



# **East of Scotland Compost Market Survey**

**Summary of Results for Lothian and Borders**



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## EXECUTIVE SUMMARY

Remade Scotland has undertaken a quantitative market research for the Lothian and Borders region. This report complements the market research for the Glasgow and Clyde Valley area undertaken in 2005.

The main objectives of this research are:

- Quantify current demand for green compost in existing markets
- Identify new markets and assess potential demand for these new markets
- Identify main drivers and barriers in current and new potential markets
- Identify and assess possible actions to increase the use of green compost

A market research was carried out using mail questionnaires and telephone surveys. The research targeted the main market sectors with the potential to use significant amounts of green compost.

Based on the information collected the following conclusions were obtained:

The current estimated usage of green compost (36,000 m<sup>3</sup>) accounts on average for nearly 26% of the potential demand (155,700 m<sup>3</sup>). Green compost demand is likely to increase in coming years.

The replacement of other products by green compost depends on the type of application. Currently, green compost expansion is being more successful in applications such as mulching and soil ameliorant. These applications have a lower quality requirement, which makes green compost a more competitive product.

The replacement rate in applications such as growing media or topdressing, with specific requirements about nutrient content or pH levels, is much lower. For these applications peat-based products still are the first choice of the market.

Land reclamation represents a realistic end market for huge amounts of green waste in the short and medium term. Yet, it has to be carefully monitored as completion or initiation of big projects can create serious imbalances between offer and demand.

Landscaping is the sector with mayor potential demand. The relatively low current demand is mainly due to the fact that this sector is highly reactive to their clients' demand. That is, they will not use new products with higher or similar cost if their clients do not request them. Local authorities and other public bodies can become a mayor driver by demanding the use of green compost in their tenders.

Golf courses are increasing steadily the consumption of green compost for mulching and topdressing. However, the lack of information about nutrient content and pH level in PAS100 compost is a mayor barrier to increase its use. Sport clubs and garden services are in a similar situation.

## **1. - BACKGROUND AND PURPOSE OF THE STUDY**

Changes to European and UK environmental policies have resulted in the implementation of legislation encouraging a shift towards a more sustainable approach to the ways in which we manage our waste. The Council Directive 99/31/EC on the landfill of waste requires local authorities to reduce the amount of biodegradable (organic) waste disposed through land filling. It entered into force on 16.07.1999. The directive became Scottish law with the Landfill (Scotland) regulations 2003.

Recycling is one of the main options to achieve landfill diversion targets. Organic waste consists primarily of kitchen and garden waste, which account for approximately 30% by weight of the waste arising from households in Scotland. Although kitchen waste is not being collected for composting yet (due to the limitations set in the animal by-products regulations), green waste is already being source-segregated for composting. The compost produced is commercialised on the market.

Therefore, at the moment only garden waste is being diverted for composting. To ensure a safe production of quality compost SEPA developed standards for the composted material based on the BSI Publicly Available Specification (PAS 100) for Composted Materials (Annex I). Only green waste composted following the PAS100 specification will be considered as recycled and suitable to return to the market.

In Scotland, householders generate around 350,000 tonnes of organic waste annually. Further organic material is generated from numerous commercial premises, wastewater treatment works and farms.

With considerable volumes of composts now available in the Lothian and Borders region, Remade Scotland has undertaken a quantitative market research for the region. This report complements the market research for the Glasgow and Clyde Valley area undertaken in 2005.

The objective of this research is to:

- Quantify current green waste arising in the area
- Forecast green waste arising in the coming years
- Quantify current demand for green compost in existing markets
- Identify new markets and assess potential demand for these new markets
- Identify main drivers and barriers in current and new potential markets
- Identify and assess possible actions to increase the use of green compost

## 2. - METHODOLOGY

The quantification of current green waste arising and the forecast of green waste arising in coming years are carried out using data from LAWAS reports and information provided by Local Authorities through a telephone survey.

A questionnaire (Annex II) is developed to quantify current demand for green compost, to identify new markets<sup>1</sup> and to assess the potential demand for new and existing markets.

This questionnaire only aims at landscaping and gardening companies, golf courses, sport grounds and landscape architects. The assessment of other market sectors in which green compost may be used, such as agriculture or land reclamation, is done through telephone interviews with key players such as green compost suppliers and Local Authorities.

The questionnaire was sent by mail to both suppliers and potential end users of green compost. 588 questionnaires were sent. The database of potential end users and suppliers used during the project was purchased by Remade Scotland from the Yellow Pages, in addition to other in-house sources. To analyse the responses the 588 companies were split into 8 markets sectors depending on the type of commercial activity.

To ensure quality results a threshold of 10% responses is set as the minimum number of responses necessary to obtain representative results. When responses from the mail questionnaire are below the 10% threshold, telephone surveys are carried out until reaching a satisfactory number of responses.

A total of 33 mail questionnaires properly completed were received, an average response of 5.3%.

A telephone survey was carried out to gather additional information until the 10% target was met. The telephone survey was successful (and the 10% target met) with all the market sectors but the landscaping companies, with only 9 additional companies willing to participate in the market research (6.7% final responses).

This information gap was offset by requesting information about their clients' requirements to the main suppliers of green compost identified in the area, GPgreen and Forth Resource Management. Green compost suppliers were willing to participate and provided reliable, up-to-date information about the requirements and purchasing behavior of their clients.

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<sup>1</sup> The identification of products currently used by the landscaping industry which could be replaced by green compost. For instance, peat and peat-based products, excavated topsoil or wood chipping.

### 3. - MARKET AREA

The Lothian and Borders Waste Strategy Area consists of the City of Edinburgh (264 km<sup>2</sup>), East Lothian (679 km<sup>2</sup>), Midlothian (354 km<sup>2</sup>), West Lothian (427 km<sup>2</sup>) and Scottish Borders (4732 km<sup>2</sup>).<sup>2</sup>



In the north, the Lothian Region is predominantly classified as urban with around 80% of the population living in an urban area. It is situated at the heart of the national road and rail transport networks with the A1 and East Coast mainline to London passing through East Lothian, whilst the M8 corridor to Glasgow and the M9 corridor to Forth Valley pass through West Lothian. Edinburgh has one of the major airports in Scotland and also has a large cargo capacity through the Forth Ports Authority. On the other hand, the Scottish Borders is a large rural area wholly dependent on its road network for communications. However, there are developments underway to re-establish rail links between the Scottish Borders and the national rail network.

Within the Lothian and Borders Waste Strategy Area, there is a predicted population growth of 6% between 2000 and 2016 with an even more significant increase in households – 18% to 2014.<sup>3</sup>

|                              | <b>Households</b> | <b>Population</b> | <b>Area</b><br>(sq. km) | <b>Pop. Density</b><br>(Persons per<br>sq. km) |
|------------------------------|-------------------|-------------------|-------------------------|--|
| <b>City of<br/>Edinburgh</b> | 217,000           | 448,624           | 264                     | 1,703  |
| <b>East Lothian</b>          | 42,206            | 90,088            | 679                     | 133  |
| <b>Midlothian</b>            | 33,563            | 80,941            | 354                     | 229  |
| <b>West Lothian</b>          | 70,500            | 158,714           | 427                     | 372  |
| <b>Scottish<br/>Borders</b>  | 53,252            | 106,764           | 4,732                   | 23   |

<sup>2</sup> Scottish Executive GRO(S) statistics

<sup>3</sup> Scottish Executive GRO(S) statistics / Household Growth Projections (Scottish Executive)

| <b>Council</b>                     | <b>Population % change<br/>(2000 – 2016)</b> | <b>Household % change<br/>(2000 – 2014)</b> |
|------------------------------------|--|---|
| <b>City of Edinburgh</b>           | + 3.8  | + 17.9                                      |
| <b>East Lothian</b>                | + 10.9                                       | + 21.8                                      |
| <b>Midlothian</b>                  | + 7.4  | + 16.4                                      |
| <b>West Lothian</b>                | + 11.8                                       | + 24.0                                      |
| <b>Scottish Borders</b>            | - 1.0  | + 10.9                                      |
| <b>Lothian and Borders<br/>WSA</b> | + 5.7  | + 18.3                                      |

Edinburgh's population is boosted by an inflow of approximately 10,000 students during term time. The city's population is almost doubled by around 400,000 tourists and visitors during the peak tourist season. The local economy is expanding with an expected growth of 30,000 jobs in the Lothian's and 20,000 in Edinburgh by 2015. It has been identified that 40% of development within the area will be focussed on Midlothian.<sup>45</sup>

| <b>Sector</b>                 | <b>Edinburgh and Lothians<br/>(1993 – 1997) approx. %</b> | <b>Scottish Borders<br/>(1995 – 1997) approx. %</b> |
|-------------------------------|---|---|
| <b>Agriculture</b>            | - 3.5   | + 63.3  |
| <b>Hotels and Restaurants</b> | + 3.2   | + 3.4   |
| <b>Manufacturing</b>          | + 14  | - 3.2   |
| <b>Construction</b>           | + 2   | - 15.1  |
| <b>Retail</b>                 | + 4.5   | + 7.9   |
| <b>Transport</b>              | - 2.5   | + 8.1   |
| <b>Banking and Finance</b>    | + 20  | + 4.7   |
| <b>Public Administration</b>  | + 19  | + 18.6  |
| <b>Other Services</b>         | - 10  | - 19  |

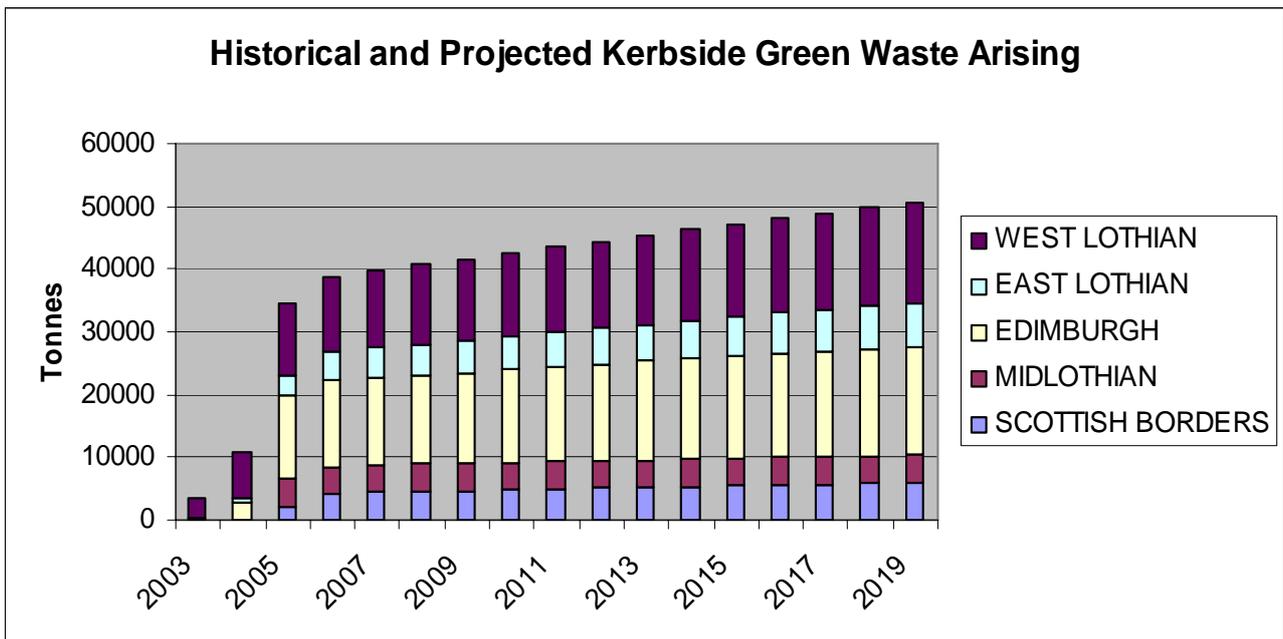
Waste arising have been estimated according to these predicted growth projections (varying between 1.5% and 3.5%), giving an average of 2.62% growth per annum for Lothian and Borders.

<sup>4</sup> *East of Scotland Plan 2000 – 2006 Objective 2 Programme*

<sup>5</sup> *South of Scotland Objective 2 Bid, June 2000*

#### 4. - GREEN WASTE ARISING (LA) & GREEN COMPOST PROYECTION

Examining SEPA LAWAS data for the year 2004-2005, together with Remade projections to 2020, the expected kerbside collections of municipal green waste are expected to rise considerably.



Information provided by professional composters indicates that the average efficiency in the composting process is around 50%. This would equate to finding a market for approximately 16,000 tonnes at present and 25,000 tonnes of compost in the Lothian and Borders area by 2020. This equal to 25,600 m<sup>3</sup> at present and 40,000 m<sup>3</sup> by 2020.

This figure only considers household green waste. Other organic materials such as kitchen waste or green waste from commercial premises are not included. Therefore, it is very likely that in the future there will be more compost available than the forecast from LAWAS reports.

## 5. - MARKET SECTORS

In the east of Scotland there are several market sectors with the potential to use significant amounts of green compost every year. Agriculture, reclamation land and landscaping are widely accepted as the main potential users of green compost.

However, only landscaping is likely to pay higher prices for green compost. The other two sectors will tend to utilise green compost only if it is available at low prices.

Table: Market demographics

| Market sector | Agriculture | Land restoration | Local authorities | Landscaping | Sport clubs | Golf course | Garden services | Garden centres |
|---------------|-------------|------------------|-------------------|-------------|-------------|-------------|-----------------|----------------|
| <b>Total</b>  | ?           | 1,726 ha         | 5                 | 150         | 235         | 83          | 91              | ?              |

### 5.1 Agriculture

This is a diminishing activity in Edinburgh and the Lothian's area. The forecast for population growth in coming years, in addition to the increased orientation of the economy towards the service sector suggest even lower levels of agricultural activity in years to come. On the other hand, in the Scottish Borders agriculture and farming still are a noticeable part of the economy.

The benefits of green compost to crop production have been widely demonstrated worldwide, through both laboratory research and field use. In addition, the increasing demand of organic food<sup>67</sup> at national level certainly will encourage even further the use of green compost.

However, due to the cost involved in the transport and production of green compost, at the moment its use is only feasible with high value crops which are able to generate enough profit to cover the initial investment.

<sup>6</sup> Organic agriculture only can use products obtained naturally as a fertilizers. For instance, green compost or livestock manure.

<sup>7</sup> Although there is a recorded evidence of an increasing demand of organic products at national level, it was not possible to obtain tailored data for the area under study.

In intensive organic agriculture green compost use faces competition from livestock manure. Livestock manure is produced at zero cost, readily available in most rural areas and with higher nitrogen content. The nitrogen present in manure is released faster than the nitrogen present in green compost, which makes it more suitable for intensive agriculture of most crops. Fruits and greenhouse crops (vegetables) are the only crops in which green compost characteristics (Annex III) may bring more benefits than livestock manure.

Another barrier to increase the use of green compost in agriculture is availability. Composting facilities are located near Edinburgh and the Lothian's area whilst most of the agriculture is located in the Scottish Borders. The transport cost, in addition to the cost associated to the production of green compost, makes it use economically unfeasible in many cases.

A possible solution to increase the use of green compost in rural communities was pointed out by Mr. Jack Roberts of the Perthshire Machinery Ring in Remade's market research for the Glasgow & Clyde valley area.

He highlights the success of a local farmer in the Perthshire area, who also owns the local landfill and receive a gate fee of approximately 20.00£ per tone of green waste delivered to his landfill. He is composting the material and applying the product to his own land using a conventional manure spreader at the rate of 30 m<sup>3</sup>/hectare.

Mr. Roberts is a strong advocate of establishing more "on farm" composting facilities as is his believe that farmers would rather receive the gate fee to process the green waste, and then use it for free or sell it to other local farmers, rather than purchase it from a commercial producer. Buying from commercial producers will usually increase the transport cost (and the environmental impact) as commercial composting facilities are closer to Edinburgh.

| <b>Market Segment</b> | <b>Estimated Hectares</b> | <b>Compost Application Rates</b> | <b>Current compost usage**</b> | <b>Potential Compost Usage</b> |
|-----------------------|---------------------------|----------------------------------|--------------------------------|--------------------------------|
| <b>Agriculture</b>    | unkown <sup>8</sup>       | 15 – 30 m <sup>3</sup> /ha       | unknown                        | unknown                        |

## 5.2 Land restoration

<sup>8</sup> There are 133,726ha of agricultural land in the area. Yet, the use of green compost depends on the type of soil and the type of crop. Accurate information about those factors could not be obtained. Further research is necessary to accurately assess potential demand from the agriculture sector.

Landfills, contaminated, vacant and derelict land as well as construction sites may need land restoration activities. These sites can use green compost to improve poor quality soils in order to improve the topsoil quality, increase protection against erosion processes or establish a vegetative cover in order to make the land under restoration suitable for further uses. Aside from improving soil quality and encouraging improved vegetation, compost has also been shown to bind heavy metals and degrade petroleum-based substances<sup>9</sup>.

Although a relatively small proportion of the compost produced in the Lothian & Borders area is used for landfill restoration<sup>10</sup>, a large amount has been diverted for restoration projects such as the Polkemmet open cast mine. There are numerous sites in the area awaiting restoration: 221 ha of vacant land and 1077 ha of derelict land<sup>11</sup>, mostly in former mining sites in West and Midlothian.

| Market Segment                           | Estimated Hectares   | Compost Application Rates | Current green compost usage | Potential Compost Usage |
|--|----------------------|---------------------------|-----------------------------|-------------------------|
| <b>Land restoration</b> <sup>12 13</sup> | 1,726                | 125-250                   | 8,000-9,000                 | 8,650 – 16,875          |
| <b>Total</b>                             | (50-90 hectare/year) | m <sup>3</sup> /ha        | m <sup>3</sup>              | m <sup>3</sup>          |

Green compost is a suitable product for land restoration. In addition, the high volume of compost usually needed in a reclamation project allows the supplier to achieve economy of scale in the transport of materials, bringing the final price down.

For instance, GP green, one of the mayor suppliers of green compost in the central belt is currently selling green compost in bulk for several reclamation projects at the competitive price of 7£/m<sup>3</sup>, VAT and transport included. The same company indicates that reclamation projects are becoming a mayor part of his business activity (around 50%) and will probably increase in coming years.

Considering the Scottish executive forecast of 18% increase of households by 2014 in the Lothian's and Edinburgh area, the number of land restoration and construction projects will also increase and, therefore, the demand for green compost.

<sup>9</sup> Ron Alexander associates, Glasgow & Clyde valley market research

<sup>10</sup> Is common practice to stockpile topsoil during landfill construction and management

<sup>11</sup> ENV/2006/1 Scottish Vacant and Derelict Land Survey 2005, Scottish Executive, January 2006

<sup>12</sup> Assuming present consumption of green compost in area for landfill capping

<sup>13</sup> Assuming land restoration taking place in 5% of vacant/derelict sites per annum

This market sector represents a realistic end market for huge amounts of green waste in the short and medium term. Yet, it has to be carefully monitored as it can create serious imbalances between offer and demand.

For instance, the restoration of the Polkemmet open cast mine used last year around 40% of the total green compost available in the area. When this project is completed new reclamation projects should start to fill up the “gap” in demand. Otherwise, suppliers may lose overnight a significant source of revenue, bringing uncertainty and financial stress to these companies, situation that can jeopardise the sustained development of this industry.

### **5.3 Local authorities**

Local authorities are one of the main sources of green waste as they are responsible for the kerbside collection scheme for households. In addition, they have the potential to use significant amounts of green compost. Indeed, it is becoming common practice among Local Authorities to purchase green compost from the same company that process the green waste collected in the kerbside collection scheme.

All Local Authorities are currently using green compost. Yet, the tonnage used per year depends on the local authority. East Lothian started to use green compost nearly two years ago and now is using around 1800 m<sup>3</sup>/year.

On the other hand, Midlothian started to run trials this year to assess its suitability as soil ameliorant for plant bedding and general gardening and as top dressing for turf in football pitches. This year Midlothian used around 150 m<sup>3</sup> of green compost. Nonetheless, its consumption may be much higher next year as the trials were quite satisfactory and new applications such as mulching are being considered.

A significant increase in consumption is very likely in several councils. However, in councils that have a high consumption already, the demand can not increase much more due to the limitations of green compost for some applications. For instance, East Lothian ran trials to use green compost as replacement for peat-based products as growing media in the nursery. The trials were unsatisfactory and peat-based growing media performed better than green compost. Quality became a limiting factor and peat-based products will not be replaced by green compost yet. Therefore, Local Authorities such as East Lothian, which is already using green compost for mulching (up to 1000 m<sup>3</sup>) and soil improver will find it difficult to increase much more its demand for green compost. Even if the trials of green compost as growing media were satisfactory, East Lothian could only use an additional 5-8 m<sup>3</sup>.

The increase in demand in other local authorities (i.e. Scottish Borders) is limited because gardening and landscaping activities such as top dressing and grass maintenance are carried out by subcontractors.

Finally, some Local Authorities do have potential for a noticeable increase in green compost consumption. Midlothian used 100-200 m<sup>3</sup> of green compost last year. If green compost is used for mulching and soil ameliorant its consumption should be around 1500-2000 m<sup>3</sup>, similar to east Lothian.

| <b>Market Segment</b>    | <b>Green waste arising (tonnes)</b> | <b>Green compost production<sup>14</sup> (m<sup>3</sup>)</b> | <b>Current green compost usage (m<sup>3</sup>)</b> | <b>Potential Green Compost Usage (m<sup>3</sup>)</b> |
|--------------------------|-------------------------------------|--|--|--|
| <b>Local Authorities</b> | 30,000                              | 24,000   | 4,000-5,000  | 15,000-18,000  |

From the interviews with Local Authority representatives it was possible to identify trials and applications from which each local authority is gathering valuable information about the potential and limitations to the use of green compost.

The inability of green compost to replace peat-based products as **growing media** has been mentioned already. Green compost can not provide enough nutrients to the growing plants and additional nitrogen must be supplied. In addition, PAS 100 compost does not provide information about nutrient content, which makes very difficult the creation of suitable blends for each type of plant.

Green compost has performed very well as **mulching**. Feedback from councils highlight its efficiency as weed suppressor. One Local Authority has been able to phase out inorganic pesticides used as weed killer altogether. Therefore, the use of green compost, an environmentally friendly product, also improves the health and safety records of the LA as staff does not need to handle and dispose of hazardous products such as pesticides any more. Many cubic metres of green compost can be used in this application.

**Topdressing** mixes using green compost are already available in the market (i.e. Steward Turf). It has been tested in trials with a satisfactory performance. Yet, in this case price has become a limiting factor and the widespread use of this mix is not feasible due to economical limitations.

It has been successfully used as soil **ameliorant/plant bedding**. Yet, for a successful use it is necessary to monitor the quality of the product before use, in special the maturity level (mature compost is odor free). Otherwise, anaerobic conditions can develop in the root area with negative effects for the plant development. Several ground maintenance managers highlighted the lack of information about nutrient content (NPK) and pH level as a major barrier to prepare tailored topsoil mixes for specific plant species.

<sup>14</sup> Considering 50% efficiency during composting

## 5.4 Landscape architects

Landscape architects can have a positive influence on the green compost demand through their specifications. Every plan to boost green compost consumption should engage with this professional sector.

There are 19 landscape architects registered in the area. 4 were contacted over the phone and all of them were willing to participate in the market research. Two of them (50%) always specify green compost, one recommend it use (although also accepts equivalent materials) and another does not specify green compost on a regular basis.

## 5.5 Landscaping companies

Landscaping companies have the highest potential demand. In the area surveyed 150 landscaping companies were identified. By using the mail questionnaire and telephone calls it was possible to identify 9 companies willing to provide information. This gives a final response of 6.7% over the total. Few companies could (or wanted to) provide accurate information about volumes of green compost and peat-based products used last year. Yet, it was possible to estimate<sup>15</sup> from the data collected current and potential compost usage.

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| Market Segment        | Number of companies | Compost Application Rates   | Current compost usage (19%) | Potential Compost Usage (5800ha) |
|-----------------------|---------------------|-----------------------------|-----------------------------|----------------------------------|
| Landscaping companies | 150                 | 7.5 – 30 m <sup>3</sup> /ha | 8,250- 33,000               | 43,500 – 174,000                 |

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The data collected also makes possible to identify which are the main applications for green compost, the main barriers to increase it use and which one are the main competing products and potential new markets and why.

**80% of companies are currently using green compost.** Nonetheless, in many cases it is not the main material used, with peat-based products still being the first choice as growing media, topdressing and sometimes topsoils manufacture. A couple companies stated that apart from mulching (green compost is widely used for this application) they are currently running trials to assess green compost potential as topdressing and growing media.

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<sup>15</sup> Results obtained from the data collected. Yet, the data comes from less than 10% of the total number of companies so that the data is not statistically representative.

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| <b>USE</b>                          |     |
|-------------------------------------|-----|
| Mulching                            | 70% |
| Topsoil manufacture/soil ameliorant | 50% |
| Top dressing                        | 20% |
| Growing media                       | 10% |
| <b>ORIGIN</b>                       |     |
| Only in house                       | 20% |
| Supplied & in house                 | 80% |
| <b>CONCERNS/BARRIERS</b>            |     |
| Price                               | 70% |
| Quality                             | 50% |
| Availability                        | 10% |
| Physical contaminants               | 0%  |
| No concerns/answer                  | 10% |

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From conversations with several companies it becomes clear than green compost is an emerging product in the market. Nonetheless, the situation can be different depending on the type of application.

**Mulching** is the most common application for green compost. It does not mean that this is the application using more volume of green compost. It is common practice among the landscaping industry to use green compost as mulching media due to it beneficial properties (Annex III) and the lower quality required for this application. This market sector is well aware of the beneficial properties of green compost and is always keen to use it for this application. The fact that high quality is not required for this application encourages many companies, big and small alike, to do compost in house with their own garden waste. The main use of this self-produced green compost is mulching and, in several companies, soil ameliorant.

Price and availability are the main barriers to increase the use of green compost as mulching media. If price is too high landscaping companies will try to do green compost by themselves. If the product is only available from suppliers distant to the application point companies will try to cut transport cost by making green compost on-site.

**Topsoil manufacture/soil ameliorant** is the application with the potential to use more green compost. Noticeable volumes are already being used by private companies and several local authorities for this application. A higher quality/price ratio would bring a significant increase on the demand. Several companies are running trials for this application and topdressing due to the increasing demand for green compost from their clients. One company stated that they have been able to secure additional contracts since they use green compost.

**Topdressing** is an emerging application. It is already used for turf maintenance by several private companies and local authorities. It is also used by a fraction of sports

grounds and golf courses. For this application green compost still faces fierce competition from peat-based products, especially from products blended with topsoil or sand. Lower prices and the development of high quality blended products would increase green compost consumption.

**Growing media** requirements are difficult to obtain from green compost. There have been several trials in the area, carried out by local authorities, with disappointing results. Green compost is unable to provide all the nutrients (especially nitrogen) a plant needs during the growing process. Additional nitrogen must be provided. In addition, pH levels are not standardized under the PAS 100 regulations and this information is very necessary to optimize survival rates of plants. Finally, if green compost is not mixed properly with sand based products water retention can lead to anaerobic conditions in the roots area, with negative consequences for the development of the plant. Further research and the development of high-tech blends are necessary to increase the demand for this application.

## 5.6 Golf courses

There are 83 golf courses in the area under study. 7 replied to the mail survey (8.3%). An additional 5 golf courses were contacted over the phone. This market sector is a valuable source of information as the staff (especially green keepers) is always willing to cooperate and to share information about the management of the course.

Topdressing is the main application for green compost in golf courses. Yet, a significant amount can also be used as soil ameliorant/plant bedding and mulching in gardens and areas between fairways. Two golf courses are composting in-house grass cuttings to be used as soil ameliorant and mulching. Yet, the majority prefer to purchase all materials from specialised suppliers. 38% of golf courses use green compost, 28% use green compost as topdressing. The other applications are soil ameliorant and mulching.

| Market Segment       | Estimated Hectares | Compost Application Rates <sup>16</sup> | Current compost usage (m <sup>3</sup> ) | Potential Compost Usage (m <sup>3</sup> ) |
|----------------------|--------------------|---|---|---|
| <b>Golf Courses*</b> | 1,494              | 7.5 – 30 m <sup>3</sup> /ha             | 3360- 13446                             | 11,205 – 44,820                           |

\*Extrapolated from 83 golf courses x 18 fairways (assuming 1 ha/fairway)

The main barrier (highlighted by green keepers) to increase the use of green compost is the unknown mixture of nutrients (NPK) in PAS 100 green compost. The possible presence of physical contaminants (plastic bits, glass, stones) also jeopardise an increase on the demand.

<sup>16</sup> To calculate the potential compost usage two products have been considered: 25% compost/75% sand-based products and 100% pure green compost. Only one application per year. The real demand will be between the two estimations.

On the other hand, the positive qualities of green compost for turf maintenance are widely reckoned among this market sector. Therefore, the development of high-tech blends tailored for turf maintenance would increase the demand for green compost.

## 5.7 Sport clubs

235 sport clubs, sport grounds and stadiums were targeted during the mail survey. 9 responses were received so 12 additional premises were targeted during the telephone survey. Information could not be obtained easily because in many cases the maintenance is carried out by a subcontractor, usually a landscaping company. Local authorities are also involved in the maintenance of sport grounds, stadiums and sport clubs. To overcome this difficulty and obtain meaningful information 26 sports clubs/grounds were finally contacted.

The telephone survey focused on the use of green compost as topdressing, questions about its use as mulching or soil ameliorant were omitted as these uses are not important in those types of premises.

Using the information collected it is possible to estimate in **10-15% the number of premises already use green compost**. It was not possible to collect representative information about the purity of the product used (100% pure or blended green compost).

The compost application rate varies depending on the soil conditions, compost characteristics (100% pure or blended) and specific requirements of each turf species. Topdressing composition usually includes materials providing nutrients (peat, green compost or inorganic fertilizer) and sand-dominated materials to ensure good drainage.

For turf is recommended the application of a fine layer (0.6cm) of topdressing. This application requires around 30 m<sup>3</sup> per hectare. Depending on soil characteristics and turf species topdressing may be needed once or twice a year.

| Market Segment              | Estimated Hectares | Compost Application Rates <sup>17</sup> | Current compost usage <sup>**</sup> | Potential Compost Usage      |
|-----------------------------|--------------------|---|-------------------------------------|------------------------------|
| Sports Grounds <sup>*</sup> | 235                | 7.5 – 30 m <sup>3</sup> /ha             | 220-870 m <sup>3</sup>              | 1,762 – 6,960 m <sup>3</sup> |

<sup>\*</sup>Extrapolated from 235 sports pitches (at 1 ha/pitch)<sup>18</sup>

<sup>\*\*</sup> Assuming 20% of premises already using green compost.

<sup>17</sup> To calculate the potential compost usage two products have been considered: 25% compost/75% sand-based products and 100% pure green compost. Only one application per year. The real demand will be between the two estimations.

<sup>18</sup> Bowling and tennis grounds are less than 1 ha. Yet, some premises have more than one sport ground so it has been assumed that each premise has only one sport ground and the surface of this sport ground equals 1 ha.

## 5.8 Garden services and nurseries

91 garden services were identified in the area. All were targeted in the mail survey. Because 8 responses were received (8.8%), an additional company was contacted over the phone to comply with the 10% contact target. Additional information was obtained from Local Authorities as the activity of their grounds maintenance departments is very similar to the activity of private gardening companies and nurseries.

**78% of the companies are using green compost.** Companies may use green compost for different applications. It has been possible to establish the main uses, the origin and the main concerns in this market sector about the use of green compost.

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### USE

|                                   |      |
|-----------------------------------|------|
| Mulching                          | 100% |
| Topsoil manufacture/plant bedding | 100% |
| Top dressing                      | 28%  |
| Growing media                     | 0%   |

### ORIGIN

|          |     |
|----------|-----|
| In house | 28% |
| Supplied | 72% |

### CONCERNS/BARRIERS

|                       |     |
|-----------------------|-----|
| Price                 | 55% |
| Quality               | 44% |
| Availability          | 0%  |
| Physical contaminants | 11% |
| No concerns/answer    | 33% |

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| Market Segment  | Number of companies | Compost Application Rates   | Current compost usage   | Potential Compost Usage   |
|-----------------|---------------------|-----------------------------|-------------------------|---------------------------|
| Garden services | 91                  | 7.5 – 30 m <sup>3</sup> /ha | 680-2730 m <sup>3</sup> | 3400-13650 m <sup>3</sup> |

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The most common applications are topsoil manufacture and mulching. Green compost is being used more in these applications because the quality required is lower. Mulching is the main application when manufactured in house. Supplied green compost is more used for topsoil manufacture and topdressing.

Mulching is becoming the favorite application for green compost due to positive properties such as higher water retention and weed suppressor. Although mulching may be the most common application, more volume is used for topsoil manufacture and plant bedding. For these uses price and quality become a barrier and green compost is still displaced by peat-based products in many companies.

Quality is a mayor barrier to use green compost as growing media. Issues with pH levels and the availability of less nitrogen than necessary for growing plants were raised by one private company and two local authorities. High-tech blends using green compost should be developed to overcome this problem.

## 5.9 Green compost suppliers

There are two mayor companies producing green compost in the area: Forth Resource Management (FRM) and TARMAC<sup>19</sup>. A third one, GP Green, is located in Lanark (South Lanarkshire) but has a commercial activity in the whole central belt, the Lothian's and Edinburgh included. The same applies for FRM and TARMAC. As the boundaries of the area under study do not mach the commercial boundaries of these companies it has been not possible to establish with accuracy how much compost was sold by these suppliers in the area.

| <b>Market Segment</b>          | <b>Green compost sold (m<sup>3</sup>)<sup>20</sup></b> | <b>Green compost sold in the area (m<sup>3</sup>)<sup>21</sup></b> | <b>Potential Green Compost Usage<sup>22</sup></b> |
|--------------------------------|--|--|---|
| <b>Green compost suppliers</b> | 28000  | 15,000   | ?   |

These companies can provide different types of green compost. The final price will depend on the quality of the final product and the quantity purchased. Bigger orders can get noticeable discounts so as a significant part of the business for these companies comes from reclamation land projects (slightly more than 50% of the turnover for one company). Other mayor clients are Local Authorities, big landscaping companies and topsoil suppliers.

The average price for 1m3 of green compost is 12-16£ delivered. Yet the price can go down as much as 7£ delivered for big orders, usually from land reclamation projects.

<sup>19</sup> Applying for PAS100 standard. Not selling green compost at the moment.

<sup>20</sup> The data is an estimate for the whole central belt. TARMAC is not included. It consider P green and FRM

<sup>21</sup> Estimate

<sup>22</sup> Estimate, highly variable depending on land reclamation projects. Yet, demand rising every year.

## 5.10 Turf & soil suppliers

There are 11 turf suppliers registered in the area. 6 replied to the mail survey (54%). Only one company (16% of the total answers) is using green compost at the moment. Yet, this company has 43 employees whilst the other five have between 1 to 3 employees. Thus, it is very likely that the actual use of green compost in this market sector is well above 16%.

The company using green compost (Steward Turf) uses 60% of green compost for topsoil manufacture and the rest for turf topdressing and other applications. This company produces green compost in house, although most of the material used is supplied.

## 5.11 Retailers & Garden centers

Around 85% of the UK population now have access to a garden<sup>23</sup>. Domestic users have compost requirements for three types of application:

- Compost as a soil improver/general soil conditioner (typically screened to 10mm), which can be used as a soil ameliorator
- Mulch (may require a 20-40mm product)
- Growing media for use in potting and containers

Green compost faces severe competition from peat-based products when applied as soil conditioner and growing media.

Green compost application as a mulch may find competition from more aesthetical products such as wood chipping or pine bark.

This market sector was especially difficult to research. A mayor barrier was the impossibility to assess with accuracy the number of retailers and the volume of materials sold last year in the area.

Smaller retailer's shops are usually part of bigger businesses such as landscaping and gardening companies, nurseries or turf and soil suppliers. When these shops could be identified and the owner contacted they only could provide estimations of the volumes of green compost traded last year.

On the other hand, bigger retailers (B&Q, Homebase...) could provide accurate information about the products they sold last year, but only at national level. It was also possible to identify suppliers with no commercial premises in the area, which makes the calculation of real and potential demand even harder.

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<sup>23</sup> *Monitoring peat & alternatives as growing media & soil improver in the UK 2001. Enviro (2003)*

To overcome these difficulties two of the bigger retailers with premises in the area (B&Q and HOMEBASE) were chosen as indicators to assess current market demand and to identify potential new markets for green compost. Data obtained from B&Q and HOMEBASE<sup>24</sup> corporate offices was extrapolated to the shops in the area (B&Q: 8 shops, Homebase: 5).

B&Q sold around 22.400m<sup>3</sup> of peat-based products and 1840m<sup>3</sup> of green compost-based products. Whether the products were pure or blended is not known. That gives a consumption ratio between peat and green compost of 12/1. Thus, for every 12 bags of peat-based compost sold only one bag of green compost is sold.

HOMEBASE sold around 6750m<sup>3</sup> of peat-based products, 340m<sup>3</sup> of topsoil and 65m<sup>3</sup> of green compost. That gives a peat/green compost ratio of 113/1.

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<sup>24</sup> Information obtained through R. Alexander associates

## 6. - MARKET EXPANSION

Green compost has multiple applications, from growing media in nurseries to soil ameliorant in reclamation land projects and agriculture. Each market sector may have different drivers and barriers to increase the use of green compost. Moreover, each market sector may be able to use green compost for one or more applications (mulching, topdressing, etc...). Therefore, the feedback obtained from each market sector often mention specific actions to increase the use of green compost for specific applications. All this information has been summarised so as the main points are highlighted.

The information provided by green compost suppliers clearly points at the **land reclamation** sector as a mayor source of demand in the short and medium term. This sector needs high volumes of low quality compost, which can be provided at competitive prices. Availability can be a barrier for mayor projects as suppliers may be unable to cope with sudden peaks on demand. The location of green compost suppliers should also be considered. Distant suppliers can not provide big volumes of green compost at competitive prices because transport cost, a mayor barrier for the development of this market sector, rise proportionately with the distance.

For a sustainable development of the market reclamation land projects should be properly planned so as there is not sudden peaks and drops on the demand. Even though green compost can be stock piled for a long time a variable demand may bring uncertainty and financial stress to green compost suppliers.

**Agriculture** is not a big consumer of green compost and it is unlikely that it will become a “paying” market for green compost in the near future. Green compost can be effectively used is several types of crops and the increasing demand for organic products may have an effect on the demand from green compost. Yet, transport cost, directly affected by the availability of suppliers will make it use unfeasible in many rural areas. A possible solution is the development of a network of on-farm composting sites in rural areas as it has been explained in point 5.1.

**Local authorities** can increase greatly the use of green compost. They have the potential to use high volumes every year. In addition, they are mayor clients of landscaping companies and through their demand (green compost is a suitable product to be included in a sustainable procurement policy) they can shape the offer provided by landscaping companies. This will have a positive effect as the landscaping industry is a rather reactive sector. That is, they only change their products when the demands from their clients change. Specifications from **landscape architects** can also have a mayor impact on the products used by landscapers and gardeners.

The **landscaping industry** is a market-driven sector so that price is a limiting factor for the utilisation of new product. There are green compost products currently available with the right quality to be used as mulching, soil ameliorant and even topdressing. If prices can go down whilst keeping the same quality the use of green compost will be increased.

**Big retailers** would increase their offer as soon as clients increase their demand. Therefore, highlighting the environmental benefits of green compost (a recycled product, locally produced and with smaller carbon footprint than peat-based compost) to the general public may increase the demand.

**Golf courses and sport grounds** need high performing products for turf maintenance. There are blends using green compost already available in the market. Yet, the price is higher than peat-based blends. And additional complain from this sector is the lack of information about nutrient content and pH level in PAS 100 compost. If this information is provided green keepers, gardeners and landscapers would be able to use much more green compost.

## 7. - CONCLUSIONS AND RECOMMENDATIONS

The current estimated usage of green compost (34,000 m<sup>3</sup>) accounts on average for nearly 23% of the potential demand (147,780 m<sup>3</sup>). In addition, green compost demand is likely to increase in coming years.

| Market sector                   | Number   | Current demand<br>(m <sup>3</sup> ) | Potential demand<br>(m <sup>3</sup> ) |
|---------------------------------|----------|-------------------------------------|---------------------------------------|
| Land restoration                | 1,726 ha | 8,600                               | 12,600                                |
| Local authorities <sup>25</sup> | 5        | 4,500                               | 16,500                                |
| Landscaping <sup>26</sup>       | 150      | 10,000*                             | 50,000*                               |
| Sport clubs                     | 235      | 450                                 | 3480                                  |
| Golf course                     | 83       | 6,700                               | 22,400                                |
| Garden services                 | 91       | 1,350                               | 6,800                                 |
| Garden centers                  | ?        | 2,400                               | 36,000                                |
| <b>Total</b>                    |          | <b>34,000</b>                       | <b>147,780</b>                        |

The replacement of other products by green compost depends on the type of application. Each possible application of green compost (mulching, soil ameliorant, topsoil manufacture, topdressing or growing media) has different requirements about the quality and quantity of green compost. These variations have an effect on the final price of the compost and, therefore, on the final demand.

Currently, green compost expansion is being more successful in applications such as mulching and soil ameliorant. These applications have a lower quality requirement, which makes green compost a more competitive product.

On the other hand, applications such as growing media or topdressing have requirements about nutrient content and pH levels that green compost not always can meet. Therefore, in these applications peat-based products still are the first choice of the market.

<sup>25</sup> The grounds maintenance in two Local Authorities is carried out by landscaping companies. To avoid double counting the estimated use for these two LA's has been counted as being used by the landscaping sector.

<sup>26</sup> \* This data is an estimation as only 6.7% of landscaping companies participated in the survey. 6.7% is below the minimum threshold of 10% necessary to consider the data representative.

The volume of green compost demanded for each application varies in each market sector. For instance, land reclamation projects can use significant amounts of compost as soil ameliorant but nearly nothing as growing media.

Land reclamation represents a realistic end market for huge amounts of green waste in the short and medium term. Yet, it has to be carefully monitored as completion or initiation of big projects can create serious imbalances between offer and demand.

Local authorities have the potential to use significant amounts of green compost. There are Local Authorities successfully using green compost in every application but growing media, with an annual consumption of 3,500m<sup>3</sup>.

Landscaping is the sector with mayor potential demand. The relatively low current demand is mainly due to the fact that this sector is highly reactive to their clients' demand. That is, they will not use new products with higher or similar cost if their clients do not request them.

Golf courses are increasing steadily the consumption of green compost for mulching and topdressing. However, the lack of information about nutrient content and pH level in PAS100 compost is a mayor barrier to increase it use. Sport clubs and garden services are in a similar situation.

Garden centre is the market sector with the current lowest demand. They mainly commercialise high performance blends which usually are peat-based products. When quality becomes a mayor factor PAS100 compost can not compete with peat-based blends.

## **Recommendations**

1. "On farm" composting facilities, where farmers receive a gate fee to process the green waste, and then use it for free or sell it to other local farmers, rather than purchase it from a commercial producer can increase the use of green compost in agriculture. Farmers can also benefit from lower transport cost, making the use of green compost more attractive. A feasibility study to further asses this option should be undertaken.
2. Land restoration projects should be carefully timed so as there are not sudden variations on green compost demand from this market sector.
3. Local authorities and other public bodies (e.g. colleges & universities) should be actively encouraged by the Scottish Executive to consider green compost as the "first choice" in their landscaping activities. In case private companies are hired for this task the use of green compost should be included in the contracts. This would have a positive effect on landscaping and gardening companies, which would be forced to include green compost use in their bids.
4. The replacement of peat-based products with green compost as a way to offset carbon emissions should be further analysed and a standard CO<sub>2</sub>-offset value should be provided by the Scottish Executive. This would give to green

compost a mayor marketing advantage over peat based products. Every year more companies and individuals are trying to become “carbon neutral”. Highlighting the environmental benefits of green compost may be a mayor driver to increase it use.

5. BSI PAS 100 standard should be further developed to include information about nutrient content (NPK) and pH level. This information is vital to increase green compost use in high performance applications such as topdressing or growing media. Gardeners and green keepers need this information to manufacture tailored blends with specific applications, a common practice in their profession. These professionals highlighted this lack of information as a barrier to further increase the use of green compost.

## ANNEX I Compost Standards

This lack in compost standards has been shown to be a significant barrier to the marketing of compost products derived from green waste. Work by the Composting Association and WRAP (Waste Resources Action Programme) has led to the development of the basic compost standard PAS 100.

### COMPOST CHARACTERISTICS AND QUALITY

WRAP also showed that the characteristics and quality of composted products were strongly related to the feedstock materials that had been processed. By managing the process and introducing control measures the quality of the finished product could be affected, thereby attenuating most risks and hazards.<sup>27</sup>

| Hazard   | Attenuation during composting                    | Other controls  |
|--|--|---|
| <b>Animal/Human Pathogens</b>  | Composting process conditions (time/temperature) | Selection of feedstock, containment                                       |
| <b>Plant Pathogens</b>   | Composting process conditions (time/temperature) | Selection of feedstock  |
| <b>Potentially Toxic Elements (PTE's)</b>                            | Not attenuated                                   | Selection and blending of feedstock                                       |
| <b>Contras &amp; Sharps</b> (e.g. glass, metal, plastics)            | Not attenuated                                   | Selection of feedstock, Pre-treatment screening, Post-treatment screening |
| <b>Pernicious weeds</b>  | Composting process conditions (time/temperature) | Selection of feedstock  |
| <b>Phytotoxicity</b> (toxic organic chemicals limiting plant growth) | Composting process conditions optimisation       | Selection and blending of feedstocks                                      |

<sup>27</sup> *Research & Analysis of the Market Potential for lower grade composted materials in the UK, WRAP (2002)*

## Compost Standards

BSI PAS 100 for composted materials was sponsored by the Waste Resources Action Programme (WRAP) and developed by The Composting Association (TCA). It was prepared and published by the British Standards Institution (BSI).<sup>28</sup>

BSI PAS 100 specifies the minimum requirements for the selection of input materials, process of composting and the quality of composted materials, in addition to marking and information labelling of the product. BSI PAS 100 only covers biodegradable materials that have been kept separate from non-biodegradables (source-separated), and applies to composted materials produced at centralised, on-farm and community composting facilities.

TCA has adopted BSI PAS 100 as the specification that composted materials must meet in order to achieve the independently verifies Composting Association accreditation and use of the TCA logo.

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### Key Elements covered by BSI PAS 100

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| Key Element                                | Summary Description   |
|--|---|
| <b>Process Control</b>                     | <ul style="list-style-type: none"><li>• A process control system supported by accurate record keeping and document control procedures must be in operation throughout the composting process, and must be regularly reviewed/updated</li><li>• The process control system must use composting and product batch codes to ensure identification of composting material through the process</li><li>• Compost Producers must have a clearly defined quality policy and all staff must be appropriately trained and supervised</li></ul> |
| <b>Input Materials</b>                     | <ul style="list-style-type: none"><li>• Criteria must be established for the acceptance or rejection of input materials arriving at the site for composting</li><li>• Activities for the storage and preparation of input materials must be recorded</li></ul>  |
| <b>Composting Activity – sanitisation</b>  | <ul style="list-style-type: none"><li>• All input materials must be sanitised in a defined and identifiable phase</li><li>• Temperature checks must take place every working day during the sanitisation phase</li></ul>  |
| <b>Composting Activity – stabilisation</b> | <ul style="list-style-type: none"><li>• Procedures to achieve stabilisation of all material composted must be followed. In the absence of a validated stabilisation test, a maturity test can be used to indicate compost stability</li></ul>   |
| <b>Compost quality requirements</b>        | <ul style="list-style-type: none"><li>• Limits for human pathogens (indicator species), potentially toxic elements (PTE's), physical contaminants, phytotoxins and weed propagules must not be exceeded</li></ul>   |

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<sup>28</sup> PAS 100 – Specification for composted materials, BSI (2002)

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|  |   |
|--|---|
| <b>Product Preparation</b>               | <ul style="list-style-type: none"> <li>• The standard operating procedure for composting and product preparation must be set down in writing</li> <li>• Criteria for composted material unsuitable for product preparation must be established; the options for distribution, treatment or disposal set out and such decisions recorded when the product is unsuitable</li> </ul>     |
| <b>Compost Sampling and Analysis</b>     | <ul style="list-style-type: none"> <li>• Compost must be sampled and tested as close to distribution time as possible; after any product preparation that creates one or more grades and prior to blending with any other materials</li> <li>• Detailed records of sampling must be kept</li> </ul>   |
| <b>Final Product Storage</b>             | <ul style="list-style-type: none"> <li>• Provision must be made for final product storage including: storage location, conditions and product identification</li> </ul>   |
| <b>Classification of Compost</b>         | <ul style="list-style-type: none"> <li>• Compost produced must be classified as one of the following products: soil conditioner; mulch; growing medium; growing medium constituent; turf dressing; turf dressing constituent; top soil constituent (manufactured); biofilter; biofuel; other (to be specified by the producer)</li> </ul>   |
| <b>Informative Labelling and Marking</b> | <ul style="list-style-type: none"> <li>• Compost products must be clearly labelled with, or accompanied by the following information: product type; grade; quantity; moisture content; product batch code; storage instructions; instructions for use; advice on risks and precautions appropriate for safety; health and safety guidance; contact details of the producer</li> </ul> |
| <b>Marking</b>                           | <ul style="list-style-type: none"> <li>• All consignments of compost must be accompanied with packaging or documentation containing the following information: name, identification and trademark of the producer; product type; statement of conformity with BSI PAS 100: 2002</li> </ul>  |
| <b>Monitoring and Traceability</b>       | <ul style="list-style-type: none"> <li>• Processes for monitoring, product identification and control of non-conforming composting material must be in place</li> </ul>   |

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## ANNEX II Questionnaire

**Horticulture/Landscape/Turf Sectors**

**Date:**.....

**Name of Organisation:**

.....

**Address:**

.....

.....

.....

**Contact Name:**.....

**Position:**.....

**Type of business:**.....

What types of projects are you involved in? (*Circle all that apply*)

Parks maintenance  
course maintenance

General landscaping

Golf

.....  
Reclamation/remediation

Sports/athletic pitches

Estate maintenance  
Other?

Road construction

Do you employ landscape architects / soil specialists, or contract them from private companies for specific projects?

.....

Please list the contacts

.....

.....

.....

Do you have any experience of green/recycled products?

Yes

No

**If Yes:**

What specific type(s) of green compost/soil amendments do you use and for what application?

.....

Are you able to obtain the quantity and quality of green compost you require?

Yes

No

Which factors would get you to buy more?

.....

.....

.....

Which of the following organic materials do you currently use?

|                            | Organic Material      | Volume used/sold | Cost | Retail Price |
|----------------------------|-----------------------|------------------|------|--------------|
| <b>Traditional Compost</b> | Growing media         |                  |      |              |
|                            | Virgin topsoil        |                  |      |              |
|                            | Topsoil blends        |                  |      |              |
|                            | Mulch                 |                  |      |              |
|                            | Compost (type)        |                  |      |              |
|                            | Compost (type)        |                  |      |              |
|                            | Peat                  |                  |      |              |
|                            | Peat-reduced products |                  |      |              |
|                            | Top-dressings         |                  |      |              |
|                            | Other                 |                  |      |              |
| <b>Green Waste Compost</b> | Green Waste Compost   |                  |      |              |

Who are your current suppliers?

.....  
.....  
.....

Do you have any concerns about using green compost? If so, please specify:

.....  
.....  
.....

What characteristics would green compost need to have in order for you to use it?

.....  
.....  
.....

Which characteristics would you want to avoid?

.....  
.....  
.....

Are you involved in compost production?

Yes

No

**If Yes:**

Do you distribute /sell the product?

.....

If so, in what form?

**Bulk**

**Bags**

**Both**

Who are your primary customers?

.....

Do you have any concerns about the use of kitchen waste-derived composts? (Please elaborate)

.....  
.....  
.....

Any further comments?

.....  
.....  
.....

## ANNEX III Compost Benefits

The information provided in this Annex has been obtained from the “Compost specifications for the landscape industry”. The document has been created by the Landscape Institute in association with WRAP & NBS.

### 1.1 Nutrient Supply

Compost contains significant quantities of macronutrients, such that the additional application of phosphate and potash fertilizers often becomes unnecessary. However, nitrogen levels are not always high enough in compost to meet the nutrient requirements of certain plant species (e.g., grasses). Therefore, it is necessary in these instances to apply supplemental inorganic nitrogen to provide adequate nutrients for optimal plant growth, but still at a reduced rate - reducing fertilizer costs. Composts typically provide nitrogen and phosphate in a slow-release form, and provide potash in a readily available form. Unlike inorganic nitrogen fertilizers, much of the nitrogen in compost is not subject to leaching over winter. Compost may therefore be applied in the autumn and a majority of the nitrogen will remain in the soil to benefit plants in the following years.

Other primary nutrients are also provided by composts, such as calcium, magnesium and sulphur, as are a full range of minor nutrients or trace elements (e.g., zinc, copper, manganese and boron). Many conventional fertilizers do not contain trace elements, and products which do include them are relatively expensive. As they are needed in small quantities, applications of trace elements are not required when using compost in planting schemes. The calcium in compost also provides a small liming effect (it has up to 10% of the neutralising value of limestone on a dry matter basis), so 30 tonnes of fresh compost may be as effective as 2 tonnes of limestone. The composition of compost will vary according to the characteristics of the feedstocks used in its production and the extent to which they have been composted.

Composted garden materials tend to be lower in available nutrients than compost made from animal manures and kitchen materials. The application rate of compost may need to be lowered when products possessing a higher nutrient content are used.

### 1.2 Reduced nutrient losses and improved cation exchange capacity

Light textured soils (in the sandy categories) possess low cation exchange capacities (CEC) and adding compost raises the CEC of these soils. This enables the soil to better hold onto nutrients, such as potash and nitrogen, which would otherwise leach beyond the rooting depth.

### 1.3 Better plant survival and growth

Although ideal soil conditions are found under long-term grassland and woodland areas, most landscapers have to deal with very poor soil conditions. Most landscape trees and shrubs have been selected to tolerate poor soil conditions, but they cannot tolerate compacted soils or seasonal waterlogging. Organic matter is therefore required to improve soil conditions, providing benefits outlined within this section of the manual. Good growth during plant establishment, and sustained growth and plant quality need adequate levels of organic matter in the soil. It has been found that additional nitrogen fertilizer alone cannot compensate when the organic matter is low. This may be because landscape plants, many of which are not native, need to establish rapidly. Enhanced root colonization requires both an adequate quality (good physical conditions) and volume of soil. These conditions allow for rapid root growth, necessary to explore the soil for nutrients and water.

Humus content plays a central role in soil structural stability and aggregation, and the addition of organic matter will encourage the formation of stable aggregates in the soil. This increases the number and size of the pore spaces in the soil, enhancing the rate at which water can be absorbed, and also increases the volume of air and water that the soil can hold. The application of organic matter in the form of compost will therefore improve soil structure, reducing bulk density and improving moisture percolation, thereby providing a more suitable rooting environment for plant growth. While percolation is improved, so is the soil's water holding capability, making water available for a longer period of time in dry conditions. In addition, the dark colour of compost can lead to soil temperature raising effects, thus enhancing seed germination and improving growth rates in cool conditions.

The organic matter in many landscape soils may often be less than 2%, for example on brownfield sites. However, for good plant growth, rooting conditions in the soil need to be favourable. Plant roots require air, water and nutrients, plus a firm anchor to support the top growth. Soil organic matter is essential for the provision of these elements and should be raised to at least 4 – 5%, and higher for some soils, depending on soil texture. Compost is able to provide organic matter in a relatively stable form that can raise the soil organic matter levels and provide benefits described, resulting in improved plant survival, growth, quality of plants and cost savings.

### 1.4 Reduction in soil compaction

Many experiments have shown that organic matter improves the aggregate strength of soils. This means that the soil can better resist compaction and that roots can penetrate more easily to find nutrients and water. Heavy soils are also more easily worked (improved tilth) when the soil organic matter is high.

### 1.5 Improvement in soil water holding capacity

As one of the overall benefits of improved soil structure, the infiltration of rainfall and irrigation water is improved, as is soil water holding capacity - especially on light soils. Light soils retain more moisture over a longer period. Therefore the need or frequency of watering after planting can be reduced, leading to savings in labour. Plant survival is also improved leading to lower maintenance costs.

### 1.6 Control erosion and weeds (by mulching with compost)

Compost mulches act as a physical protective barrier to the soil surface. They can provide enormous benefits to landscape plantings through weed control (when a coarse particle size grade is used), moisture conservation, moisture percolation and erosion control. Chemical herbicides can be expensive and damaging to the environment, and herbicide resistance is increasingly commonplace. Therefore, compost mulches provide an inexpensive, environmentally-safe means of weed control which also reduce costs and labour inputs. In addition to their direct benefits, compost mulches act as a soil improver as they degrade over time, and are incorporated into the site soil.

### 1.7 Microorganisms increase soil aggregation, recycle nutrients and suppress soil borne diseases

The organic matter in compost is populated by microorganisms which supplement those already present in the soil. The microorganisms utilise organic matter as an energy source and release polysaccharides and humic substances that help form soil aggregates and improve the structure of soil.

Microorganisms cycle nutrients in the soil and release nutrients to plants from organic matter. Annual applications of compost can lead to a significant increase in soil enzyme activity. This specific activity affects nutrient turnover cycles.

Soil borne plant pathogens may be suppressed when specific types of microorganisms are present in large enough populations in the soil. This suppression may be caused by a combination of factors such as competition, antibiosis, parasitism, and induced systemic resistance in plants. These beneficial microorganisms are found in many composts. Plant losses due to soil borne diseases can be substantial, expensive and often visually unattractive. Landscapers have been encouraged to use chemical measures in the past, but attitudes are changing to these management practices. Alternative, non-chemical methods are increasingly being sought. Mature composts are biologically active and contain a complex mix of microorganisms which have been shown to suppress a range of plant pathogen species including *Phytophthora*, *Pythium* and *Rhizoctonia*.

### 1.8 Cost benefits

Although compost purchase and application is a cost to a landscape project, the benefits of using compost have cost-saving implications. As organic matter and nutrients are added in one product this reduces the risk of error in the separate application of fertilizers. Fertilizer costs can be reduced as compost contains most of the nutrients required by plants for many situations. When used properly, compost can aid the survival of plants in a planting scheme, saving replanting costs. This is because the soil improvements mean that light soils will hold more water for plant survival through dry periods, and heavy soils will have a better soil structure to aid root growth.

Compost mulches (coarse particle size grade) applied to beds and around trees can save herbicide costs and reduce the competition caused by weeds. Composts also often contain beneficial microorganisms that can help suppress plant diseases which can reduce the survival of newly planted specimens.