	A term given to those gas compounds in the atmosphere that reflect heat back toward the Earth rather than letting it escape freely into space. Gases include carbon dioxide, methane, nitrous oxide, ozone, water vapour and some chlorofluorocarbons.
Global Warming	The progressive and gradual increase of the earth's surface temperature thought to be caused by the greenhouse effect and responsible for changes in climate patterns.
Hazardous Waste	Defined by European Union (EU) legislation as the most harmful wastes to people and the environment.
Health Impact Assessment	The World Health Organization Gothenburg Consensus definition of HIA is: "A combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population."
Health and Social Inequalities	Are the differences in health and social status between different groups in a society. While some of these differences are inherent many differences in health are linked to the way plans and project impact unequally on different groups. Certain groups tend to be disproportionately disadvantaged and it is therefore important to ensure that new plans and project do not create additional disadvantages.
Incineration with energy recovery	The controlled thermal treatment of waste by burning, either to reduce its volume or toxicity. Energy can be recovered from incineration by utilising the calorific value of the waste to produce heat and/or power.
Industrial Waste	Waste from any factory and from any premises occupied by an industry (excluding mines and quarries).
Inequalities	See Health and Social Inequalities
Integrated Pollution Prevention & Control (IPPC)	The European Integrated Pollution Prevention and Control applies an integrated environmental approach to the regulation of certain activities. Emissions to air, water and land, plus a range of other environmental effects, must be considered together. Regulators must set permit conditions so as to achieve a high level of protection for human health and the environment as a whole. These conditions are based on the use of 'best available techniques/technologies' that balances the costs to the operator against the benefits to human health and the environment. IPPC aims to prevent emissions and waste production and, where that is not practicable, reduce them to acceptable levels.
Landfill	Licensed facilities where waste is permanently deposited for disposal.
Licensing (Waste Management)	The system of permits operated by the Environment Agency under the Environmental Protection Act to ensure that activities authorised to recover or dispose of waste are carried out in a way which protects the human health and the environment.

Life Cycle Assessment (LCA)	The systematic identification and evaluation of all the environmental benefits and disbenefits that result, both directly and indirectly, from a product or function throughout its entire life from extraction of raw materials to its eventual disposal and assimilation into the environment. It can make an important contribution to assessing the environmental impacts of waste management operations. It can provide part of the input into strategic decision making 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 Practical Environmental Option (BPEO), the waste hierarchy and the proximity principle.
Local Development Plan (or Development Plan)	A land-use planning document required by Act of Parliament to set the policies and framework for making decisions on planning applications.
Materials Recycling/ Recovery Facility (MRF)	A dedicated facility for the sorting and separating recyclable materials such as paper, glass, metals, clothing etc.
Mechanical Biological Treatment/ Biological Mechanical Treatment (MBT/BMT)	A generic term for a resource recovery process which integrates several processes commonly found in other waste management facilities such as Materials Recycling Facilities (MRFs) and composting facilities. MBT/BMT can incorporate a number of different processes in a variety of combinations and can be built for a range of purposes. A common aspect of all MBT/BMT plant used for Municipal Solid Waste (MSW) management is to sort mixed waste into different fractions using mechanical means and to recover materials for recycling.
Mechanical Heat Treatment (MHT)	A term used to describe various configurations of mechanical and thermal, including steam, based treatment technologies. The most common system being autoclave.
Municipal Solid Waste (MSW)	Household waste and any other wastes collected by a Waste Collection Authority, such as municipal parks and gardens waste, beach cleansing waste, commercial or industrial waste for which the collection authority takes responsibility, and waste resulting from the clearance of fly-tipped materials.
Pyrolysis	A thermal treatment process where organic waste is heated in the absence of air to produce a mixture of gaseous and liquid fuels and a solid, inert residue (mainly carbon).
Recovery	The recovery of valuable materials and energy from waste. The waste hierarchy states that the recovery of resources is more favourable than their final disposal. It reduces the need for primary resources and thus also reduces cost of producing new products e.g. tins.
Recycling	Involves the processing of wastes, into either the same product or a different one. Many non-hazardous wastes such as paper, glass, cardboard, plastics and scrap metals can be recycled. Hazardous wastes such as solvents can also be recycled by specialist companies.
Reduction	Reducing the quantity or the hazard of a waste produced from a process. Reduces the need for primary resources and thus also reduces cost.
Refuse Derived Fuel (RDF)	A fuel produced from combustible waste that can be stored and transported, or used directly on site to produce heat and/or power.

Regional Waste Groups (RWGs), Regional Member Groups (RMGs) and Regional Technical Groups (RTGs)	The Welsh Assembly Government has given the responsibility of preparing, monitoring and revising the 3 Regional Waste Plans to the 3 Regional Waste Groups. Each Regional Waste Group is led by a Regional Member Group of councillors representing each of the local authorities in the region, supported by a Regional Technical Group of officers from local government, the Welsh Assembly Government, Environment Agency Wales and other government bodies, as well as representatives from the waste industry and environmental groups.
Regional Waste Plan (RWP)	These are regional plans for how waste from the local authorities within a region will be managed in an integrated and sustainable way.
Regional Waste Plans 1 st Review (RWPR)	This is the process of updating the Regional Waste Plans that is required by the Welsh Assembly Government's Technical Advice Note 21.
Residual Waste	Waste remaining that still needs to be disposed of, usually to landfill, after reuse, recycling, composting and recovery of materials and energy.
Reuse	Can be practiced by the commercial sector with the use of products designed to be used a number of times, such as reusable packaging. The processes contribute to sustainable development and can save raw materials, energy and transport costs.
Spatial Options	The Spatial Options is the development of explicit environmental and health criteria to identify the best possible locations for the new waste facilities needed in Wales.
Social capital and community cohesion	Social capital and community cohesion is the extent to which individuals and groups are a) embedded within their family relationships, social networks and communities; and b) have a sense of belonging and civic identity.
Strategic Options	See Strategic Waste Management Option (SWMO)
Sustainability Appraisal	Sustainability Appraisal involves systematically identifying and evaluating the economic, social and environmental impacts of a plan or policy.
Strategic Environmental Assessment (SEA)	A procedure which assesses the likely significant effects on the environment of implementing a plan or programme, and reasonable alternatives plans/programmes, are identified, described and evaluated.
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	Requires that waste management should be carried out in a way that does not place undue social, economic or environmental burdens on either present or future generations and that ensures social equity, effective protection of the environment, the prudent use of natural resources and the maintenance of high and stable economic growth and employment. The aim is to de-couple waste production from economic growth.
Strategic Waste Management Option (SWMO)	The different combinations of waste management technologies which would create an integrated and sustainable approach to managing waste as well as meet or exceed legislative targets on waste reduction, reuse, recycling and recovery.

Technical Advice Note 21 (TAN21)	Planning Policy Wales published in November 2001, providing guidance on how the land use planning system should contribute to sustainable waste management.
Thermal Treatment	The treatment of waste using high temperatures as the primary means to change the chemical, physical or biological character or composition of the waste. Examples of thermal treatment processes are gasification, pyrolysis and incineration.
Treatment	A catch-all term for physical, thermal, chemical or biological processes, including sorting, that change the characteristics of the waste in order to reduce its volume and hazardous nature, facilitate its handling or enhance recovery.
Waste	See Municipal Solid Waste, Industrial Waste and Hazardous Waste
Waste Hierarchy	This concept highlights the fact that waste should be seen as a resource and that the most effective environmental and public health option is to firstly, to reduce the amount of waste generated (reduction); secondly, where further reduction is not achievable, reuse and repair products and materials (reuse); and thirdly, where reuse is not possible, recycle, compost or recover energy from waste (recovery); and only when none of the above can be done should waste be disposed of in landfill.
Waste Management Licence	A waste management/ resource recovery facility licensed under the Environmental Protection Act.
Welsh Health Impact Assessment Unit (WHIASU)	WHIASU provides advice, guidance and support on organisations and communities in Wales wanting to carry out HIAs. The Unit is funded by the Welsh Assembly Government.

References and Notes

- ¹ National Public Health Service for Wales, Health needs assessment 2006 – Demography, 2007.
- ² National Public Health Service for Wales, Health needs assessment 2006 – Health status and key determinants, 2007.
- ³ National Public Health Service for Wales, Health needs assessment 2006 – Injuries, 2007.
- ⁴ National Public Health Service for Wales, Health needs assessment 2006 – Mental health, 2007.
- ⁵ Wales Centre for Health, A profile of rural health in Wales, 2007.
- ⁶ Local Government Data Unit Wales, Wales Index of Multiple Deprivation 2005, 2006.
- ⁷ Office of National Statistics, Census 2001 and other neighbourhood data, 2001.
- ⁸ In this health profile Powys is presented as being part of North Wales to avoid duplication. In terms of public health regional boundaries in Wales it actually sits in the South East Region. Additionally, only North Powys sits within the North Wales Waste Region with a large part of Powys (South Powys) sitting within the South East Wales Waste Region.
- ⁹ Epidemiology is the study of the occurrence and causes of illness/disease in human populations. An epidemiological study usually compares two groups of people who are similar except for one factor, such as exposure to a chemical or the presence of an illness effect. Epidemiologists then try to work out what factors, if any, are associated with the illness.
- ¹⁰ Leonardi G., Waste and Health in London: a brief overview, London School of Hygiene & Tropical Medicine, 2001 (Part of the HIA of the London Mayor's draft Municipal Waste Strategy 2001)
- ¹¹ Williams P, Waste treatment and disposal, John Wiley & Sons, Chichester, 1999.
- ¹² Oxfordshire Waste Partnership, No Time to Waste: The Oxfordshire Joint Municipal Waste Strategy Appendix 2, Annex D: Options for residual waste (treatment and disposal), 2006.
- ¹³ Milton Keynes Council, A review of the potential health and environmental impacts from municipal waste Management technologies which might be used in Milton Keynes, 2005.
- ¹⁴ Bedfordshire County Council, Analysis of Waste Management Options: Developing a Sustainable Waste Strategy for Bedfordshire and Luton, 2000.
- ¹⁵ London Health Commission, Mayor of London's Waste Strategy HIA, 2001.
- ¹⁶ Friends of the Earth, UK Waste and Waste Watch, Beyond the Bin: the economics of waste management options, 2000.
- ¹⁷ Community Recycling Network, Maximising recycling rates: tackling residuals, 2002.
- ¹⁸ Hogg D, Costs and benefits of residual waste management options – what should we do?, Conference "The future of residual waste management in Europe" 2005.
- ¹⁹ Strange K, Overview of Waste Management Options: their efficacy and acceptability, Issues in Environmental Science and Technology, No. 18, Environmental and Health Impact of Solid Waste Management Activities, Royal Society of Chemistry, 2002.
- ²⁰ European Commission, Waste management options and climate change, 2001
- ²¹ Royal Commission on Environmental Pollution, 26th Report The Urban Environment, 2007.
- ²² South West Public Health Observatory, Waste management and public health: the state of the evidence, 2002.
- ²³ The waste hierarchy is a framework for thinking about and dealing with waste. It is usually represented as an upside down triangle where reduction of waste forms the base followed by reuse and recycling with treatment and disposal in landfill represent the tip. Welsh Assembly Government, The national waste strategy for Wales: wise about waste, 2002.
- ²⁴ National Public Health Service for Wales, Health effects of waste management technologies – DRAFT, 2006. [This report is an update of 'Health impacts of waste management: methodological aspects and information sources', (R&D Publication P6-011/1), 2003]
- ²⁵ DEFRA, Review of environmental and health effects of waste management: municipal solid waste and similar wastes, 2004.

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- ²⁶ Environment Agency, Health impacts of waste management: methodological aspects and information sources (R&D Publication P6-011/1), 2003.
- ²⁷ Health Research Board, Health and environmental effects of landfilling and incineration of waste – a literature review, Ireland, 2003.
- ²⁸ Community Recycling Network, Maximising recycling rates: tackling residuals, 2002.
- ²⁹ Devon Council, Grace Road, Exeter energy from waste facility, 2007.
- ³⁰ Lewisham Borough Council, SELCHP waste to energy plant HIA, 2005
- ³¹ Waste Recycling Group, Eastcroft energy from waste facility HIA (part of the EIA), 2005
- ³² Health & Safety Executive, Mapping health and safety standards in the UK waste industry (Research Report 240), 2004.
- ³³ North Sheffield Primary Care Trust, Parkwood landfill site, Sheffield HIA - Volumes 1 and 2, 2005.
- ³⁴ Wales Centre for Health and Agency for Toxic Substances and Disease Registry, Public health investigations at the Nant-y-Gwyddon landfill site, 2002.
- ³⁵ Devon Health Forum, Project Greensweep: a North Devon composting project HIA, 2002.
- ³⁶ Western Cheshire Primary Care Trust, Proposed Ince (waste) Resource Recovery Park HIA, 2006
- ³⁷ Devon Health Forum, Project Greensweep: a North Devon composting project HIA, 2002.
- ³⁸ Western Cheshire Primary Care Trust, Proposed Ince (waste) Resource Recovery Park HIA, 2006
- ³⁹ DEFRA and Wycombe District Council, HIA of alternate weekly collections of biodegradable waste, 2007.
- ⁴⁰ Stoke-on-Trent Council, Alternate weekly collection of residual waste, 2006.
- ⁴¹ National Society for Clean Air for Environmental Protection, Relative impacts of transport emissions in recycling, 2002.
- ⁴² Committee on the Medical Effects of Air Pollution, Long term exposure to air pollution: effect on mortality, Draft report for consultation, Department of Health, 2007.
- ⁴³ Committee on the Medical Effects of Air Pollution, Cardiovascular disease and air pollution, Department of Health, 2006.
- ⁴⁴ DEFRA, Review of environmental and health effects of waste management: municipal solid waste and similar wastes, 2004.
- ⁴⁵ National Society for Clean Air for Environmental Protection, Relative impacts of transport emissions in recycling, 2002.
- ⁴⁶ Welsh Assembly Government, Wise About Waste: The National Waste Strategy for Wales, 2002.
- ⁴⁷ Environment Agency Wales, Sustainability Appraisal and Life Cycle Assessment of the Strategic Waste Management Options, 2007.
- ⁴⁸ In all cases, the recycling/composting rate for municipal waste will exceed 50%. For option 1, the aspiration for the treatment of residual waste is to achieve the 2020 (Biodegradable Municipal Waste (BMW) Landfill Directive target in 2013. For options 2-4 all residual waste will be treated using the chosen technology type.
- ⁴⁹ This option has been amended for the life cycle analysis to represent a scenario whereby no alternative disposal or treatment options are developed and all residual waste is sent to landfill. Source separated recycling and composting rates are the same as in all other options.