

Waste Protocols Project

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# Wood

A technical report for the manufacture  
of products from waste wood.

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## Executive summary

### Background

The Business Resource Efficiency and Waste (BREW) Waste Protocols Project aims to produce Quality Protocols for various waste streams, which will provide guidance to business to:

- define the point of full recovery from waste back into a product or material that can be reused by the business or industry or sold into other markets;
- define when waste is recovered to a state where the Environment Agency considers that it is acceptable to use it in accordance with the Environment Agency's low risk regulatory principles; and
- confirm to the business community what legal obligations remain to control reusing the treated waste material.

The Project Board asked the Technical Advisory Group (TAG) to consider if a Quality Protocol could be produced so that the point of recovery of waste wood could be moved closer to the point of production.

### Methodology

A Technical Advisory Group (TAG) was set up to bring together representatives from the Environment Agency, the Waste & Resources Action Programme (WRAP) and industry. It's objective was to produce a technical report setting out the process and controls necessary to determine when waste wood ceases to be waste. To do this, the TAG:

- identified the major markets and end uses for processed wood;
- identified the current legislative framework that governs the production, handling, storage, transportation and use of waste wood;
- sought analytical data on the composition of material produced;
- reviewed available standards and specifications;
- assessed relative risks to human health and the environment from using waste wood, and any necessary mitigation methods; and
- proposed ways forward for each of the major markets so that certain end uses may be regarded as fully recovered where strictly defined conditions are met.

### Findings

The TAG found:

- apart from reusing material in its original form, there are four main markets for waste wood. These are:
  - the wood based panel industry;
  - animal products (mainly bedding);
  - landscaping and horticultural products; and
  - fuel for renewable energy.
- there is no evidence that animal, landscape and horticultural products made from clean waste wood cause harm to human health or the environment. Therefore, it is suggested that if clean waste woodchip is sold on as a product (animal, landscape or horticultural products) it will cease to be waste once it has been sold into a market and is therefore certain to be used;
- the market with most growth potential is the renewable energy market. However, the legal situation for using waste wood for fuel prevented this market being investigated further;
- there are no apparent benefits in producing a Quality Protocol for the wood based panel industry;
- there was some uncertainty over what constitutes clean waste wood. This could mean that potentially treated timbers were inadvertently finding their way into what would otherwise be an unregulated non-waste product;
- to have confidence that processed wood chip for use in animal, landscaping or horticultural markets does not contain treated timbers and therefore pose a risk to human health or the environment, it would be necessary to have quality control measures in place for input, process and output to make sure only clean waste wood is used;
- the variety of materials, suppliers, uses and lack of standards means that materials are mainly supplied according to specifications or acceptance criteria agreed between customers and suppliers;

- the lack of common standards that analyse the physical and chemical contamination limits for each end use may cause potential problems with identifying and implementing input, process and output controls; and
- there are presently no commercially viable technologies for effectively removing chemical contaminants from treated waste wood.

The TAG was unable to find enough evidence to support moving the point where waste wood ceases to be waste closer to the point of production. So, the matter was referred to the Environment Agency to produce guidance on when waste regulatory controls apply.

### Recommendations

The TAG recommends that the Environment Agency produce guidance on when regulatory controls apply that reflects:

- the low risk of harm posed by using clean waste wood provided that quality controls, as proposed in this report, are in place to minimise any potential risk posed by contaminating materials;
- treated wood waste should remain as waste; and
- wood offcuts produced as a result of processing virgin wood (for example from sawmill operations or timber product manufacturing) that are free from contaminants and it is clear how they are going to be used, should not be seen as waste and therefore should not be regulated.

### Clean waste wood

There is no evident that using clean waste wood in animal, landscape and horticultural products creates a significant risk to human health or the environment. The TAG recommended that these activities are low risk and regulatory controls are not needed.

To make sure only clean waste wood is used, the TAG recommended that common standards should be developed and the potential impacts of chemical and physical contaminants on human health and the environment analysed. This could be done in a number of ways:

- the grading system used by the Wood Recyclers' Association (WRA) could be further developed to include the minimum specifications that are acceptable;
- the code of practice being developed by WRA could be finalised and adopted by the wider industry; and
- the WRAP document '*Identification of feedstock specifications for UK wood recycling applications and examples of good practice in their achievement*' (see Appendix F) could be developed and revised to include details on acceptable levels of physical contaminants for each end product. This review could take into account the potential for harm to human health and the environment as well as market acceptability. It was recognised that WRAP is not presently planning further work in the area of waste wood.

### Treated waste wood

The TAG recommended that where treated waste wood is mixed with clean waste wood this will be treated as waste.

The TAG recommended that if the waste wood industry can provide evidence that this material poses a low risk to human health and the environment, this position should be reviewed.

There needs to be clarity on acceptable levels of chemical contaminants and contamination levels in virgin wood. Such data can then be used to compare with contaminants in clean waste wood to ensure no additional human health or environmental effects arise from the use of this material.

The TAG recommended that there should be more research into the effectiveness of technologies that remove contaminants from treated waste wood. The Environment Agency could then consider developing a Quality Protocol for this material.

The TAG recommended that the Environment Agency consider further the regulation of waste wood as fuel, considering the importance and growth of this market.

# 1. Introduction

- 1.1 The Waste Protocols Project is a joint Environment Agency and Waste & Resources Action Programme (WRAP) initiative, funded by the Department for the Environment, Food and Rural Affairs (Defra) Business Resource Efficiency and Waste (BREW) Programme.
- 1.2 Uncertainty over the point at which 'waste' is fully recovered and ceases to be waste has meant that some materials have continued to be controlled under the EU Waste Framework Directive 2006 (as amended) and, in some cases, disposed of to landfill. To provide more certainty, to stop materials being landfilled unnecessarily and to increase the use of waste as a resource, we have set up the Waste Protocols Project.
- 1.3 Depending on the circumstances of the sector concerned, the project aims to achieve one or more of the following outcomes:
- to produce a Quality Protocol defining the point at which waste may become a non-waste product or material that can be either reused by business or industry, or supplied into other markets. This would mean that recovered products could be used without needing waste regulation controls;
  - to produce a statement, in accordance with the Environment Agency's low risk regulatory policy<sup>1</sup>, indicating that using the waste is considered to be such low risk that it would not normally be in the public interest to take enforcement action for failing to obtain a waste management licence; and
  - to produce a statement that confirms to the business community what legal obligations they must comply with to use the treated waste material.
- 1.4 Waste wood is one of the waste streams addressed during the first year of the BREW Waste Protocols Project. A TAG was set up to bring together representatives from the Environment Agency, WRAP and industry. Appendix A contains a list of TAG members and Appendix B gives its terms of reference.
- 1.5 The TAG carried out its work for waste wood during September to November 2006.
- 1.6 For waste wood to cease to be waste it needs to be demonstrated that the material has been fully recovered and that there is no further need for waste regulatory controls. To investigate this, the TAG looked at a number of issues that were particularly relevant, such as finding when the waste:
- will not cause harm to human health or the environment;
  - meets a defined standard and requires no further processing; and
  - has a market where it can be used.
- 1.7 This technical report does not consider:
- reclaimed solid wood which is re-used in its original form, such as poles, pallets and floorboards; and
  - waste wood chip intended for use as an input material for compost production.
- 1.8 The objectives of this report are to:
- describe the TAG's progress on this topic;
  - set out the TAG's findings; and
  - provide recommendations to the waste protocols project board and the Environment Agency on what steps are needed to meet one of the three project aims, stated in point 1.3.
- 1.9 The TAG set out to:
- identify the major markets and end uses for processed wood;
  - identify the current legislative framework that governs the production, handling, storage, transportation and use of waste wood;
  - source analytical data on the composition of material produced;
  - review available standards and specifications;
  - assess relative risks to human health and the environment from using waste wood, and any necessary mitigation methods; and
  - propose ways forward for each of the major markets so that certain end uses may be regarded as fully recovered where strictly defined conditions are met.

1 See <http://www.environment-agency.gov.uk/subjects/waste/1416460/1334460/1098094/>

## 2. Main markets for waste wood

2.1 The TAG identified and reviewed the main markets for waste wood to establish whether the waste could definitely be used again once it had been processed.

2.2 For the purposes of this technical report, markets were considered for recycled wood products made from waste wood recycled in chipped or pellet form (see Definitions – Appendix C). This waste wood may come from:

- materials recovered from products at end-of-life, for example wood from demolition and packaging (for example pallets); and
- offcuts and other waste from panel board, furniture and other wood product manufacture, and from building and construction activities.

2.3 The main findings are summarised here. More detailed market information is provided in Appendix D.

### 2.4 Market development and growth potential

2.4.1 The waste wood recycling industry is relatively small and new, and most of the 10.5 million tonnes of waste wood continues to be landfilled (Appendix D). Nevertheless, the industry and markets are growing rapidly. In 2006, 1.58 million tonnes of waste wood were processed and significant growth is projected in the years ahead.

2.4.2 There are four main current markets for waste wood:

- the wood based panel industry;
- animal products, for example bedding;
- horticultural and landscaping; and
- fuel for renewable energy.

2.4.3 It should be noted that these current markets are largely existing (rather than new) markets in which waste wood competes with virgin wood material on specification, price, delivery and other factors. The wood based panel industry currently takes most waste wood which, when clean and dry, has the advantage of low moisture content compared to virgin material.

2.4.4 In recent years, efforts have been made by the recycling industry, WRAP and others to encourage the development of more diverse and value-added markets and to reduce dependence on the wood based panel industry. This has helped to develop the animal, horticultural and landscaping markets.

2.4.5 There are other new or potential markets, for example use in products made from wood-plastic composites and ethanol production. Such markets do not presently exist or are not significant in the UK and further development is uncertain.

2.4.6 While continued growth in all markets for waste wood is projected, markets are uncertain for various reasons. These include competition between recycled and virgin materials, competition for clean waste wood between the main markets, and international competition with the UK wood based panel industry. Growth will depend on how far barriers are broken down, including negative perceptions towards 'waste' materials and the development of infrastructure, technologies and practices for higher levels of recycling.

2.4.7 One of the criteria for waste wood to cease to be waste (Section 1.6) is 'having a market where it can definitely be used'. However, the nature of the markets for waste wood means that generally there is no definite use for waste wood material until it has been transformed into a product or there is a contract of supply between producer and buyer.

2.4.8 The market with the highest growth potential is using waste wood as fuel for energy production in response to demands for renewable energy. The TAG found that there is also major potential for growth in using treated waste wood (the majority of which is currently landfilled) for the energy market. The regulatory position on the use of waste wood as a fuel is outlined in Section 3. The TAG did not investigate the renewable energy market further, but emphasised industry desire for a standard to be produced that would bring greater certainty to this market.

## 2.5 Markets and material grade

- 2.5.1 Markets for waste wood may be inhibited by the perception that it is a single commodity and all waste wood is contaminated. Confusion is compounded by the many sources and various ways of describing waste wood by the way it was originally used (for example furniture), how it was collected (for example civic amenity sites), the type of material (for example plywood) and its potential to become contaminated (for example untreated or treated).
- 2.5.2 Clean waste wood is acceptable for all markets. Treated waste wood (TWW) is presently unacceptable for most purposes as it may contain copper chrome and arsenic (CCA) and creosote, although some uses may tolerate residual chemical contaminants (see Section 4).
- 2.5.3 A study carried out by WRAP<sup>2</sup> concluded that the only viable use for treated waste wood is re-use or recovery via energy from waste. Both animal products and horticultural and landscape products were considered and found not to be viable options. Since the WRAP document was published, waste wood containing copper, chrome and arsenic (CCA) and creosote has been classified as hazardous waste. The TAG indicated that the only viable options are to landfill this type of waste or burn in a WID compliant plant.
- 2.5.4 The TAG agreed that it would be useful to have a consistent terminology, which reflects market grade and acceptability. This is further discussed in Section 5, quality controls and standards.

### 3. Current legislative position

- 3.1 The current legislative position was reviewed to clarify:
- those materials and products which waste regulatory controls apply to; and
  - when in the supply and production cycle waste regulatory controls no longer apply and a waste becomes a product.
- 3.2 All wood waste processing must be carried out at fully authorised sites. That is, sites which hold a pollution prevention control (PPC) permit, waste management licence (WML) or which are registered as exempt from licensing.
- 3.3 If wood waste is transferred to another site and there is further processing, regulatory controls will continue to apply. These controls may not be directly related to the waste material being accepted, but may be required as a result of the processing activity, for example regulating air emission limits from panelboard manufacture.
- 3.4 It should be noted that material containing CCA and creosote is classed as hazardous waste and may not be used in any of the named end uses.
- 3.5 The current legislative controls, which apply to waste wood after chipping, are summarised in Table 1.

**Table 1: Summary of legislative controls on waste wood after chipping**

Use	Current legislative control	Current regulatory approach
Woodchip for panelboard manufacture	<p>Woodchip delivered to the panelboard manufacturer is considered to be waste and so duty of care applies.</p> <p>The site receiving the material must be authorised to receive and to be process it (the site will have either an IPC or PPC permit which will incorporate this).</p>	<p>Normal regulatory controls.</p> <p>Once processed into panelboard the material is no longer considered waste so regulatory control would no longer apply.</p>
Animal products	<p>The users of animal products made from waste woodchip must hold a registered exemption under paragraph 15.</p> <p>Accordingly, duty of care applies to transporting that material.</p>	<p>Producer responsibility obligations (packaging waste) regulations 2005, state that packaging waste wood is treated as recycled when made into animal bedding ready for sale to the final consumer.</p>
Horticultural and landscape products	<p>The users of horticultural and landscape products made from waste woodchip must hold a registered exemption under paragraph 7A.</p> <p>Accordingly, duty of care applies to transporting that material.</p>	<p>Producer responsibility obligations (packaging waste) regulations 2005, state that packaging waste wood is treated as recycled when made into decorative woodchip or arena chip ready for sale to the final consumer.</p>

**Table 1: Summary of legislative controls on waste wood after chipping** continued

Use	Current legislative control	Current regulatory approach
Wood as renewable fuel	Using waste wood as fuel in an appliance has to be regulated under IPPC or a WML exemption and unless 'excluded plant' for waste incineration directive <sup>3</sup> (WID), the burning has to comply with that Directive.	Normal regulatory controls apply.

### 3.6 The wood based panel industry

3.6.1 The current legislative regime and existing case law indicates that waste wood going to the wood based panel industry cannot cease to be waste until it is incorporated into wood based panels.

3.6.2 However, as the material entering a wood based panel manufacturer meets a standard, the TAG decided it would be valid to assess whether the material accepted onto site could be considered a secondary raw material, which was similar to creating woodchip from virgin timber.

### 3.7 Animal products

3.7.1 Animal products produced from clean waste wood are deemed to cease to be waste when chipped for use as animal products. However, there is some uncertainty over what constitutes clean wood waste and where the actual point of recovery sits. The TAG considered it valid to look at these end uses further, to define 'clean waste wood' and to clearly define whether the point at which the material ceases to be waste is when it is used, or whether it could be moved closer to the point of production, that is when the material is chipped and sent off site to a customer.

### 3.8 Landscape and horticultural products

3.8.1 The same uncertainties as animal products apply to landscape and horticultural products. Again, the TAG considered it valid to look at these end uses further, to define 'clean waste wood' and to clearly define whether the point at which the material ceases to be waste is when it is used, or whether it could be moved closer to the point of production.

3.8.2 Waste wood chip to be used in producing compost was not considered further, as it was felt this is adequately covered in the Quality Protocol for the production and use of quality compost from source-segregated biodegradable waste.

### 3.9 Wood as renewable fuel

3.9.1 Current case law indicates that waste to be used as a fuel normally remains as waste until the energy is recovered by burning. Plants that burn waste wood must comply with the requirements of the Waste Incineration Directive (WID) if the wood contains halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or coating.

3.10 Plants that only burn waste wood, which is not contaminated with halogenated organic compounds or heavy metals (resulting from treatment with wood preservatives or coating), are not regulated under WID. Details on the regulatory controls, which apply to burning these materials (whether with or without energy recovery) are included in the Environment Agency document 'Regulation of Energy from Solid Biomass Plants'.

3.11 It was concluded that waste wood (whether treated or not) to be used as fuel, should not be considered further in this report. For any WID related issues, the Environment Agency should be contacted directly.

## 4. Material composition and production process

4.1 The TAG reviewed the material composition of waste wood inputs and processed outputs to each market.

### 4.2 Input materials

4.2.1 The TAG indicated that the main inputs that are processed to derive woodchip for wood based panel, animal, landscaping and horticultural products markets are usually limited to clean waste wood, consisting of packaging waste wood and discarded wood offcuts, with little or no contamination. Clean waste wood is defined fully in Appendix C.

4.2.2 All waste wood inputs to processing may contain other materials (referred to in this report as contaminants), depending on where they came from and how the material has been collected, segregated and stored. These may include:

- ferrous and non-ferrous metals;
- grit and dust;
- plastics, glass, paper and rags;
- colouration;
- resins and glues;
- coating such as paints and other surface treatments; and
- treatment chemicals, including preservatives and pesticides.

4.2.3 WRAP and other organisations, for example CL Associates 2006 have examined the levels of contaminants in waste wood in various studies. These studies have found that where treated waste wood has entered processing it may contain one or more of the following treatment chemicals:

- copper chrome arsenic (CCA);
- copper organics;
- creosote;
- light organic solvent preservatives (LOSP);
- micro emulsions;
- paints/stains; and
- varnishes.

4.2.4 Waste wood may also contain pesticide residues, including fumigants. These are generally less persistent than preservatives but whether they are acceptable or not will depend on the material and end product. For example, pesticides are not accepted in chipboard if the material is to be WID compliant for subsequent burning.

### 4.3 Production process

4.3.1 Waste wood, which enters the site, undergoes some degree of sorting and segregation before entering the production process. Sorting is mainly conducted visually, but, in some cases, spray indicator or other methods may be used to detect chemical (mainly copper) contaminants. The level of segregation and sorting of material could vary from site to site and there are no standard practices in place. The implications of this are discussed further in Section 5.

4.3.2 The level of unwanted contaminated material entering processing, including treated waste wood removed by pre-sorting, cannot be defined. In practice, and depending on the source of the wood and level of sorting, physical contaminants such as nails and treated waste wood will be present in most waste wood sent for processing.

4.3.3 The level of processing subsequently carried out will vary depending on how successful the initial segregation and sorting stage(s) are.

4.3.4 After sorting and segregation, the material accepted on site then enters the production process. Appendix E provides full details of all the potential stages of processing. In summary, after chipping, physical contaminants are removed by various means, including magnets for ferrous metals and eddy currents for non-ferrous metals.

4.3.5 This material is then ready for despatch as an input material to the wood based panel manufacturers market, and as a product to the animal, landscaping and horticultural markets.

#### 4.3.6 Wood based panel manufacture

- 4.3.7 Whilst the same processes are used to produce wood chips for supply to the wood based panel industry, further decontaminating and cleansing processes are carried out at the site of the wood based panel manufacturer. These are integral to the production process as once the waste wood chip enters the process, it does not leave until it has been incorporated into a wood based panel.
- 4.3.8 The manufacture of wood based panelboard is quality controlled and carefully managed to ensure that the end product meets accepted specifications and that air emission limits are adhered to.
- 4.3.9 However, it was found that inputs to wood based panel manufacturing may include wood chips from waste wood sources other than clean waste wood (for example up to five per cent painted wood) provided they meet the requirements of Publicly Available Specification (PAS) 104 'Wood recycling in the panelboard manufacturing industry' and other industry specifications<sup>4</sup>.
- 4.3.10 Given that the wood based panel industry accepts over 1.2 million tonnes of waste wood, 5 per cent contamination would equal 62,500 tonnes of wood with some painted surfaces.

#### 4.4 Outputs

- 4.4.1 If it is possible to process waste wood to the point where the material is the same as virgin material, the output may be considered to have ceased to be waste. Studies for WRAP (for example BRE 2005<sup>5</sup>) suggest that virgin wood may frequently contain contaminants obtained through the soil and so it is important that correct contamination thresholds are set if comparing waste wood to virgin material.
- 4.4.2 On the basis of the information provided, it has not been demonstrated that the output produced is the same as virgin wood, as there are no standard contamination thresholds set.
- 4.4.3 It is recognised that the wood based panel industry has high specifications for its product, but the specifications being considered within this report relate to input materials. From the information provided, it is apparent that the input materials do not lose their waste characteristics until they are incorporated into wood based panel.
- 4.4.4 In the case of landscape, animal and horticultural products, there was no evidence of consistent industry practice in place, which would ensure that there are adequate input, production process and output controls. It is recognised that these will vary depending upon the source of the waste, what the processor defines as a 'clean' input material, how much processing (and removal of contaminants) they feel is required and the needs of the intended end markets.
- 4.4.5 Without common terminology and procedures in place there is doubt over whether outputs can be processed to a standard or specification where the user can be confident that appropriate quality controls have been taken. In addition, there is uncertainty whether potential of harm to human health or risk to the environment could be quantified as low, as without quality controls in place there is the potential for treated waste wood to enter the production process.

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4 Wood Panel Industries Federation (2005). WPIF/IG/12.2005 *Guidance for the specification and control of post-consumer reclaimed wood raw materials used in the manufacture in the UK of wood particleboard, MDF and OB*. WPIF:

5 BRE Ltd (2005). *Assessment of Types and Levels of Naturally occurring Contaminants in Virgin Wood Sources*. WRAP (Waste & Resources Action Programme).

## 5. Quality controls and standards

5.1 The TAG reviewed available standards, codes, specifications and acceptance criteria for input materials for the main products and markets to consider:

- when materials meet a standard and require no further processing; and
- if there is a need for a standard to be produced.

5.2 The TAG reviewed 'standards' in the broad sense, including publicly available national and international standards, codes, industry and company specifications and acceptance criteria.

### 5.3 Wood based panels

5.3.1 Publicly available specification (PAS) 104 sets the minimum acceptable standards for wood chip destined for wood based panel manufacturing. The wood based panel industry also follow guidance document WPIF/IG/12.2005, '*Guidance for the specification and control of reclaimed wood raw materials used in the manufacture in the UK of wood particleboard's, MDF and OSB*' to control the incoming wood materials. The acceptance criteria vary between operators so that they can make sure that the air quality standards for their sites are not exceeded.

5.3.2 The contamination limits permitted in particleboard as defined by WPIF are as follows:

Contaminant	Mg/kg of finished product
Arsenic	25.0
Cadmium	50.0
Chromium	25.0
Copper	40.0
Pentachlorophenol (PCP)	5.0
Lead	90.0
Mercury	25.0
Fluorine	100.0
Chlorine	1000.0
Creosote	0.5

These limits are equivalent to the toy safety standards and are also noted in the WRAP report 'Options and risk assessment for treated wood waste, WRAP 2005<sup>6</sup>'.

5.3.3 Once incoming material enters a panelboard manufacturing site it is subject to inspection, and non-compliant loads are rejected. The waste wood accepted then enters the production process which is regulated under PPC or IPC. The process includes further screening of the woodchip to remove physical contaminants. The woodchip then enters the drying stage.

5.3.4 Quality management processes are used to make sure that materials and products meet specifications. Visual inspection, laboratory tests and other methods may be used to check that it meets specifications.

5.3.5 Depending on the sampling method however, individual samples may exceed specifications due to the localised presence of contaminants. For example, a small piece of copper wire may cause an individual sample to exceed specifications on copper content. Contamination with copper wire does not constitute contamination with chemical treatment.

5.3.6 From the point at which it enters the drying stage, the waste-derived woodchip is handled in the same way as woodchip from virgin timber.

### 5.4 Animal, landscape and horticultural products

5.4.1 Currently, there is no industry wide PAS or standard for animal, landscape and horticultural products. Instead, input materials and contamination levels are agreed between producer and buyer.

- 5.4.2 Specifications for most products include a 'no toxic material' requirement (see Urban Harvest study for WRAP 2003<sup>7</sup>) as well as physical properties such as moisture content. In practice, some level of contamination may be allowed depending on the use.
- 5.4.3 The TAG considered producing a standard for animal, horticultural and landscaping markets using information from the WRA and WRAP. The TAG considered a standard could be produced, which provides common quality controls covering inputs, processing and outputs as outlined in Appendix E to give confidence that no further processing is required.
- 5.4.4 The different requirements of each market need to be considered when developing a common standard. Even if inputs are restricted to clean waste wood there may be some residual contamination in the end product because of physical contaminants within clean waste wood, such as plastics, glass, grit and metals during collection. It will, therefore, be necessary to remove contaminants, although the amount of contaminants removed may vary according to how the product is used. For example, more grit will be removed for horse bedding than for landscape chip for pathways.
- 5.4.5 The TAG considered various sources of information on which contaminant levels in end products could be based. The WRAP document 'Identification of feedstock specifications for UK wood recycling applications and examples of good practice in their achievement' was identified as the best source of guidance on the levels of acceptable contamination within different animal, landscape and horticultural products. However, the TAG found that these levels were developed to make the outputs acceptable to the market and that there was some uncertainty over whether the contamination levels set considered the potential for harm to human health or the environment.
- 5.5 Quality assurance**
- 5.5.1 A number of options have been proposed to solve the lack of standardisation in all markets.
- 5.5.2 WRA has proposed a grading system to categorise waste wood with respect to market grade and acceptability based on market suitability. This system is still at the proposal stage, as it has not been accepted industry wide and is presented in Appendix D, table A2.
- 5.5.3 WRA and WRAP have developed a code of practice covering good management practice, but this has not yet been formally adopted.
- 5.5.4 In summary, there are currently no common quality controls applied across the wood recycling industry. It is recognised that the difference in input materials may mean a risk-based approach is needed for quality control measures. However, it is considered that, as a minimum, all waste wood recyclers should carry out three quality control measures:
1. Classify input materials – identify the source of the material and the types of contamination likely to be present. Sort and segregate treated from untreated timber. Remove physical contaminants by picking.
  2. Make sure the production process used is fit for purpose. Make sure it removes the types of contaminants present in the input materials well enough to meet the requirements of the end users' specification.
  3. Make sure outputs meet an agreed specification. For example, material going to wood based panel manufacture will meet, as a minimum, the PAS104 specification.
- 5.5.5 If the above measures are carried out, the TAG agreed that the output could be clean waste wood and acceptable to all markets as a non-waste/waste derived product.
- 5.6 Section 6 examines why it is necessary for these measures to be carried out to ensure a low risk of harm to human health and the environment.

<sup>7</sup> Urban Harvest, (2003) *Identification of Feedstock Specifications for UK Wood Recycling Applications and Examples of Good Practice in Their Achievement*. WRAP.

## 6. Risk assessment and mitigation

- 6.1 To establish the level of risk which waste wood potentially poses to human health and the environment, the TAG reviewed risks in relation to its production, handling and storage and subsequent use in each of the end uses.
- 6.2 Also, in the present context, the TAG considered factors which may affect certainty of use, including market certainty and degradability.
- 6.3 Section 5 concluded that if appropriate quality controls are put in place to ensure an output of clean waste wood, then risks to human health and the environment are considered to be low. This section focuses on why it is necessary to use clean waste wood to ensure a low risk of harm to human health and the environment.
- 6.4 Processing, handling and storage**
- 6.4.1 Any risks to human health or the environment during the production process, as detailed in Section 4 and Appendix D, are mitigated under waste management regulations. The regulations that apply to wood recyclers are detailed in Section 3.
- 6.4.2 The handling and storage of waste wood is also mitigated under waste management legislation. However, the TAG felt that additional mitigation was needed to minimise the risk of fire, degradability and dust nuisance.
- 6.4.3 To minimise the risk of fire associated with stockpiling processed wood chip, and degradability of the material, the TAG recommended that appropriate mitigation be put in place. It is recognised that the mitigation measures will vary from site to site depending on the size and storage time of stockpiles and level of fire risk.
- 6.4.4 Where material contains fines it is a potential nuisance risk as well as a health risk where there is a high level of exposure. Dust nuisance can be reduced by storing the material in closed containers and also by pre-selection. This may also help to reduce odour.
- 6.4.5 The risk of chipped material degrading can be reduced by storing it for no longer than six months. This was suggested by the TAG to allow storage time at the wood recyclers before it reaches the wood based panel industry where it should only be kept for approximately three months. There is possibly a need for paperwork to be completed to state the storage time, although the time to avoid degradation will vary depending on the storage conditions.
- 6.5 Clean waste wood**
- 6.5.1 Clean waste wood was seen by the TAG to constitute a very low risk to both human health and the environment. Provided adequate input controls are in place, the TAG agreed that this material poses no greater risk to human health or the environment than wood chip from virgin timber used for the same purpose. Where the input material contains physical contaminants, processing technologies can remove most of these contaminants.
- 6.5.2 The TAG recognised that there is a potential risk of treated waste wood entering the process through mixing waste streams. However, it considered that if inputs into the chipping plant are adequately monitored and controlled, mixing waste streams will be limited such that 'harm' will not be caused. This would mean that the risk of treated waste wood entering the process is low. The process and quality control measures (identified in Appendix E) will further reduce the risk of this occurring.
- 6.5.3 Therefore, using clean waste wood that has been appropriately processed to a point where it poses no greater risk to human health or the environment than wood chip from virgin timber used for the same purpose, is seen to pose a low risk.

## 6.6 Treated waste wood

- 6.6.1 No research information has been found on the potential toxicological impacts of using recycled waste wood. The Environment Agency has carried out some research on the possible environmental impacts of timber treatment chemicals<sup>8</sup>. However, this research is limited to reviewing the impacts of using whole treated timbers (for example logs, planks) in aquatic environments and does not consider the potential impacts on soil systems. However, this work indicates that some timber treatments are more prone to leaching than others.
- 6.6.2 Internationally, extensive research has been carried out into leaching from CCA treated timbers. This and the toxic nature of the material have supported banning the use of CCA to treat timber. However, it will still be present in the waste stream for the foreseeable future, as buildings are demolished which contain CCA treated timber.
- 6.6.3 Where stockpiles are uncovered and contain treated waste wood, there is a possibility that some leaching may occur and contribute to ground contamination and surface water pollution. The risk of leaching is generally low where chemicals are strongly bonded to the wood, but in subsequent product use chemicals may be released if the wood breaks down.
- 6.6.4 During the further decontaminating and cleansing stages at the wood based panel manufacturers, fines are screened out from the recycled wood they receive. Such material may include a proportion of lead (from paint fragments) and if so, there may be risks to the environment associated with its use. The level of risk could not be quantified. No data was made available to the TAG on the quantities of lead within the material. However, this material still remains as waste and must be handled in accordance with duty of care regulations.
- 6.6.5 Whilst the definition of clean waste wood used within this report specifically excludes treated timbers, the TAG considered that some material from treated timber may be included in this category.
- 6.6.6 The TAG initially noted that it might be feasible to remove treatment chemicals from treated waste wood so it could potentially be recycled. Potential processes include:
- fungal breakdown of contaminants;
  - removing chemicals by oxalic acid, solvents or other chemicals; and
  - physically removing surface layers.
- 6.6.7 Further consideration suggests that while these processes are technically possible in some cases, they are generally not feasible currently because:
- technologies are not well developed and are restricted to laboratory or small-scale processes and have not been demonstrated on a commercial scale; and
  - the value of the product in relation to the cost of treatment suggests that these processes are unlikely to be commercially viable.
- 6.6.8 It considered that further information was needed on how effective these technologies were and on how different timbers take up treatment chemicals to assess the level of risk associated with using processed treated waste wood in different end uses.
- 6.6.9 Until this additional research has been concluded, using treated waste wood is seen to be a risk to human health and the environment and should not be used in any of the markets stated.

## 6.7 Summary

- 6.7.1 If treated waste wood is removed at the input stage, and appropriate processing is carried out to produce clean waste wood, the TAG considers that the risk to human health and the environment is low.
- 6.7.2 However, the outputs produced must also reach an agreed end user specification so they can definitely be used.

## 7. Findings

7.1 The Technical Advisory Group (TAG) found that:

- apart from using material in its original form, there are four main markets for waste wood. In order of existing market size these are:
  - the wood based panel industry;
  - animal products (mainly bedding);
  - landscaping and horticultural products; and
  - fuel for renewable energy.
- whilst initially supportive of developing a Quality Protocol, it became apparent during the review that for various reasons this could not happen straightaway. These reasons are detailed further under the sub-headings below.

### 7.2 Quality Protocol for waste wood as fuel

7.2.1 The TAG found that there were two obstacles to achieving a Quality Protocol for wood as fuel:

- current case law indicates that waste to be used as a fuel normally remains as waste until the energy is recovered by burning; and
- the main area of potential market growth is in the burning of treated wood waste. The Waste Incineration Directive (WID) is clear that the only wood waste that can be burned is that which is not contaminated with halogenated organic compounds or heavy metals. The TAG felt that this zero tolerance to metals in wood is unachievable.

7.2.2 The TAG agreed that the Waste Protocols Project was not the correct forum for addressing this issue, but felt that there is a need for a standard to be produced for waste wood as fuel. The Environment Agency TAG members felt that this may not be achievable, as energy from waste facilities may require different feedstock qualities due to different technical requirements. A common specification may therefore limit the market.

### 7.3 Quality Protocol for the wood based panel industry

7.3.1 The TAG considered the options for developing a Quality Protocol for the wood based panel industry but found no apparent benefits for either wood processors or wood based panel manufacturers of changing from the current situation.

7.3.2 Based on the review of acceptance procedures and production processes carried out by wood based panel manufacturers, the TAG identified three options where waste derived woodchip could be considered to have ceased to be waste:

*Option 1: When incorporated into panelboard*

This is the current situation.

*Option 2 : After processing and before entering the drying stage*

After physical contaminants (for example pieces of plastic, metal and grit) have been removed, and before the material enters the drying stage, it may be considered to be the same as producing woodchip from virgin timber.

*Option 3: Where wood processors have removed the same level of contaminants as the wood based panel manufacturer*

This means where the material meets the industry developed standard WPIF/IG/12.2005, 'Guidance for the specification and control of reclaimed wood raw materials used in the manufacture in the UK of wood particleboards, MDF and OSB' and the level of contaminant removal which is currently carried out on the wood based panel manufacturer site.

7.3.3 In the case of option 2, it was questionable what would be achieved by defining the material as ceasing to be waste, given that it has already entered the production process. This option provides no apparent benefit to the wood based panel industry, as it will not affect the regulation of the production process. This will still remain regulated under PPC.

7.3.4 In the case of option 3, there is currently no common standard used by the wood based panel industry to define the levels of processing necessary to reach this point. Whilst the TAG did not derive costs for implementing this option, from their experience in the industry they felt that the level of investment required to achieve this would be prohibitively high, and its viability is therefore questionable.

7.3.5 In view of these considerations it was found that a Quality Protocol is unlikely to add value to the industry, as it would not be viable to move the point of recovery.

#### **7.4 Quality Protocol for animal, landscape and horticultural products**

7.4.1 Given the current non-waste status of these products (when derived from clean waste wood), the TAG was unsure what added value a Quality Protocol would offer the industry.

7.4.2 Due to the lack of a publicly available specification for woodchip supplied to the animal, landscape and horticultural markets, the TAG considered whether information currently available could be used to produce a Quality Protocol.

7.4.3 The TAG found some potential difficulties in developing a meaningful Quality Protocol. These are:

- waste wood inputs vary between operators. It was felt that some form of standard production process controls would be necessary to have confidence that the risk of painted or treated timbers entering the product is being minimised. The level of control required may vary from site to site depending upon the type of waste wood accepted;
- there are uncertainties regarding the maximum levels of chemical contaminants that may be permitted in various product types considering the risks to human health and the environment; and
- there are no industry wide standards on the maximum levels of physical contamination that are acceptable in the products, and there is uncertainty over whether these might pose a risk to human health and the environment.

7.4.4 It was agreed that, to have complete confidence that the products manufactured did not pose a risk to human health and/or the environment, it was necessary for the wood processor to carry out three quality control measures:

- Classify input materials – identify the source of the material and the types of contamination likely to be present. Sort and segregate treated from untreated timber. Remove physical contaminants by picking.
- Make sure the production process used is fit for purpose. Does it remove the types of contaminants present in the input materials enough to meet the requirements of the end users' specification?
- Make sure outputs meet an agreed specification. For example material going to wood based panel manufacture will meet (as a minimum) the PAS104 specification.

7.4.5 It is recognised that the different input materials may need a risk-based approach to be taken to quality control measures. But, it is considered that the above quality control measures are necessary as a minimum.

7.4.6 The TAG considered that by having these quality control procedures in place there will be certainty that the woodchip products supplied will be clean waste wood and therefore meet the necessary minimum contamination levels.

7.4.7 The TAG considered that it might be feasible to remove treatment chemicals from treated waste wood to enable them to be included in the category of 'clean waste wood'. It was concluded that further information on how effective these removal technologies are is needed before a Quality Protocol can be produced.

7.4.8 Although it would be ideal to have a standard clarifying maximum level of contamination in each waste stream, the TAG found no evidence that animal, landscape and horticultural products made from clean waste wood are causing harm to human health and/or the environment.

7.4.9 This matter was referred to the Environment Agency for it to produce guidance on when waste regulatory controls apply. The Environment Agency is developing a regulatory guidance note.

## 8. Recommendations

- 8.1 The TAG recommends that the Environment Agency produces guidance on when regulatory controls apply that reflects:
- the low risk of harm posed by using clean waste wood provided that quality controls, as proposed in this report, are in place to minimise any potential risk posed by contaminating materials;
  - treated wood waste should remain as waste; and
  - wood offcuts produced as a result of processing virgin wood (for example from sawmill operations or timber product manufacturing) that are free from contaminants and can definitely be used again should not be waste and therefore should not be regulated.
- 8.2 Clean waste wood**
- 8.2.1 There is no evidence that using clean waste wood in animal, landscape and horticultural products creates a significant risk to human health or the environment. The TAG recommended that these activities are low risk and regulatory controls are not needed.
- 8.2.2 To make sure that only clean waste wood is used, it is recommended that common standards should be developed and the potential impacts of chemical and physical contaminants on human health and the environment analysed. This could be done in a number of ways:
- the grading system used by the Wood Recyclers' Association (WRA) could be further developed to include the minimum specifications that are acceptable;
  - the code of practice being developed by WRA could be finalised and adopted by the wider industry; and
  - the WRAP document 'Identification of feedstock specifications for UK wood recycling applications and examples of good practice in their achievement' could be developed and revised to include details on acceptable levels of physical contaminants for each end product. This review could take into account the potential for harm to human health and the environment as well as market acceptability. It was recognised that WRAP is not presently planning further work in the area of waste wood.
- 8.3 Treated waste wood**
- 8.3.1 The TAG recommended that where treated waste wood is mixed with clean waste wood this will be treated as waste.
- 8.3.2 The TAG recommended that if the waste wood industry can provide evidence that this material poses low risk to human health and the environment, this position should be reviewed.
- 8.3.3 There needs to be clarity on acceptable levels of chemical contaminants and contamination levels in virgin wood. Such data can then be used to compare with contaminants in clean waste wood to ensure no additional human health or environmental effects arise from the use of this material.
- 8.3.4 The TAG recommend that more research should be done on the effectiveness of technologies that remove contaminants from treated waste wood. The Environment Agency could then consider developing a Quality Protocol for this waste stream.
- 8.4 It is recommended that the Environment Agency consider further the regulation of waste wood as fuel, considering the importance and growth of this market.

## Appendix A Technical Advisory Group membership

Organisation	Representative	Type of member
Biffa	Alan Webb	Attending
British Furniture Manufacturers'	Alistair Bromhead	Correspondence
Environment Agency	Suzanne Laidlaw	Attending
	Michelle Steer	Attending
	Dominic O'Neill	Attending
	Amanda Barratt	Correspondence
	Clare McCallan	Correspondence
	Jonathan Hofton	Correspondence
Environment Agency Wales	Rebecca Favager	Correspondence
Kronospan Limited	Dr Harry Earl	Attending
National Farmers' Union (NFU)	Aarun Naik	Attending
National Industrial Symbiosis Programme (NISP)	Dr Adrian Murphy	Attending
Scottish Environment Protection Agency (SEPA)	John Harris	Correspondence
Shanks Group plc	Paul Dumpleton	Correspondence
Sonae UK	Peter Townson	Attending
Waste & Resources Action Programme (WRAP)	Olwen Cox	Attending
	Sarah Clayton	Attending
Timber Trade Federation (TTF)	Nick Boulton	Attending
Veolia Environmental Services	Sabrina Rubio	Attending
Viridor Waste Management	Bill Griffiths	Attending
Wood Recyclers' Association (WRA)	Toby Beadle	Attending
	Rick Wilcox	Attending
Wood Panel Industries Federation (WPIF)	Alastair Kerr	Attending

## Appendix B Terms of reference

### 1. Mission Statement

*To produce a Quality Protocol, recognised by (and produced with the support of) industry, that defines when wood waste has been reprocessed to such a level that it is considered to be fully recovered and no longer subject to the requirements of the regulatory waste regime.*

If this is not achievable, the Quality Protocol will provide guidance to business that will:

- define when wood waste is recovered to a state where the Environment Agency considers that it is acceptable to use it in accordance with their low risk regulatory principles; and
- confirm to the business community what legal obligations remain to control reusing the treated waste material.

### 2. Desired outcomes/outputs

The Technical Advisory Group (TAG) will produce a technical report that will identify and establish:

- which end products the protocol should address;
- whether there are any existing standards and specifications for each end product;
- whether the material can be collected and reprocessed to meet existing standards and specifications;
- where existing standards and specifications do not exist, to identify alternatives and/or to scope out project for producing a new standard or specification;
- what the potential environmental and human health impacts are and what mitigation methods may be used to maintain or reduce those impacts;
- costs and benefits of the different end uses (with the help of project economist); and
- a standard terminology.

### 3. Limitations

- In relation to the output of this TAG, the Environment Agency must be satisfied with the TAG's determination of the point at which wood waste has been fully recovered.
- If the point of full recovery of wood waste cannot be defined or agreed, the TAG will refer this matter to the Environment Agency for them to produce guidance on when waste regulatory controls apply.
- Where specifications and standards do not exist, and are required, financial or time implications may result in the TAG being delayed.

## Appendix C Definitions

### Animal products:

Products that can be made from processing wood such as:

- horse bedding;
- equestrian surfaces (gallops and arenas);
- cattle bedding;
- poultry bedding; and
- domestic pet bedding and cat litter.

### Clean waste wood:

There is no formal definition, but the term refers to waste material such as:

- sawdust, wood shavings and untreated offcuts, from sawmill operations, furniture manufacturing or other timber product manufacturing that are discarded; and
- packaging waste wood

that is free of contamination, for example chemical treatment, plastics, metals and grit etc.

### Decontamination:

Removing grit, plastics, glass, metals and other non-wood materials.

### Environment Agency:

The Environment Agency is the leading public body for protecting and improving the environment in England and Wales. Its job is to make sure that air, land and water are looked after by everyone in today's society, so that tomorrow's generations inherit a cleaner, healthier world.

### Landscape and horticultural products:

Products that can be made from processing wood such as:

- pathway surfaces;
- decorative and coloured landscape chip;
- play surfaces;
- soil remediation material; and
- compost.

### Mitigation measures:

Measures put in place to reduce all potentially significant effects.

### Packaging:

A full definition of packaging can be found in the Packaging Directive at the following link:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31994L0062:EN:HTML>

### Panelboard:

Panel material manufactured under pressure and heat from particles of wood (wood flakes, chips, fibres, shavings, sawdust, wafers, strands and similar) and/or other lignocellulosic material in particle form (flax shives, hemp shives, bagasse fragments and similar) with an adhesive added.

### Particleboard products:

Any timber/wood products manufactured in flat sheets from particles of wood (chipped wood, wood flakes, shavings, sawdust, etc) bonded through a process involving pressure, heat and adhesive or glue. This term describes products such as chipboard and medium density fibreboard (MDF).

### Physical contaminants:

Unwanted material.

### Post consumer:

Wood or wood based materials previously used in consumer or commercial products, discarded for reuse, recycling or disposal not including sawmill or forestry residues.

### Processing:

Producing wood chips from post-consumer wood, incorporating the removal of contamination and reduction in size.

**Reclaimed wood:**

Waste wood materials and by-products that have been recovered or diverted from the waste stream. This does not include materials and by-products generated from, and commonly reused within, an original manufacturing process.

**Recycled wood:**

Post-consumer wood that has been processed (usually mechanically) to be used in the manufacture of a new product.

**Reused wood:**

Wooden products or materials that, after serving their original function, are used again in their present form.

**Standard:**

A standard can be defined as a document, established by consensus and approved by a recognised body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at achieving the most order in a given context. Standards range from individual company standards to multi-national (international) standards.

**Surface treatments:**

These include paint and varnish that are used to change the appearance of the finished product and/or to protect items from wear and water damage.

**Timber:**

A general term for natural or sawn wood in a form suitable for building or structural purposes.

**Treated waste wood or treated timber:**

Wood that has been chemically treated to improve or alter the performance of the original wood. Treatments include penetrating oils, tar oil preservatives, waterborne preservatives, organic based preservatives, boron and organo-metallic based preservatives, boron and halogenated flame retardants and surface treatments.

**Waste:**

Waste is any substance or object that the holder discards, intends to discard or is required to discard. There have been a number of judgements by the European Court of Justice (ECJ). A summary of these judgements, which are legally binding, is available on the Defra website at <http://www.defra.gov.uk/environment/waste/topics/ecj-definition.pdf>

**Woodchip:**

Processed post-consumer wood pieces formed by shredding, crushing, hammering or chopping.

**Wood packaging:**

Any packaging made of wood, for example pallets, crates, reels.

**Wood pellets:**

Waste wood highly compressed into a pellet form. Natural lignin of the wood serves as a binder.

**WRAP:**

WRAP (Waste & Resources Action Programme) works in partnership to encourage and enable businesses and consumers to be more efficient in their use of materials and recycle more things more often. This helps to minimise landfill, reduce carbon emissions and improve our environment.

## Appendix D Production and accessible markets for waste wood

### 1 Introduction

- 1.1 In defining markets for waste wood the distinction should be made between 'products', which are items, which are bought and sold, and 'markets', who are the buyers of these products. These distinctions are important in identifying and understanding the various markets and the different specifications necessary to meet the requirements of each market.
- 1.2 It should be noted that most current markets for waste wood are well established, traditionally supplied with other materials such as sawdust, shavings and pellets from virgin timber. In supplying these markets, recovered waste wood must compete with virgin materials on price, specification, performance and delivery.

### 2 Market development

- 2.1 Total waste wood generated in the UK was approximately 10.5 million tonnes in 2006. The quantity has been increasing with economic activity, particularly from growth in the building and construction sector. Most waste wood is landfilled, while some is burned, both with and without energy recovery.
- 2.2 Environmental and other factors have encouraged the growth of a small but significant wood recycling industry over the last 10-15 years. Regulations and incentives to reduce landfill, recycle packaging and encourage renewable energy have been especially important in driving waste wood recycling and market development.
- 2.3 The wood recycling industry processed approximately 1.58 million tonnes of waste wood in 2006 and continued growth is projected.
- 2.4 An important development in the growth of the industry was when the wood based panel industry, which accepts most chipped waste wood, accepted recycled material. Previous barriers were overcome by various factors, including the wood based panel industry setting up acceptance specifications and financial incentives (packaging recovery notes or PRNs) for the industry to use chips from recycled wood packaging. Recognising the advantages of low moisture content compared to virgin material, which requires less drying and uses less energy, was also important.
- 2.5 In recent years, the recycling industry, WRAP and others have made efforts to encourage the development of more diverse and value-added markets. This effort is ongoing and involves addressing technical, market and other barriers.
- 2.6 The TAG identified four main markets for waste wood:

#### Wood based panel products

- chipboard
- medium density fibreboard (MDF)

#### Animal products<sup>9</sup>

- horse bedding
- equestrian surfaces (gallops and arenas)
- cattle bedding
- poultry bedding
- domestic pet bedding and cat litter

#### Landscaping and horticultural products<sup>10</sup>

- pathway surfaces
- decorative and coloured mulches
- play surfaces
- for use in soil remediation
- for use in compost

<sup>9</sup> Guide to Marketing Recycled Wood Products, WRAP.

<sup>10</sup> Guide to Marketing Recycled Wood Products, WRAP.

Renewable fuel for energy production<sup>11</sup>

- domestic and commercial use
- wood fired energy plants, co-fired energy plants and combined heat and power (CHP) plants

2.7 There are other new or potential waste wood markets, for example products made from wood-plastic composites. Markets for these products are not significant currently in the UK and their further development is uncertain.

### 3 Market size and projected growth

3.1 Approximate tonnages and projections for each main market are as follows.

**Table A1: Tonnage of waste wood processed by market sectors**

Wood waste management route	Tonnes per year 2006	Tonnes per year 2016	Comments
Used for wood based panel manufacture <sup>12</sup>	1,252,000	2,163,000	Significant percentage increases for 2007 to 2009. 2010 to 2016 no increases.
Animal bedding, landscaping and horticultural surface products	230,000	250,000	Small changes in 2006, 2008 to 2016 no change.
Biomass waste wood usage <sup>13</sup>	100,000	1,460,000	
<b>Total wood waste processed</b>	<b>1,582,000</b>	<b>3,873,000</b>	

Source: Projections provided by WRA and the WPIF

3.2 While continued growth can be expected for environmental and other reasons, markets are also uncertain. Reasons for this include competition between recycled and virgin materials, and competition for clean waste wood between the main markets. Growth will depend on how far these barriers are broken down.

3.3 Around nine million tonnes of wood waste goes to landfill each year. At first glance there appears to be significant potential to expand the quantity of waste wood recycled. However, on further inspection, it was found that there are various barriers to growth including:<sup>14</sup>

- A lot of waste wood is of such low quality that it cannot currently be recycled. There is limited quantity of clean waste wood, which can be used for most wood products so there is competition for this material from the different end markets. However, as technology develops more of the non-clean material may be converted to clean waste wood. For biomass for energy the technology should develop to be able to use non-clean materials.<sup>15</sup>
- As much as 70 per cent of waste wood is only suitable for burning in Waste Incineration Directive (WID) compliant boilers or disposal to landfill. As more wood based panel products are discarded, the wood waste stream is deteriorating in quality and becoming less suitable for supplying recycling markets. The proportion of low-grade material in the whole waste stream is rising.

11 *Guide to Marketing Recycled Wood Products*, WRAP.

12 Assumes increased use of recycled wood per annum until capped at 50% of total wood usage. Limited by requiring 60% packaging waste. Assumes no displacement of panel quality recycled intake.

13 Takes account of planned and anticipated investments. Assumes no recycled wood used in co-firing.

14 Confidential industry source.

15 Pers. Comm Harry Earl (WPIF).

- If, through technological developed, there is the potential to dramatically increase the amount of clean waste wood, then recycling could still be constrained if there is insufficient demand in the end markets. There may be a perception that waste wood products are lower quality compared with alternatives. It is possible that the stigma of the product being waste actually leads to a dampening in demand. However, some customers will actually seek out products derived from waste for environmental reasons.
- 3.4 The end market most likely to expand significantly over the next 10 years is biomass recycled wood usage as projected in table A1. This will be driven by demand and incentives for renewable energy. To be used as a feedstock for biomass, the woodchip needs to be to a very high specification for environmental and emission reasons. The sector needs clean waste wood. This is a potential constraint to growth in this market.
- 3.5 The wood based panel industry is likely to continue to grow but not at the same rate as in the past five years. The demand by the wood based panel sector for clean waste wood could increase if there is an increase in the recycled percentage of its wood input. Competition from imports can put pressure on domestic wood based panel manufacturers.
- 3.6 Currently the animal bedding markets use relatively little waste wood. They may grow significantly in percentage terms but the tonnages would still be relatively small. Perception of poor quality compared to shavings and sawdust is sometimes a barrier in these markets. The forecasts in table A1 above are pessimistic.
- 3.7 In conclusion, it is projected that there will be significant growth in the use of clean wood waste. The pool of clean waste wood available will come under increasing pressure as:
- growth in the use of clean waste wood by the biomass sector may make it more difficult for wood based panel manufacturers to find enough clean waste wood; and
  - growth in the use of clean waste wood by the wood based panel industry and especially the biomass sector will reduce the amount available for animal bedding, landscaping and horticultural products.

#### **4 Markets and waste wood grades**

- 4.1 Markets for waste wood need to be considered in relation to grades of material and suitability for a market. The use of the term 'waste wood' gives the impression that all waste wood is of one grade, and therefore that all waste wood is contaminated.
- 4.2 Various descriptions are used to describe waste wood, including:
- origin, for example from civic amenity sites;
  - type of wood material, for example plywood;
  - how it was used, for example furniture; and
  - potential to become contaminated.
- 4.3 The situation is further complicated by the fact that much waste wood at source is a mixture of different types of wood materials. Some sources may not even keep wood separate from other non-wood materials (for example bricks and plasterboard with demolition timber).
- 4.4 To more clearly define waste wood, and since it is not technically or economically feasible to process all waste wood streams into clean waste wood, the WRA has proposed a market-orientated grading system for waste wood. The initially proposed system consists of the following grades (Table A2) and is being further developed, recognising that standards will be required.

Table A2: Market grades of waste wood		
Grade and market	Origin and content	Notes
<p>Grade 1 Clean waste wood</p> <p>Acceptable for all applications but increasingly valued for the manufacture of horse bedding and horticultural mulch.</p>	<p>Packaging waste and offcuts from manufacturing.</p> <p>Before processing may contain nails and metal fixings.</p> <p>Not painted or otherwise treated.</p>	<p>Does not require WID compliance if burnt as fuel. Easy to prove Renewables Obligation Certificate (ROC).</p> <p>Despite its attractions, there is currently no real prospect of Grade 1 clean waste wood being available as biomass.</p>
<p>Grade 2 Chipboard grade</p> <p>Describes the one million tonnes of waste wood used in the wood based panel industry.</p>	<p>Contains up to 60 per cent clean wood. Also construction and demolition waste subject to meeting specification.</p> <p>Excludes most waste from panel products such as chipboard, MDF, plywood and fibreboard, and material treated with preservatives.</p>	<p>Does not require WID compliance*. Easy to prove ROC ability.</p> <p>Recycled chipboard cannot generally be used because the resin prevents penetration.</p> <p>Treated waste wood cannot be used which makes the product non WID compliant.</p>
<p>Grade 3 Fuel Grade (non WID)</p> <p>For boilers not requiring WID compliance.</p>	<p>A high content of material not useable by the chipboard and other sectors. A high content of panel products such as chipboard, MDF, plywood and fibreboard.</p> <p>Often from Civic Amenity sites.</p>	<p>Less easy to prove ROC ability.</p>
<p>Grade 4 Fuel Grade (WID)</p> <p>For boilers requiring WID compliance.</p>	<p>May contain some treatment chemicals but not copper, chrome, arsenic, creosote or other hazardous chemicals.</p>	<p>Less easy to prove ROC ability, but possible.</p>

\* Please note that this is the TAG's opinion. The Environment Agency confirms that WID will apply unless it can first be shown that it is not contaminated with halogenated organic compounds or heavy metals (resulting from treatment with wood preservatives or coating).

## Appendix E Production stages and quality control measures required to process clean waste wood into animal, landscape and horticultural products

### 1 Production stages

The main production stages for animal, landscape and horticultural products are shown in Figure A1. Stages 1 to 9 also apply to wood chips for panelboard production.

After the waste is received at the processing facility and it has been initially sorted and picked, hammer milling or crushing techniques are usually used to process waste wood into chips. This first stage reduces and controls the size of the particles and removes larger size contaminants, including ferrous metal. The process may be described as shredding, chipping, milling, crushing or comminution.

The initial objective is to produce a basic wood chip, which is suitable for supplying to the chipboard manufacturing industry. Apart from contamination limits, the main criterion for this basic chip is a maximum particle size of 50mm in any dimension, and a minimum of 5mm. Many first stage production units do not use the second stage screening normally necessary to achieve the minimum chip size requirement. Instead, they rely on further cleaning capacity, and tolerance on the part of the receiving mill, and exclude potentially dust-producing raw materials such as panel products.

A basic chip would make up some 90 per cent of the product currently processed in the UK and is generally produced by all waste wood processors. It is also the specification that most processors would initially offer in response to any enquiries from added value markets, and it has found some success in these markets. However, to fully satisfy the performance requirements of different markets, the basic chip may need to be processed further.

Once the wood has been chipped, the quality can be improved by separating the chips into different sizes and removing non-ferrous contamination.

Trommel screens are capable of separating basic woodchip into different particle sizes. The plant will usually be installed in line with the prime mover (shredding machine) and may require conveyors, but no extra loader capacity. As it is only capable of separating one or two chip sizes it is not best suited to producing a range of added value products.

Flat screens are capable of separating basic woodchip into several (normally three or four) different particle sizes. They are particularly suited to added value products. The requirement of most panelboard mills to exclude material below five millimetres is best achieved by flat screens where such material is being supplied as a low cost product to some markets.

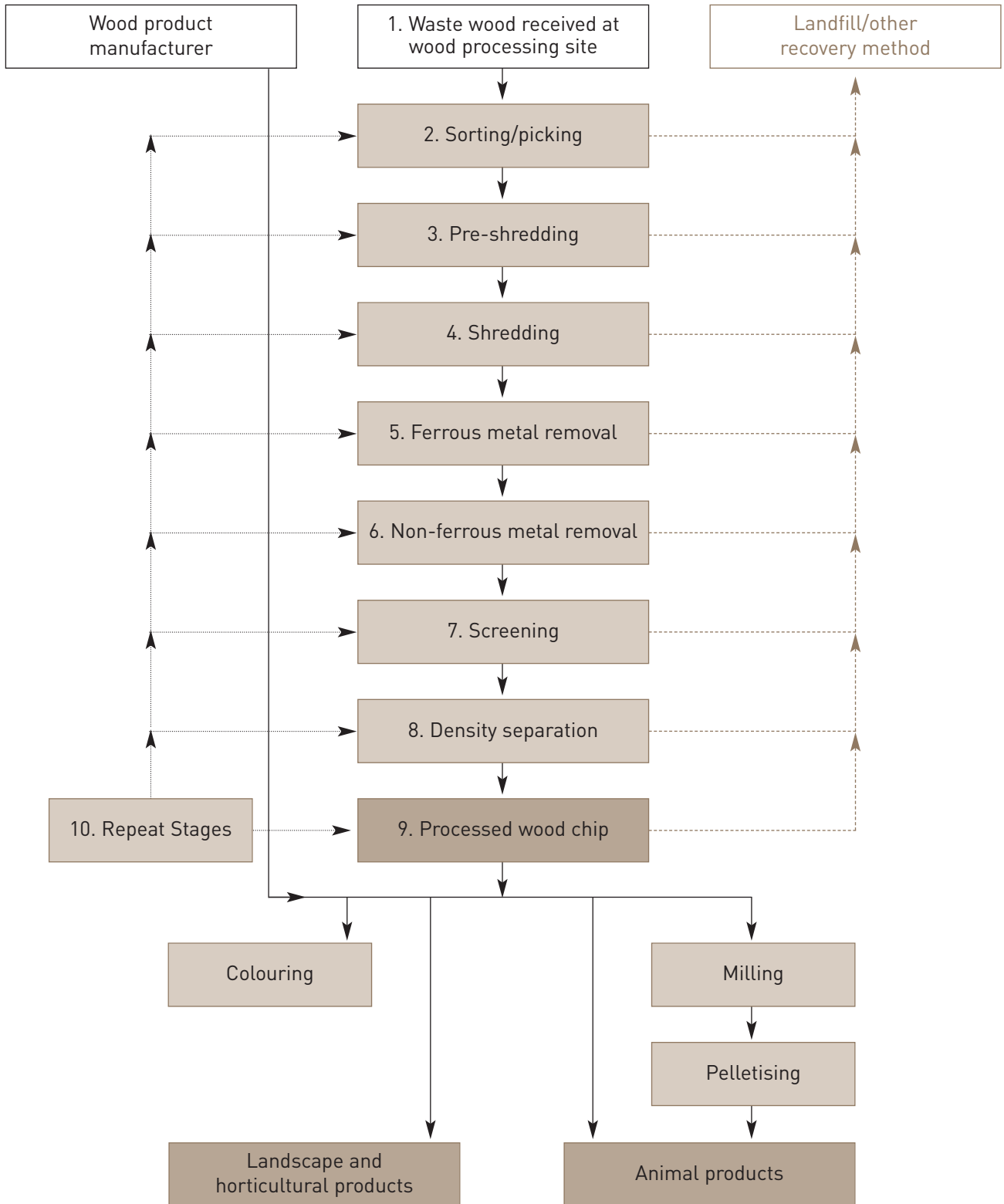
Where non-ferrous (stainless steel, brass, copper, aluminium) metal extraction is required, it would be normal to put an eddy current separator in line with the basic production unit. This unit would normally be static, and electrically powered, although such capability is now available built into a mobile shredder.

Producing weed suppressants and pellets for other markets requires the wood chip to be manufactured further, including:

- interim storage of raw materials;
- drying/conditioning;
- grinding;
- colouring;
- pelletising;
- cooling;
- screening;
- storage; and
- packaging.

On higher value products packaging is used to contain and protect the product, and to carry messages such as branding and safety instructions.

Figure A1 Production stages



## 2 Quality control measures

Quality management systems (for example certified to or based on ISO 9001: 2000) should be applied to all management processes and production operations to make sure that processed waste wood meets the required specification.

The TAG noted the following main quality control measures (Table A3) necessary to process waste wood into animal, landscape and horticultural products.

Testing will be required according to the input and product specification.

**Table A3: Quality control measures**

Production stage	Quality control measure
1	<p>Waste wood received at wood recyclers (chipping) site All incoming materials to be visually assessed for unacceptable contamination, for example grease and oil.</p> <p>Wood recyclers to build up knowledge on the likely composition of wood waste received from suppliers. For example, pallet manufacture/distribution or leasing companies, timber merchants, sawmills, joiners, distributors and retailers are likely to provide suitable clean waste wood.</p> <p>Where possible, contract of supply between waste wood supplier and wood processor to be held and maintained.</p>
2	<p>Sorting/picking The level of sorting/picking required will depend on where the waste has come from.</p> <p>Suggested aid for identifying clean waste wood – WRAP illustrated wall chart<sup>16</sup>.</p> <p>Clean waste wood is the only acceptable input, unless otherwise specified by the customer. This is likely to come in the form of slabs, offcuts and packaging waste. Wood from treated timbers may be acceptable depending on the material and specification.</p>
3 and 4	<p>Pre-shredding and shredding Outsize material is removed and either re-worked through process or sent to suitably licensed site for alternative end use/disposal.</p>
5 and 6	<p>Ferrous metal removal and non ferrous metal removal Stage 5 and 6 may take place in either order.</p>
7	<p>Screening Particle sizes separated according to market needs. This stage also removes grit, metal, paint and other small particles.</p>
8	<p>Density separation Involves removing light and heavy parts, for example plastics and paper.</p>
9	<p>Processed woodchip The amount of processing and contaminants removed will depend upon the intended end market. Additional measures may be taken where agreed between the wood recycler and customer.</p> <p>The levels recommended in the WRAP Research Report entitled the <i>'Identification of feedstock specifications for UK wood recycling applications and examples of good practice in their achievement'</i> should be met.</p>
10	<p>Repeat stages Stages can be carried out more than once depending on source of timber or intended use.</p>

## Appendix F References and information sources

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[http://www.wrap.org.uk/publications/Info\\_Sheet\\_Wood.pdf](http://www.wrap.org.uk/publications/Info_Sheet_Wood.pdf)

WRAP *Guidance for Separating Wood for Recycling at Source*

WRAP *Guide to Marketing Recycled Wood Products*

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Wood Panel Industries Federation (2005). WPIF/IG/12.2005 *Guidance for the specification and control of post-consumer reclaimed wood raw materials used in the manufacture in the UK of wood particleboard, MDF and OB*. WPIF:

Wood Recyclers Association and WRAP *Draft Code of Practice*. See information sources below

### **Information sources**

UK legislation

<http://www.legislation.hmso.gov.uk>

Environment Agency

<http://www.environment-agency.gov.uk/subjects/waste>

Department of Environment, Food and Rural Affairs (Defra)

<http://www.defra.gov.uk/environment/waste>

### **Research supported by WRAP**

WRAP

[www.wrap.org.uk](http://www.wrap.org.uk)

See also references above for research organisations

### **Industry information**

RecycleWood: Wood waste recycling information source

<http://www.recyclewood.org.uk>

Wood Panel Industries Federation

<http://www.wpif.org.uk>

Wood Recyclers' Association

[http://www.woodrecyclers.org/recycling.php\\_](http://www.woodrecyclers.org/recycling.php_)

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