

A rapid prospective 'desk-top' health impact assessment

**The construction of a
Energy from Waste Plant in
Her Majesty's Naval Base,
Devonport, Plymouth**

Public Health Plymouth
Plymouth teaching Primary Care Trust
October 2011

CONTENTS

ACKNOWLEDGEMENTS	IV
PREFACE	IV
EXECUTIVE SUMMARY	V
DIRECT IMPACTS	V
INDIRECT IMPACTS	VI
MITIGATION AND PLANNING CONTROL MEASURES	VII
<i>Mitigation Measures</i>	<i>vii</i>
<i>Control and Planning Conditions</i>	<i>viii</i>
BACKGROUND	1
RATIONALE FOR THE RAPID HEALTH IMPACT ASSESSMENT	2
<i>The definition of health and health impact assessment used</i>	<i>2</i>
METHOD	3
<i>HIA Scope and Objectives</i>	<i>3</i>
<i>Health Profile</i>	<i>3</i>
<i>Literature review</i>	<i>3</i>
<i>Issues of Public Concern</i>	<i>4</i>
THE HEALTH IMPACTS	8
DIRECT INFLUENCES	8
INDIRECT INFLUENCES	9
DISCUSSION	10
<i>Identifying the Impacts of the EfW proposal</i>	<i>10</i>
STUDY LIMITATIONS	15
CONCLUDING REMARKS	15
REFERENCES	18
APPENDIX 1: HEALTHY URBAN DEVELOPMENT UNIT CHECKLIST	20
APPENDIX 2: HEALTH PROFILE OF PLYMOUTH (SUMMARY)	33
APPENDIX 3: BRIEF LITERATURE REVIEW	39

Acknowledgements

HIA Steering Group Members

Sarah Lawson: Consultant in Public Health, NHS Plymouth

Kevin Elliston: Consultant in Public Health, NHS Plymouth

Sally Sleeman: Community Public Health Practitioner, NHS Plymouth

Katie Hoppood: Speciality Registrar in Public Health, NHS Plymouth

Jenny Arnosson: Community Public Health Nurses, NHS Plymouth

Linda Morgan: Primary Care Manager, NHS Plymouth

Pete Smith: Health Protection Practitioner, Health Protection Agency

Preface

Plymouth Health Plymouth's Health Impact Assessment (HIA) Framework was launched in 2004, its purpose and intentions are to:

- encourage debate on the use of HIA to inform decision making on projects, policies or programmes that might affect people's health
- work towards integrated assessments of policies across a range of organisations and groups in Plymouth.

The values underpinning the HIA Framework are derived from the 1999 World Health Organisations' Gothenburg Consensus Paper and NHS London's statement for HIA which identified five values of HIA

- democracy
- equity
- sustainable development
- ethical use of evidence
- promotion of health and equality.

This rapid desk-top HIA of the construction of a Energy from Waste (EfW) Plant in Her Majesty's Naval Base, Devonport, Plymouth affords the Developers, MVV Devonport, an opportunity of enhancing the positive health impacts that are evident from their plans, but also to minimise potential negative health impacts that could arise from the construction and life-cycle of the EfW plant.

The rapid desk-top HIA has been undertaken by Public Health Plymouth in association with colleagues in the Primary Care Trust and the Health Protection Agency.

Executive Summary

This rapid desk-top health impact assessment study of the proposed development of a EfW Plant in the North Yard of HM Naval Base in Plymouth is based on the judgements of senior public health staff and is supported by a selected review of evidence from published and grey literature sources. Lay perspectives have been drawn from letters sent to the Planning Authority which are posted on the Plymouth City Council website.

This rapid HIA adapted the Healthy Urban Development Unit checklist for planning proposals and identified 31 issues of public health concern (Appendix 1), arising from the EfW proposal against which the Primary Care Trust is seeking assurance from the Developers.

The 18 Direct and 20 Indirect Impacts identified by the rapid HIA are listed below:

Direct Impacts

Housing Amenity

- The proposal has the potential to impact upon existing housing amenity. (Negative impact)

Access to Public Services

- The proposal impacts on public services needs, location and accessibility do not seem to have been considered. (Negative impact)
- The Primary Care Trust requirements, including model of care, do not seem to have been assessed in context of the proposal. (Negative impact)
- Community facilities are provided within the proposal. (Positive impact)

Opportunities for Physical Activity

- The proposal prioritises and encourages cycling. (Positive impact)
- The proposal does not detail how it will ensure that buildings are designed to maximise physical activity (e.g. positioning of stairwells, shower rooms, secure cycle parking) (Negative impact)
- The proposal enhances opportunities for play and exercise. (Positive impact)
- The proposal does not address open space and natural space deficiency for the plant employees. (Negative impact)

Air Quality, Noise and Neighbourhood Amenity

- The proposal includes measures aimed at minimising construction impacts, including dust and noise.
- The proposal would be a source of additional air pollution (Negative impact)
- The proposal would be a source of additional noise (Negative impact)
- The proposal includes measures aimed at improving air quality (Negative impact)
- The proposal includes measures to protect and enhance green space (Positive impact)
- The proposal provides some high quality amenity space (Positive impact)

Accessibility and Transport

- The proposal site is designed to ensure a clear distinction between the operational waste management areas and the administrative and visitor areas, with separate public and operational access. (Positive impact)
- The proposal, including the buildings, is accessible for people with mobility problems or disability impairment and it incorporates measures to assist people who are car dependent. (Positive impact)
- The proposal is easily accessible and well served by public transport. (Positive impact)
- The proposal incorporates measures aimed at minimising the need to travel by car. (Positive impact)

Indirect Impacts

Crime Reduction and Community Safety

- The proposal incorporates a mix of uses to encourage activity in buildings and public spaces. (Positive impact)
- The local community has been engaged and consulted with regards to the proposal. (Positive impact)

Access to Healthy Food

- The proposal does not facilitate local access to healthy food supply (Negative impact).
- The proposal does not specify how it will avoid contributing towards over concentration of fast food outlets in the local area (Negative impact).

Access to Work

- The proposal provides access to employment and training opportunities. (Positive impact)
- The proposal provides potential diversity in jobs for local residents. (Positive impact)
- The proposal provides opportunities for existing local businesses. (Positive impact)

Social Cohesion and Social Capital

- The proposal contributes towards opportunities for social interaction. (Positive impact)
- The proposal has not addressed local health and social inequalities. (Negative impact)
- The proposal incorporates community facilities. (Positive impact)
- The proposal does not detail how it could provide voluntary sector opportunities. (Negative impact)

Resource Minimisation

- The proposal does not make best use of existing land. (Negative impact)
- The proposal incorporates sustainable design and construction. (Positive impact)
- The proposal does not detail arrangements for the management of waste generated on site. (Negative impact)

Climate Change

- The proposal incorporates renewable energy. (Positive impact)
- The proposal does not detail how it will provide a sustainable approach to transport. (Negative impact)
- The proposal incorporates measures to help to maintain and enhance biodiversity. (Positive impact)
- The proposal has been flood risk assessed. (Positive impact)
- The proposal incorporates sustainable drainage systems to safely deal with surface runoff. (Positive impact)

General

- The proposal has not been subjected to an independent BREEAM assessment. (Negative impact)

The overall public health concerns identified by the HIA are therefore:

- The precautionary principle indicates that there should be an aim of minimising as far as is practicable the production of all emissions relating to air quality and noise from EfW facilities. Research to date does not provide conclusive evidence of the absence of health impacts and risk associated with modern EfW facilities.
- There local population experience multiple deprivation with associated inequalities in health. The proposed development has the potential to impact adversely on the physical and mental health and wellbeing of the local population and may exacerbate existing health inequalities.
- The cumulative impact of this EfW development is likely to place the greatest burden upon some of the poorest and most vulnerable people in the City.
- The literature review and letters of public concern highlight the need of addressing the public perception of risk of EfW plants; the requirement for ongoing meaningful public engagement for the proposal is also highlighted in order to ensure that the local community believe their concerns are being heard, being taken seriously and given due consideration.

Mitigation and Planning Control Measures

As a result of this Rapid HIA exercise, the Plymouth Primary Care Trust has identified a number of concerns which it is believed can either be dealt with by mitigation measures, or controlled by the application or appropriate planning conditions.

Mitigation Measures

The public health concerns that it is believed can be dealt with by mitigation measures are;

Housing Amenity

The proposal has the potential to impact upon existing housing amenity.

- The PCT therefore needs assurance that MVV will deliver a district heating system to Barne Barton.
- The PCT needs assurance that a residential property disamenity impact assessment has been conducted by MVV.

Access to Public Services

The proposal impacts on public services needs, location and accessibility do not seem to have been considered. In particular, the Primary Care Trust requirements do not seem to have been assessed in context of the proposal.

- The PCT therefore needs assurance that MVV will actively consider the promotion of access to good public services, including consideration of Section 106 obligations for health facilities.

Social Cohesion and Social Capital

The proposal has not addressed local health and social inequalities.

- The PCT therefore needs assurance that the MVV proposal will not exacerbate existing health inequalities and will consider in full the Section 106 Obligations.

Resource Minimisation

The proposal does not make best use of existing land.

- The PCT therefore needs assurance from the Planning Authority that the MVV Proposal is acceptable in planning policy terms.

Control and Planning Conditions

The public health concerns that are believed can be controlled by appropriate planning conditions are:

Opportunities for Physical Activity

The proposal does not fully detail how it will ensure that buildings are designed to maximise physical activity (e.g. positioning of stairwells, shower rooms, secure cycle parking).

- The PCT therefore needs assurance that the MVV proposal design encourages employees to be physically active at work, i.e. provide onsite staff gym facilities.

The proposal does not fully address open space and natural space deficiency for the plant employees.

- The PCT therefore needs assurance that the MVV proposal considers access to open natural space for all employees whilst at work.

Air Quality, Noise and Neighbourhood Amenity

The proposal includes measures aimed at minimising construction impacts, including dust and noise.

- The PCT therefore needs assurance that the MVV proposal with regard to Construction Dust and Noise, will respond to community concerns and mitigate accordingly.

The proposal would be a source of additional air pollution

- The PCT therefore needs assurance that the MVV proposal requires all vehicles servicing the site meet lowest emission standards for all vehicles.

The proposal would be a source of additional noise.

- The PCT therefore needs assurance that the MVV proposal would respond to any public complaints of noise of the Plant in construction or operation in a responsive manner.

The proposal includes measures aimed at minimising the negative impact on air quality.

- The PCT therefore needs assurance that the MVV proposal would consider where practicable additional tree planting and provision of green/brown roofs within the plant complex and buildings and the neighbouring areas.

Access to Healthy Food

The proposal does not facilitate local access to healthy food supply.

- The PCT therefore needs assurance that the MVV proposal will ensure that all food provided on-site is locally sourced with healthy options available.

The proposal does not specify how it will avoid contributing towards over concentration of fast food outlets in the local area.

- The PCT therefore needs assurance that the MVV proposal will not add to the provision of fast food outlets in the local area pre and post construction.

Social Cohesion and Social Capital

The proposal does not detail how it could provide voluntary sector opportunities.

- The PCT therefore needs assurance that the MVV proposal will provide opportunities for local voluntary sector use, i.e. use of Visitor Centre facilities for voluntary sector.

Resource Minimisation

The proposal does not specify how waste generated on the site will be managed to minimise creation and maximise recycling.

- Plymouth City Council has provided written assurance that the proposal is part of an integrated waste management strategy where strenuous efforts to significantly increase the level of materials recycled in the area will be on-going; the PCT therefore needs assurance that this will be realised to ensure there is no negative impact.

Climate Change

The proposal does not detail how it will provide a sustainable approach to transport.

- The PCT therefore needs assurance from MVV that all sustainable transport options for transporting waste (to the site and waste materials from site) have been considered.

General

The proposal has not been subjected to an independent BREEAM assessment

- The PCT therefore needs assurance from MVV that the EfW plant design will be subjected to a full and independent environmental assessment using tailored BREEAM criteria to assess the environmental lifecycle of the construction/plant, including health and wellbeing considerations.

Recommendations to enhance potential positive impacts

The following recommendations would enhance the potential positive impacts to maximise health benefit.

Access to Public Services

Community facilities are provided within the proposal.

- The PCT therefore needs assurance that the MVV proposal will ensure wide accessibility to all sectors of the 'local communities' to derive local health and social benefits and that it will add health benefit value to Blackie Woods via out-door gyms and social gathering areas.

Opportunities for Physical Activity

The proposal prioritises and encourages cycling.

- The PCT therefore needs assurance that the MVV proposal will encourage the plant workforce and incentivise towards active travel to work.

The proposal enhances opportunities for play and exercise.

- The PCT therefore needs assurance that the MVV proposal will consider opportunities for recreation facilities for people of all ages and abilities within Blackie Woods and the adjacent, areas for health benefits.

Air Quality, Noise and Neighbourhood Amenity

The proposal includes measures to protect and enhance green space.

- The PCT therefore needs assurance that the MVV proposal will consider all opportunities for accompanied field visits to Weston Mill Creek for educational and environmental purposes.

The proposal provides some high quality amenity space.

- The PCT therefore needs assurance that the MVV proposal has considered potential impacts upon existing Community facilities, e.g. Tamar View. Assurance is also needed that the MVV Visitor Centre/Facilities will provide added value for all sectors of the local community.

Accessibility and Transport

The proposal incorporates measures to try to minimise the need to travel by car.

- The PCT therefore needs assurance that the MVV proposal will, where practicable, continue with measures to minimise staff travel by car once the plant is operational.

Crime Reduction and Community Safety

The proposal incorporates a mix of uses to encourage activity in buildings and public spaces.

- The PCT therefore needs assurance that the MVV Visitors Centre/Community Facilities will be open and accessible for a wide range of activities at times convenient to the community at incentivised rates or free of charge for the local community.

The local community has been engaged and consulted with regards to the proposal

- The PCT therefore needs assurance that the MVV is committed to developing and sustaining the Local Liaison Committee and the role of the Community Liaison Officer.

Access to Work

The proposal provides access to employment and training opportunities.

- The PCT therefore needs assurance that the MVV proposal will provide a range of opportunities for skills development which could lead to employment, i.e. via volunteering opportunities at the Visitor Centre facility.

Social Cohesion and Social Capital

The proposal contributes towards opportunities for social interaction

- The PCT therefore needs assurance that the MVV proposal will ensure that improved access to Blackie Woods and the provision of a local visitor centre will enable quality opportunities for social interaction by local communities.

The proposal incorporates community facilities

- The PCT therefore needs assurance that the MVV Visitors Centre/Community Facilities are open and accessible for a wide range of activities at times convenient to the community at incentivised rates or free of charge for the local community.

Climate Change

The proposal incorporates measures to help to maintain and enhance biodiversity

- The PCT therefore needs assurance from MVV that the expected benefits to bio-diversity will be realised.

The proposal incorporates sustainable drainage systems to safely deal with surface runoff

- The PCT therefore needs assurance from MVV that the surface water drainage strategy poses no risk to the development or third parties.

General Recommendations

1. That Plymouth City Council Planning Services read and give due consideration to this report and its findings
2. That MVV Environment Devonport Ltd read and give due consideration to this report and its findings and provide assurances as indicated.

A rapid prospective health impact assessment

The construction of a Energy from Waste Plant in Her Majesty's Naval Base, Devonport, Plymouth

Background

Through a competitive tendering process, MVV Environment Devonport Limited (MVV) has been awarded the South West Devon Waste Partnership's (SWDWP) residual waste treatment and disposal contract. The SWDWP is a collaboration that has been established between Plymouth City Council, Torbay Council and Devon County Council to provide a long term solution to deal with waste from the southwest Devon area which is left over after re-use, recycling and composting. MVV's proposal is to construct and operate a Energy from Waste (EfW) facility, incorporating Combined Heat and Power (CHP) technology, on land currently situated in the north east of Her Majesty's Naval Base (HMNB) Devonport, Plymouth. This EfW CHP facility will, depending on the composition of the waste and therefore its energy content, have capacity to process up to 265,000 tonnes per year of waste although it is expected that 245,000 tonnes per year will be processed. The waste will be combusted and the heat will be used to generate steam. The steam will drive a steam turbine and generate renewable electricity for use at the facility, to supply Devonport Dockyard and HMNB, and for export to the National Grid. Steam will also be extracted from the turbine and fed into the Devonport Dockyard and HMNB steam network to be used for heating. Locating a energy from waste incinerator in the Naval Base, adjacent to urban areas of deprivation, will be a contentious decision and has already generated a great deal of public concern and debate in Plymouth.

Rationale for the rapid health impact assessment

The proposal to construct and run a Energy from Waste (EfW) plant in the Naval Base in Plymouth is a significant development; potential health and social issues arising from the development need to be considered and assessed against scientific evidence, alongside public concern. The EfW impacts could be experienced by the local community over the next twenty years or more in Plymouth. The rationale for the rapid prospective health impact assessment (HIA) was two fold; firstly, to be used as the method to inform Plymouth PCT's response to the planning application and secondly to afford the Developers an opportunity to respond to adverse health impacts, where identified via mitigation measures and secondly to enhance, where possible, positive impacts on health where identified by this HIA study.

The definition of health and health impact assessment used

The definition of health from the World Health Organisation (1946) offers a broad concept of health and was used as the basis of understanding health in the study.

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being, without distinction of race, religion, political belief, economic or social condition".

For the purposes of this HIA the 'Gothenburg Consensus paper', also from the World Health Organisation (WHO 1999:4), was used as the basis to understand health impact assessment and the nature of health impacts:

Health Impact(s) are the overall effects, direct or indirect, of a policy, strategy, programme or project on the health of a population. (This may include direct effects on the health of the members of the population and more indirect effects through intermediate factors that influence the determinants of health of the population. Such impacts may be felt immediately, in the short term, or after a longer period of time).

Health Impact Assessment is a combination of procedures, methods and tools by which a policy, programme 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.

There is no agreed methodology for undertaking an HIA, but they may be conducted retrospectively, prospectively or concurrently; this HIA was a rapid desk-top prospective study.

Method

HIA Scope and Objectives

The objectives of the rapid prospective Health Impact Assessment are to;

- Assess the prospective health impacts of the proposed Energy from Waste plant on the local resident population and health and social care service delivery
- Inform the Planning Application process in considering the application to develop the Energy from Waste plant

Method

- Establishment of a multi-professional Steering Group
- Rapid literature review of the selected evidence
- Collation of appropriate local health intelligence
- Thematic analysis of letters to the planning authority
- Review of the Developers EfW proposal documentation
- Professional Public Health judgement of the proposal and likely impacts on health
- Identification of possible solutions to any negative impacts identified and enhancements to any positive impacts identified

Health Profile

A mini-health profile of Plymouth was compiled using data and reports relevant to inequalities in health. The profile is an integral part of the baseline information for the EfW HIA and can be found in Appendix 2.

Literature review

A brief literature review of the evidence of impacts on health from EfW developments was undertaken (Appendix 3); six themes (see below) were identified from the literature and were used to inform the rapid HIA.

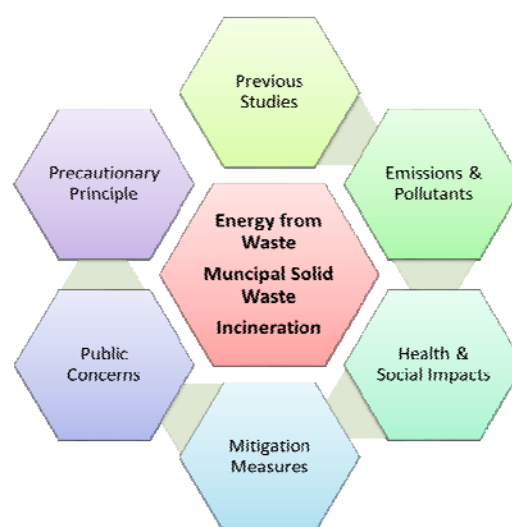


Figure 1: Six themes arising from the EfW literature review

This HIA study was undertaken using a desk-top approach; public participation was not possible because of time constraints. Public concerns were therefore identified by a thematic analysis of letters from the public responding to the local authority concerning the planning application and to the Health Protection agency concerning the environmental permit application.

Issues of Public Concern

Planning Applications afford members of the public an opportunity to raise any issues of concern or objection to the planning proposal. These objections and concerns are put into the public domain as part of the overall consultation process. In order to determine public concern in relation to the EfW proposal in Plymouth the letters of representation to the Plymouth Planning Authority were accessed via the City Council website and reviewed by the Public Health Department.

Method to identify areas of Public Concern

399 letters to the local authority (in response to the Planning Application) and the Health Protection Agency (in response to the EA Permit application) from residents in Devon and Cornwall were analysed for themes. Only those letters with a Plymouth (PL) postcode were included in the analysis. Corporate concerns were excluded. Of the 339 different people who raised concerns 310 had a full postal address for mapping origin of concern (Figure 2). When multiple letters were identified from the same residents, additional concerns were pooled with the original letter of representation to avoid duplication.

Figure 2 shows that majority of residents' letters of objection or concern originated from the areas of Barne Barton, Weston Mill, Keyham and St.Budeaux; concerns were raised by residents in other areas of the city who would be less directly affected by the proposal; these include residents in areas such as Stoke, Ford, Beacon Park and Pennycross.

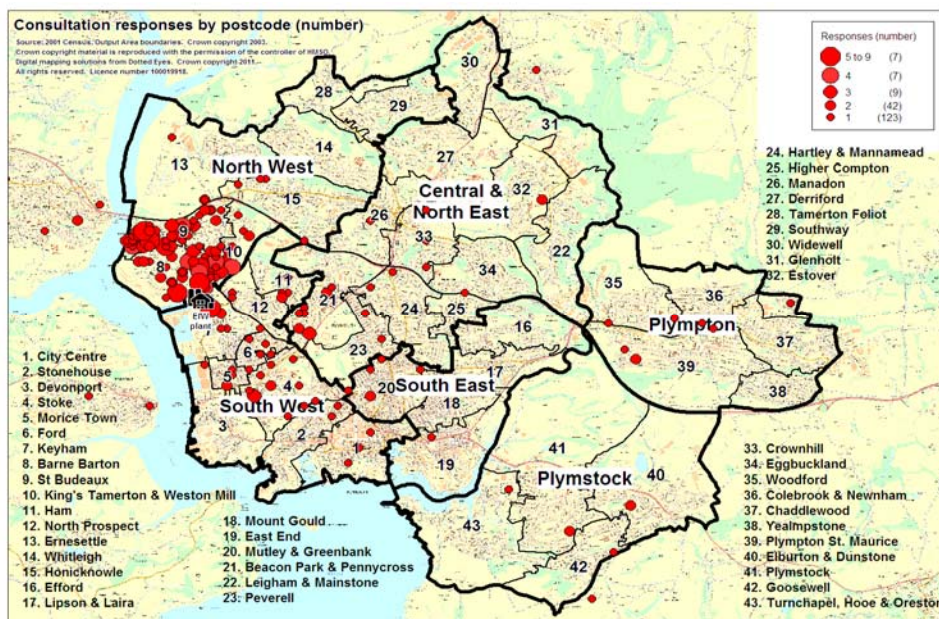


Figure 2: Map of Plymouth showing origin of residents objecting to the EfW proposal, based on Postcode and weighted to represent number of concerned residents.

Recurrent themes of public expressed concerns – a summary

The effect of site traffic

Of the 339 residents raising concerns to the EfW proposal the issues of the increase in traffic and heavy good vehicles was a common theme. Residents were concerned with the extra congestion and presence of traffic (n=169), the danger that this poses in relation to the safety of themselves or their children on local roads (n=45) and the impact of the extra vehicle emissions on themselves or their local environment (n=99).

One resident stated:

'According to MVV's figures, on weekdays there would be traffic going either onto or out of the site at the rate of 1 every 2.5 minutes. This would result in practically continuous noise for the local inhabitants during the 11 hours per day of lorry movements. In fact the only day in the entire year when there would be no lorry noise would be Christmas day.'

Pollution (short and long term)

150 residents raised concerns about the impact on the local air quality as a consequence of the EfW proposed plant. Many residents expressed concern that additional air pollution would exacerbate asthmatic and allergic conditions of themselves and their children, or lead to worsening of respiratory disease. 67 residents were concerned about the smell that would be caused by the plant and its activity.

One resident suggested:

'all fumes from the slow moving or static vehicles plus the smells from the sewage plant and the toxic fumes from the incinerator which will all hang in the area which incidentally is also adjacent to a Primary School and old peoples' sheltered scheme housing estate and this must be a serious health hazard to everyone having to live, go to school ad work in the vicinity.'

116 residents expressed more general concerns regarding pollution of the local environment to humans, animals and landscape; 24 residents expressed fear of the effect of the additional pollution on their locally grown organic crops.

Choice of site location

165 residents raised concerns about the close proximity of the proposed site to local schools and housing. The visual impact of the proposed facility on the landscape was raised by 96 residents with residents concerned that the building will block out light and views for nearby housing. 127 residents felt that the noise from the plant and traffic would impact on local residents.

In reference to the site drawings one resident wrote:

'it reveals in truly shocking detail the impact of the proposed incinerator on its immediate surroundings and shows clearly perhaps for the first time, how it overshadows nearby residential properties; with the roof garden and office windows looking directly into my home'

64 residents raised concerns about the proposed site being in an area of deprivation, with an existing vulnerable community. For example:

'Building this in a built up residential area in an area of poor health outcomes is not just insensitive, it is counter-productive to the City Council's stated objective of "narrowing the gap".'

Cumulative risk

Residents (n=105) were concerned with the cumulative risk of expanding an already industrial area. This risk was expressed in terms of personal safety, i.e. should a major industrial accident occur, as well as the cumulative environmental impact and contribution to global warming and the risks of flooding in the local area.

'I am concerned as there is only one way in and out of the area if an emergency were to happen and an evacuation has to take place'.

Economic impact

Residents, especially homeowners, raised concerns about the impact of the development on house prices, while residents from all forms of accommodation highlighted concerns in the council spending money and how this would indirectly impact on them in the future. Combined these concerns were raised by 45 residents; for example:

'The noise from the plant is inevitable and people's houses will be devalued, we don't all live in council houses you know! Would this incinerator be placed near an affluent area, I don't think so'.

Public engagement and consultation

Although MVV have engaged in consultation with the local community many residents raised concern that they have not been included in this consultation, or that they feel that their opinions have not been taken seriously by local authorities (n=81).

One resident wrote:

'This is the first time I have ever written such a letter, I feel that strongly about it, we have signed petitions etc but so far they seem to have been ignored. Come on please think again. Would you like to live near such a place. Bet you wouldn't. A lot of us in St Budeaux, Barne Barton, Keyham etc have no choice. Please try to see our point of view and help stop this project now'

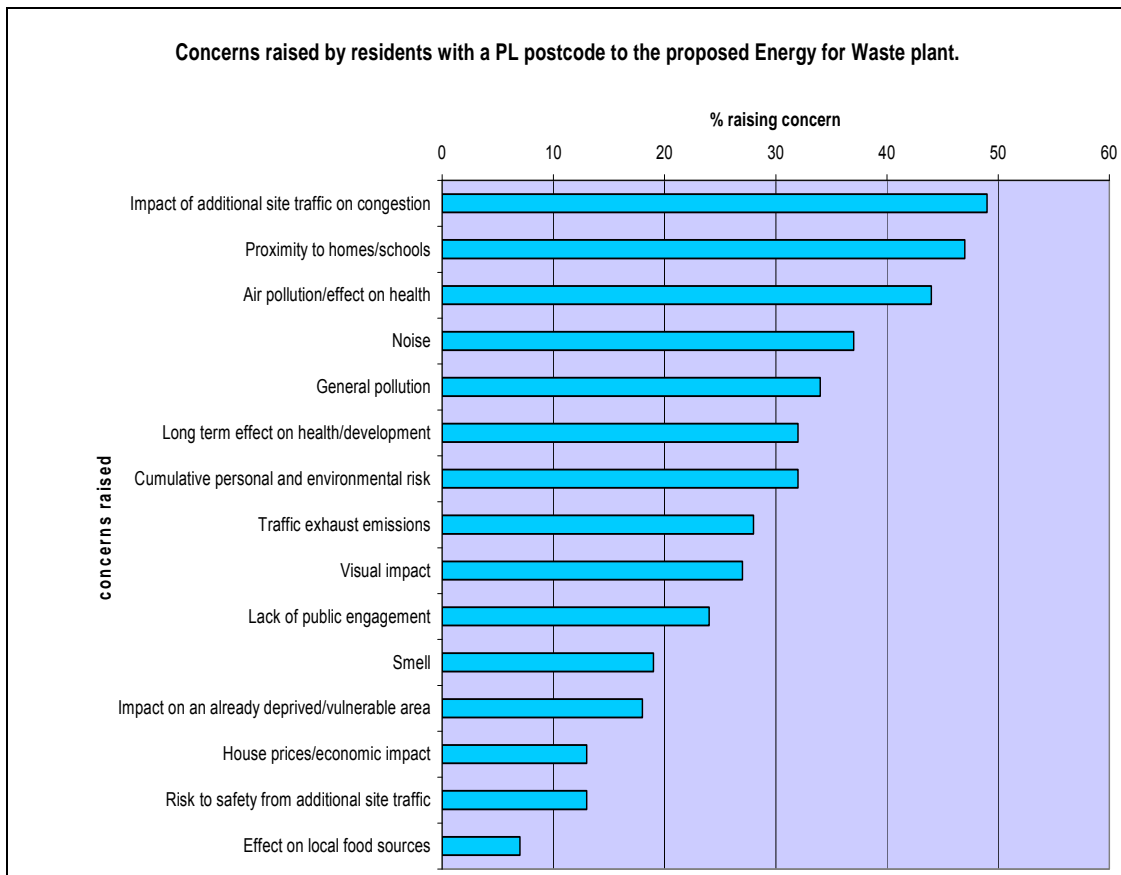


Figure 3: Bar chart identifying the % of residents raising themed concerns

THE HEALTH IMPACTS

DIRECT INFLUENCES

Direct Influence	√	X
Housing Amenity The proposal has the potential to impact upon existing housing amenity.		X
Access to Public Services The proposal impacts on public services needs, location and accessibility do not seem to have been considered.		X
The Primary Care Trust requirements, including model of care, do not seem to have been assessed in context of the proposal.		X
Community facilities are provided within the proposal.	√	
Opportunities for Physical Activity The proposal prioritises and encourages cycling.	√	
The proposal does not detail how it will ensure that buildings are designed to maximise physical activity (e.g. positioning of stairwells, shower rooms, secure cycle parking)		X
The proposal enhances opportunities for play and exercise.	√	
The proposal does not address open space and natural space deficiency for the plant employees.		X
Air Quality, Noise and Neighbourhood Amenity The proposal includes measures aimed at minimising construction impacts, including dust and noise.	√	X
The proposal would be a source of additional air pollution		X
The proposal would be a source of additional noise		X
The proposal includes measures aimed at minimising the negative impact on air quality		X
The proposal includes measures to protect and enhance green space	√	
The proposal provides some high quality amenity space	√	
Accessibility and Transport The proposal site is designed to ensure a clear distinction between the operational waste management areas and the administrative and visitor areas, with separate public and operational access.	√	
The proposal including the buildings, is accessible for people with mobility problems or disability impairment and it incorporates measures to assist people who are car dependent	√	
The proposal is easily accessible and well served by public transport	√	
The proposal incorporates measures to try to minimise the need to travel by car	√	

INDIRECT INFLUENCES

Indirect Influence	√	X
Crime Reduction and Community Safety		
The proposal incorporates a mix of uses to encourage activity in buildings and public spaces	√	
The local community has been engaged and consulted with regards to the proposal	√	
Access to Healthy Food		
The proposal does not facilitate local access to healthy food supply		X
The proposal does not specify how it will avoid contributing towards over concentration of fast food outlets in the local area		X
Access to Work		
The proposal provides access to employment and training opportunities	√	
The proposal provides potential diversity in jobs for local residents	√	
The proposal provides opportunities for existing local businesses	√	
Social Cohesion and Social Capital		
The proposal contributes towards opportunities for social interaction	√	
The proposal has not addressed local health and social inequalities		X
The proposal incorporates community facilities	√	
The proposal does not detail how it could provide voluntary sector opportunities		X
Resource Minimisation		
The proposal does not make best use of existing land		X
The proposal does not directly encourage recycling	√	X
The proposal incorporates sustainable design and construction	√	
The proposal does not specify how waste generated on the site will be managed to minimise creation and maximise recycling		X
Climate Change		
The proposal incorporates renewable energy	√	
The proposal does not detail how it will provide a sustainable approach to transport		X
The proposal incorporates measures to help to maintain and enhance biodiversity	√	
The proposal been flood risk assessed	√	
The proposal incorporates sustainable drainage systems to safely deal with surface runoff	√	
General		
The proposal has not been subjected to an independent BREEAM assessment		X

DISCUSSION

Identifying the Impacts of the EfW proposal

The qualitative analysis of public responses to the planning application for the MVV proposal identified the following areas of local public concern;

- Impact of additional site traffic on congestion
- Proximity of development to existing homes and schools
- Air pollution and effects on health
- Noise
- General pollution
- Long term effects on health
- Cumulative personal and environmental risk
- Traffic exhaust emissions
- Visual impact
- Lack of public engagement
- Odour
- Impact on an already deprived and vulnerable area and population
- House prices and economic impact
- Risk to safety from additional site traffic
- Effect on local food sources

The local health profile demonstrates that the neighbourhoods adjacent and nearest to the proposal are some of the most deprived in the City and the health of the local residents, in terms of morbidity and mortality is some of the poorest in the City. The area demonstrates considerable and persistent inequalities in many aspects of health and wellbeing. There are large numbers of vulnerable families living close to the proposed site and there is a very high proportion of children in the local area. The above all make for a vulnerable local population who are likely to experience greater disadvantage as a result of the proposal than an average population.

The main themes identified by the rapid literature review are;

- Evidence from previous studies
- Emissions and Pollutants
- Health and Social Impacts
- Mitigation Measures
- Public Concerns
- Precautionary Principle

It is against this background information that the following judgements have been made by Public Health Plymouth and the HIA Steering Group in assessing the potential impacts of the proposal.

Direct Influences

Housing Amenity

The proposal has the potential to impact upon existing housing amenity. The potential for the proposal to give rise to disamenity in terms of residential properties (e.g. reduction in property value and saleability) in the local area is not detailed in the Environmental Statement. The WHO (2007) Scientific Report says that it is important that the adverse effects on health due to the effect on property values should be considered. The potential impact on house prices has also been raised as a local public concern. The proposal does however recognise the opportunity to provide a district heating system serving local residential properties. The proposal includes an undertaking to examine this possibility. The provision of subsidised district heating to local residential properties would contribute to a potential reduction in fuel costs and improved heating which could have a positive impact on the health of residents. The recent Marmot Review Team Report (2011) details the positive physical and mental health benefits gained from reducing fuel poverty and cold housing conditions.

Access to Public Services

The proposals' impacts on public services needs, location and accessibility do not seem to have been considered and the Primary Care Trust requirements do not seem to have been assessed. The consideration of the promotion of access to good public services, including health should be considered. There is potential for the proposal to contribute to improved service provision in the local neighbourhoods which could have a positive impact on residents' health and wellbeing.

Opportunities for Physical Activity

The proposal prioritises and encourages cycling within the proposed work travel plan. It also provides enhanced opportunities for play and exercise for local residents by the provision of an informal sports field and increased public access to Blackie Woods. The health benefits of these proposals could be maximised by the provision of recreational facilities for people of all ages and abilities.

The proposal does not detail how it will ensure that buildings are designed to maximise physical activity (e.g. positioning of stairwells, shower rooms, secure cycle parking) and it does not address open space and natural space deficiency for the plant employees. Addressing these issues would maximise opportunities for health benefiting physical activity by employees.

Air Quality, Noise and Neighbourhood Amenity

The proposal would be a potential source of additional air pollution and noise, both of which have the potential to impact negatively on the health of local residents. The existing health of local residents is poor compared to average levels of health in Plymouth, as evidenced by the Local Health Profile provided in Appendix 2. The Health Protection Agency's review of the research examining the links between emissions from municipal waste incinerators and effects on health suggests that while it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable. However, The WHO Scientific Report (2007) argues that the health impact of waste management procedures cannot yet be properly evaluated, because of the limitations of the current state of

knowledge. Other reports argue that the absence of evidence of harm or impact is not evidence of absence and that the precautionary principle should therefore apply as the overriding concern. The WHO also comments on the importance of an appreciation of possible inequity in the distribution of exposure to emissions among population subgroups, taking into account the possibility of higher exposure of socioeconomically deprived groups, as would be the case in this instance. In addition to the emissions from the proposed incinerator, the additional traffic required to serve the incinerator would also add to local air pollution levels and generate further noise. Local residents have raised concerns regarding air quality, impacts on health, traffic pollution and existing health inequalities.

The proposal includes many measures aimed at minimising these impacts both in construction and operation. The requirement to obtain an Environment Agency permit to operate the plant should ensure that current legal requirements are met with regards to the emissions from the proposed plant. Further measures such as the requirement for all vehicles servicing the site to meet the lowest emission standards, and prompt responsive action to any complaints from local residents of nuisance from noise and dust generated from either construction or operation could be provided.

The proposal includes measures aimed at improving air quality, such as the proposed provision of a brown roof, additional tree planting and hedgerow provision. These measures could be enhanced if additional planting and green/brown roofs were provided. The proposal includes further measures to protect and enhance green space and provides some high quality amenity space. These measures could be further enhanced by providing opportunities for accompanied field visits to the adjacent areas for educational and environmental purposes and if the community facilities provided deliver added value, over and above existing facilities, for the local community. These measures help to minimise the negative impact on air quality, but overall the proposal is considered to have a negative impact on air quality.

Accessibility and Transport

The proposal site is designed to ensure a clear distinction between the operational waste management areas and the administrative and visitor areas, with separate public and operational access. The site and buildings are intended to be accessible for people with mobility problems or disability impairment and measures to assist people who are car dependent are detailed. The proposal is also easily accessible and well served by public transport and incorporates measures to try to minimise the need to travel by car. These elements provide potential positive impacts. Continuing measures to minimise staff travel by car once the plant is operational would deliver additional benefit.

Indirect Influences

Crime Reduction and Community Safety

The proposal incorporates a mix of uses to encourage activity in buildings and public spaces. The proposed Visitor Centre and community facilities should be open and accessible for a wide range of activities at times convenient to the local community. Providing the facilities free of charge or at incentivised rates would also improve their potential impact.

The local community has been engaged and consulted with regards to the proposal, however some local residents reported in their letters of objection that their concerns are not being

given due consideration and perceived lack of public engagement was a concern raised in public responses to the planning application. There must be a continuing commitment to developing and sustaining the Local Liaison Committee and to responding to community requests on further engagement and the Community Liaison Officer role should be flexible to help meet community needs in order to maximise the potential for positive impacts. Opportunities for active community participation have been shown to be essential in achieving waste management goals and in enabling effective mitigation of the impacts of developments such in this proposal.

Access to Healthy Food

The proposal does not facilitate local access to healthy food supply and does not specify how it will avoid contributing towards an over concentration of fast food outlets in the local area as a result of the construction phase. Ensuring that all food provided on the proposed site is locally sourced, that healthy options are always available and preventing the provision of fast food outlets on site during construction and operation would provide potential to impact positively on the health of workers, visitors and the local community.

Access to Work

The proposal provides welcome access to employment and training opportunities. It also provides potential diversity in jobs for local residents. These are potential positive impacts in an area of existing high unemployment that could be enhanced by the proposal providing a range of further opportunities for skills development which could lead to employment e.g. via volunteering opportunities at the Visitor Centre.

The proposal provides opportunities for existing local businesses. During construction there is the potential for local businesses to supply materials and labour. The provision of heat and power to the MOD and Babcock Ltd within HM Naval Base Devonport provide opportunities for these undertakings and are potential considerable positive impacts.

Social Cohesion and Social Capital

The proposal contributes towards opportunities for social interaction by means of the provision of a Visitor Centre and improved access to Blackie Woods. To maximise the potential positive impact of these elements the proposal should ensure that these enable quality opportunities for social interaction by local communities and groups.

The proposal notes existing local inequalities but has not addressed these in the proposal; assurance is therefore needed that the proposal will not exacerbate existing health inequalities. The location of an EfW plant such as this in deprived areas raises complex issues of environmental and social justice. Research shows that social concerns will concentrate on health effects and the impact on quality of life. A sense that health risks are not shared equally has been shown to exist in similar developments with real concerns on cumulative risk from numerous pollution sources. The status of local residents has been shown to be very important when considering the health and social impacts of similar proposals. These concerns have been reflected in local public responses to the planning application. The local population experiences multiple deprivation with existing considerable health inequalities. There is a large local child population. Children are known to be more sensitive to environmental hazards and children living in deprived areas are known to already be more exposed to harmful environmental conditions.

The proposal incorporates community facilities with the provision of a Visitor Centre and improved access to Blackie Woods. The potential positive impacts of these should be maximised by ensuring full and open access and provision of a range of activities at times convenient to the local community and at incentivised rates or preferably free of charge for the local community. The proposal does not detail how it could provide voluntary sector opportunities. The Visitor Centre should be made available for use by the voluntary sector in order to negate this.

Resource Minimisation

The proposal does not make best use of existing land in that the proposed site is not allocated as a suitable waste site in the City Council's Waste Development Plan. Assurance would be needed that the proposal is therefore acceptable in planning terms in order to deviate from existing policy.

The proposal does not directly encourage recycling. The potential for energy from waste developments where long term contracts are present to undermine efforts to reduce waste at source and to increase recycling and reuse of wastes is recorded in relevant literature and reviews. An assurance has already been provided by the City Council that as part of an integrated waste management strategy this proposal will not undermine their strenuous efforts to increase the levels of materials recycled in the City. This assurance will need to be realised to prevent a negative impact in this respect.

The proposal incorporates sustainable design and construction and as such has the potential to deliver some positive impact. Opportunities to incorporate further sustainable construction would deliver greater potential benefit.

Climate Change

The proposal incorporates renewable energy which would provide a significant positive impact in terms of carbon reduction. The proposal does not detail how it will provide a sustainable approach to transport over and above a workforce travel plan. Assurance would be needed that all sustainable options for transporting waste and materials too and from the site are considered and implemented wherever practicable.

The proposal incorporates measures to help to maintain and enhance biodiversity by means of environmental improvements to Blackie Woods and local streams and culverts. The anticipated benefits to biodiversity would need to be realised to ensure a positive impact in this respect.

The proposal has been assessed for flood risk and it incorporates sustainable drainage systems to safely deal with surface runoff. There should be no risk to the development or to third parties from surface water drainage.

General

The proposal has not been subjected to an independent BREEAM assessment. Subjecting the plant design to such an assessment would provide further independent assessment of the environmental lifecycle of the construction and operation of the plant, including the health and wellbeing considerations.

Study Limitations

The study is a rapid prospective and desktop health impact assessment; timing and staffing resources did not permit a comprehensive HIA (see Ison 2000), to be undertaken and it is based on the HIA judgements of the senior public health staff and a multi-professional Steering Group.

There are limitations to the rapid thematic analysis of resident's letters of representation, as this was only a sample of the local populations view. Those less able or inclined to convey their opinions in writing may not be represented in this analysis. More in depth 1:1 or focus group interviews would have been advised to capture this detail of qualitative analysis and include harder-to-reach groups concerns (Green and Thorogood, 2004). Additionally only those letters made publically available through the council website and HPA were analysed. Other letters of representation may have been submitted to local councillors and/or MVV. This could have resulted in underrepresentation of resident views in the analysis. Due to the timescales involved analysis was brief and the level of depth limited, this means that less frequent concerns were omitted from the overall analysis, i.e: Asbestos (4 letters of concern raised).

CONCLUDING REMARKS

It is the policy of NHS Plymouth to conduct a HIA on large proposed developments in order to encourage debate and to inform decision making on projects and policies that might affect people's health. A HIA Framework was developed and implemented in 2004 with approval from the Overview and Scrutiny Panel of Plymouth City Council.

The advantage of conducting a prospective HIA is that it provides an opportunity to identify potential impacts prior to a development, making it possible to influence plans before they are implemented. It would have been preferable to have conducted a participative HA, but this was not possible within the time available. Instead, consideration has been given to the full range of documents relating to the EfW proposal that are available in the public domain. This HIA report has been scrutinised and approved by the multi-professional Steering Group.

The proposal by MVV Environment Devonport Limited to construct and operate an EfW facility on land currently situated in the north east of Her Majesty's Naval Base (HMNB) Devonport has caused considerable public concern, as identified through the public letters and responses to the planning and permit applications. The top 5 expressed concerns relate to additional traffic and congestion, the proximity of the proposal to existing homes and schools, the effect of potential air pollution on health, noise and general pollution. In addition residents' letters raised concerns about long term health impacts, cumulative personal and environmental risk and impact on an already deprived area. Despite public consultation events taking place, parts of the local community have expressed that their concerns are not being listened too or taken seriously.

The existing health of the population in the neighbourhoods immediately adjacent to the proposal site is poor compared to City and national average health. The local population

experience multiple deprivations, with associated inequalities in health. The impacts of a development such as that proposed are likely to be more marked on such a population.

A rapid literature review identified the overriding consideration to be to accept the notion of the precautionary principle approach, whilst acknowledging the improved regulation and design of modern EfW incineration plants.

The HIA has identified a range of potential impacts, both positive and negative, relating to the proposed EfW plant. The report makes suggestions for potential mitigation of negative impacts and enhancement of positive impacts. (Appendix 1)

The overall public health concerns identified by the HIA are;

- The precautionary principle indicates that there should be an aim of minimising as far as is practicable the production of all emissions relating to air quality and noise from EfW facilities. Research to date does not provide conclusive evidence of the absence of health impacts and risk associated with modern EfW facilities.
- There local population experience multiple deprivation with associated inequalities in health. The proposed development has the potential to impact negatively on the physical and mental health and wellbeing of the local population and thus may exacerbate the existing inequalities.
- The cumulative impact of this EfW development is likely to place the greatest burden upon some of the poorest and most vulnerable people in the City.
- The literature review and letters of public concern highlight the need of addressing the public perception of risk of EfW plants; the requirement for ongoing meaningful public engagement for the proposal is also highlighted in order to ensure that the local community believe their concerns are being heard, being taken seriously and given due consideration.

As a result of this exercise, the Primary Care Trust has identified a number of concerns which it is believed can either be dealt with by mitigation, or controlled by the application of appropriate planning conditions.

Those concerns that it is believed can be dealt with by mitigation are;

Housing Amenity

The proposal has the potential to impact upon existing housing amenity.

Access to Public Services

The proposal impacts on public services needs, location and accessibility do not seem to have been considered. In particular, the Primary Care Trust requirements do not seem to have been assessed in context of the proposal.

Social Cohesion and Social Capital

The proposal has not addressed local health and social inequalities

Resource Minimisation

The proposal does not make best use of existing land

Those concerns that it is believed can be controlled by appropriate planning conditions are;

Opportunities for Physical Activity

The proposal does not detail how it will ensure that buildings are designed to maximise physical activity (e.g. positioning of stairwells, shower rooms, secure cycle parking)

The proposal does not address open space and natural space deficiency for the plant employees.

Air Quality, Noise and Neighbourhood Amenity

The proposal includes measures aimed at minimising construction impacts, including dust and noise.

The proposal would be a source of additional air pollution

The proposal would be a source of additional noise

The proposal includes measures aimed at minimising the negative impact on air quality

Access to Healthy Food

The proposal does not facilitate local access to healthy food supply

The proposal does not specify how it will avoid contributing towards over concentration of fast food outlets in the local area

Social Cohesion and Social Capital

The proposal does not detail how it could provide voluntary sector opportunities

Resource Minimisation

The proposal does not specify how waste generated on the site will be managed to minimise creation and maximise recycling

Climate Change

The proposal does not detail how it will provide a sustainable approach to transport

General

The proposal has not been subjected to an independent BREEAM assessment

REFERENCES

- Achillas, C., C. Vlachokostas, et al. (2011). "Social acceptance for the development of a waste-to-energy plant in an urban area." *Resources, Conservation and Recycling* 55(9-10): 857-863.
- Audit Commission (2008). *Well disposed: Responding to the waste challenge*, Audit Commission.
- Birley M, Abrahams D, et al. (2008). *A Prospective Rapid Health Impact Assessment of the Energy from Waste Facility in the States of Jersey: Stage 2*, IMPACT: University of Liverpool.
- Bond, A., J. Fawell, et al. (2005). *Health Impact Assessment of Waste Management: Methodological Aspects and Information Sources*. Environment Agency.
- Brisson, I. and D. Pearce (1995). *Benefits transfer for disamenity from waste disposal*, University of East Anglia.
- British Medical Association (1998). *Health and environmental impact assessment: an integrated approach*. London, Earthscan Publications Ltd.
- Buroni, A. (2010). *Brig y Cwm EfW Facility, Merthyr Tydfil: Health Impact Assessment*, RPS Planning and Development.
- CIWM (2003). *Energy from Waste: A good practice guide*, The Chartered Institute of Waste Management.
- DEFRA (2007). *Waste Strategy for England 2007*. F. a. R. A. Department for Environment. London, HMSO.
- Enviros Consulting Ltd, University of Birmingham, et al. (2004). *Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes*.
- Gatrell, A. C. (2002). *Geographies of Health: an introduction*. Cornwall, Blakwell Publishers.
- Green J and Thorogood N (2004). *Qualitative Methods for Health Research*. London: SAGE
- Giusti, L. (2009). "A review of waste management practices and their impact on human health." *Waste Manag* 29(8): 2227-2239.
- Health Protection Agency (2009). *The Impact on Health of Emissions to Air from Municipal Waste Incinerators*. London, Health Protection Agency.
- House of Commons (2002). *Waste Incineration: Research Paper 02/34*. London.
- Ison E (2000). Resource for health impact assessment. Volume 1. London: NHS Executive, London
- Jamasb, T., H. Kiamil, et al. (2008) *Hot Issue and Burning Options in Waste Management: A Social Cost Benefit Analysis of Waste-to-Energy in the UK*.
- Liamsanguan, C. and S. H. Gheewala (2006). "Environmental assessment of energy production from municipal solid waste incineration." *The International Journal of Life Cycle Assessment* 12(7): 529-536.
- Marmot Review Team (2011). "The Health Impacts of Cold Homes and Fuel Poverty". Marmot Review Team, Department of Epidemiology and Public Health, University College London.

Roberts, R. J. and M. Chen (2006). "Waste incineration--how big is the health risk? A quantitative method to allow comparison with other health risks." J Public Health (Oxf) 28(3): 261-266.

Royal Town Planning Institute (2009). Delivering Healthy Communities: RTPi Good Practice Note 5. R. T. P. Institute, Royal Town Planning Institute.

The Chartered Institute of Waste Management (2003). Energy from Waste: A good practice guide, The Chartered Institute of Waste Management.

The Parliamentary Office of Science and Technology (POST) (2000). Incineration of Household Waste: Post 149. T. P. O. o. S. a. Technology. London, The Parliamentary Office of Science and Technology.

World Health Organisation (1946) The World Health Organisation Constitution. Geneva: WHO

World Health Organisation (1999) Health Impact Assessment: Gothenburg consensus paper (December 1999). Europe: WHO

World Health Organization Regional Office for Europe (2007). Population health and waste management: scientific data and policy options. Report of a WHO workshop Rome, Italy, 29–30 March 2007, World Health Organization Regional Office for Europe.

Appendix 1: Healthy Urban Development Unit Checklist

1. Direct Influences				
Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
1.1 Housing Amenity				
Does the proposal contain homes that have a high Code for Sustainable Homes rating (e.g. 4 and above)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Are all homes wheelchair accessible?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Are homes adaptable in supporting independent living for older and disabled people?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal promote good design in terms of layout and orientation (internal space, access to sunlight etc)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Are there a range of home tenures and sizes?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal contain homes that are highly energy efficient (e.g. have high SAP ratings)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Are homes affordable (in line with local planning policy)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal have the potential to impact upon existing housing amenity?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	The proposal recognises the opportunity to provide a district heating system. Potential disamenity in terms of residential properties is not detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that MVV will deliver a district heating system to Barne Barton. PCT needs assurance that a residential property disamenity impact assessment has been conducted by MVV.
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			0%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
1.2 Access to Public Services				
Have public services needs, location and accessibility been considered?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Not detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that MVV will actively consider the promotion of access to good public services, including health.
Has assessment of healthcare demand via use of the HUDU Model been carried out?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a	No new housing in proposal	<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Have Primary Care Trust requirements including model of care been assessed in context of the proposal?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Not detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will consider in full the Section 106 Obligations.
Does the proposal facilitate multiple building uses for different public services?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a	No use of site facilities for public services detailed in the MVV proposal.	<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Are community facilities provided within the proposal?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	The proposal includes a visitor centre, with potential community use of on site facilities and access to improved Blackie Woods.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will ensure wide accessibility to all sectors of the 'local communities' to derive local health and social benefits and that it will add health benefit value to Blackie Woods via out-door gyms and social gathering areas.
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			33%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
1.3 Opportunities for Physical Activity				
Does the proposal prioritise and encourage walking (e.g. HomeZones, walking plans, wide and safe streets etc.)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal prioritise and encourage cycling (e.g. cycle lanes, secure cycle stands, office shower facilities)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Proposal includes Work Travel Plan	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will encourage the Plant Workforce and incentivise towards active travel to work.
Does the proposal ensure that buildings are designed to maximise physical activity (e.g. positioning of stairwells, shower rooms, secure cycle parking)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Not fully detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal design encourages employees to be physically active at work, i.e. staff gym facilities.
Does the proposal enhance opportunities for play and exercise (e.g. follows Active Design by Sport England for instance)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	The proposal includes improvements to Blackie Woods. It also includes the provision of an "informal sports field" adjacent to Savage Gardens.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV proposal considers opportunities for recreation facilities of all ages and abilities within Blackie Woods and the adjacent areas for health benefits.
Does the proposal address open space and natural space deficiency for the Plant Employees?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Not detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal considers access to open natural space for all employees whilst at work.
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			50%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
1.4 Air Quality, Noise and Neighbourhood Amenity				
Does the proposal minimise construction impacts (including dust and noise)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	D13.81 Mitigation measures for Construction dust itemised.	<input type="checkbox"/> n/a <input checked="" type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal with regard to Construction Dust and Noise, will respond to community concerns and mitigate accordingly.
Does the proposal minimise air pollution?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Increased traffic volumes during construction and plant operation along with plant emissions will add to background air pollution, although a EA permit would regulate emissions.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal requires all vehicles servicing the site meet lowest emission standards for all vehicles.
Does the proposal minimise noise pollution?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	D14.1 construction noise mitigation measures are identified, plant design to maximise sound attenuation is identified, however, noise levels will increase.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal would respond to any public complaints of noise of the Plant in construction or operation in a responsive manner.
Does the proposal promote good air quality (through for example planting of trees or provision of green/brown roofs etc)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Brown roof on workshop building to promote biodiversity plus tree planting and provision of Devon hedgerow in neighbouring area aim to minimise negative impact on air quality but on balance the proposal would cause a deterioration in air quality	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal would consider where practicable additional tree planting and provision of green/brown roofs within the plant complex and buildings and the neighbouring areas.
Does the proposal protect and enhance green space?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Environmental improvements to Blackie Woods and Weston Mill Creek.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will consider all opportunities for accompanied field visits to Weston Mill Creek for educational and environmental purposes.
Does the proposal provide high quality amenity space?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	The provision of a Visitors Centre and community facilities.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV proposal has considered potential impacts upon existing Community facilities, i.e. Tamar View. PCT needs assurance that the MVV Visitor Centre/Facilities will provide added value for all sectors of the local community.
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			30%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
1.5 Accessibility and Transport				
Does the proposal facilitate streetscape accessibility, legibility and permeability?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Site designed to ensure a clear distinction between the operational waste management areas and the administrative and visitor areas. Visitors will be directed to the main building via pedestrian friendly access to external landscaped amenity areas	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	
Is the proposal including buildings, accessible for people with mobility problems or disability impairment?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Compliant with DDA requirements.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	
Is the proposal easily accessible and well served by public transport?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Locality well served by existing public bus services.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	
Does the proposal minimise the need to travel especially by car (e.g. by cutting down trips as result of good access or incorporation of local facilities)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	During the construction phase measures to minimise staff travel by car have been identified.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will where practicable, will continue with measures to minimise staff travel by car once the plant is operational.
Does the proposal incorporate measures to assist people who are car dependent (e.g. disabled Blue Badge holders etc)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Compliant with DDA requirements.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	
Does the proposal incorporate traffic calming measures aimed at reducing and minimising road traffic injuries (e.g. use of HomeZones and 30 mph limit)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			100%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

2. Indirect Influences

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
2.1 Crime Reduction and Community Safety				
Has the proposal 'designed out crime'?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a <input checked="" type="checkbox"/> D/k	It is felt that this issue is not particularly relevant for this proposal.	<input type="checkbox"/> n/a <input checked="" type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal incorporate effective security and street surveillance?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a <input checked="" type="checkbox"/> D/k	It is felt that this issue is not particularly relevant for this proposal as it is within the secure HM Naval Base site	<input type="checkbox"/> n/a <input checked="" type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal incorporate a mix of uses to encourage activity in buildings and public spaces?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a		<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV Visitors Centre/Community Facilities are open and accessible for a wide range of activities at times convenient to the community at incentivised rates or free of charge for the local community.
Has the local community been engaged and consulted with regards to the proposal?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a		<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV is committed to developing and sustaining the Local Liaison Committee and the role of the Community Liaison Officer.
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			100%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
2.2 Access to Healthy Food				
Does the proposal facilitate local access to healthy food supply?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Not detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will ensure that all food provided on-site is locally sourced with healthy options available.
Does the proposal avoid food being monopolised locally by a single provider?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal avoid contributing towards over concentration of fast food outlets in the local area?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Not detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will not add to the provision of fast food outlets in the local area pre and post construction.
Does the proposal provide social enterprise support for local producers or retailers of nutritional and affordable food?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal safeguard loss of allotments, good agricultural land, city farms or farmers markets from development?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a	On a brown-field existing industrial site.	<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal incorporate or facilitate access to healthy living centres?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a	Not detailed in the MVV proposals, however awaiting response to 106 Obligations negotiations.	<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will consider in full the Section 106 Obligations
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			0%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
2.3 Access to Work				
Does the proposal provide access to employment and training opportunities?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	New employment and apprenticeship opportunities.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will provide a range of opportunities for skills development which could lead to employment, i.e. via volunteering opportunities at the Visitor Centre facility.
Does the proposal provide diversity in jobs for local residents?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Range of employment opportunities provided via the plant.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	
Does the proposal provide childcare facilities?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal provide opportunities for local businesses?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Potentially supply of materials during construction phase. Provision of heating and power to Babcock and MOD within HM Naval Base provides opportunities for these undertakings	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			100%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
2.4 Social Cohesion and Social Capital				
Does the proposal contribute towards opportunities for social interaction?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	The MVV proposal includes improved access to Blackie Woods and the provision of a local visitor centre.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will ensure that improved access to Blackie Woods and the provision of a local visitor centre will enable quality opportunities for social interaction by local communities.
Has the proposal addressed local inequalities?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	The MVV proposal notes existing health inequalities.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will not exacerbate health inequalities and will consider in full the Section 106 Obligations
Does the proposal advance mixed communities by having a mix of tenures and uses?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Does the proposal incorporate community facilities?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Yes, via Visitor Centre & Blackie Woods	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance that the MVV Visitors Centre/Community Facilities are open and accessible for a wide range of activities at times convenient to the community at incentivised rates or free of charge for the local community.
Does the proposal provide voluntary sector opportunities?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Not detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that the MVV proposal will provide opportunities for local voluntary sector use, i.e. use of Visitor Centre facilities for voluntary sector.
Does the proposal avoid community severance (by major roads, large commercial schemes etc)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/a		<input checked="" type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			50%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
2.5 Resource Minimisation				
Does the proposal make best use of existing land?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	The solution proposed by MVV Umwelt is for an Energy from Waste facility located on a site owned by the MOD located within the Devonport Royal Naval Dockyard. This site is located within Plymouth City boundaries but is not allocated within the Council's Waste Development Plan Document as a suitable waste site.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance from the Planning Authority that the MVV Proposal is acceptable in planning policy terms.
Does the proposal encourage recycling (including building materials)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	The MVV proposal recognises the potential to impact negatively upon recycling rates in the area. However the proposal is for a recognised renewable energy resource.	<input type="checkbox"/> n/a <input checked="" type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	Plymouth City Council has provided written assurance that the proposal is part of an integrated waste management strategy where strenuous efforts to significantly increase the level of materials recycled in the area will be ongoing. This assurance needs to be realised to ensure there is no negative impact.
Does the proposal incorporate sustainable design and construction?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a		<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	
Are waste management facilities incorporated within the proposal?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	The MVV proposal does not detail arrangements for the management of waste generated on site although there is a legal duty of care to manage such waste.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance that MVV will fulfil their duty of care to manage waste created on site and to minimise resource use and maximise recycling and reuse of materials.
Have Environmental Health, Environment Agency or Health Protection Agency been informed about potential hazards related to the proposal?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a		<input type="checkbox"/> n/a <input checked="" type="checkbox"/> no diff <input type="checkbox"/> -ve <input type="checkbox"/> +ve	
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			20%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
2.6 Climate Change				
Does the proposal incorporate renewable energy?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	This is a proposal for a combined heat and power energy from waste plant.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	
Does the proposal provide a sustainable approach to transport?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Not detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance from MVV that all sustainable transport options for transporting waste (to the site and waste materials from site) have been considered.
Does the proposal maintain or enhance biodiversity?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Expected beneficial effects through enhancement of Blackie Woods, replacement of culverts and cleaning up of streams.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance from MVV that the expected benefits to bio-diversity are realised.
Has the proposal been flood risk assessed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Flood risk assessment has been conducted; the majority of the site is considered low risk of flooding.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	
Does the proposal incorporate sustainable drainage systems to safely deal with surface runoff?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/a	Proposal incorporates measures to deal with increased surface water run-off.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input type="checkbox"/> -ve <input checked="" type="checkbox"/> +ve	PCT needs assurance from MVV that surface water drainage strategy poses no risk to the development or third parties.
Overall positive impacts for this category (Add up the total number of positive impacts and divide by the number of relevant issues above and multiple by 100, this gives a percentage outcome)			80%	Outcomes above 50 percent equal a positive outcome for this category, while that below equals a negative outcome for health. This informs the tick box Summary Table outlined in Stage 3 of the Checklist.

Additional Question

Issue	Included in proposal	Details and evidence	Potential health impact	Action or mitigation required
Additional question relating to a full and independent assessment using the Building Research Establishment's Environmental Assessment Method http://www.breeam.org/				
Has the proposal been subjected to an independent BREEAM assessment?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/a	Not detailed in the MVV proposals.	<input type="checkbox"/> n/a <input type="checkbox"/> no diff <input checked="" type="checkbox"/> -ve <input type="checkbox"/> +ve	PCT needs assurance from MVV that the EfW plant design will be subjected to a full and independent environmental assessment using tailored BREEAM criteria to assess the environmental lifecycle of the construction/plant including health and wellbeing considerations.

Feedback: A key purpose of Watch Out for Health is as a tool to improve policies, projects and planning applications so as to not only better consider health but also help realise actual positive outcomes from implementation. Going through the Checklist at Stage 2 should enable you to come up with an appreciation and assessment of the extent to which health has been covered in a plan, project or proposal. A simple overview can be gained by using Table 3 below in relation to the two main sections (i.e. direct and indirect influences) analysed.

Table 3: Summary overview

1. Direct influences			
Category	Positive (✓)	Negative (✓)	Not applicable/ Neutral (✓)
1.1 Housing		(✓)	
1.2 Access to Public Services		(✓)	
1.3 Opportunities for Physical Activity			(✓)
1.4 Air Quality, Noise and Neighbourhood Amenity		(✓)	
1.5 Accessibility and Transport	(✓)		
Overall Impact		(✓)	

2. Indirect Influences			
Category	Positive (✓)	Negative (✓)	Not applicable/ Neutral (✓)
2.1 Crime Reduction and Community Safety	(✓)		
2.2 Access to Healthy Food		(✓)	
2.3 Access to Work	(✓)		
2.4 Social Cohesion and Social Capital			(✓)
2.5 Resource Minimisation		(✓)	
2.6 Climate Change	(✓)		
Overall Impact	(✓)		

Appendix 2: Health Profile of Plymouth (Summary)

“Health Profiles” is the Department of Health’s programme to improve availability and accessibility to health and health-related information in England. The profiles give a snapshot overview of health for each local authority in England. Health Profiles are produced annually by the Public Health Observatories in England working in partnership and are commissioned by the Department of Health. The latest profile for Plymouth is embedded here for information. It shows that the health of people in Plymouth is generally worse than the England average. Deprivation is higher than average and life expectancy for men is lower than the England average. It notes that the priorities in Plymouth include improving health overall, reducing health inequalities and working with partners to make Plymouth a fairer place to live.



G:\HAZ\Sarah
Lawson\EfW\HealthPi

Source: Department of Health. ©Crown Copyright 2011

The Plymouth data on life expectancy and early deaths from Cancer and Circulatory Disease are provided below;

Life expectancy	Plymouth Male	77.2 years
	England Average	78.3 years
	England Worst	73.7 years
	England Best	84.4 years
	Plymouth Female	82.0 years
	England Average	82.3 years
	England Worst	79.1 years
	England Best	89.0 years

Early Deaths from Cancer (Direct Age Standardised Rate per 100,000 under 75s 2007-09)

Plymouth	116.3
England Average	112.1
England Worst	159.1
England Best	76.1

Early Deaths from Heart Disease and Stroke (Direct Age Standardised Rate per 100,000 under 75s 2007-09)

Plymouth	82.1
England Average	70.5
England Worst	122.1
England Best	37.9

Plymouth Health Profile Data

Local health data has been used to consider the current health status of the local population and in particular those people living in the 5 neighbourhoods closest to the proposed Energy from Waste plant i.e. Barne Barton, Keyham, Kings Tamerton and Weston Mill, North Prospect and St Budeaux. The current ranking of these neighbourhoods for the Index of Multiple Deprivation is also provided.

Index of Multiple Deprivation 2010

Neighbourhood	IMD Score	Ranking
Barne Barton	43.2	5 th
Keyham	30.6	14 th
Kings Tamerton and Weston Mill	28.8	17 th
North Prospect	50.1	3 rd
St Budeaux	32.1	13 th
Plymouth City Average	25.9	

Mortality Data (Direct Age Standardised Rates per 100,000 population)

All Cause Mortality 2009

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	903.1	542.0
Keyham	614.2	325.0
Kings Tamerton and Weston Mill	686.2	415.5
North Prospect	699.8	417.2
St Budeaux	595.2	268.0
Plymouth City Average	590.5	299.2

All Circulatory Disease Mortality 2009

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	479.9	224.3
Keyham	169.2	41.8
Kings Tamerton and Weston Mill	229.1	126.7
North Prospect	280.0	152.7
St Budeaux	197.2	68.9
Plymouth City Average	181.7	77.8

Stroke Mortality 2009

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	157.8	35.7
Keyham	15.4	0
Kings Tamerton and Weston Mill	13.2	0
North Prospect	18.2	0
St Budeaux	46.0	25.4
Plymouth City Average	40.3	12.4

Coronary Heart Disease Mortality 2009

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	205.5	112.4
Keyham	70.2	22.4
Kings Tamerton and Weston Mill	159.9	92.8
North Prospect	144.0	43.1
St Budeaux	103.3	43.5
Plymouth City Average	81.6	37.2

All Cancers Mortality 2009

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	197.1	160.0
Keyham	194.5	169.7
Kings Tamerton and Weston Mill	235.3	206.9
North Prospect	245.3	162.6
St Budeaux	180.9	104.0
Plymouth City Average	180.2	112.5

Respiratory Diseases 2009

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	73.5	44.0
Keyham	100.2	22.4
Kings Tamerton and Weston Mill	92.9	36.7
North Prospect	71.3	42.2
St Budeaux	40.5	0
Plymouth City Average	61.8	18.6

Morbidity Data (Direct Age Standardised Rates per 100,000 population)

All A & E Attenders 2010/11

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	24421.3	24337.8
Keyham	27356.0	27334.7
Kings Tamerton and Weston Mill	22152.7	21940.6
North Prospect	27209.5	26700.3
St Budeaux	24053.1	23856.3
Plymouth City Average	21342.6	20851.5

A & E Attenders for Respiratory Problems 2010/11

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	1137.8	1185.2
Keyham	1127.6	1106.4
Kings Tamerton and Weston Mill	1027.5	1003.2
North Prospect	1712.7	1363.1
St Budeaux	1082.7	1029.4
Plymouth City Average	933.5	865.5

Hospital Admissions for Circulatory Diseases 2010/11

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	1017.6	806.8
Keyham	667.6	557.4
Kings Tamerton and Weston Mill	565.1	428.2
North Prospect	719.6	506.4
St Budeaux	737.9	600.1
Plymouth City Average	710.5	507.4

Hospital Admissions for Respiratory Diseases 2010/11

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	1504.2	1490.5
Keyham	1303.1	1255.1
Kings Tamerton and Weston Mill	1477.2	1405.4
North Prospect	2213.5	1690.4
St Budeaux	1452.2	1392.6
Plymouth City Average	1190.6	1051.8

All Elective Admissions 2010/11

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	12852.4	11990.8
Keyham	14358.1	13806.7
Kings Tamerton and Weston Mill	10964.8	10064.7
North Prospect	9564.2	8792.2
St Budeaux	10264.1	9486.4
Plymouth City Average	9839.0	8947.6

All Emergency Admissions 2010/11

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	11399.6	10699.7
Keyham	10839.3	10313.8
Kings Tamerton and Weston Mill	9909.6	9220.5
North Prospect	12005.3	10840.6
St Budeaux	9478.7	8751.6
Plymouth City Average	8900.4	7961.6

New Outpatient Referrals 2010/11

Neighbourhood	DASR All Age	DASR < 75
Barne Barton	37401.5	36275.6
Keyham	45426.2	45160.2
Kings Tamerton and Weston Mill	34909.4	33809.5
North Prospect	36349.8	35269.8
St Budeaux	35426.8	34536.9
Plymouth City Average	31775.8	30679.1

From Plymouth Health Visitor Survey Data 2010

Percentage of Vulnerable Families within neighbourhood

Neighbourhood	%
Barne Barton	35
Keyham	11
Kings Tamerton and Weston Mill	21
North Prospect	24
St Budeaux	20
Plymouth City Average	12

Percentage of families dependent on benefits

Neighbourhood	%
Barne Barton	49
Keyham	13
Kings Tamerton and Weston Mill	28
North Prospect	24
St Budeaux	32
Plymouth City Average	20

Barne Barton has other particular problems identified in the Health Visitor Survey

Problem Area	Barne Barton %	Plymouth City %
Depressed and mentally ill parents	19.7	9.1
Child protection problems	19.7	2.7
Parenting Problems	11.3	5.0
Violence in the family	26.4	10.6
One parent families	29.0	12.4
Main wage earner unemployed	29.0	11.5

Appendix 3: Brief Literature Review

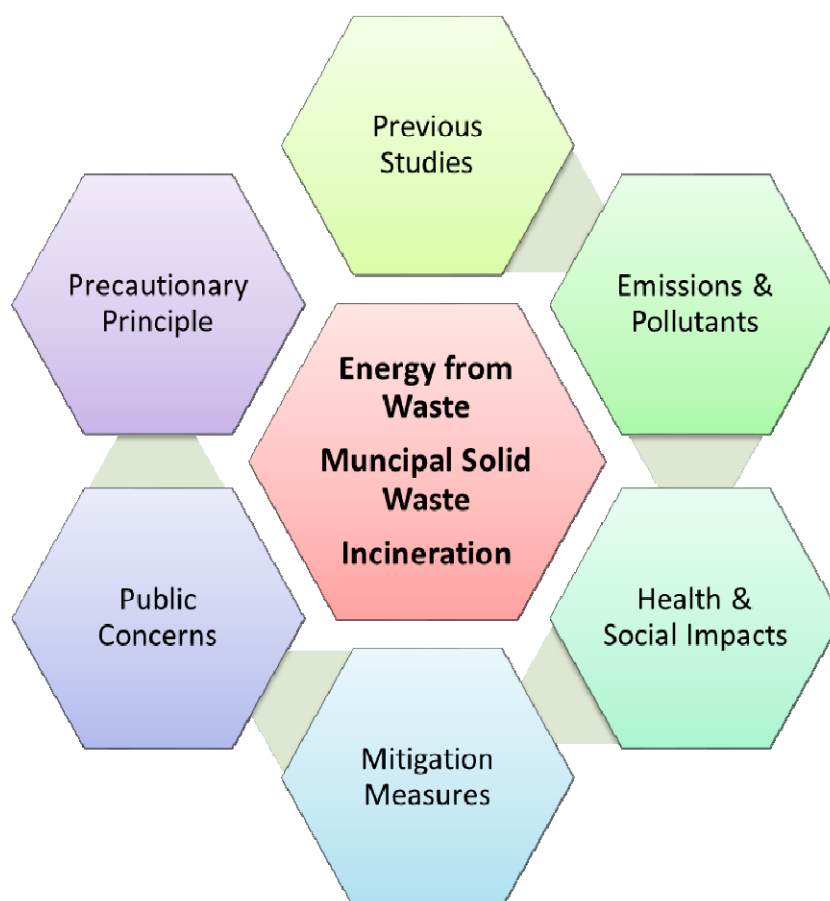
Energy from Waste Incineration:

A brief review of selected published and grey literature

Introduction

This brief literature review of Energy from Waste (EfW) impact on health has been conducted to inform a desk-top health impact assessment of the proposed EfW incineration plant in Plymouth. The review has drawn together headline findings from secondary literature sources to summarise published impacts on health arising from EfW incineration. The sources for this literature review were identified via a Scirus search using the key words: 'health impacts assessment waste incineration ("energy recovery")'. Online searches of the Health Impact Assessment (HIA) Gateway www.apho.org.uk/default.aspx?QN=P_HIA, the HIA Wiki Community Knowledge site <http://healthimpactassessment.pbworks.com/> and the World Health Organisation HIA site www.who.int/hia/en produced other relevant publications and documents for the literature review.

The review considers six themes arising from the selected literature (see below).



Six themes arising from the EfW literature review

Summary Findings from the Literature Review

Previous Studies of Incineration summary: The majority of epidemiological studies have focused on older generations of incinerators and not the more modern Energy from Waste (EfW). Previous studies are based upon incineration and the associated health effects but have tended not to distinguish between older mass burn plants without energy recovery, and the more modern and better managed and controlled EfW plants. Comparing previous studies of incinerators to more modern EfW plants with regard to health impacts is therefore problematic. The WHO (2007) point out that stack emissions from modern plants are much reduced compared to old generation plants.

Emissions summary: This section of the literature review highlights that the main difference between modern incinerators and, for example, power-stations is that incinerators tend to have more sophisticated pollution abatement technologies. If the short-term peak concentrations lie within health-based air quality standards it is unlikely that significant adverse health effects will occur. For dioxins and furans direct exposure through inhalation is a small contributor to exposure, which is dominated by exposure through foodstuffs. Calculation of dioxin and furan transfers through the food chain into home-grown produce indicates that the maximally exposed individuals around a modern incinerator receive well under 1% of their total dioxin intake as a result of incinerator emissions. The HPA's review of the research examining the links between emissions from municipal waste incinerators and effects on health suggests that while it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable.

Health and Social Impacts of MSW Incineration summary: Measuring and determining health and social impacts associated with EfW incineration is problematic; when considering the health effects of an individual facility, it is important to take account of the local circumstances and any evidence of sensitivity of local residents to the health effects of concern. Government reports indicate that the impact on human health from EfW emissions is minor and the emission limits are far stricter than for other forms of electricity generation; however concern over health effects is most frequently cited in connection with incinerators. Atmospheric dispersion modelling studies have indicated that emissions to air from MSW management are not likely to give rise to significant increases in the adverse health effects studied and estimated incremental increase in cancers due to emissions to air from treatment and disposal of MSW is lower still. The review conducted by the Health Protection Agency (2009) therefore argued that calculating the environmental costs of different waste disposal options is not simple, nor is there a single established method.

Public concern summary: This section of the literature review suggests that waste authorities cannot achieve their objectives without public support; the audit Commission recognises that local concerns are influential in decisions on planning permission for waste facilities; the effectiveness of recycling and composting collections are dependent on the extent and quality of public participation; and action by the public to reduce and reuse their waste will decrease the quantity of waste and reduce service costs. The DEFRA review suggests that modern, well-managed incinerators can be an effective means of reducing and disposing of waste materials. However, there is often considerable public concern over the

possible health effects of living near to incinerators processing hazardous, clinical or municipal waste.

Mitigation measures summary: In summary mitigation measures are best secured through the active participation of the local community in which the EfW incinerator will be located; community engagement in a health impact assessment has proved an effective method to articulate community and health impacts and of raising awareness of a range of possible mitigation measures.

Precautionary principle summary: The WHO Scientific Report (2007) argues that the health impact of waste management procedures cannot yet be properly evaluated, because of the limitations of the current state of knowledge. Other reports argue that the absence of evidence of harm or impact is not evidence of absence. Priority-setting for environmental remediation should be based on hazard detection, estimation of the size of the exposed population (including vulnerable groups) and appreciation of inequity in the distribution of exposure among population subgroups, taking into account the possibility of higher exposure of socioeconomically deprived groups. Levels of uncertainty are compounded in conditions of cumulative exposure of many chemicals from many sources; the precautionary principle should therefore apply as the overriding concern.

Reviewing selected literature

Managing Waste in the UK.

The UK produces over 400 million tonnes of waste every year. Of this, 28 million tonnes is municipal solid waste (MSW), most of which is disposed of to landfill. As a result of the Landfill Directive new ways of dealing with MSW are needed to reduce the level of waste being taken to landfill. Incineration is one of the options available. The Government issues planning guidance for waste planning authorities. It also requires waste management strategies to be prepared on a regional and local level. The inclusion of incineration is not prescriptive and it is up to individual authorities to determine the need for new incinerators. Estimates for the number of new incinerators that may need to be built by 2020 vary from 21 to 104 (The Parliamentary Office of Science and Technology (POST) 2000).

The Environment Agency (EA) in England and Wales, and the Scottish Environment Protection Agency (SEPA) regulate releases to the environment from MSW incinerators under the integrated pollution control (IPC) regime. Releases must be prevented or reduced to a minimum using the 'best available techniques not entailing excessive cost'. When authorising processes, the EA and SEPA impose limits on a range of substances released to air water and land, together with conditions on operation (e.g. regular monitoring). MSW incinerators were first authorised under IPC in 1993, and new EU standards imposed in 1996, resulting in the closure of many older incinerators. A new EU waste incineration directive (agreed in 2000), introduces tighter standards, including an emission limit on dioxins of 0.1 nanogrammes⁶ of TEQ per cubic metre of exhaust gas (ngTEQ/m³) – equivalent to 100pgTEQ/m³ (Box 3). The incineration directive requires that new incinerators comply with the standards from 2003 and existing plant from 2007. The siting of incinerators is regulated under the land use system, where the operator must obtain permission from the local planning authority. In determining the planning application, the local authority must have regard for, among other things, environmental impacts, and hence requires the developer to produce an environmental impact statement. In addition, the local authority will consult the environmental regulator (EA or SEPA). The recent Pollution Prevention and Control Regulations will require closer coordination and consultation between the environmental regulators and local authorities responsible for land use control. Increasingly, local authorities are developing waste local plans in a regional context, taking account of regional planning guidance (The Parliamentary Office of Science and Technology (POST) 2000).

Previous Health Impact Studies of Incinerators

Several publications discuss the limitations of previous studies of MSW incinerators when trying to draw comparisons to modern MSW incinerators; these are discussed briefly below.

The Chartered Institute for Waste Management (CIWM 2003) review states that the vast majority of epidemiological studies have focused on older generations of incinerators and not the more modern Energy from Waste (EfW). The CIWM argue that previous studies are based upon incineration and the associated health effects but have tended not to distinguish between older mass burn plants without energy recovery, and the more modern and better managed and controlled EfW plants. Care must therefore be taken in reviewing and interpreting the results of relevant research work. Pyrolysis and gasification technologies are relatively new and studies of health effects specific to plants using these technologies have

yet to be undertaken. Birley (Birley M, Abrahams D et al. 2008) however adds that although most literature about waste incineration relates to “old type” facilities with significantly different emissions profiles and that newer EfW plants have to meet stricter controls and therefore are significantly cleaner it does not mean that there are no health effects from “new type” waste incineration facilities, but that there is as yet, little robust evidence relating to them and the evidence at the moment cannot establish a causal relationship. This may be due to limitations in the data available, or the effects of confounding factors, such as exposure to other emissions (e.g. traffic), population, socio-economic and lifestyle factors. The CIWM (2003) argue further that previous studies have looked for spatial patterns in three categories of disease viz, cancer, respiratory and reproductive diseases. A typical approach is to construct concentric bands around an incinerator looking for differences in the prevalence of disease, with proximity used as a surrogate for pollutant exposure. There are a number of difficulties and drawbacks associated with this approach, not least of which is that there is frequently a gradient in the social make-up of populations such that there is a higher level of deprivation, itself associated with a higher frequency of disease irrespective of the presence of the incineration plant, closer to the plant compared with further away. Studies which have carefully controlled for so-called socio-economic confounding have generally failed to find any convincing evidence of an adverse health outcome associated with living in close proximity to an incineration plant.

Comparing previous studies of incinerators to more modern EfW plants with regard to health impacts is therefore problematic. The WHO (2007) point out that stack emissions from modern plants are much reduced compared to old generation plants. The few studies carried out on new generation incinerators are difficult to compare with the previous ones, because of these differences in technology between the plants. The adoption of the BAT, enforced by the EU, results in the fact that the occurrence of measurable health effects on populations resident in close proximity of new generation incinerators is becoming less likely. However their overall impact on the general environment and on human health through indirect mechanisms of action, has not been evaluated yet. In particular waste incineration, currently on the increase in many countries, may be a nonnegligible contributor of greenhouse gases and persistent pollutants on a global scale.

Emissions of incinerator plants

The following papers and publications considered by this literature review discuss research with regard to emissions of incinerator plants.

Research by Bond, Fawell et al. (2005) suggests that newly constructed incinerator plants have to meet stricter controls on emissions than those operating prior to the mid 1990s. Analyses of cancer incidence associated with the older generation of incinerators demonstrates that any potential risk of cancer, due to residency for periods in excess of ten years near to municipal solid waste incinerators, is exceedingly low and probably not measurable. They go on to state that data on emissions and ambient air monitoring in the vicinity of incinerators indicates that modern well-managed waste incinerators will only make a very small contribution to background levels of air pollution. However they argue that Robust epidemiological data concerning health risks associated with exposure to bioaerosols are not available. (Jamasb, Kiamil et al. 2008) argue that EfW plants emit some pollutants,

which include sulphur dioxide, lead, and dioxins which are linked with damage to health and the environment if they occur in high enough concentrations.

Liamsanguan and Gheewala (2006) state “Although incineration of MSW is an attractive option for disposal, it has some problems related to the emission of dioxins. Dioxin is the term commonly used to refer both polychlorinated dibenzo-p-dioxins (PCDDs) and poly chlorinated dibenzofurans (PCDFs). Dioxins are types of highly toxic chemicals considered harmful to human health. People exposed to large amount of dioxins experience a skin disease called chloracne. Some studies have shown that high exposures also may contribute to the development of liver, kidney, heart, thyroid and blood disorders, as well as adult onset of diabetes and cancer. Dioxins could be formed as trace by-products in combustion systems like incineration as well as burning of various fuels where chlorine, carbon, hydrogen and oxygen come into contact with heat. Dioxins are an indirect result of incomplete combustion, being formed mainly in the post-combustion zone due to the catalytic reaction of chlorine and products of incomplete combustion on the surface of ash in the temperature range of 250 to 400°C.”

The CIWM’s Good Practice Guide (2003) states “Incineration emits a wide range of typical combustion-generated pollutants in line with other major combustion plant. The main difference between modern incinerators and, for example, power stations is that incinerators tend to have more sophisticated pollution abatement technologies. The most important pollutant emissions include sulphur dioxide, oxides of nitrogen, particulate matter, hydrogen chloride, hydrogen fluoride, a range of trace metals, dioxins and furans. Estimation of the impact involves calculation of both short-term and long-term average ground level concentrations. If the short-term peak concentrations lie within health-based air quality standards it is unlikely that significant adverse health effects will occur. The long-term concentrations are nonetheless associated with adverse health effects which can be calculated using exposure-response functions which have generally been determined from air pollution epidemiology involving entire urban populations exposed to pollutants predominantly from road traffic. Such calculations demonstrate that an EfW plant will generally be associated with less than one additional hospital admission for respiratory or cardiovascular disease and less than one death brought forward per year. Calculation of population exposures to chemical carcinogens including arsenic, nickel, chromium and PAH shows a negligible impact on cancer rates. For dioxins and furans direct exposure through inhalation is a small contributor to exposure, which is dominated by exposure through foodstuffs. Calculation of dioxin and furan transfers through the food chain into home-grown produce indicates that the maximally exposed individuals around a modern incinerator receive well under 1% of their total dioxin intake as a result of incinerator emissions. Since the tolerable daily intake for dioxins is designed to be protective against both reproductive and cancer effects, it is unlikely that exposure as a result of incinerator emissions is a significant contributor to these diseases”.

The Health Protection Agency (2009) has reviewed research undertaken to examine the suggested links between emissions from municipal waste incinerators and effects on health. While it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable. This view is based on detailed

assessments of the effects of air pollutants on health and on the fact that modern and well managed municipal waste incinerators make only a very small contribution to local concentrations of air pollutants. The Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment has reviewed recent data and has concluded that there is no need to change its previous advice, namely that any potential risk of cancer due to residency near to municipal waste incinerators is exceedingly low and probably not measurable by the most modern techniques. Since any possible health effects are likely to be very small, if detectable, studies of public health around modern, well managed municipal waste incinerators are not recommended.

The WHO (2007) Scientific Review of population health and waste management however says that as to the possible health effects of incinerators, reasons for concern are inhalation of airborne pollutants resulting from combustion and from incomplete combustion, consumption of contaminated foods and water, or contact with contaminated soil. Information on the presence of hazardous agents in the vicinity of an incinerator is not easily translated into useful exposure measures. Compared to landfills, fewer epidemiological studies are available. While some positive studies exist, the evidence is, overall, not conclusive to establish the occurrence and magnitude of risks. The evidence is inadequate to draw conclusions that can be used to determine optimal policy choices on incineration: relatively few good quality studies exist and they refer mostly to old generation incineration plants – an important distinction, as stack emissions from modern plants are much reduced compared to old generation plants. The adoption of emission-abating technology, enforced by the European Union (EU), has resulted in a less likely occurrence of measurable health effects on populations resident in the proximity of new generation incinerators. The review commissioned by DEFRA (Enviros Consulting Ltd, University of Birmingham et al. 2004) state that they found no consistent evidence for significantly elevated levels of ill-health in populations potentially affected by emissions from Municipal Solid Waste (MSW) incineration.

Assessing Health and Social Impacts of Municipal Solid Waste Incineration

This section of the review draws together selected published and grey literature with regard to assessing the health and social impacts of municipal solid waste incineration.

When considering the health effects of an individual facility, it is important to take account of the local circumstances and any evidence of sensitivity of local residents to the health effects of concern (Enviros Consulting Ltd, University of Birmingham et al. 2004). Bond, Fawell et al. (2005) argue that most epidemiological investigations with regard to assessing the health impacts of waste management have been based on spatial patterns of morbidity or mortality and they note that confounding factors, such as deprivation, have been insufficiently quantified to permit scientifically robust conclusions on disease causation, let alone providing credible dose-response relationships. This approach to epidemiological studies of MSW incineration is perfectly reasonable due to ethical reasons as (Giusti 2009) reminds us that epidemiological studies dealing with the impact of waste management activities on human health are observational, as opposed to experimental studies.

Roberts and Chen (2006) highlight the measurement challenges associated with assessing impact on health of MSW, e.g. they note that anxiety, employment, noise, occupational risks, road accidents, and reduced use of landfill were all considered to have a potential, but

unquantifiable, effect on health. Other challenges to effective measurement are highlighted by Guisti (2009) says that although incinerators can potentially emit a number of pollutants the main concern about incinerators has been the emission of a group of persistent organic compounds known as “dioxins”, more specifically polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and polychlorinated biphenils (PCBs). PCDDs and PCDFs however these are produced by all combustion processes, and mostly by incomplete combustion of municipal waste, medical waste, household waste, by forest fires, by burning wood and coal, during the manufacture of pesticides and other chemicals, and are present in tobacco smoke and car exhaust These substances are quite resistant to biodegradation, they accumulate in food (dairy products, eggs, fish, animal fat), and many are considered to be toxic. Guisti therefore argues that the complications faced by health impact investigators is due to the wide range of potential sources, and some of the possible causes of confounding factors in epidemiological studies. Jamasb, Kiamil et al. (2008) highlight that the local population will experience health effects or congestion from vehicles transporting the waste to the plant site

Jamasb, Kiamil et al. (2008) also argue that some interest groups dispute the government’s findings, and health concerns remain a sticking point during many EfW plant applications due to the perceptions of local residents. In some cases, plants which have secured a PPC licence have been refused planning permission on the grounds that the perception of effects would negatively affect the use of the surrounding land (CIWM, 2003). Government reports indicate that the impact on human health from EfW emissions is minor (Enviros Consulting Ltd, University of Birmingham et al. 2004) and the emission limits are far stricter than for other forms of electricity generation.

Giusti (2009) cites the commissioned DEFRA review (Enviros Consulting Ltd, University of Birmingham et al. 2004) of 102 publications and concluded that there is no convincing evidence of a link between incineration and cancer or respiratory problems. Giusti goes onto reiterate that main exposure to dioxin-like substances is via food (seafood, dairy products, animal fats and eggs) contaminated with PCDDs and PCDFs.

The 2007 Waste Strategy for England (DEFRA 2007) states that concern over health effects is most frequently cited in connection with incinerators. Research carried out to date shows no credible evidence of adverse health outcomes for those living near incinerators. The relevant health effects – primarily cancers – have long incubation times, but the available research demonstrates an absence of symptoms relating to exposures twenty or more years ago, when emissions from incineration were much greater than they are now. Very demanding EU standards for dioxin emissions now apply.

The DEFRA review (Enviros Consulting Ltd, University of Birmingham et al. 2004) highlights that atmospheric dispersion modelling studies indicates that emissions to air from MSW management are not likely to give rise to significant increases in the adverse health effects studied. On a national scale, approximately 5 hospital admissions per year are estimated to arise due to emissions to air from treatment and disposal of MSW. Although this numerical estimate is of poor quality, it is indicative of a much lower incidence of hospital admissions compared to the 168,000 hospital admissions per year which result from accidents in the home. Similarly, emissions from treatment and disposal of MSW are estimated to result in

approximately one death being brought forward nationally every two years. This single statistical value is somewhat misleading, as the effect corresponds to a slight shortening of numerous individual lives. The numerical value is also of poor quality. The estimated incremental increase in cancers due to emissions to air from treatment and disposal of MSW is lower still. The effects would not be detectable in individuals.

The Royal Town Planning Institute (2009) reminds us that children are particularly sensitive to the harmful effects of environmental hazards; they breathe more air, drink more water, and eat more food relative to their size than adults. Children in deprived areas are most exposed to harmful environmental conditions/factors.

The review conducted by the Health Protection Agency (2009) argued that calculating the environmental costs of different waste disposal options is not simple, nor is there a single established method. All assessments require assumptions to be made. But evaluating the social costs of different options is a vital part of the strategy process. These costs typically include: impact on air quality from gaseous emissions such as carbon dioxide, methane and nitrogen dioxide, and particulates; transport-related effects including energy costs, traffic movements, and road safety issues; and issues such as odour, health risks, visual amenity and noise. Also, the local population will experience health effects or congestion from vehicles transporting the waste to the plant site (Jamasb T, Kiamil H, et al. 2008)..

With regard to disamenity Jamasb, Kiamil et al. (2008) suggest that local residents may experience some consequences from having a EfW plant in the neighbourhood as these are often perceived as 'unsightly' or produces odours; valuing the disamenity from waste landfill and incineration facilities however has yet to be undertaken in the UK (Brisson and Pearce 1995). The WHO (2007) scientific report supports the view of Brisson and Pearce (1995) that the overall impact on the general environment and on human health through indirect mechanisms of action has not yet been evaluated.

Public Concern of waste incineration

Waste authorities cannot achieve their objectives without public support. The audit Commission (2008) recognises that local concerns are influential in decisions on planning permission for waste facilities; the effectiveness of recycling and composting collections are dependent on the extent and quality of public participation; and action by the public to reduce and reuse their waste will decrease the quantity of waste and reduce service costs (Audit Commission 2008).

The DEFRA review (Enviros Consulting Ltd, University of Birmingham et al. 2004) suggests that modern, well-managed incinerators can be an effective means of reducing and disposing of waste materials. However the by-products of the combustion process may contain hazardous or toxic pollutants and emissions will add to background pollution levels. As a result, there is often considerable public concern over the possible health effects of living near to incinerators processing hazardous, clinical or municipal waste.

Giusti (2009) paper discusses that as science and technology developed, the management of an ever increasing volume of waste became a very organised, specialised and complex activity. The characteristics of waste material evolved in line with changes in lifestyle, and the

number of new chemical substances present in the various waste streams increased dramatically. The long-term health effects of exposure to substances present in the waste, or produced at waste disposal facilities are more difficult to measure, especially when their concentrations are very small and when there are other exposure pathways (e.g. food, soil). Nonetheless, lack of evidence can cause public concern. Despite important technological advancements, improved legislation and regulatory systems in the field of waste management, and more sophisticated health surveillance, the public acceptance of the location of new waste disposal and treatments facilities is still very low due to concern about adverse effects on the environment and human health. Health issues are associated with every step of the handling, treatment and disposal of waste, both directly (via recovery and recycling activities or other occupations in the waste management industry, by exposure to hazardous substances in the waste or to emissions from incinerators and landfill sites, vermin, odours and noise) or indirectly (e.g. via ingestion of contaminated water, soil and food).

The Parliamentary Office of Science and Technology (POST) (2000) summarises that there is a range of opinion among environmental campaigning groups regarding the place of incineration in waste management. For example the POST states that the National Society for Clean Air and Environmental Protection argues for incineration to play a part in a comprehensive strategy that includes waste reduction, reuse and recycling. Waste Watch agrees, but wishes to see these other options maximised before adopting incineration. Concerns remain, however, that there is no definitive guidance on how waste planning authorities can prove that options higher in the hierarchy have been exhausted before adopting incineration. Other groups (e.g. Greenpeace and Friends of the Earth) argue that there is little or no place for incineration in waste management. They allege that the pollutants released present an unacceptable risk to health and are concerned that commitment by local authorities to long-term contracts for supplying waste to incinerators will undermine efforts to reduce waste at source, and to recycle and reuse residual wastes. Lastly, some groups reject the classification of energy from waste as a form of renewable energy – this is highly contentious, but is beyond the scope of this briefing

The POST (2000) further highlights that there are general concerns amongst the general public about the safety of incineration and the possibility of health problems associated with emissions. Dioxins are of particular concern. In addition, incineration is seen by some, especially environmental groups, as an inefficient use of resources. In a House of Commons Waste Incineration Research Paper (House of Commons 2002) it is argued that the Government and many in the waste industry regard incineration as a safe and necessary part of the Waste Strategy, however it also notes that opposition to incinerators is often strong.

The Parliamentary Office of Science and Technology (POST) (2000) paper suggests that concerns arise over whether an incinerator is:

- justified in relation to reduction, reuse and recycling of wastes.
- sited and sized appropriately – e.g. if it deals only with wastes originating locally, and if it is located in a deprived area (raising issues of environmental justice).
- regulated to sufficient environmental standards, and that these standards are enforced adequately – i.e. whether the regulator can be trusted as independent and competent.

The paper refers to these concerns as being characterised as NIMBYism (Not in My Back Yard). However, research shows that people's concerns often stem from the way that MSW Incinerators are planned and consultation conducted. In particular, opposition arises when people feel excluded from decision making and have decisions imposed upon them. Acceptability is increased if local people are involved early in planning, including in the regional and waste local planning process. This process is now regarded as the 'norm' and an essential part of good practice. The Parliamentary Office of Science and Technology (POST) (2000).

The WHO (2007) scientific review itemises further the public concerns with regard to the perceived health risks from waste management to be at the "unacceptable" end of the scale. The WHO report states "there is little public acceptance that any health risks associated with waste management are a consequence of personal and societal production of waste, and a deep mistrust of waste in general". The report authors suggest that this may be due to some or all of the following factors:

- The health risks are not shared equally.
- The waste management industry does not have an unblemished record in the operation of its facilities.
- There is no apparent benefit to individuals – i.e. the public does not in general have a perception of responsibility for dealing with its own waste.
- There are contradictory views from government, the waste industry and NGOs on the risks posed to health from waste.
- Waste management poses risks which individuals cannot control. Waste is a heterogeneous and variable mixture of materials.
- This can give the impression that its behaviour is unpredictable, and can cause difficulties when the composition of waste varies from the norm.
- Waste is intrinsically considered to be unhealthy. We are taught not to touch it from an early age - and perhaps "programmed" to avoid contact with decomposing materials.
- Studies on health have been sensationalised and subject to contradictory comment.

Achillas, Vlachokostas et al. (2011) draw attention to public concern of the design of EfW plants. Their research highlights that the public's primary social concerns related to health effects of incinerators' emissions, potential accidents involving "toxic" waste, adverse impact on the quality of life and management of industrial waste. Achillas, Vlachokostas et al. (2011) further argue that despite improvements in EfW regulation and plant design terms such as "dioxins", "furans", "toxic waste" and "PCBs" gain – not always unreasonably – intense concern and create diachronically a significant debate, Achillas, Vlachokostas et al. (2011) show that the acceptance of waste incineration cannot be improved merely by pointing out that emissions meet or remain below the stringent emission standards and that modern process technology is used. The effectiveness of any MSW management scheme and its smooth operation heavily depends on its acceptance by the local community. This becomes even more imperative for communities with practically no prior experience in specific waste treatment alternatives, this will be of particular relevance in the introduction of MSW EfW incineration.

Experience from MSW EfW facilities in south Wales (Buroni 2010) suggests that once operational, key community concerns are generally focussed on the potential risk from a number of compounds emitted to air (and water). Defining the potential risk to health is ultimately dependent upon the release rate of these compounds emitted from the proposed Facility and the level, mode and extent of community exposure to them. Based upon a review of the ES air dispersion modelling, together with the application of exposure response mechanisms developed by the Department of Health's Committee on the Medical Effects of Air Pollutants (COMEAP), it is concluded that the proposed Facility does not constitute a significant risk to health from emissions to atmosphere during construction or operation. Such a conclusion is in keeping with the current evidence base on the potential health effects from modern Energy from Waste facilities and is consistent with the Position Statements issued by the Environment Agency, the UK Health Protection Agency, the Committee on the Carcinogenicity of Chemicals, the Chartered Institute of Water & Environmental Management and the Department for Environment Food & Rural Affairs. Once operational, socio-economic benefits provide a relatively small but important increase in permanent direct employment opportunities for those individuals, while the proposed Visitor Centre will aid in raising awareness as to more environmentally conscious waste management behaviour, and in demonstrating the design features in place to protect the environment and health. The proposed Facility has the capacity to generate heat energy for use by local business, helping to attract inward investment, encourage regeneration and increase local employment opportunities. Current negotiations with two major potential inward investors would potentially increase local socio-economic benefits

Mitigating Impacts on Health

Health Impact Assessment studies of similar EfW plants have identified several mitigation measures for example Buroni (2010) highlights that during construction of the proposed EfW in South Wales, the most significant risk associated with the construction stage was from increased traffic movements and associated risk of collision. To mitigate this a 'Framework Construction Travel Plan' was developed to minimise such risk and associated community disruption.

The Scientific Report by the WHO (2007) says that it is also important that the adverse effects on health due to nuisance (smell, noise, litter, effect on property values, stress for lack of regulatory response etc) are considered. These endpoints often escape formal epidemiological analysis but are relevant for the health of communities. Consideration of all relevant health elements may be achieved through integrated and participatory approaches, such as health impact assessment (HIA), which has proven effective in some cases in waste management policies. HIA can be done at a policy, program or project level, and help judge the potential effects of a proposal as well as the distribution of those effects. Understanding and managing the potential or likely health impacts of waste management is likely to be best addressed through either HIA or strategic environmental assessment (SEA).

Ensure waste management encourages the reduction, recycling and reuse of waste at household and development sites. Minimise exposure to air pollution through the separation of noisy and polluting industrial areas from residential and service areas, and promote 'good neighbour' policies (Royal Town Planning Institute 2009).

Precautionary Principle

The WHO report (2007) states “In view of the various limitations hampering our ability to characterize all risks, such assessments should be inspired by a precautionary approach, with respect both to the creation of new facilities and the mitigation of exposure to emissions and leachates of existing sites”.

There are several difficulties in trying to assess the association between hazardous waste and health outcomes. Most serious is the question of exposure: how do we measure this, and to what extent can we assume that the exposure has not varied over time? What is known about the residential histories of those affected, or other possible sources of exposure, as in the workplace? Definitions of study areas and study populations are also problematic; certainly the first of these is inherently arbitrary. Studies of area units may be suggestive, but detailed case-control studies are needed for a more convincing result, not least because such studies can adjust for the influence of confounding variables (Gatrell 2002).

The WHO Scientific Report (2007) argues that the health impact of waste management procedures cannot yet be properly evaluated, because of the limitations of the current state of knowledge. However, absence of evidence is not evidence of absence. Hence, available information of localized environmental contamination and, to some extent, of increased occurrence of adverse health effects in the vicinity of landfills and incinerators should inspire a precautionary approach with respect both to the instalment of new facilities and the mitigation of exposure to emissions and leachates of existing sites. Priority-setting for environmental remediation should be based on hazard detection, estimation of the size of the exposed population (including vulnerable groups) and appreciation of inequity in the distribution of exposure among population subgroups, taking into account the possibility of higher exposure of socioeconomically deprived groups. The latter aspect should be present to decision-makers even if the absolute number of exposed subjects might appear to be small, thus resulting in a moderate number of attributable cases. The questions of distribution of impacts and benefits, as well as the perceived risks, should be taken into consideration when comparing the health implications of waste against known risk factors with established higher effects (for example, traffic-related air pollution or passive smoking). This process should be made accessible to administrators and concerned communities in a truthful and understandable way, taking into account local concerns, promoting participatory activities and supporting autonomous decision processes.

The BMA (British Medical Association 1998) further argues that in the case of many low level pollutants, it is very difficult or even impossible to establish whether a significant risk exists when a community is exposed to them. Knowledge may be sufficient for taking action, but insufficient to satisfy scientific enquiry. Levels of uncertainty are compounded in conditions of cumulative exposure of many chemicals from many sources. The notion of precautionary principle can be interpreted in a variety of different ways. The UK government have interpreted it to mean that ‘where there are significant risks of damage to the environment, the government will be prepared to take precautionary action to limit the use of potentially dangerous materials or the spread of potentially dangerous pollutants even when scientific knowledge is not conclusive, if the likely balance of costs and benefits justifies it. Use of the precautionary principle helps ensure that decisions made today are not a source of regret tomorrow.

Literature Review concluding comments:

This brief review has drawn upon selected published and grey literature to inform the desk-top health impact assessment of the proposed EfW plant located in Plymouth. The review briefly summarises managing waste and examines previous studies of waste incineration and health, noting that the majority of previous studies focus on older incineration plants pre tightened European directives. Research on the level of pollutant emissions is reviewed, noting that observational epidemiological studies of impact upon human health present limitations for conclusive evidence. The potential health and social impacts of MSW incineration are discussed and note that the wider social impact issues can be overlooked by disease focused studies and warrant the same level of attention. Public concern is reported in the literature; there is a healthy concern in the general population with regard to the health impacts of waste and incineration, there is limited room for public acceptance of living in the vicinity of a EfW incinerator. The review offers some insight into suggested mitigation measures, the presenting feature of successful management is full and active participation of the community at all stages. The overriding consideration arising from this review is to accept the notion of the precautionary principle approach whilst acknowledging the improved regulation and design of EfW incineration plants.

