Compost Specifications for the Landscape Industry

The Compost Specifications for the Landscape Industry manual was developed by the Waste and Resources Action Programme, in conjunction with The Landscape Institute, as part of its commitment to the development of sustainable markets for composted materials. Many other individuals and companies also made this publication possible, including the British Association of Landscape Industries (BALI) and the National Building Specifications (NBS), a major supplier of industry specifications.

Additionally, thanks go out to the projects internal review and project team: Louise Hollingworth (WRAP’s Project Manager), Emily Nichols (Technical Manager, The Composting Association), Tom La Dell (Tom La Dell Landscape Architects), Tim O’Hare (Soil & Land Consultants), Phil Wallace (Enviros’s Project Manager) and Ron Alexander (Enviros’s Technical Leader).

Thanks is also given to NBS for allowing excerpts from their various landscape and topsoil specifications to be published within this manual, and for the use of their format for the new Topsoil Manufacture Specifications. Their copy written text can be found in Section 3.2, and should not be copied without their explicit approval.

NBS, part of RIBA Enterprises Ltd has produced the National Building Specification since 1973. It is the UK standard specification system with around 5,000 subscribing offices. Responding to the needs of the Landscape industry, a dedicated service – NBS Landscape – was launched in 1998. Now, around two-thirds of landscape architects’ practices subscribe.

NBS saves the user time and makes it easy to produce comprehensive and accurate specifications. This continues to be NBS’ focus, using the latest software technologies to make specification writing even quicker and more assured. More services are also being developed to help administration of project documentation and improve communication and integration between different members of the design team.

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WRAP (the Waste & Resources Action Programme) is a national Government programme established to promote sustainable waste management by tackling the barriers to waste minimisation and increased recycling.

For more information go to www.wrap.org.uk or phone 0808 100 2040.
Letter to Landscape Architects:

Your industry's major trade organizations, along with individuals working within the industry, and experts in composting and compost use, have teamed up with WRAP (Waste and Resources Action Programme) to complete this manual and provide landscape architects, amenity horticulturists, landscape contractors and garden designers with a tool which will allow them to use compost effectively.

Since ‘true’ composts are typically produced from recycled biodegradable (organic) materials, and composting is growing at a great pace in the UK, greater volumes of compost are becoming accessible to the landscape industry. As such, landscape architects will be approached more frequently to specify it, instead of virgin products (e.g., peat, topsoil) and existing soil ameliorants (e.g., mushroom compost). In both Europe and North America, the growth of the composting industry has been a boon to the landscaping and related industries, providing it with products that are not only effective and economical, but also annually renewable.

A tremendous amount of information is available worldwide, as well as in the UK, related to the use of compost in landscaping, and its use has been proven over the past 20 years. However, since ‘true’ composts (a soil ameliorant produced using the composting process) are only now becoming available in large volumes in the UK, the goal of this manual is to familiarize landscape architects with compost and illustrate how it can best be utilised in specific landscape applications. Although the manual may not answer all questions posed by individual landscape architects, it will increase the overall level of understanding within the industry. The information provided encompasses the best and latest science pertaining to the subject of compost use. In saying this, the knowledge base within this field continues to grow every year.

In order for UK landscape architects and landscapers to have the same success that other landscape professionals have had using compost, it is important for the industry to understand how to properly specify its use, as well as specify a product that is fit for purpose. Experience has shown that, when quality compost is properly specified and used, landscapers and landscape architects continue to use it over and over again (because it works!). We also know that landscape architects are pursued on an ongoing basis to specify many types of new products, and they only have a limited amount of time to allocate to learn about new products. That is why we have placed additional compost related information in this manual. To both quicken progress up the ‘learning curve’ and provide a concise body of information.

We hope you find this manual helpful, and will consider specifying compost – a high quality and renewable product.

Thank you.
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Letter to Landscape Architects

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Introduction and General Information

Compost has proven to be an important product to the landscaping industry in many countries. In many ways it fills a ‘product void’, providing a bulk soil ameliorant that can be supplied in large volumes, while maintaining product consistency. It is also unique in that it is manufactured under controlled and scientifically monitored conditions. Compost is also an extremely versatile product that can improve the physical, chemical and biological characteristics of the soil. It is often used in general soil preparation for garden and turf establishment, in outdoor planter media, as a turf top dressing (maintenance) and mulch, as well as a main constituent in manufactured topsoils. Also, the use of compost in landscaping and topsoil treatment practices, as a soil ameliorant, has been more thoroughly researched than any of its competing products.

To assist you in the specification and use of compost, this manual provides information on the following subjects:

- Benefits of Compost Use (Section 1, page 06)
- Importance of compost usage in the UK (Section 2, page 09)
- Numerical product specifications for various landscape applications (Section 3, page 10)
- Procedural specifications for landscape compost (Section 3, page 14)
- Related background and guidance data (Section 4, page 50)
- Sourcing and using compost (Section 4, page 52)

The information provided within will allow landscape architects to specify compost in most landscape applications. In saying this, there will also be situations (e.g., topsoil manufacturing) where additional technical assistance will be necessary. In those instances, it is always suggested that consultancy assistance be obtained. It should also be mentioned that on certain projects, modification of the procedural specifications may be required, and numerical product specifications may need to be tightened. Of course, it is important that this not be done arbitrarily, but based on sound technical information.
1 Benefits of Compost Use

A great deal has been learned over the last 20 years about how the addition of organic matter affects the soil, as well as the benefits of different types of organic matter. Within this section the primary benefits of compost as an organic matter source are described together with an explanation of why compost is often better than other forms of organic matter for landscape applications.

Soils that require landscaping are often situated on land that has suffered from prior human and industrial use. The topsoils may have been substantially disturbed from their natural condition and they and their subsoils may have poor structure, often compacted. As a result, plant growth on such sites would be severely restricted unless remedial action is undertaken. This document sets out guidance on how soil preparation in conjunction with the correct application of compost can be used to alleviate the poor soil conditions, resulting in benefits in terms of plant establishment and growth, and cost savings.

Organic matter content in soil is essential for soil structure, water holding properties, microbial activity and overall soil health. Compost is an excellent source of organic matter for landscape soils. It's major benefits relate to its content of organic matter, which can both improve soil structure and supply nutrients. It increases the productivity of soils, while reducing plant losses through its many benefits, as listed in Figure 1 below:

- Nutrient supply
- Reduced nutrient losses and improved cation exchange capacity
- Better plant survival and growth
- Reduction in soil compaction
- Improvement in soil water holding capacity
- Control erosion and weeds (by mulching with compost)
- Microorganisms increase soil aggregation, recycle nutrients and suppress soil borne diseases
- Cost benefits

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.

On light soils, the risk of erosion from wind and water is high. This is especially true where organic matter levels are low and soil aggregation is poor. Compost used as a soil mulch reduces the energy of wind and rain on the soil and improves moisture percolation, both of which will reduce erosion.
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.

“Compost has high nutritional benefits that result in a noticeable reduction of plant wastage compared to other non-compost products.”

Chris Allen, Curator, Compton Acres
2 Importance of Compost Use to the UK Landscaping Industry

The growth of the composting industry is occurring at a time when environmental pressures are pushing for the reduced extraction and utilization of peat and when the popularity of bark based products has caused a shortage in supply. Further, most landscapers will admit that it has become increasingly more difficult to locate high quality topsoils to use on their projects, and that soils have become more expensive to purchase. It should also be noted that many landscape architects, as well as other green industry professionals, are finding it less acceptable to harvest soil from historically agricultural lands, only to sell it off as topsoil.

The development of previously used land (‘brownfield’ sites) will be a continuing feature of future development. Most of these sites have no or very degraded topsoils. Large savings can be made in the development of brownfield sites if the topsoil is manufactured ‘on site’ using site subsoil and imported compost for the organic matter. The effective and economic use of materials is an important indicator of sustainable development.

The production and availability of ‘true’ composts has increased significantly in the UK, coinciding with the adoption of national recycling targets and European environmental law. While compost availability has already expanded, supply will continue to grow over the next 20 years. Additional composting facilities and greater volumes of finished product will lead to a broad based availability of compost throughout the UK. Increases in production volumes should keep the overall cost of compost stable for the foreseeable future, and since it is essentially a product derived from secondary resources, the supply of product will continue to grow (unlike other products which will become less available, or which will continue to degrade in quality). Also, as the UK composting industry has continued to mature, it has learned how to produce consistent, high quality products, that are fit for purpose, as well as a variety of blended products.

So, as has been discussed earlier, the use of ‘true’ composts has already been proven within the UK landscaping industry in a variety of applications, and research and ‘field’ usage has demonstrated that composts possess a broad array of agronomic benefits. As important, by using compost to improve the overall soil health, sustainable landscapes are being created which will require fewer inputs over time and which will have the ability to better persist in times of environmental stress.
3 Landscape Specifications for Compost and Compost Use

In any specification for a landscape related product, both numerical product specifications and procedural (instructional usage) specifications are necessary. This allows for the specifications to clarify the characteristics of an acceptable product, as well as how that product is properly or most effectively used. This specific information is provided within this section.

3.1 Numerical Product Specifications

Within this section, a general description of compost is provided, together with a series of numerical product specifications which correspond to specific landscape applications for compost. These product specifications should be used along with the procedural specifications, given in Section 3.2 which were developed in a NBS format. One, or more, of the product specifications should be used along with the procedural specifications, where appropriate, based on the type of product required (e.g., soil ameliorant, mulch, topdressing).

Please note that the product specifications are meant to be voluntary in nature, as they are not associated with any UK regulation. However, they are meant to be specified by landscape architects as ‘required’ specifications for any project in which they are used.

Using the Numerical Product Specifications

In order to use the series of numerical product specifications effectively, it is necessary to understand the approach to their development, and that this approach has been followed through within the guidance given. Key aspects considered are given below, and should be taken into account when using the specifications.

- Compost/Soil Analysis - obtaining test analysis results for both the compost products specified and the soils to be planted should be the normal procedure in landscaping and landscape design. Providing compost test analyses is required of the supplier under PAS 100. Use of this data to consider specific compost and soil suitability will allow landscape architects to better meet the goals of their project or customer. Whenever possible, a soil analysis (to BS 3882) should be completed by a reputable laboratory before any soil preparation procedures are begun. Further, it is helpful to test the soil once the compost is incorporated, in order to evaluate if further nutrient or pH adjustment is necessary, and whether the soil quality improvement goals were met.

- Application Rates - the numerical product specifications were developed assuming that specific application rates, as outlined in the latter part of this section, will be used. They also assume that the appropriate plant species are used (based on indigenous soil and climatic conditions), and that the compost is applied in a reasonable time period before planting.

- Feedstock Dependant Specifications and Preferences – the numerical product specifications were developed to be feedstock independent. This was done in order to simplify the specification of compost, while assuring product quality. Therefore, a series of composts (produced from source-separated feedstocks) could be produced, and then used within the scope of these specifications. With this said, it is understood that a landscape architect may prefer to use one type of compost (e.g., garden vs. kitchen materials based) over another.

- Technical Assistance – if you are unfamiliar with compost or are not trained in soil science, then additional assistance may be required for using compost on a specific project. This is often the case anyway, when existing soil conditions need to be improved on a project site. Don’t be afraid to obtain outside assistance, but make sure that your advisor is familiar with compost, and its use in the intended application.

The numerical specifications build on the requirements of PAS 100 and are designed from experience to be used without amendment. However, there may be particular circumstances where a compost with characteristics outside the ranges shown may be used, or further requirements added.
Numerical Product Specifications for Landscape Compost

All composted products shall be produced to the British Standards Institution Publicly Available Specification – PAS 100 (October 2002). This specification covers the range of biodegradable materials used to make compost, their quality and traceability, the minimum requirements for the process of composting and the quality of the end product. The PAS 100 specification should be deemed as a minimum specification for compost. The compost supplied by the Contractor (compost supplier) shall be of a friable texture without excessive moisture, and shall not exceed the PAS 100 limits on stones, weed propagules, and physical and chemical contaminants, reproduced in the table below. The product shall contain no substances toxic to plants and possess no objectionable odours.

The Contract Administrator shall be provided with a representative sample of compost (5 litre minimum) and the most recent compost analysis, carried out on both PAS 100 required and specific horticultural parameters. In addition, where requested, the Contractor will arrange, at no extra cost to the Contract Administrator, an analysis to be conducted by an approved independent laboratory according to the methods specified in PAS 100, to determine physical, chemical and biological details of the compost to be used. In such instances, the supplier shall provide representative and clearly labelled product samples. The analysis will include determination of the characteristics listed in the specification tables below, as well as to those listed in PAS 100. Each specific source of compost must be separately analysed.

Where approval is given, the Contractor will ensure that all compost is equivalent to the approved sample.

Specifications in addition to PAS 100

PAS 100 sets out the minimum quality criteria for composted products. The specifications below for each end-use are required to be met in addition to the PAS100 requirements in order to ensure that the product is fit-for-purpose.
Soil improvement for general landscaping

Planting beds, tree, shrub and herbaceous planting, turf establishment

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
<th>Recommended Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
<td>7.0 – 8.7</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>2000 µS/cm or 200 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;25</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>99% pass through 25mm screen, 90% pass through 10mm screen</td>
</tr>
<tr>
<td>C:N Ratio</td>
<td></td>
<td>20:1 maximum</td>
</tr>
</tbody>
</table>

Top dress and grass maintenance

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
<th>Recommended Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
<td>7.0 – 8.7</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>2500 µS/cm or 250 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;25</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>100% pass through 10mm screen*</td>
</tr>
<tr>
<td>C:N Ratio</td>
<td></td>
<td>20:1 maximum</td>
</tr>
</tbody>
</table>

*On finer turf, those mowed to a lower height, a compost with particles that pass through 5 mm screen apertures may be required

Topsoil manufacturing

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
<th>Recommended Range</th>
</tr>
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<tbody>
<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
<td>6.5 – 8.7</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>3000 µS/cm or 300 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;25</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>95% pass through 25mm screen, 90% pass through 10mm screen</td>
</tr>
<tr>
<td>C:N Ratio</td>
<td></td>
<td>20:1 maximum</td>
</tr>
</tbody>
</table>

*If compost possesses a conductivity of above 2000 µS/cm or 200 mS/m, apply it at proportionally reduced application rate

Mulch

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
<th>Recommended Range</th>
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<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
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<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>3000 µS/cm or 300 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;30</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>99% pass through 75mm screen, &gt;25 pass through 10mm screen</td>
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</table>
The British Standards Institution’s Publicly Available Specification for Composted Materials Safety-Related Parameters and Limits
(PAS 100 specification)

<table>
<thead>
<tr>
<th>Contaminant Parameters</th>
<th>Reported as (units of measure)</th>
<th>Limits</th>
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<tr>
<td>Chemical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>mg/kg (ppm) dry matter</td>
<td>≤ 1.5</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>mg/kg (ppm) dry matter</td>
<td>≤ 200</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>mg/kg (ppm) dry matter</td>
<td>≤ 100</td>
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<tr>
<td>Lead (Pb)</td>
<td>mg/kg (ppm) dry matter</td>
<td>≤ 200</td>
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<tr>
<td>Nickel (Ni)</td>
<td>mg/kg (ppm) dry matter</td>
<td>≤ 50</td>
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<tr>
<td>Mercury (Hg)</td>
<td>mg/kg (ppm) dry matter</td>
<td>≤ 1</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>mg/kg (ppm) dry matter</td>
<td>≤ 400</td>
</tr>
<tr>
<td>Biological</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmonella spp.</td>
<td>MPN / 25 g</td>
<td>Absent</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>CFU g(^{-1})</td>
<td>≤ 1000 CFU g(^{-1})</td>
</tr>
<tr>
<td>Weed Seeds</td>
<td>Viable propagules/litre</td>
<td>≤ 5 maximum</td>
</tr>
<tr>
<td>Phytotoxicity</td>
<td>Score % of control</td>
<td>80% minimum</td>
</tr>
<tr>
<td>Physical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total glass, metal and plastic</td>
<td>% m/m air-dried sample &gt; 2mm</td>
<td>≤ 0.5</td>
</tr>
<tr>
<td></td>
<td>% m/m air-dried sample &gt; 2mm</td>
<td>≤ 0.25*</td>
</tr>
<tr>
<td>Stones and other consolidated mineral contaminants &gt; 2mm</td>
<td>% m/m air-dried sample</td>
<td>≤ 7</td>
</tr>
</tbody>
</table>

*It should be noted that the target limit for these specific contaminants should be zero, to near zero

[The Composting Association Certification Scheme provides a third-party, independent verification of conformity with BSI PAS 100. This is useful for quick and easy identification of products that comply with this PAS. Such products carry the Association’s certification mark on packaging and/or printed information accompanying or related to the product.]

At no cost to the Contract Administrator, the Contractor shall provide a suitably sized sample of the compost prior to importation. Where approved, all subsequent deliveries must match the source material approved. Samples shall be kept on site for inspection and comparison throughout the project.

Exceptions
Compost products that fall outside the above compost specification ranges should not automatically be considered to be of poor quality or unusable. Some of these products may simply need to be used in a different way (e.g., lower application rate, different soil conditions). A good example is compost that is too wet or too dry to meet the specifications. If too dry, and therefore dusty, then moisture may be applied to the product manually to adjust it upward. If too wet, and therefore unable to transport the maximum volume in a dedicated vehicle, then a compromise may be made to deliver extra compost for free to offset the higher haulage costs.
3.2 Procedural Specifications for Landscape Compost

As part of this manual, procedural specifications for the use of compost in the most commonly used of these applications have been provided in NBS format, namely:

- Seeding/turfing Q30
- External planting Q31
- Landscape maintenance Q35
- Topsoiling Q28
- Topsoil Manufacturing in-situ
- Topsoil Manufacturing ex-situ

In Appendix I of the report, the product and procedural specifications have been combined to create short version specifications, which have been designed to be more appropriate for use by landscape contractors. These short specifications are also provided in a separate BALI document.

“We have noticed an increase in plant growth when we use the compost as a soil conditioner on poor quality ground, and a decrease in the need for replanting. We use it on all our landscaping contracts as we think it offers our clients real value for money.”

Robert Moody, Managing Director, Jack Moody Ltd
Procedural Specifications

Format
The following are a series of procedural specifications for compost which were developed for landscape architects using a format marketed by National Building Specifications (NBS), which provides both specification clauses and guidance notes. Obviously, NBS formatted specifications are not the only specifications used within the UK landscape industry (see also the short specification versions in the Appendix I), as landscape architects or their consultants often create their own project specifications. However, since the NBS formatted specifications are so popular with UK landscape architects, they were chosen to be used in the example specs within this manual. In saying this, it is important to understand that the NBS specifications system provides general specification language, along with a variety of associated language options, which allow landscape architects to modify the specifications to meet their specific project requirements. The NBS does not try to dictate the specific aspects of the project specifications, instead they provide language and guidance notes for a variety of options, thereby allowing the landscape architect to make the appropriate choices. Further, their specs neither dictate, nor suggest the use of specific (proprietary) products or techniques. In contrast, however, the example procedural specifications found below include the use of compost throughout them in order to illustrate how compost may be pragmatically infused within a typical NBS formatted specification. This was done for educational purposes.

Permission has been granted by the NBS to publish excerpts from their specifications within this manual. All of their copy written text within this section of the manual is published in black (specification clauses), while the guidance notes and other specific compost related language is published in green and blue text, respectively. The copy written NBS text within this section should not be copied without explicit approval from the NBS. However, all of the information provided in coloured text within this section, as well as all other information within this manual, should be considered ‘in the public domain’, and therefore may be copied and redistributed.

The following procedural specifications should be used along with the numerical product specifications given in Section 3.1. One or more of these product specifications would be included along with the following procedural specifications, within a project’s specifications package.

Usage
The NBS format specifications were developed to illustrate to landscape architects how the use of compost could fit into the NBS, or other specification, format, and how its use affects the rest of the specifications (e.g., exclusion of additional fertilizers and lime in most cases). The specification clauses that are published in green refer specitically to compost related subject matter, and is highlighted for your convenience, while the blue text should be considered as guidance notes to the specification clauses. Suggested application rates for compost are provided within this text, which are based on the best and latest science, but actual project application rates must take into account project related conditions (e.g., plants to be established, soil and climatic condition). Relevant technical data related to these issues can be found in Appendix II.
### GUIDANCE NOTES

145 **Take note that the addition of compost may reduce the required frequency of watering.**

### SPECIFICATION CLAUSES

#### GENERAL INFORMATION/REQUIREMENTS

<table>
<thead>
<tr>
<th>115 SEEDED AND TURFED AREAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Growth and development: Healthy, vigorous grass sward, free from the visible effects of pests, weeds and disease.</td>
</tr>
<tr>
<td>• Appearance: A closely knit, continuous ground cover of even density, height and colour.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>120 CLIMATIC CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• General: Carry out the work while soil and weather conditions are suitable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>145 WATERING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Quantity: Wet full depth of topsoil.</td>
</tr>
<tr>
<td>• Application: Even and without displacing seed, seedlings or soil.</td>
</tr>
<tr>
<td>• Frequency: As necessary to ensure the establishment and continued thriving of all seeding/turfing.</td>
</tr>
</tbody>
</table>

#### PREPARATION

<table>
<thead>
<tr>
<th>205 PREPARATION MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• General: Free from toxins, pathogens or other extraneous substances harmful to plant, animal or human life.</td>
</tr>
<tr>
<td>• Certified materials: For each of the following materials submit a certificate giving supply source, content analysis, confirmation of suitability for purpose and confirmation of absence of harmful substances such as chemical, biological and physical contaminants.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>212 SEED BED CLEANING BEFORE SOWING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Operations: Remove weeds by hand weeding and hoeing. Kill pernicious weeds with selective contact herbicide.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>222 SOIL AMELIORANT FOR ALL SEEDED AND TURFED AREAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Type: Compost that conforms to the attached Numerical Product Specification for Landscape Compost.</td>
</tr>
<tr>
<td>• Supplier/Source: [Landscape Architect may name specific compost producer].</td>
</tr>
<tr>
<td>• Reference/Description/Grading: Compost shall be produced from biodegradable materials and shall fall within the recommended ranges for the horticultural parameters outlined in the attached specification table, as well as fall within the limits for contaminant parameters in PAS 100. Coverage: Uniformly apply a [Landscape Architect to specify] mm layer over the area to be treated.</td>
</tr>
<tr>
<td>• Timing: Apply prior to cultivation.</td>
</tr>
</tbody>
</table>
In almost all landscaping applications, the addition of pre-plant fertilizer can be eliminated when a stable compost is applied at recommended rates. A 50 mm layer of a 'typical' compost will supply up to approximately 200-400 kg/ha of Nitrogen, 380 kg/ha of Phosphate, and 1,200 kg/ha of Potash the first year after application. Therefore, always modify fertilizer application rates based on current soil conditions, available nutrients in the compost, and plant species requirements. In saying this, however, where the compost contains a lower nutrient content, high nutrient requiring species are to be established, or when the compost possesses a relatively high Carbon to Nitrogen ratio (over 20:1), additional nutrition (fertilization) may be required.

In the UK, it is estimated that 10-20% of the nitrogen found in the compost will be available to the grass during the first year following application. Estimate compost nitrogen at 10% or less if the compost has a C:N ratio of 15:1 or higher, and 20% if the C:N ratio is lower. Assume that compost phosphorous and potassium will be available similarly to their chemical fertilizer forms.

---

**231 PEAT**
- Peat or products containing peat: Do not use.

**250 INCORPORATION OF COMPOST AND CULTIVATION**
- Compacted topsoil: Break up to full depth (400mm, where possible).
- Cultivation: To a minimum depth of 150 mm, once compost has been applied.
- Material brought to the surface: Remove stones and clay balls larger than 50 mm in any dimension, roots, tufts of grass, rubbish and debris.

**260 GRADING**
- Topsoil condition: Reasonably dry and workable.
- Contours: Smooth and flowing, with falls for adequate drainage. Remove minor hollows and ridges.

**270 FERTILIZER FOR ALL SEEDED AND TURFED AREAS**
- Location: [Landscape Architect to specify].
- Types: As recommended by soil test.
- Application: Before final cultivation and three to five days before seeding/turfing.
- Coverage: [Landscape Architect to specify].

---

**280 FINAL CULTIVATION**
- Timing: After grading and compost addition.
- Seed bed: Reduce to fine, firm tilth with good crumb structure.
- Depth: 25 mm.
- Surface preparation: Rake to a true, even surface, friable and lightly firmed but not over compacted.
- Remove surface stones/earth clods exceeding:
  - General areas: 50 mm.
  - Fine lawn areas: 25 mm.
- Adjacent levels: Extend cultivation into existing adjacent grassed areas sufficient to ensure full marrying in of levels.
Topdressing compost should meet the specifications of a general landscaping compost, but be more finely screened (100% passing through 10 mm screen apertures).

Modify fertilizer application rates based on current soil conditions, available nutrients in the compost, grass/turf species requirements and site activity level.

<table>
<thead>
<tr>
<th>SEEDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>310</td>
</tr>
<tr>
<td>• Supplier: [Landscape Architect may specify supplier].</td>
</tr>
<tr>
<td>• Mixture: [Landscape Architect to specify].</td>
</tr>
<tr>
<td>• Rate of application: [Landscape Architect to specify] g/m².</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOWING/HYDRAULIC SEEDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• General: Establish good seed contact with the root zone to promote healthy, consistent growth.</td>
</tr>
<tr>
<td>• Method: To suit soil type, proposed usage of grassed area, location and weather conditions during and after sowing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOWING SEASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Grass seed generally: [Landscape Architect to specify].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TURFING</th>
</tr>
</thead>
<tbody>
<tr>
<td>405</td>
</tr>
<tr>
<td>• Supplier: Turfgrass Growers Association (TGA) member, to TGA quality standards.</td>
</tr>
<tr>
<td>• Seed mixture: [Landscape Architect to specify].</td>
</tr>
</tbody>
</table>

Topdressing compost should meet the specifications of a general landscaping compost, but be more finely screened (100% passing through 10 mm screen apertures).

<table>
<thead>
<tr>
<th>TURFING GENERALLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use industry standard turf laying and establishment techniques</td>
</tr>
<tr>
<td>• Dressing:</td>
</tr>
<tr>
<td>- Use compost (that conforms with the attached Numerical Product Specification for Landscape Compost), or a compost/sand/soil mix that is finely screened (100% passing through 10 mm screen apertures).</td>
</tr>
<tr>
<td>- Brush well in to completely fill all joints.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FIRST CUT OF GRASSED AREAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use industry standard techniques</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLEANLINESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Soil and arisings: Remove from hard surfaces.</td>
</tr>
<tr>
<td>• General: Leave the works in a clean, tidy condition at Completion and after any maintenance operations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAINTENANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>605</td>
</tr>
<tr>
<td>• Duration: Carry out the operations in clauses 610 to 685 from completion of seeding/turfing until [Landscape Architect to specify].</td>
</tr>
</tbody>
</table>

Modify fertilizer application rates based on current soil conditions, available nutrients in the compost, grass/turf species requirements and site activity level.

<table>
<thead>
<tr>
<th>FERTILIZER FOR ALL SEEDED AND TURFED AREAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• March application: Apply fertilizer as recommended by soil test results.</td>
</tr>
<tr>
<td>• September application: Apply fertilizer as recommended by soil test results.</td>
</tr>
</tbody>
</table>
## GUIDANCE NOTES

**145**

Take note that the addition of compost may reduce the required frequency of watering.

## SPECIFICATION CLAUSES

### GENERAL INFORMATION/REQUIREMENTS

#### 112 SITE CLEARANCE
- **General:** Remove rubbish, concrete, metal, glass, decayed vegetation and contaminated topsoil.
- **Stones:** Remove those with largest dimension exceeding 25 mm.
- **Contamination:** Substances injurious to plant growth including subsoil, rubble, fuel, and lubricants.
- **Vegetation:** Complete as required using mechanical and chemical techniques.
- **Large roots:** Grub up and dispose of without undue disturbance of soil and adjacent areas.

#### 118 SOIL CONDITIONS
- **Soil for cultivating and planting:** Moist, friable and not waterlogged.
- **Frozen or snow covered soil:** Give notice before planting. Provide additional root protection. Prevent planting pit sides and bases and backfill materials from freezing.

#### 120 CLIMATIC CONDITIONS
- **General:** Carry out the work while soil and weather conditions are suitable. Do not plant during periods of frost or strong winds.

#### 125 TIMES OF YEAR FOR PLANTING
- **As per industry standards**

#### 145 WATERING
- **Quantity:** Wet to full depth of soil profile.
- **Application:** Even and without damaging or displacing plants or soil.
- **Frequency:** As necessary to ensure establishment and continued thriving of planting.

#### 165 PREPARATION, PLANTING AND MULCHING MATERIALS
- **General:** Free from toxins, pathogens or other extraneous substances harmful to plant, animal or human life.
- **Certified materials:** For each of the following materials submit a certificate giving supply source, content analysis, confirmation of suitability for purpose and confirmation of absence of harmful substances such as chemical, biological and physical contaminants.
  - Give notice before ordering or using

#### 200 PLANTS/ TREES - GENERAL
- **Meet industry standards**

**EXTERNAL PLANTING - NBS Specification Q31**

To be read with Preliminaries/General conditions.
Lime is typically not required in UK soils, and especially where compost has been applied. Typical composts contain 1.25 – 2.5% Calcium. Research has shown that each dry tonne of compost has the neutralising value of 0.1 tonne of chalk.

In almost all landscaping applications, the addition of pre-plant fertilizer can be eliminated when a stable compost is applied at recommended rates. A 50 mm layer of a 'typical' compost will supply up to approximately 200-400 kg/ha of Nitrogen, 380 kg/ha of Phosphate, and 1,200 kg/ha of Potash the first year after application. Therefore, always modify fertilizer application rates based on current soil conditions, available nutrients in the compost, and plant species requirements.
In saying this, however, where the compost contains a lower nutrient content, high nutrient requiring species are to be established, or when the compost possesses a relatively high Carbon to Nitrogen ratio (over 20:1), additional nutrition (fertilization) may be required.

| 359 PEAT | Peat or products containing peat: Do not use. |

For most projects, uniformly apply a 25-50 mm layer of compost over the area to be treated, (2.5 – 5.0 m³ per 100 m²). The application rates above are typical for many sites. However, soils rich in organic matter may not require any compost, while even higher compost application rates could be used on soils that are very low in organic matter, or droughty (primarily sand and gravel based).

These recommendations are suitable for most external planting beds. However, recommendations may require modification for plant species requiring low nutrient levels, and those that are lime-hating, such as rhododendrons, camellias, etc. Typically, compost should not be used (and sometimes used at _ the normal application rate) where lime-hating species are established.

Goal: to create a soil medium possessing characteristics that more closely resembles a loam soil, and possesses a minimum of 5% organic matter content (by dry weight).

<table>
<thead>
<tr>
<th>359 SOIL AMELIORANT/CONDITIONER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locations: [Landscape Architect to identify appropriate locations].</td>
</tr>
<tr>
<td>Type: Compost that conforms to the attached Numerical Product Specification for Landscape Compost.</td>
</tr>
<tr>
<td>Supplier/Source: [Landscape Architect may name specific compost producer].</td>
</tr>
<tr>
<td>Reference/Description/Grading: Compost shall be produced from biodegradable materials and shall fall within the recommended ranges for the horticultural parameters outlined in the attached specification table, as well as fall within the limits for contaminant parameters in PAS 100.</td>
</tr>
<tr>
<td>Coverage: Uniformly apply a [Landscape Architect to specify] mm layer over the area to be treated.</td>
</tr>
<tr>
<td>Timing: Apply prior to cultivation.</td>
</tr>
</tbody>
</table>

Many compost producers can manufacture specialized growing media for external planting application. These compost blends could be made available upon request and/or specification.

<table>
<thead>
<tr>
<th>365 TECHNICAL/SPECIALIST IMPORTED GROWING MEDIUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locations: [Landscape Architect to identify appropriate locations and/or applications (e.g., raised beds, planters, etc.)].</td>
</tr>
<tr>
<td>Manufacturer/Supplier: [Landscape Architect may specify supplier].</td>
</tr>
<tr>
<td>Product reference: [Landscape Architect may specify specific product].</td>
</tr>
</tbody>
</table>
### 375 CULTIVATION
- Compacted topsoil: Break up to full depth.
- Cultivation: Loosen, aerate and break up soil into particles of 2 - 8 mm.
- Depth: Initially cultivate to a minimum depth of 300 mm, then cultivate the top 200 mm (minimum) after the soil ameliorant and fertilizer is applied.
- Timing: Within a few days before planting.
- Weather and ground conditions: Suitably dry.
- Surface: Leave regular and even.
- Levels:
  - As required in sections D20 and Q28.
  - Within [Landscape Architect to specify] of levels specified on drawings.
- Undesirable material brought to the surface: Remove, including weeds, roots, stones and clods larger than 50 mm in any dimension, tufts of grass and foreign matter.

### PLANTING SHRUBS/HERBACEOUS PLANTS/BULBS

### 400 PLANT LAYOUT
- Spacing: [Landscape Architect to specify].
- Density: [Landscape Architect to specify].

### 405 SHRUB PLANTING PITS
- Timing: Depending on weather conditions, pits should not be left open for more than 1 – 2 days.
- Sizes: 150 mm wider than roots when fully spread and 200 mm deep.
- Pit bottom improvement: Break up to a depth of 150 mm, incorporating soil ameliorant/conditioner (as described in 476), at a rate equal to that used in the backfill material.
- Backfilling material: As clause 476.

### 445 PLANTING:
- Use industry standard planting techniques and preparation methods, planting at the ideal depth for the specific plant species.

### 476 BACKFILLING MATERIAL
- Composition: Previously prepared mixture of topsoil excavated from pit and additional topsoil as required, together with:
  - Ameliorant/Conditioner: Compost that conforms to the attached Numerical Product Specification for Landscape Compost.
  - Supplier/Source: [Landscape Architect may name specific compost producer].
  - Reference/Description: Compost shall be produced from biodegradable materials and shall fall within the recommended ranges for the horticultural parameters outlined in the attached specification table, as well as fall within the limits for contaminant parameters in PAS 100.
Top dressing: Do not fertilize during the growing season in which the plant was established. Apply a 25 mm layer of compost, or a typical rate of slow release fertilizer at the beginning of the second growing season.

For most projects, uniformly apply a 25 - 75 mm layer of compost mulch over the area to be treated (2.5 – 7.5 m³ per 100 m²).

Coverage: shall be a [Landscape Architect to specify] blend (v/v) of soil excavated from the planting pit and compost.

Manufacturer/Supplier: [Landscape Architect may specify supplier].
Product reference: [Landscape Architect may specify specific product].
Reference/Description/Grading: Compost mulch shall be produced from biodegradable materials and shall fall within the recommended ranges for the horticultural parameters for mulch outlined in the attached specification table, as well as fall within the limits for contaminant parameters in PAS 100.
Purity: Free of pests, disease, fungus and weeds.
Coverage: Uniformly apply a [Landscape Architect to specify] mm layer over area to treated.
Timing: Apply after planting.
Preparation: Clear all weeds. Water soil thoroughly.
Watering: Water soil thoroughly before laying.
Plants: Apply closely around plant stems but not against.

PLANTING TREES

Tree Pits
Sizes: 75mm deeper than root system and wide enough to accommodate roots when fully spread.
Sloping ground: Maintain horizontal bases and vertical sides with no less than minimum depth throughout.
Pit bottoms: With slightly raised centre. Break up to a depth of 150mm.
Pit sides: Scarify.
Backfilling material: As clause 586.

Tree Pit Drainage - as per industry standards.

Staking - as per industry standards
586  
Typically use a 4:1 ratio (v/v) blend of soil excavated from the planting pit and compost. Apply no additional fertilizer at time of planting. These recommendations are suited for most external planting pits. However, recommendations may require modification for plant species requiring low nutrient levels, and those that are lime-hating, such as rhododendrons, camellias, etc. Typically, compost should not be used where lime-hating species are to be planted.

589  
For most projects, uniformly apply a 25-75 mm layer of compost mulch over the area to be treated (2.5 – 7.5 m³ per 100 m²), or in a one metre weed-free circle apply 20 – 60 litres per tree.

586  BACKFILLING MATERIAL
- Composition: Previously prepared mixture of topsoil excavated from pit and additional topsoil as required, together with:
  - Ameliorant/Conditioner: Compost that conforms to the attached Numerical Product Specification for Landscape Compost. (as clause 476).
  - Coverage: shall be a [Landscape Architect to specify] blend (v/v) of soil excavated from the planting pit and compost. Place this blend around the rootball but not below it.

590  MULCHING TREES
- Manufacturer/Supplier: [Landscape Architect may specify supplier].
- Product reference: [Landscape Architect may specify specific product].
- Reference/Description/Grading: Compost mulch shall be produced from biodegradable materials and shall fall within the recommended ranges for the horticultural parameters for mulch outlined in the attached specification table, as well as fall within the limits for contaminant parameters in PAS 100.
  - Purity: Free of pests, disease, fungus and weeds.
  - Coverage: Uniformly apply a [Landscape Architect to specify] mm layer over area to treated or a one metre weed-free circle.
  - Timing: Apply after planting.
  - Preparation: Clear all weeds. Water soil thoroughly.
  - Watering: Water soil thoroughly before laying.
  - Plants: Apply closely around plant stems but not against.

595  TREE PROTECTION - as per industry standards.

750  PLANTING MAINTENANCE GENERALLY
- Weed control: Maintain weed free area around each tree and shrub, minimum diameter the larger of 1m or the surface of original planting pit.
  - Keep planting beds clear of weeds, by [Landscape Architect to specify method].
  - Planted areas: Fork over beds as necessary to keep soil loose, with gentle cambers and no hollows. Take care not to reduce depth or effect of mulch.
- Precautions: Ensure that trees and shrubs are not damaged by use of mowers, nylon filament rotary cutters and similar powered tools.
- Staking: Check condition of stakes, ties, guys and guards. Replace broken or missing items. Adjust if necessary to allow for growth and prevent rubbing of bark. Cut back any damaged bark.
- Frequency of checks:
- Trees: Spray crown when in leaf during warm weather. Carry out in the evening.
A 25 – 50 mm layer of compost will typically provide planting bed crops with enough fertilization for a full year. Do not apply additional fertilizer during the growing season in which the plant was established. Apply a 25 mm layer of compost, or a typical rate of slow release fertilizer at the beginning of the second growing season.

**Planting Maintenance - Fertilizer**
- Time of year: March or April.
- Fertilizer:
  - Manufacturer: [Landscape Architect may specify supplier].
  - Product reference: [Landscape Architect may specify specific product].
- Application: Evenly spread, carefully incorporating below mulch materials.
- Coverage: [Only apply fertilizer if recommended by soil test.]

**Planting Maintenance - Watering**
- General: As clause 145.

**Maintenance Instructions**
- General: Before end of the period stated in clause 710, submit printed instructions recommending procedures to be established by the Employer for maintenance of the planting work for one full year:

**Final Mulching**
- Timing: At end of the period stated in clause 710.
- Watering: Ensure that soil is thoroughly moistened prior to remulching, applying water where necessary.
- Planting beds: Remulch as clause 485.
  Coverage: Apply volume necessary to ensure 50mm layer.
- Trees: Remulch as clause 590.
  Coverage: Apply volume necessary to ensure 50mm layer.
<table>
<thead>
<tr>
<th>GUIDANCE NOTES</th>
<th>SPECIFICATION CLAUSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERALLY</td>
<td></td>
</tr>
<tr>
<td>130 REINSTATEMENT</td>
<td>Damage or disturbance to soil structure, planting, grass, fencing, hard landscaping, structures or buildings: Reinstate to original condition.</td>
</tr>
</tbody>
</table>
| 155 WATERING | Supply: Potable mains water.  
• Quantity: Wet full depth of topsoil.  
• Application: Do not damage or loosen plants.  
• Compacted soil: Loosen or scoop out, to direct water to rootzone.  
• Frequency: As necessary for the continued thriving of all planting. |
| 170 DISPOSAL OF ARISINGS - as per industry standards. |
| 195 PROTECTION OF EXISTING GRASS | General: Protect areas affected by maintenance operations using boards/tarpaulins. Do not place excavated or imported materials directly on grass. |
| 197 CLEANLINESS | Soil and arisings: Remove from hard surfaces.  
• General: Leave the works in a clean, tidy condition at completion and after any maintenance operations. |
| GRASSED AREAS |                       |
| 210 MAINTENANCE OF GRASSED AREAS | General: Maintain turf in a manner appropriate to the intended use.  
• Grass height: Maintain within range specified in clauses 260 to 280.  
• Soil and grass condition:  
• Maintain a healthy vigorous sward, free from disease, fungal growth, discolouration, scorch or wilt.  
• Prevent waterlogging and compaction.  
• Repair damage due to trampling, abrasion or scalping during mowing.  
• Ornamental turf and lawns: Maintain reasonably free from moss, thatch, weeds, frost heave, worm and mole casts.  
• Edges: Neat and well defined.  
• Litter and fallen leaves: Remove regularly to maintain a neat appearance. |
For most projects, uniformly apply a 5 - 10 mm layer of compost over the area to be treated. A combination of aeration, top dressing with compost and seeding is an excellent maintenance practice on grass swards that are suffering from compaction or are supporting weak stands of vegetation. This practice is often used on sportsfields, in autumn applications. The nutrients supplied in this autumn compost application often will typically replace the need for any autumn fertilization.

### MAINTENANCE OF GRASSED AREAS
- **Standard:** To BS 7370-3. Carry out maintenance appropriate to each category of turf, as follows:
  - **Objectives:** To BS 7370-3, table 6.
  - **Programme:** To BS 7370-3, clause 11.
  - **Mowing methods:** To BS 7370-3, table 3.

### GRASS CUTTING GENERALLY
- **Before mowing:** Remove litter, rubbish and debris.
- **Finish:** Neat and even, without surface rutting, compaction or damage to grass.
- **Edges:** Leave neat and well defined. Neatly trim around obstructions.
- **Adjoining hard areas:** Sweep clear and remove arisings.
- **Drought or wet conditions:** Obtain instructions.

### TREE STEMS
- **Precautions:** Do not use mowing machinery closer than 100 mm to tree stems. Use nylon filament rotary cutters and other hand held mechanical tools carefully to avoid damage to bark.

### TOP DRESSING
- **Type:** Use compost, or a compost/sand/soil mix that is finely screened (100% passing through a 10 mm screen aperture).
- **Dressing:** Compost that conforms to the attached Numerical Product Specification for Landscape Compost.
- **Coverage/Depth:** Uniformly apply a [Landscape Architect to specify] mm layer over the area to be treated.

### ROLLING
- **Operations:** Consolidate turf and reduce frost heave.

### SPIKING
- **Operations:** Aerate the soil to a depth of 150mm.

### SCARIFYING
- **Operations:** Relieve thatch conditions and remove dead grass.
- **Depth:** 25 mm into soil.

### HARROWING
- **Operations:** Aerate soil and remove worm casts.
- **Type of harrow:** Chain harrow or drag mat.

### HOLLOW TINING
- **Depth:** 75 mm.

### EDGES TO SEEDED AREAS
- **Location:** Planting beds and around newly planted trees.
- **Timing:** After seeded areas are well established.
- **Edges:** Cut to clean straight lines or smooth curves. Draw back soil to permit edging.
**LANDSCAPE MAINTENANCE - NBS Specification Q35**

To be read with Preliminaries/General conditions.

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
</table>
| **310** RE-FORMING GRASS EDGES | - Location: Planting beds, paths, manhole covers and the like.  
- Edges: Draw back soil and re-form edges to clean straight lines or smooth flowing curves, sloping slightly back from vertical. |
| **311** RE-FORMING GRASS EDGES | - Location: Planting beds, paths, manhole covers and the like.  
- Standard: To BS 7370-3, clause 12.3. |
| **320** LEVELLING HOLLOWS AND BUMPS IN TURF | - Standard: To BS 7370-3, clauses 12.4 and 12.5. |
| **325** RELIEVING SURFACE COMPACTION IN TURF | - Standard: To BS 7370-3, clause 13.5. |
| **330** SELECTIVE HERBICIDE | - Type: Selective herbicide.  
- Areas not to be sprayed: Wild flower or bulb and corm planted areas. |
| **340** SPOT WEEDKILLING IN ROUGH GRASS AREAS | - Operations: Spot treat with a suitable herbicide. |
| **350** FERTILIZER - SPRING APPLICATION | - Type:  
- Manufacturer: [Landscape Architect may specify supplier].  
- Product reference: [Landscape Architect may specify specific product].  
- Coverage: [Landscape Architect may specify supplier]. |
| **360** FERTILIZER - AUTUMN APPLICATION | - Type:  
- Manufacturer: [Landscape Architect may specify supplier].  
- Product reference: [Landscape Architect may specify specific product].  
- Coverage: [Landscape Architect may specify supplier]. |
| **380** REINSTATEMENT OF LAWNS - WORN AREAS | - Damaged turf: Remove to a depth of 50 mm.  
- Preparation: Cultivate substrate to a fine tilth.  
- Reinstatement: Contractor's choice of returfing or topsoiling and reseeding:  
  - Returfing: Quality and appearance to match existing.  
  - Reseeding: Fill with fine topsoil to BS 3882 general purpose grade, free from stones, debris and weeds. Reseed with a seed mix to match existing grass in quality and appearance.  
- Protection and watering: Provide as necessary to promote successful germination and/or establishment. |
### 381 REINSTATEMENT OF LAWNS - WORN AREAS
- Worn or damaged areas: Make good by returfing or reseeding:
  - Returfing standard: To BS 7370-3, Clause 12.2.
  - Reseeding standard: To BS 7370-3, Clause 12.6.
- Turf or seed: To match existing in appearance and quality.
- Protection and watering: Provide as necessary to promote successful germination and/or establishment.

### FLOWER BEDS/SEASONAL BEDDINGS

#### 450 PLANTING BEDS OF ANNUALS
- Clearance: Remove previous season’s bedding, including all bulbs, litter and debris.
- Preparation: Dig over beds using a spade or hand held mechanical cultivator:
  - Bury annual weeds.
  - Carefully dig out perennial weeds.
- Fertilizer: Either in autumn or spring spread and incorporate.
- Type:
  - Manufacturer: [Landscape Architect may specify supplier].
  - Product reference: [Landscape Architect may specify specific product].
- Coverage: [Landscape Architect may specify supplier].
- Annual bedding plants: Plant out [Landscape Architect to specify], including edging plants, main layer, specimen or pot plants, corms, bulbs or tubers.
- Watering: Keep plants watered as necessary before planting out and water in after planting.
- Failed planting: Replant as necessary any plants, or areas of plants, that have failed to thrive.

#### 450 PLANTING BEDS OF ANNUALS

#### 460 BEDS OF PERENNIALS OR PERENNIALS AND ANNUALS
- Plant supports: Stake and tie plants using: [Landscape Architect to specify].
- Maintain throughout the growing season.
- Gaps in planting: Refill by replanting.
- Watering new plants: Before and after planting out.
- Operations at end of growing season:
  - Cut down older flowering stems of herbaceous perennials.
  - Generally clean through borders removing redundant plant supports, litter, debris and arisings.
  - Fork over the soil, taking care not to cause undue disturbance to plants and apply.
In almost all landscaping applications, the addition of pre-plant fertilizer can be eliminated when a stable compost is applied at recommended rates. In saying this, however, where the compost contains a lower nutrient content, high nutrient requiring species are to be established, or when the compost possesses a high C:N ratio (over 20:1), additional nutrition (fertilisation) may be required.

470 FLOWER BEDS GENERALLY
- Operations:
  - Remove dead flower heads.
  - Remove litter and debris.
  - Remove fallen leaves.
  - Thoroughly hand weed.
  - Lightly hoe.
  - Clip grass edges.
- Fungicide: [Landscape Architect to specify].
- Insecticide: [Landscape Architect to specify]

490 THINNING BY REMOVAL OF SURPLUS PLANTS
- Plants to be thinned.
- Standard: BS 7370-4, clause 3.5.17.1.
- Timing: Thin when foliage of adjacent plants has begun to touch.
- Roots:
  - Remove as much as possible without causing undue disturbance to adjacent plants.
  - Refill holes with topsoil to leave an even graded surface.
  - Make good any minor damage to adjacent plants immediately.
- Plants for retention: Select plants with a strong healthy habit.
- Mature planting density:

SHRUBS/TREES/HEDGES

500 ESTABLISHMENT OF NEW PLANTING
- Duration:
- Weed control:
  - Keep planting beds clear of weeds by:
  - Maintain a weed free area around each tree and shrub, minimum diameter the larger of 1 m or the surface of the original planting pit.
- Soil condition: Fork over beds to keep soil loose, with gentle cambers and no hollows. Do not reduce depth or effect of mulch.
- Trees: When in leaf, spray crowns in the evening during warm weather.

502 ESTABLISHMENT OF NEW PLANTING - FERTILIZER
- Time of year: March or April.
- Type:
  - Manufacturer: [Landscape Architect may specify supplier.]
  - Product reference: [Landscape Architect may specify specific product].
  - Coverage: [Landscape Architect to specify].
- Spreading: Spread evenly. Carefully lift and replace any mulch materials.
Do not apply additional compost if it was already added during original planting procedures. Do not apply additional fertilizer during the growing season in which the plant was established. Apply a 25 mm layer of compost, or a typical rate of slow release fertilizer, at the beginning of the second growing season.

**520 REFORMING OF TREES AND SHRUBS**
- **Timing:** After strong winds, frost heave and other disturbances.
- **Refirming:** Tread around the base until firmly bedded.
- **Collars in soil at base of tree stems, created by tree movement:** Break up by fork, avoiding damage to roots. Backfill with topsoil and refirm.

**630 DEAD PLANTS**
- **Removal:** Handle as per industry standard methods.
- **Replacement:** Handle as per industry standard methods.

**635 REINSTATEMENT OF SHRUB/HERBACEOUS AREAS**
- Dead and damaged plants: Remove.
- **Replacement plants:**
  - Use pits and plants to original specification or to match the size of adjacent or nearby plants of the same species, whichever is the greater.
  - **Additional requirements:** [Landscape Architect to specify]
- **Dressing:** Slow release fertilizer
  - **Manufacturer:** [Landscape Architect may specify supplier].
  - **Product reference:** [Landscape Architect may specify specific product].
  - **Coverage:** [Landscape Architect to specify].

**645 WEED CONTROL GENERALLY**
- **Weed tolerance:** [Landscape Architect to identify frequency of weed control].
- **General:** Remove weeds entire, including roots.

**675 DIGGING OVER**
- **General:** Dig over beds. Do not damage existing plants, bulbs and roots.
  - **Depth of dig (minimum):** [Landscape Architect to specify].

**680 SOIL AERATION**
- **Compacted soil surfaces:** Prick up to aerate the soil of root areas. Break surface crust, reduce size of lumps to crumb and level off. Do not damage plants and their roots.

**685 SOIL LEVEL ADJUSTMENT**
- **Level of soil/mulch at edges of beds:** Reduce to 50 mm below adjacent grass or hard surface.
  - **Arisings (if any):** Spread evenly over the bed.

**690 MAINTENANCE OF LOOSE MULCH**
- **Thickness (minimum):** 50 mm.
  - **Top up:** Every six weeks
- **Mulch spill on adjacent areas:** Remove weeds and rubbish and return to planted area.
- **Weeding:** Remove weeds growing on or in mulch by hand weeding or herbicide application.
<table>
<thead>
<tr>
<th>695</th>
<th>FERTILIZING ESTABLISHED TREES AND SHRUBS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Only apply fertilization if recommended by soil test.</td>
</tr>
<tr>
<td></td>
<td>- Time of year: [Landscape Architect to specify].</td>
</tr>
<tr>
<td></td>
<td>- Type of fertilizer: [Landscape Architect to specify].</td>
</tr>
<tr>
<td></td>
<td>- Manufacturer: [Landscape Architect may specify supplier].</td>
</tr>
<tr>
<td></td>
<td>- Product reference: [Landscape Architect may specify specific product].</td>
</tr>
<tr>
<td></td>
<td>- Coverage: [Landscape Architect to specify]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>705</th>
<th>WINTER LEAF REMOVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operations: Take down temporary leaf fences. Collect accumulations of drifted leaves from the vicinity and from planting beds.</td>
</tr>
<tr>
<td></td>
<td>Arisings:</td>
</tr>
</tbody>
</table>
## TOPSOILING - NBS Specification Q28

To be read with Preliminaries/General conditions.

<table>
<thead>
<tr>
<th>GUIDANCE NOTES</th>
<th>SPECIFICATION CLAUSES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL INFORMATION/REQUIREMENTS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>120 SITE INVESTIGATION</strong></td>
<td>• Report: See section 300 for Topsoil Analysis requirements.</td>
</tr>
<tr>
<td></td>
<td>• Additional investigation/reports may be necessary</td>
</tr>
<tr>
<td><strong>200 GRADING SUBSOIL</strong></td>
<td>• General: Grade to smooth flowing contours to achieve specified finished levels of topsoil.</td>
</tr>
<tr>
<td></td>
<td>• Areas of thicker topsoil: Excavate locally.</td>
</tr>
<tr>
<td><strong>210 LIGHT AND NONCOHESIVE SUBSOILS</strong></td>
<td>• Loosening: Use a three tine ripper, drawn 300 mm deep at 600 mm centres in two directions obliquely, when ground conditions are reasonably dry.</td>
</tr>
<tr>
<td><strong>220 STIFF CLAY AND COHESIVE SUBSOILS</strong></td>
<td>• Loosening: Use a single tine ripper, driven 450 mm deep at 1 m centres in two directions obliquely, when ground conditions are reasonably dry.</td>
</tr>
<tr>
<td><strong>230 ROCK AND CHALK SUBGRADES</strong></td>
<td>• Loosening: Lightly scarify to promote free drainage.</td>
</tr>
<tr>
<td><strong>250 SURFACE PREPARATION</strong></td>
<td>• Stones: Immediately before spreading topsoil remove stones larger than 75 mm.</td>
</tr>
<tr>
<td></td>
<td>• Other items: Remove arisings, contaminants and debris.</td>
</tr>
<tr>
<td><strong>300 TOPSOIL ANALYSIS</strong></td>
<td>• Soil to be analysed: All areas to be grassed or planted (or as specified in drawings).</td>
</tr>
<tr>
<td></td>
<td>• Soil analyst: [Landscape Architect may name preferred soil laboratory].</td>
</tr>
<tr>
<td></td>
<td>• Samples: Collect in accordance with BS 3882, Annex A.</td>
</tr>
<tr>
<td></td>
<td>• Submit originals of:</td>
</tr>
<tr>
<td></td>
<td>- Declaration of analysis in accordance with BS 3882, clause 6 and table 2. (e.g., stone content, textural classification, chemical analysis)</td>
</tr>
<tr>
<td></td>
<td>- Report detailing soil analyst’s recommendations.</td>
</tr>
</tbody>
</table>
### 310 PREPARATION OF UNDISTURBED TOPSOIL

- **General:** Prepare areas to receive soft landscaping as necessary to ensure that the topsoil is in a suitable state for cultivation operations specified in sections Q30 and/or Q31.
- **Hard ground:** Break up with a ripper operated in transverse directions. Remove roots and boulders.
- **Areas covered with turf or thick sward:** Plough or dig over to full depth of topsoil.
- **Fallow period:**
  - After preparation leave for not less than one month.
  - Weed control: At appropriate times treat with a suitable translocated non-residual herbicide.

### 320 TEMPORARY CROP ON UNDISTURBED TOPSOIL

- **Seed mix supplier:** [Landscape Architect may specify supplier].
- **Product reference:** [Landscape Architect may specify specific product].
- **Sowing rate:** [Landscape Architect to specify based on recommendation of see supplier] g/m².

### 330 SURPLUS TOPSOIL TO BE RETAINED

- **Generally:** Spread and level on site:
  - **Locations:** Any areas where topsoil is required for new plantings (or as specified in drawings).
  - **Protected areas:** Do not raise soil level within root spread of trees that are to be retained.

### 335 SURPLUS TOPSOIL TO BE REMOVED

- **Generally:** Remove from site topsoil remaining after completion of all landscaping work.

### 340 IMPORTED MANUFACTURED TOPSOIL FOR PLANTING BEDS

- **Quantity:** Provide as necessary to make up any deficiency of topsoil existing on site and to complete the work.
- **Grade:** To BS 3882, [Landscape Architect to specify a manufactured topsoil that meets, or is equivalent to a premium or general purpose grade topsoil].
- **Source:** [Landscape Architect may specify supplier].
- **Submit:** Declaration of analysis including information detailing each of the relevant parameters given in BS 3882, clause 6 and table 2.
- **Other requirements:** Manufactured topsoil shall contain a minimum of 5% organic matter content.
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
</table>
| 341     | **IMPORTED MANUFACTURED TOPSOIL FOR SEEDING AND TURFING**  
  - Quantity: Provide as necessary to make up any deficiency of topsoil existing on site and to complete the work.  
  - Grade: To BS 3882, [Landscape Architect to specify a manufactured topsoil that meets, or is equivalent to a premium or general purpose grade topsoil].  
  - Source: [Landscape Architect may specify supplier].  
  - Foreign matter: On visual inspection, free of fragments and roots of aggressive weeds, sticks, straw, subsoil, pieces of brick, concrete, glass, wire, large lumps of clay or vegetation, and the like.  
  - Other requirements: A manufactured topsoil used in this application also must meet the minimum nutrient content index values and maximum stone content and sizing as for general purpose grade of BS 3882.  
  - Other requirements: Manufactured topsoil shall contain a minimum of 5% organic matter content. |
| 350     | **SPECIAL MANUFACTURED IMPORTED SOIL FOR**  
  - Supplier: [Landscape Architect may specify supplier].  
  - Product reference: [Landscape Architect may specify specific product]. |
| 360     | **NOTICE OF IMPORTING TOPSOIL**  
  - Give notice: Before importing first load of manufactured topsoil for transfer to site.  
  - Notice period: 14 days. |
| 370     | **SAMPLE LOAD OF IMPORTED TOPSOIL**  
  - General: Deliver to site a sample load of not less than 5 m.  
  - Give notice: Allow CA to inspect before making further deliveries to site. Retain for comparison with subsequent loads. |
| 380     | **CONTAMINATION**  
  - General: Do not use manufactured topsoil contaminated rubbish or other materials that are:  
    - Corrosive, explosive or flammable.  
    - Hazardous to human or animal life.  
    - Detrimental to healthy plant growth.  
    - Subsoil: In areas to receive topsoil, do not use subsoil contaminated with the above materials.  
  - Give notice: If any evidence or symptoms of soil contamination are discovered on the site, or in manufactured topsoil to be imported. |
**TOPSOILING - NBS Specification Q28 continued**

To be read with Preliminaries/General conditions.

<table>
<thead>
<tr>
<th>410</th>
<th>Handling Manufactured Topsoil</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment:</strong> Select and use equipment to minimize disturbance, with no trafficking on or compaction of stockpiled or laid soil.</td>
<td></td>
</tr>
<tr>
<td><strong>Contamination:</strong> Do not mix manufactured topsoil with:</td>
<td></td>
</tr>
<tr>
<td>- Subsoil, stone, hardcore, rubbish or material from demolition work.</td>
<td></td>
</tr>
<tr>
<td>- Other grades of topsoil.</td>
<td></td>
</tr>
<tr>
<td><strong>Multiple handling:</strong> Keep to a minimum. Use topsoil immediately after importation.</td>
<td></td>
</tr>
<tr>
<td><strong>Wet conditions:</strong> Handle topsoil in the driest condition possible. Do not handle during or after heavy rainfall.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>420</th>
<th>Spreading Topsoil</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temporary roads/surfacing:</strong> Remove before spreading topsoil.</td>
<td></td>
</tr>
<tr>
<td><strong>Layers:</strong></td>
<td></td>
</tr>
<tr>
<td>- Depth: 150 mm for grass and 450 mm for planted areas.</td>
<td></td>
</tr>
<tr>
<td>- Gently firm each layer before spreading the next.</td>
<td></td>
</tr>
<tr>
<td><strong>Depths after firming and settlement (minimum):</strong></td>
<td></td>
</tr>
<tr>
<td>100 mm for grass and 300 mm for planted areas.</td>
<td></td>
</tr>
<tr>
<td><strong>Crumb structure:</strong> Do not compact topsoil. Preserve a friable texture of separate visible crumbs wherever possible.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>450</th>
<th>Finished Levels of Topsoil After Settlement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Above adjoining paving or kerbs:</strong> [Landscape Architect to specify] mm.</td>
<td></td>
</tr>
<tr>
<td><strong>Below dpc of adjoining buildings:</strong> Not less than [Landscape Architect to specify] mm.</td>
<td></td>
</tr>
<tr>
<td><strong>Shrub areas:</strong> Higher than adjoining grass areas by [Landscape Architect to specify] mm.</td>
<td></td>
</tr>
<tr>
<td><strong>Within root spread of existing trees:</strong> Unchanged.</td>
<td></td>
</tr>
<tr>
<td><strong>Adjoining soil areas:</strong> Marry in.</td>
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</tr>
</tbody>
</table>
Topsoil Manufacturing with Compost

Background and Insights

Following this introductory page are two specifications developed to assist landscape architects use compost in the manufacture of topsoil. This method of creating soils suitable for landscape and reclamation applications has been successfully developed and tested at universities and field trialled in the UK for the past 15 years, as well as abroad for over 20 years.

The specifications are developed in a NBS-type format, largely because of the popularity of this specification style. Like the landscape specifications outlined previously, these procedural specifications should be used along with the numerical product specifications for Landscape Compost. Both in-situ (making topsoil in its final location) and ex-situ (making topsoil by mixing in a designated area of the site) topsoil manufacturing specifications have been developed. In either case, it is assumed that both applications will be completed at an actual landscaping or reclamation project site. Ex-situ topsoil manufacturing is typically considered to be the best-practice method, as it is easier to manufacture a uniform end product.

The concept of topsoil manufacturing allows for the use of subsoils, degraded soils and other suitable materials found at a particular project site, as well as compost, to create a medium that is appropriate for sustaining healthy plant growth. Landscape topsoils need to be suitable for their end uses of tree and shrub planting, herbaceous planting, amenity grass, sports grass, fine grass and cultivable soils for bedding plants or gardens. A suitable grade from British Standard 3882 - Specification for Topsoil can be chosen to meet the need.

If topsoil manufacturing is considered to be a viable option at a particular landscape, construction, or reclamation (brownfield) project site, then specific actions should be considered. First, completing a more in depth site investigation is suggested, to better understand the types and composition of soils that exist at the site, expressed as particle size distribution of the mineral fraction. Also, the site should be evaluated to determine potential locations for stockpiling and blending of the soil materials. Ex-situ blending on hardstanding or compacted soil is always preferred over in-situ blending, because a more uniform product can more easily be created. Additionally, if it is believed that the site may be contaminated (e.g., petroleum hydrocarbons, heavy metals, etc.), then data outlined on the websites of the Department for the Environment, Food and Rural Affairs and the Environment Agency (outlined within the specification) should be consulted.

Previously developed land (brownfield) requires a risk assessment of contamination. All contaminated sites require a proper site investigation and report. It should contain, among other things, details of subsoil particle size distribution. Data required for topsoil manufacturing, which should be provided through the site investigation, includes all relevant horticultural soil parameters. Parameters also include those referenced in BS 3882, as well as the Contaminated Land Exposure Assessment (CLEA) Model and Soil Guidance Values (SGVs) for soil Potentially Toxic Elements (PTE’s). Within Appendix II of this manual, you will find technical information related topsoil textural classes, the recording of organic matter content and the classification of electrical conductivity levels. This is provided as general information to assist in estimating compost inclusion rates, as well as evaluating planting practices and suitable plants.

REMEMBER: Specify the manufactured topsoil proportion of subsoil and organic matter as percentages by dry weight. The compost (and the soil) will naturally contain a variable percentage of water. The contractor will vary the volume of compost added to the subsoil depending on the moisture content of the compost. The post-manufacture testing of the manufactured topsoil will provide the actual percentages to compare with the specifications.
### ON-SITE MANUFACTURING OF TOPSOIL (IN-SITU) Specification

To be read with Preliminaries/General conditions.

<table>
<thead>
<tr>
<th>GUIDANCE NOTES</th>
<th>SPECIFICATION CLAUSES</th>
</tr>
</thead>
</table>
| **110** When considering topsoil manufacturing for a specific site, more thorough soil sampling and evaluation is suggested on both the topsoil and subsoil. This will allow for a more precise estimation of soil textures and volumes. When manufacturing topsoil on a brownfield site, perform a soil investigation to include all relevant horticultural soil parameters, including those referenced in BS 3882:1994 and the SGV table. Refer to BS 10175:2001, Investigation of Potentially Contaminated Sites Code of Practice and BS 5930:1999, Code of Practice for Site Investigations for additional information. | **110 SITE INVESTIGATION**  
• Report: See section 300 for Topsoil Analysis requirements.  
• Additional investigation/reports may be necessary |
| **115** GROUND CONDITIONS FROM SITE INVESTIGATION  
• Soils and strata: [Landscape Architect shall identify].  
• Ground water level: [Landscape Architect shall identify]. | **115 GROUND CONDITIONS FROM SITE INVESTIGATION**  
• Soils and strata: [Landscape Architect shall identify].  
• Ground water level: [Landscape Architect shall identify]. |
| **120** Although compost can be effective in improving overall soil physical properties (e.g., reducing bulk density of heavy soils, thus improving moisture infiltration rates), it cannot solve inherently poor drainage conditions. If site conditions do not allow for the movement of water off site, by run-off or infiltration, then a permanent drainage system should be installed. Be careful to use fully stable compost and to use lower application rates in areas where wetter soils persist. | **120 VARIATIONS IN GROUND WATER LEVEL**  
• Give notice: If levels encountered are significantly different from levels in the site investigation report, stated as assumed, or previously measured. |
| **130** SITE CLEARANCE  
• General: Remove rubbish, concrete, metal, glass, decayed vegetation and contaminated subsoil (subject to EA authorisation) and soil-like materials.  
• Stones: Remove those with largest dimension exceeding 50 mm.  
• Contamination: Substances injurious to plant growth including rubble, fuel, and lubricants.  
• Vegetation: Remove as required using mechanical and chemical techniques.  
• Large roots: Grub up and dispose of, where necessary. Dispose of invasive non-native plants (Japanese knotweed, Giant hogweed, etc.) in an appropriately licensed tip (Wildlife and Countryside Act 1981). | **130 SITE CLEARANCE**  
• General: Remove rubbish, concrete, metal, glass, decayed vegetation and contaminated subsoil (subject to EA authorisation) and soil-like materials.  
• Stones: Remove those with largest dimension exceeding 50 mm.  
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• Large roots: Grub up and dispose of, where necessary. Dispose of invasive non-native plants (Japanese knotweed, Giant hogweed, etc.) in an appropriately licensed tip (Wildlife and Countryside Act 1981). |
| **140** SOIL CONDITIONS  
• Soil for cultivating: Moist, friable and not waterlogged.  
• Frozen or snow covered soil: Avoid cultivating soils in these conditions. | **140 SOIL CONDITIONS**  
• Soil for cultivating: Moist, friable and not waterlogged.  
• Frozen or snow covered soil: Avoid cultivating soils in these conditions. |
### 150 CLIMATIC CONDITIONS
General: Carry out the work while soil and weather conditions are suitable, and do not work the soil when saturated.

### 200 PREPARATION OF UNDISTURBED SUBSOIL OR EXISTING SOIL-LIKE MATERIALS FOR TOPSOIL MANUFACTURING
- General: Prepare areas to receive soft landscaping as necessary to ensure that the soil is in a suitable state for cultivation operations specified in sections Q30 and/or Q31.
- Hard and compact ground: Break up with a ripper operated in transverse directions [Landscape Architect to specify spacing and depth]. Remove roots and boulders.
- Areas covered with turf or thick sward: Plough or dig over to a minimum depth of 300 mm. If vegetation is particularly dense, cut and chop or rake off, depending on volume of vegetation.
- Weed control: At appropriate times treat with a suitable translocated non-residual herbicide.
  - This may be applied to existing vegetation a minimum of two weeks prior to ploughing or ripping.
  - Ensure that all Service Routes (e.g., water, gas, electricity, drains, telecommunications, fibreoptics, etc.) are not adversely affected and are marked as required.
  - Do not cultivate under the canopy spread of trees to be retained.

### 210 LIGHT AND NONCOHESIVE SUBSOILS
- Loosening: Use a three tine ripper, drawn 300 mm deep at 600 mm centres in two directions obliquely, when ground conditions are reasonably dry.

### 220 STIFF CLAY AND COHESIVE SUBSOILS
- Loosening: Use a single tine ripper, driven 450-900 mm deep at 1 m centres in two directions obliquely, when ground conditions are reasonably dry.

### 230 ROCK SUBGRADES
- Loosening: Lightly scarify to promote free drainage.
  - Be cautious not to scarify too deeply as to bring rock to the surface.

### 240 PRIMARY GRADING AND SURFACE PREPARATION
- General: Grade to smooth flowing contours to 25-75 mm of specified finished levels of soil.
- Areas of thicker soil: Excavate locally.
- Stones: Immediately before spreading compost (and other soil materials, if necessary) remove stones larger than 25 mm.
- Other items: Remove arisings, contaminants and debris.
The goal of the topsoil manufacturing process is to create an effective soil for the establishment of long-lived vegetation. Using the soil analysis data, and that of the compost (and possibly other soil-like materials), a blended soil will be created that meets a specific (and/or prescribed) BS 3882 topsoil grade or one which meets the specifications outlined by the project engineer or landscape architect. For cost related reasons, it is preferable to use only existing site soils and imported compost in the topsoil manufacturing process. However, it may also be required to add another soil material to meet the textural requirements (percent sand, silt, clay) of the manufactured topsoil.

All soils must meet CLEA Model and Soil Guidance Values (SGVs) for soil Potentially Toxic Elements (PTEs). For additional guidance, refer to the following websites:


Application rates will be based on current soil conditions, expected use of the treated site (e.g., vegetation/plants to be established, intensity of activity on site) and the basic BS 3882 topsoil standard you are trying to meet (see general specifications below). A higher compost application rate should be used on soils that are low in organic matter, droughty (primarily sand and gravel based) and/or those high in clay content unless prone to water logging.

Rule of thumb: Where a ‘typical’ compost possessing an organic matter content of 30% on a dry weight basis (other 70% is water and mineral particles) is applied at a 50-75 mm depth and incorporated to a depth of 150 mm, the organic matter content of the soil will be increased by approximately 2%. Use the higher application rate for soils possessing a higher bulk density.

### 300 SOIL ANALYSIS FOR SUBSOIL OR EXISTING SOIL-LIKE MATERIALS
- Soil to be analysed: All areas to be grassed or planted (or as specified in drawings).
- Soil analyst: [Landscape Architect may name preferred soil laboratory].
- Samples: Collect in accordance with BS 3882, Annex A.
- Submit originals of:
  - Declaration of analysis in accordance with BS 3882, clause 6 and table 2. (e.g., stone content, textural classification, chemical analysis)
  - Report detailing soil analyst’s recommendations.

### 330 SURPLUS SOIL TO BE RETAINED
- Generally: Spread and level on site:
  - Locations: Any areas where topsoil is required for new plantings (or as specified in drawings).
  - Protected areas: Do not raise soil level within root spread of trees that are to be retained.

### 335 SURPLUS SOIL TO BE REMOVED
- Generally: Remove from site soil remaining after completion of grading, soil manufacturing and all landscaping work.

### 340 IMPORTATION OF SOIL AMELIORANT FOR TOPSOIL MANUFACTURING (SEEDED/TURFED AND PLANTED AREAS)
- Type: Compost that conforms to the attached Numerical Product Specifications for Landscape Compost.
- Supplier/Source: [Landscape Architect may name specific compost producer].
- Reference/Description/Grading: Compost shall be produced from biodegradable materials and shall fall within the recommended ranges for the horticultural parameters outlined in the attached specification table, as well as fall within the limits for contaminant parameters in PAS 100.
- Coverage: [Landscape Architect to specify].
Goal: to create a soil medium possessing characteristics that more closely resembles a loam soil, and possessing a minimum of 5% organic matter (on a dry weight basis). These recommendations are suited for most swards, established through seeding, turfing, or hydraulic seeding and planting areas, and for most external planting beds. However, recommendations may require modification for areas used to develop sportsfields, and for planting areas used to grow plant species requiring low nutrient levels, and those that are lime-hating, such as rhododendrons, camellias, etc.

<table>
<thead>
<tr>
<th>345</th>
<th>IMPORTED SOIL FOR TOPSOIL MANUFACTURING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use imported soils only when required to meet the required soil grade or the textural requirements of the ‘finished’ manufactured topsoil. Remember, compost contains some sand, silt and clay sized mineral particles. Therefore, it will contribute to the textural classification of the manufactured topsoil. Soils should only be imported as necessary, based on requirements of the finished topsoil.</td>
<td></td>
</tr>
<tr>
<td>Quantity: Provide as necessary with a suitable particle size distribution to make up any deficiency of topsoil existing on site and to complete the work.</td>
<td></td>
</tr>
<tr>
<td>Grade: [Landscape Architect to specify the required soil specifications].</td>
<td></td>
</tr>
<tr>
<td>Source: [Landscape Architect may specify supplier].</td>
<td></td>
</tr>
<tr>
<td>Foreign matter: On visual inspection, free of fragments and roots of aggressive weeds, sticks, straw, subsoil, pieces of brick, concrete, glass, wire, large lumps of clay or vegetation, and the like.</td>
<td></td>
</tr>
<tr>
<td>Submit: Declaration of analysis including information detailing each of the relevant parameters given in BS 3882, clause 6 and table 2.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>360</th>
<th>NOTICE OF IMPORTING COMPOST (AND SOIL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give notice: Before importing first load of manufactured topsoil for transfer to site. Notice period: 14 days.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>370</th>
<th>SAMPLE LOAD OF IMPORTED COMPOST (AND SOIL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use clause 370 alternatively or in conjunction with clause 360.</td>
<td></td>
</tr>
<tr>
<td>General: Deliver to site a sample load of not less than 5 m³.</td>
<td></td>
</tr>
<tr>
<td>Give notice: Allow CA to inspect before making further deliveries to site. Retain for comparison with subsequent loads. Provide 20kg reference sample for CA.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>410</th>
<th>HANDLING COMPOST (AND SOIL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contamination: Do not mix compost (and soil) with:</td>
<td></td>
</tr>
<tr>
<td>· Stone, hardcore, rubbish or material from demolition work.</td>
<td></td>
</tr>
<tr>
<td>· Multiple handling: Keep to a minimum. Use compost (and soil) immediately after importation.</td>
<td></td>
</tr>
<tr>
<td>· Wet conditions: Handle compost and soil in the driest condition possible. Do not handle during or after heavy rainfall.</td>
<td></td>
</tr>
</tbody>
</table>
### ON-SITE MANUFACTURING OF TOPSOIL (IN-SITU) Specification

To be read with Preliminaries/General conditions.

#### 420  SPREADING COMPOST (AND SOIL)
- Temporary roads/surfacing: Remove before spreading compost (and soil)
- Layers:
  - Spread full quantity of compost as specified before any incorporation activities, and before spreading any other soil materials (if necessary).
  - If compost and soil is applied, gently firm each layer before spreading the next.
- Structure: Preserve a friable consistency and defined structure of separate visible crumbs wherever possible.

#### 430  INCORPORATION OF COMPOST (AND SOIL) AND CULTIVATION
- Cultivation: Loosen, aerate and break up soil into particles of 10 mm, and under.
  - Depth: cultivate to a minimum depth of 150 mm for areas to be seeded or turfed, and 300 mm for areas to be planted.
  - Timing: Two weeks before seeding, turfing or planting.
  - Weather and ground conditions: Suitably dry.
  - Compacted topsoil: Break up to full depth (450-900 mm, where necessary).
- Surface: Leave regular and even.
- Levels:
  - As required in sections D20 and Q28.
  - Within [Landscape Architect to specify] of levels specified on drawings.
- Tilth: Reduce top 100 mm of topsoil to a tilth suitable for blade grading (under 10 mm particle size).
- Undesirable material brought to the surface: Remove, including weeds, roots, stones and clods larger than 50 mm in any dimension, tufts of grass and foreign matter.

#### 450  FINISHED LEVELS OF MANUFACTURED TOPSOIL AFTER SETTLEMENT
- Above adjoining paving or kerbs: [Landscape Architect to specify] mm.
- Below dpc of adjoining buildings: Not less than [Landscape Architect to specify] mm.
- Shrub areas: Higher than adjoining grass areas by [Landscape Architect to specify] mm.
- Within root spread of existing trees: Unchanged.
- Adjoining soil areas: Marry in.
- Fallow period:
  - After preparation leave for not less than two weeks.

#### 460  FINAL GRADING
- Topsoil condition: Reasonably dry and workable.
- Contours: Smooth and flowing, with falls for adequate drainage. Remove minor hollows and ridges.
### ON-SITE MANUFACTURING OF TOPSOIL (EX-SITU) Specification

To be read with Preliminaries/General conditions.

<table>
<thead>
<tr>
<th>GUIDANCE NOTES</th>
<th>SPECIFICATION CLAUSES</th>
</tr>
</thead>
</table>
| **110** When considering topsoil manufacturing for a specific site, more thorough soil sampling and evaluation is suggested for both the topsoil and subsoil. This will allow for a more precise estimation of soil textures and volumes. When manufacturing topsoil on a brownfield site, perform a soil investigation to include all relevant horticultural soil parameters, including those referenced in BS 3882 and the SGV table. Refer to BS 10175:2001, Investigation of Potentially Contaminated Sites Code of Practice and BS 5930:1999, Code of Practice for Site Investigations for additional information. During the site investigation process, identify the best available subsoils and other materials for topsoil manufacture, potential locations on the site for the stockpiling of harvested soils and imported compost (and soil), and blending procedures. Areas which possess hardstanding are preferred for stockpiling and blending, however other compacted surfaces are acceptable. | **110 SITE INVESTIGATION**  
• Report: See section 300 for Topsoil Analysis requirements.  
• Additional investigation/reports may be necessary |
| **115 GROUND CONDITIONS - ASSUMED**  
• Soils and strata: [Landscape Architect shall identify].  
• Ground water level: [Landscape Architect shall identify].  |
| **120 VARIATIONS IN GROUND WATER LEVEL**  
• Give notice: If levels encountered are significantly different from levels in the site investigation report, stated as assumed, or previously measured.  |
| **120 SITE CLEARANCE**  
• General: Remove rubbish, concrete, metal, glass, decayed vegetation and contaminated subsoil and soil-like materials.  
• Stones: Remove those with largest dimension exceeding 50 mm.  
• Contamination: Substances injurious to plant growth including rubble, fuel, and lubricants.  
• Vegetation: Remove as required using mechanical and chemical techniques.  
• Large roots: Grub up and dispose of without undue disturbance of soil and adjacent areas, where required. Dispose of invasive non-native plants (Japanese knotweed, Giant hogweed, etc.) in an appropriately licensed tip (Wildlife and Countryside Act 1981).  |
Loosening the existing soil to a substantial depth is helpful in improving moisture infiltration (especially on heavy soils), improving soil structure and removing any shallow interfaces between the existing soil and the compost amended soil.

<table>
<thead>
<tr>
<th>140 SOIL CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Soil for cultivating: Moist, friable and not waterlogged.</td>
</tr>
<tr>
<td>• Frozen or snow covered soil: Avoid cultivating soils in these conditions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>150 CLIMATIC CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• General: Carry out the work while soil and weather conditions are suitable, and do not work the soil when saturated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>200 PREPARATION OF UNDISTURBED SUBSOIL OR EXISTING SOIL-LIKE MATERIALS FOR TOPSOIL MANUFACTURING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• General: Prepare areas to receive soft landscaping as necessary to ensure that the soil is in a suitable state for cultivation operations specified in sections Q30 and/or Q31.</td>
</tr>
<tr>
<td>• Hard and compacted ground: Break up with a ripper operated in transverse directions. Remove roots and boulders.</td>
</tr>
<tr>
<td>• Areas covered with turf or thick sward: Plough or dig over to full depth of soil. If vegetation is particularly dense, cut and chop or rake off, depending on volume of vegetation.</td>
</tr>
<tr>
<td>• Weed control: At appropriate times treat with a suitable translocated non-residual herbicide.</td>
</tr>
<tr>
<td>- This may be applied to existing vegetation a minimum of two weeks prior to ploughing.</td>
</tr>
<tr>
<td>• Ensure that all service routes (e.g., water, gas, electricity, drains, telecommunication, fiberoptics, etc) are not adversely affected and are marked as required.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>210 LIGHT AND NONCOHESIVE SUBSOILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Loosening: Use a three tine ripper, drawn 300 mm deep at 600 mm centres in two directions obliquely, when ground conditions are reasonably dry.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>220 STIFF CLAY AND COHESIVE SUBSOILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Loosening: Use a single tine ripper, driven 450-900 mm deep at 1m centres in two directions obliquely, when ground conditions are reasonably dry.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>230 ROCK SUBGRADES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Loosening: Lightly scarify to promote free drainage.</td>
</tr>
<tr>
<td>• Be cautious not to scarify too deeply as to bring rock to the surface.</td>
</tr>
</tbody>
</table>
**240 STRIPPING SOIL**

- **General:** Before beginning the importation of any materials, strip soil from areas where there will be regrading, buildings, pavings/roads and other areas shown on drawings.
  - Drawing references: [Landscape Architect shall identify].
- **Depth:**
  - Remove to an average depth of [Landscape Architect shall identify] and keep separate from excavated subsoils, etc.
  - Give notice where the depth of soil is difficult to determine.
- **Handling:** Handle soil for reuse in accordance with clause 260.
- **Around trees:** Do not remove topsoil from below the spread of trees to be retained.

**250 TREATING SOIL**

- **Treatment:** Apply a suitable translocated nonresidual herbicide.
- **Timing:** Not less than two weeks before stripping soil.

**260 HANDLING SOIL**

- **Aggressive weeds:** Give notice and, obtain instructions before moving soil.
  - Dispose of invasive non-native plants (Japanese knotweed, Giant hogweed, etc.) in an appropriately licensed tip.
- **Equipment:** Select and use equipment that will minimize disturbance, trafficking and compaction.
- **Contamination:** Do not mix topsoil with:
  - Subsoil, stone, hardcore, rubbish or material from demolition work.
  - Other grades of topsoil.
- **Multiple handling:** Keep to a minimum. Blend soil immediately after stripping or excavating from stockpile.
- **Wet conditions:** Handle topsoil in the driest condition possible. Do not handle during or after heavy rainfall or when it is wetter than the plastic limit as defined by BS 3882, Annex N2.
The goal of the topsoil manufacturing process is to create an effective soil for the establishment of long-lived vegetation. Using the soil analysis data, and that of the compost (and possibly other soil-like materials), a blended soil will be created that meets a specific (and/or prescribed) BS 3882 topsoil grade or one which meets the specifications outlined by the project engineer or landscape architect. For cost related reasons, it is preferable to use only existing site soils and imported compost in the topsoil manufacturing process. However, it may also be required to add another soil material to meet the textural requirements (percent sand, silt, clay) of the manufactured topsoil.

All soils must meet CLEA Model and Soil Guidance Values (SGVs) for soil Potentially Toxic Elements (PTEs). For additional guidance, refer to the following websites:

www.defra.gov.uk/environment/landliability/index.htm

www.environment-agency.gov.uk/subjects/landquality

Carefully monitor the topsoil blending and spreading process to avoid manufacturing excess volumes of manufactured topsoil that would need to be removed from the site.

<table>
<thead>
<tr>
<th>300</th>
<th>SOIL ANALYSIS FOR SUBSOIL OR EXISTING SOIL-LIKE MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Soil to be analysed: All areas to be grassed or planted (or as specified in drawings).</td>
<td></td>
</tr>
<tr>
<td>• Soil analyst: [Landscape Architect may name preferred soil laboratory].</td>
<td></td>
</tr>
<tr>
<td>• Samples: Collect in accordance with BS 3882, Annex A.</td>
<td></td>
</tr>
<tr>
<td>• Submit originals of:</td>
<td></td>
</tr>
<tr>
<td>- Declaration of analysis in accordance with BS 3882, clause 6 and table 2. (e.g., stone content, textural classification, chemical analysis)</td>
<td></td>
</tr>
<tr>
<td>- Report detailing soil analyst’s recommendations.</td>
<td></td>
</tr>
</tbody>
</table>

Materials to be stockpiled

<table>
<thead>
<tr>
<th>330</th>
<th>MATERIALS TO BE STOCKPILED</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Generally: Stockpile stripped (and imported) soils, and compost, at the identified location on the site, preferably, at or near the location for blending:</td>
<td></td>
</tr>
<tr>
<td>• Locations: Any location with preferable soil conditions for blending (e.g., hardstanding, compacted soils), preferably located in the proximity of areas where manufactured topsoil is required for new plantings.</td>
<td></td>
</tr>
<tr>
<td>• Stockpile all materials separately, in distinct piles, allowing enough space to manoeuvre a 360 degree excavator, front-end loader or equivalent (e.g., JCB, bucket loader) to allow for blending and loading.</td>
<td></td>
</tr>
<tr>
<td>• Protected areas: Do not stockpile soils within root spread of trees that are to be retained.</td>
<td></td>
</tr>
</tbody>
</table>

Surplus soil to be removed

<table>
<thead>
<tr>
<th>335</th>
<th>SURPLUS SOIL TO BE REMOVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Generally: Remove from site soil remaining after completion of soil manufacturing, grading and all landscaping work.</td>
<td></td>
</tr>
</tbody>
</table>

Compost inclusion rates will be based on current soil conditions, expected use of the treated site (e.g., vegetation/plants to be established, intensity of activity on site) and the basic BS 3882 topsoil standard you are trying to meet (see general specifications below). A higher compost application rate should be used on soils that are low in organic matter, droughty (primarily sand and gravel based) and/or those high in clay content unless prone to water logging.

Importation of soil ameliorant for topsoil manufacturing (seeded/turfed and planted areas)

<table>
<thead>
<tr>
<th>340</th>
<th>IMPORTATION OF SOIL AMELIORANT FOR TOPSOIL MANUFACTURING (SEEDED/TURFED AND PLANTED AREAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Type: Compost that conforms to the attached Numerical Product Specifications for Landscape Compost.</td>
<td></td>
</tr>
<tr>
<td>• Supplier/Source: [Landscape Architect may name specific compost producer].</td>
<td></td>
</tr>
</tbody>
</table>
Rule of thumb: a typical compost with an organic matter content of 30% on a dry weight basis (other 70% is water and mineral particles) blended at 65 - 84 m³ (33 - 42 tonnes of moist compost) with 100m³ (100 - 133 tonnes dry weight) of soil would raise the organic matter of a soil with low organic matter content, e.g. 2%, up to 5%.

Goal: to create a soil medium possessing characteristics that more closely resemble a loam soil, and possessing a minimum of 5% organic matter (on a dry weight basis). These recommendations are suited for most swards, established through seeding, turfing, or hydraulic seeding and planting areas, and for most external planting beds. However, recommendations may require modification for areas used to develop sportsfields, and for planting areas used to grow plant species requiring low nutrient levels, and those that are lime-hating, such as such as rhododendrons and camellias.

Use imported soils only when required to meet the required soil grade or the textural requirements of the ‘finished’ manufactured topsoil. Remember, compost contains some sand, silt and clay sized mineral particles. Therefore, it will contribute to the textural classification of the manufactured topsoil. Soils should only be imported as necessary, based on requirements of the finished topsoil.

345 IMPORTED SOIL FOR TOPSOIL MANUFACTURING

- Reference/Description/Grading: Compost shall be produced from biodegradable materials and shall fall within the recommended ranges for the horticultural parameters outlined in the attached specification table, as well as fall within the limits for contaminant parameters in PAS 100.
- Coverage: [Landscape Architect to specify.]

345

- Quantity: Provide as necessary to make up any deficiency of topsoil existing on site and to complete the work.
- Grade: [Landscape Architect to specify the required soil specifications].
- Source: [Landscape Architect may specify supplier].
- Foreign matter: On visual inspection, free of fragments and roots of aggressive weeds, sticks, straw, subsoil, pieces of brick, concrete, glass, wire, large lumps of clay or vegetation, and the like.
- Submit: Declaration of analysis including information detailing each of the relevant parameters given in BS 3882, clause 6 and table 2.

360 NOTICE OF IMPORTING COMPOST (AND SOIL)

- Give notice: Before importing first load of manufactured topsoil for transfer to site.
- Notice period: 14 days.

370 SAMPLE LOAD OF IMPORTED COMPOST (AND SOIL)

- General: Deliver to site a sample load of not less than 5 m³.
- Give notice: Allow CA to inspect before making further deliveries to site. Retain for comparison with subsequent loads. Provide a 20 kg reference sample for CA.
Use the results from soil testing, and attached background information, to determine a topsoil blending formula. Convert the blending formula to volumetric measurements to allow easy blending using a 360 degree excavator, front-end loader or equivalent.

The finished topsoil must meet Contaminated Land Exposure Assessment (CLEA) Model and Soil Guidance Values (SGVs) for soil Potentially Toxic Elements (PTEs). Blending using a 360 degree excavator or front end loader can be efficient and effective. Create a measured small pile or bed of compost, then apply the measured volume of soil on top of it (always place the product possessing the lower bulk density (lighter) on the bottom). Starting at the middle of the pile/bed, scoop and slowly dump the materials, always dumping slightly forward of the pile. Continue, and fold in the materials from either side of the pile until uniform. Do not dump the material too quickly or it will not adequately blend. Do not drive over the materials during or after blending.

Blend a batch of manufactured topsoil (volume to be specified by Landscape Architect), sample and analyse in order to evaluate if additional nutrient or pH adjustment supplements are required, and to determine the finished texture and organic matter content. Then, at specified intervals or every 1,000 cubic metres, which ever is less, sample and analyse the manufactured topsoil to monitor consistent blending. The finished topsoil must also meet CLEA SGV limits.

Do not expect to gain a considerable about of soil volume through the addition of compost (maybe 25% of the volume added), as soil particles fit closely around the compost particles minimising its effect on increasing the overall volume. Settlement will be greater than for natural topsoil.

<table>
<thead>
<tr>
<th>410 HANDLING COMPOST (AND SOIL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contamination: Do not mix compost (and soil) with:</td>
</tr>
<tr>
<td>- Stone, hardcore, rubbish or material from demolition work.</td>
</tr>
<tr>
<td>Multiple handling: Keep to a minimum. Use compost (and soil) immediately after importation.</td>
</tr>
<tr>
<td>Wet conditions: Handle compost and soil in the driest condition possible. Do not handle during or after heavy rainfall.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>420 BLENDING COMPOST AND SOIL(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blend ratio: Blend existing soil with compost at a [Landscape Architect to specify] ratio, on a volume to volume basis (or equivalent weight basis).</td>
</tr>
<tr>
<td>Weather and ground conditions: Suitably dry to allow for blending.</td>
</tr>
<tr>
<td>Surface:</td>
</tr>
<tr>
<td>- Blending should be completed on hardstanding, or other compacted surfaces, where moisture does not accumulate.</td>
</tr>
<tr>
<td>Equipment: Blend soil and compost using a 360 degree excavator, front-end loader or equivalent, or customised blending plant.</td>
</tr>
<tr>
<td>- The customised blending plant should use paddles, or other mechanisms, that do not grind the media components.</td>
</tr>
<tr>
<td>- All materials must be thoroughly blended. Do not ‘over mix’ (blend to the extent that soil structure is destroyed).</td>
</tr>
<tr>
<td>Stockpile blended product in a distinct pile, at an adequate distance from unblended materials to avoid contamination. Allow enough space in between pile, and other obstacles, to manoeuvre a front-end loader or equivalent to allow for loading.</td>
</tr>
<tr>
<td>Undesirable material created during the screening process: Remove, including weeds, roots, stones and clods larger than 50 mm in any dimension, tufts of grass and foreign matter.</td>
</tr>
</tbody>
</table>
### Depth

Manufactured topsoils should be applied to a minimum depth of 150 mm for grass and 300 mm for planted areas over thoroughly decompacted subsoil.

### Spreading Manufactured Topsoil

- Temporary roads/surfacing: Remove before spreading manufactured topsoil.
- Layers:
  - Spread full quantity of manufactured topsoil and gently firm.
  - Timing: Spread a minimum of two weeks before planting.
- Structure: Do not compact manufactured topsoil with machinery. Preserve a friable texture of separate visible crumbs wherever possible.

### Primary Grading and Surface Preparation

- General: Grade to smooth flowing contours to 25-50 mm of specified finished levels of soil.
- Areas of thicker soil: Excavate locally.
- Stones: Immediately before spreading the manufactured topsoil remove any remaining stones larger than 25mm.
- Other items: Remove arisings, contaminants and debris.

### Finished Levels of Manufactured Topsoil After Settlement

- Above adjoining paving or kerbs: [Landscape Architect to specify] mm.
- Below dpc of adjoining buildings: Not less than [Landscape Architect to specify] mm.
- Shrub areas: Higher than adjoining grass areas by [Landscape Architect to specify] mm.
- Within root spread of existing trees: Unchanged.
- Adjoining soil areas: Marry in.
- Fallow period:
  - After preparation leave for not less than two weeks.

### Final Grading

- Manufactured topsoil condition: Reasonably dry and workable.
- Contours: Smooth and flowing, with falls for adequate drainage. Remove minor hollows and ridges.
4 Background Data

This section provides additional background information on compost use, as it relates to general landscaping and site management principles.

4.1 Relevant Plant Tolerances

Always use plants appropriate for the site location, and which are tolerant of existing soil conditions and as amended by compost additions. The most critical conditions include soil and compost electrical conductivity (soluble salts content) and pH, and, to a smaller degree, nutrient content.

4.1.1 pH and Electrical Conductivity

The required conditions vary dependent upon the species of the plants to be established. Figure 2 below provides some general guidance on this subject. It should be noted that the pH and soluble salt content of the amended soil mix is more relevant to the establishment and growth of a particular plant than is the pH or soluble salt content of a specific compost (soil conditioner) used to amend the soil.

Lime is typically not required in UK soils, especially where compost has been applied. Typical composts contain 1.25 – 2.5% Calcium. Research has shown that each dry tonne of compost has the neutralising value of 0.1 tonne of limestone. Therefore, the use of certain composts may not be appropriate for use where lime hating plants are to be established.

4.1.2 Nutrients

A 50 mm layer of a ‘typical’ compost will supply up to approximately 200-400 kg/ha of Nitrogen, 380 kg/ha of Phosphate, and 1,200 kg/ha of Potash the first year after application. Nitrogen in compost is generally in a slow-release form and may not provide enough nitrogen in the first few weeks of growth. Fertilizer application rates will need to be modified based on current soil conditions, available nutrients in the compost, and plant species requirements. Additional fertilizers may be required in the following situations:

- in sandy or gravelly soils prone to nutrient leaching, or where plant nutrient requirements are high
- where the compost contains a lower nutrient content or possesses a relatively high carbon to nitrogen ratio (over 20:1)
- where soils are particularly low in nutrients

Figure 2 - Important information about pH and soluble salts

- Plant species vary in their tolerance to pH and soluble salts (electrical conductivity). [Each plant species requires a specific pH range (e.g., Rhododendrons 4.0-6.5, Dogwoods (Cornus) 5.5-8.5, Ilex 6.0-8.0). Each plant also has a salinity tolerance rating, where relative growth of the plant is affected. Most ornamental plants and turf species can tolerate a soil soluble salt level of up to a maximum of 1,500 and 2,200 µS/cm, respectively (using a 1:2.5 soil to water extract during analysis). Seeds, young seedlings and salt sensitive species often prefer soluble salt levels at half the afore mentioned levels.]
- The pH and soluble salt content of the soil will be affected by the pH and soluble salt content of the compost with which it is mixed, and visa versa.
- The pH and soluble salt content of the soil and compost should therefore be obtained separately. The final soil mix should also be tested to ensure it is suitable for the plants to be grown.
4.2 Matching compost and soils

Since both compost and soil characteristics differ, it is important to properly match these products with the planting material to be established. As mentioned earlier, the addition of compost will affect a variety of soil characteristics; including pH, nutrient availability, water percolation, etc. A simple guide to match compost to soil and plants can be found in the Figure 3 below.

![Figure 3 - Reference Guide: Existing Soil Conditions and Plants to be Established](image)

*Modified from US Composting Council, Landscape Architecture Specifications for Compost Utilization, 2003*

4.3 Soil/Site Evaluation and Testing

Compost, or any other soil ameliorant, is primarily used to improve soil conditions, in order to assure the long-term success of the landscape. Understandably, therefore, compost may not be necessary on every project – as the soil may already possess an appropriate organic matter level for the plants to be established. The goal in soil amelioration, in most instances, should be to try to establish a minimum soil organic matter content of 5%. The best way to understand existing soil conditions, as well as verify successful soil modification, is to complete appropriate soil testing (before and after the addition of ameliorants). Although this practice is not always practical, based on the scheduling of the project, it is the best way to verify whether supplemental nutrients or pH adjustment are necessary before planting.

It is important to understand that although compost can improve water penetration and percolation, it does not solve innate drainage problems in soils. With that said, it is not usually suggested to apply organic soil ameliorants to soils in low lying areas that accumulate water.

4.4 Soil Preparation

Successful and sustainable landscapes depend on proper soil preparation. This often includes soil amelioration, but also usually includes soil cultivation to some extent. If the site is predominantly made up of subsoils, deep tillage or ripping may be necessary to relieve compaction. Since the site drainage must be adequate for the intended site purpose and plant tolerances, it must be evaluated (and potentially corrected) before planting can take place. A variety of drainage techniques may be employed to improve innate conditions. Realistically, all landscape planting areas will benefit from deep tillage prior to planting, as it will relieve compaction below the topsoil layer.
4.5 Sourcing and Using Compost

Compost is a unique product manufactured by harnessing biological activity, and using engineering principles, to accelerate natural biodegradation processes. This process allows the production of a soil ameliorant that is sufficiently decomposed, yet still biologically active, such that the amended soil supports healthy plant development. To produce a high quality product, biodegradable feedstocks should be carefully selected and the process must be controlled and monitored.

4.5.1 What is composting?

Composting is a managed process of biological decay of biodegradable (organic) materials. Conditions within the composting heaps are controlled by various means to ensure there is sufficient air, moisture and high temperatures to produce compost that will have beneficial effects when added to soil or container-mixes. High temperatures reached within managed composting systems ensure that weed seeds and plant, human and animal pathogens are destroyed. The organic matter in compost will be in well-decomposed form, such that plant pathogens cannot become re-established again after mixing with the soil, and a proportion of the nutrients it contains are readily available for plant uptake.

‘Vermicomposting’, is the managed degradation of organic materials using specific worm species, and such processes can produce high quality ‘vermicomposts’. However vermicomposts have different characteristics compared with ‘true’ composts. They can be used in many of the same applications that ‘true’ composts are used for, but their application rate and frequency may be different. Vermicomposts are actually the excreta (faeces) of worms, which have ingested raw or partially composted organic materials.

4.5.2 What is compost?

Compost is the product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth. Compost bears little physical resemblance to the raw material from which it originated. Compost is used as an organic matter source that has the unique ability to improve the chemical, physical, and biological characteristics of soils. It contains and will supply plant nutrients, but is not typically considered a fertilizer.

What compost isn’t

To avoid future confusion, the record should be set straight about what ‘true’ compost is, and what it’s not! Throughout the rest of Europe, and indeed the world, compost is understood to be the resultant product of the composting process. True compost is made from biodegradable (organic) materials that are biologically decomposed over a relatively short period of time, with this accelerated decomposition process generating significant heat. Unfortunately, in the UK, many types of organically based products are called ‘composts.’ Common commercial products such as potting composts and many soil improvers are typically peat based, and not true composts, while many peat-free products are bark or wood based.

Compost is also not topsoil, but can be used in the manufacturing of soils which possesses the characteristics of true topsoil. In saying this, however, compost can be used as an alternative to peat and topsoil...

Peat is derived from Sphagnum or other plants that grow in bogs and become covered with water when they die. Due to the cold wet climate in which it grows, peat may accumulate to great depths and undergoes partial anaerobic decomposition. Peat is essentially devoid of nutrients and biological activity.

Topsoil is defined as ‘the surface or upper part of the soil profile.’ Users often define it as a naturally produced medium consisting of micro-organisms, sand, silt, clay, organic matter, trace amounts of nutrients, and other inerts capable of supporting plant growth. However, in many parts of the country, even in agricultural areas known for their productive soils, many of the soils purchased as ‘topsoil’ and used for horticultural applications are not true topsoils. Many of the materials purchased and used as topsoil are mineral soils obtained from below the true topsoil layer. These subsoils are often low in organic matter and essential plant nutrients and do not possess the physical structure required for optimum plant growth. These materials are typically processed to remove debris before marketing. Many topsoils that can be purchased today contain less than 2% organic matter. Other materials sold as topsoil are waste soils obtained from site clearance and skip waste screening operations where the proportion of actual topsoil is usually low.

1 Modified from US Composting Council, Field Guide to Compost Use, 1996
4.5.3 Compost Sampling/Testing

Compost samples should be tested by laboratories that use the methods specified in BSI PAS 100. Most of the methods are for soil improvers and growing media, such as those made from or including composts. These methods are different from those used for soils. The Composting Association maintains a list of suitable laboratories.

4.5.4 What are the standards for compost?

Biodegradable, source separated materials should be processed under carefully controlled conditions to produce a high quality product, as defined by the British Standards Institution’s Publicly Available Specification for Composted Materials – BSI PAS 100 (2002). Compost conformity to PAS 100 should be independently assessed and verified through a certification scheme such as that managed by The Composting Association – look for the certification mark.

Full details of the PAS 100 are available from the British Standards Institution (BSI). Information is also available from The Composting Association at www.compost.org.uk or from the Waste and Resources Action Programme (WRAP) at www.wrap.org.uk.

4.5.5 Compost suppliers

The Composting Association Certification Scheme is the only UK scheme that gives third party assessment and verification of conformity with the BSI Publicly Available Specification for Composted Materials (BSI PAS 100). TCA certified composts are quality assured, traceable and safe.

There are a number of composting companies that can supply quality assured compost manufactured to PAS100. For a list of certified suppliers, visit the WRAP website on www.wrap.org.uk/publications/CertifiedCompostSuppliers.pdf or call the WRAP Freephone Helpline on 0808 100 2040. Alternatively, contact the Composting Association on 01933 227 777.

4.5.6 Obtaining compost

To purchase larger volumes of compost, a landscaper or landscape architect must typically purchase directly through a composter, or compost broker. In such cases, compost samples, as well as test analyses should be supplied by the composter for evaluation. The product evaluation should take place with sufficient time before the landscape project must begin. When planning for larger projects, which are to be completed in the distant future, an evaluation of regional compost sources may be required, in order to identify an appropriate product and adequate volume, and site tours may even be appropriate. In this instance, specific compost windrows (piles) may be sampled while on site and then segregated for your future project.

Composts are typically purchased by volume (cubic metre), either collected or delivered to the project site. The bulk density, weight per unit volume, of the product greatly effects the volume of product that can be transported within a given vehicle. This will impact delivery costs, and therefore the overall delivered price.

Since compost contains organic matter, water and some mineral particles. The landscape architect will want to know the organic matter and moisture contents, as well as the actual weight for any compost delivered for use in the manufacture of topsoil.
Manufacturing Topsoil on site using Compost (Ex-Situ)
APPENDIX I

Short Specification Versions

- Grass Establishment with Compost
- Planting Bed Establishment with Compost
- Compost as a Landscape Backfill Mix Component
- Compost as a Landscape Mulch
- Compost as a Manufactured Topsoil (In-Situ) Component
- Compost as a Manufactured Topsoil (Ex-Situ) Component
Preparation of topsoil for Grass Establishment with Compost

This task consists of applying and incorporating compost into the soil at a designated location. The specification applies to grass establishment using all types of methods, including seeding, turfing, and hydraulic seeding.

Compost standards

Compost that meets the requirements of the British Standards Institution Publicity Available Specification (PAS) 100 (October 2002) will guarantee an appropriate and safe product. PAS 100 covers the range of materials used to make the compost, their quality and traceability, the minimum requirements for the process of composting and the quality of the end product. The PAS 100 specification is a minimum specification and other requirements can be added by the specifier. The compost shall meet the minimum standards of PAS 100, and the PAS 100 specification limits on stones, weed seeds and physical and chemical contaminants. The compost shall contain no substances toxic to animals or plants and possess no objectionable odours. The compost shall be of a friable texture and without excessive moisture, so that it can easily be blended and applied. No fertilisers or other conditioners shall be added to the compost unless specified.

The specification below sets out further requirements for the use of compost in grass establishment. This compost specification is designed to be used in addition to the requirements of PAS 100 for this application.

Compost specification for use in grass establishment:

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
<th>Recommended Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
<td>7.0 – 8.7</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>2000 µS/cm or 200 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;25</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>99% pass through 25mm screen 90% pass through 10mm screen</td>
</tr>
<tr>
<td>C:N Ratio</td>
<td></td>
<td>20:1 maximum</td>
</tr>
<tr>
<td>Contaminant Parameters</td>
<td>Various</td>
<td>Meet BSI PAS 100° Criteria</td>
</tr>
</tbody>
</table>

*The Composting Association Certification Scheme provides a third-party, independent verification of conformity with BSI PAS 100. This is useful for quick and easy identification of products that comply with this PAS. Such products carry the Composting Association’s certification mark on packaging and/or printed information accompanying the product.

Contact the Composting Association on 01933 227777 for a list of certified suppliers.
How to Use:
Uniformly apply compost over the entire treatment area at an average depth of 25 to 50 mm\(^1\), then incorporate it to a minimum depth of 150 mm using a rotovator or other appropriate equipment. Fertilizer and pH adjusting agents (e.g., lime and sulphur) may also be applied before incorporation, if necessary. Rake soil surface smooth prior to seeding, hydraulic seeding or laying turf. The soil surface shall be free of large stones and clay balls larger than 50 mm in any dimension, roots, tufts of grass, rubbish and debris, and other material which will interfere with planting and subsequent site maintenance. Water thoroughly after seeding or laying turf.

Sold By:
Compost will be measured by the cubic metre or the tonne at the point of loading.

Information for Use:

Soil Analysis:
Before any soil preparation procedures ensue, a soil analysis shall be completed by a reputable laboratory to determine any nutritional requirements, and any pH and organic matter adjustments necessary. Once determined, the soil shall be appropriately amended to a range suitable for the turf species to be established.

Cultural Practices:
Take note that the addition of compost may reduce the required frequency of watering. In almost all grass establishment applications, the addition of pre-plant fertilizer can be reduced and sometimes eliminated when stable compost is applied at recommended rates.

Footnotes:
\(^1\) The Landscape Architect/Designer shall specify the compost inclusion rate depending upon soil conditions and quality, plant tolerances, and manufacturer’s recommendations.

For most projects, uniformly apply a 25 - 50 mm layer of compost over the area to be treated, (2.5 - 5.0 m\(^3\) per 100 m\(^2\)). The application rates above are typical for many sites. However, soils rich in organic matter may not require any compost, while even higher compost application rates could be used on soils that are very low in organic matter, or droughty (primarily sand and gravel based). These recommendations are suited for most swards, established through seeding, turfing, or hydraulic seeding. However, recommendations may require modification for sand-based pitches and golf surfaces, and possibly sportsfields.
Preparation of Planting Beds with Compost

This task consists of applying and incorporating compost into the soil at a designated location or locations. This specification applies to the installation of various types of plant including, trees, shrubs, bulbs and herbaceous plants.

Compost standards

Compost that meets the requirements of the British Standards Institution Publicity Available Specification (PAS) 100 (October 2002) will guarantee an appropriate and safe product. PAS 100 covers the range of materials used to make the compost, their quality and traceability, the minimum requirements for the process of composting and the quality of the end product. The PAS 100 specification is a minimum specification and other requirements can be added by the specifier. The compost shall meet the minimum standards of PAS 100, and the PAS 100 specification limits on stones, weed seeds and physical and chemical contaminants. The compost shall contain no substances toxic to animals or plants and possess no objectionable odours. The compost shall be of a friable texture and without excessive moisture, so that it can easily be blended and applied. No fertilisers or other conditioners shall be added to the compost unless specified.

The specification below sets out further requirements for the use of compost in planting bed preparation. This compost specification is designed to be used in addition to the requirements of PAS 100 for this application.

Compost specification for use in planting bed establishment:

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
<th>Recommended Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
<td>7.0 – 8.7</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>2000 µS/cm or 200 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;25</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>99% pass through 25mm screen, 90% pass through 10mm screen</td>
</tr>
<tr>
<td>C:N Ratio</td>
<td></td>
<td>20:1 maximum</td>
</tr>
</tbody>
</table>

Contaminant Parameters

Various Meet BSI PAS 100* Criteria

*The Composting Association Certification Scheme provides a third-party, independent verification of conformity with BSI PAS 100. This is useful for quick and easy identification of products that comply with this PAS. Such products carry the Composting Association’s certification mark on packaging and/or printed information accompanying the product.

Contact the Composting Association on 01933 227777 for a list of certified suppliers.
How to Use:
Uniformly apply compost over the entire treatment area at an average depth of 25 to 50 mm¹, then incorporate it to a minimum depth of 150 mm using a rotovator or other appropriate equipment. Pre-plant fertilizer and pH adjusting agents (e.g., lime and sulphur) may be applied before incorporation, if necessary. Rake soil surface smooth prior to planting. The soil surface shall be reasonably free of large stones and clay balls larger than 50 mm in any dimension, roots, tufts of grass, rubbish and debris, and other material which will interfere with planting and subsequent site maintenance. Water thoroughly after planting.

Sold By:
Compost will be measured by the cubic metre or the tonne at the point of loading.

Information for Use:

Soil Analysis:
Before any soil preparation procedures ensue, a soil analysis shall be completed by a reputable laboratory to determine any nutritional requirements, and any pH and organic matter adjustments necessary. Once determined, the soil shall be appropriately amended to a range suitable for the plant species to be established.

Cultural Practices:
Take note that the addition of compost may reduce the required frequency of watering. In almost all landscaping applications, the addition of pre-plant fertilizer can be eliminated when a stable compost is applied at recommended rates.

Footnotes:
¹The Landscape Architect/Designer shall specify the compost inclusion rate depending upon soil conditions and quality, plant tolerances, and manufacturer’s recommendations. The application rates recommended above are suited for most external planting beds. However, recommendations may require modification for plant species requiring low nutrient levels, and those that are lime-hating, such as rhododendrons, camellias, etc. Typically, compost should not be used (and sometimes used at 1/2 the normal application rate) where lime-hating species are established. Lower compost application rates may be necessary for salt sensitive crops or where composts possessing higher salt levels are used.

For most projects, uniformly apply a 25 - 50 mm layer of compost over the area to be treated, (2.5 – 5.0 m³ per 100 m²). However, soils rich in organic matter may not require any compost, while even higher compost application rates could be used on soils that are very low in organic matter, or droughty (primarily sand and gravel based). These recommendations are suited for most ornamental planting beds.
Preparation of Backfill for Planting Pits with Compost

This task consists of excavating a planting hole and blending compost with the excavated soil. This specification applies to the installation (planting) of various types of plant materials, including bare root, containerized, and balled and burlapped stock.

Compost standards

Compost that meets the requirements of the British Standards Institution Publicity Available Specification (PAS) 100 (October 2002) will guarantee an appropriate and safe product. PAS 100 covers the range of materials used to make the compost, their quality and traceability, the minimum requirements for the process of composting and the quality of the end product. The PAS 100 specification is a minimum specification and other requirements can be added by the specifier. The compost shall meet the minimum standards of PAS 100, and the PAS 100 specification limits on stones, weed seeds and physical and chemical contaminants. The compost shall contain no substances toxic to animals or plants and possess no objectionable odours. The compost shall be of a friable texture and without excessive moisture, so that it can easily be blended and applied. No fertilisers or other conditioners shall be added to the compost unless specified.

The specification below sets out further requirements for the use of compost in planting pit preparation. This compost specification is designed to be used in addition to the requirements of PAS 100 for this application.

Compost specification for use in planting pits backfills:

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
<th>Recommended Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
<td>7.0 – 8.7</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>2000 µS/cm or 200 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;25</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>99% pass through 25mm screen 90% pass through 10mm screen</td>
</tr>
<tr>
<td>C:N Ratio</td>
<td></td>
<td>20:1 maximum</td>
</tr>
<tr>
<td>Contaminant Parameters</td>
<td>Various</td>
<td>Meet BSI PAS 100* Criteria</td>
</tr>
</tbody>
</table>

*The Composting Association Certification Scheme provides a third-party, independent verification of conformity with BSI PAS 100. This is useful for quick and easy identification of products that comply with this PAS. Such products carry the Composting Association’s certification mark on packaging and/or printed information accompanying the product.

Contact the Composting Association on 01933 227777 for a list of certified suppliers.
How to Use:
Excavate a planting hole equal in depth to the root mass, and 2 to 3 times its width. Place the root mass on firm soil so that the top of the root mass is level with the soil surface. For shrubs, bulbs and herbaceous plants: uniformly blend a 3:1 ratio (v/v) of soil and compost where soils are sandy in nature, or subsoils. Use a 4-5:1 (v/v) soil and compost ratio when planting species that require low nutrient levels, or on sites where soil quality is more favourable. For trees: use a 4:1 ratio (v/v) blend of excavated soil and compost. Place blended soil around the root mass, firming occasionally. Do not apply fertilization in the backfill material, or at time of planting. Water thoroughly after planting.

Sold By:
Compost will be measured by the cubic metre or the tonne at the point of loading.

Information for Use:

Soil Analysis:
Before any soil preparation procedures ensue, a soil analysis shall be completed by a reputable laboratory to determine any nutritional requirements, pH and organic matter adjustments necessary.

Cultural Practices:
Take note that the addition of compost may reduce the required frequency of watering. In almost all landscape applications, the addition of pre-plant fertilizer can be eliminated when a stable compost is applied at recommended rates.

Footnotes:
1The Landscape Architect/Designer shall specify the compost inclusion rate depending upon soil conditions and quality, plant tolerances, and manufacturer’s recommendations. These recommendations are suited for most external planting pits. However, recommendations may require modification for plant species requiring minimal fertilization, and those that are lime-hating, such as rhododendrons, camellias, etc. Typically, compost should not be used where lime-hating species are to be planted.
Compost as a Landscape Mulch

This task shall consist of applying a compost mulch to the soil surface following planting activities. This specification applies to the mulching of various types of plant materials, including trees, shrubs, herbaceous plants and bulbs.

Compost standards

Compost that meets the requirements of the British Standards Institution Publicity Available Specification (PAS) 100 (October 2002) will guarantee an appropriate and safe product. PAS 100 covers the range of materials used to make the compost, their quality and traceability, the minimum requirements for the process of composting and the quality of the end product. The PAS 100 specification is a minimum specification and other requirements can be added by the specifier. The compost shall meet the minimum standards of PAS 100, and the PAS 100 specification limits on stones, weed seeds and physical and chemical contaminants. The compost shall contain no substances toxic to animals or plants and possess no objectionable odours. The compost shall be of a friable texture and without excessive moisture, so that it can easily be blended and applied. No fertilisers or other conditioners shall be added to the compost unless specified.

The specification below sets out further requirements for the use of compost in mulching applications. This compost specification is designed to be used in addition to the requirements of PAS 100 for this application.

Compost specification for use in mulching:

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
<th>Recommended Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
<td>6.0 – 9.0</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>3000 µS/cm or 300 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;30</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>99% pass through 75mm screen &lt;25 pass through 10mm screen</td>
</tr>
<tr>
<td>Contaminant Parameters</td>
<td>Various</td>
<td>Meet BSI PAS 100 Criteria</td>
</tr>
</tbody>
</table>

*The Composting Association Certification Scheme provides a third-party, independent verification of conformity with BSI PAS 100. This is useful for quick and easy identification of products that comply with this PAS. Such products carry the Composting Association’s certification mark on packaging and/or printed information accompanying the product.

Contact the Composting Association on 01933 227777 for a list of certified suppliers.
How to Use:
Uniformly apply compost mulch over the entire treatment area, or in a one metre circle around the plant. Apply the compost mulch at a 25 - 75 mm layer over the area to be treated (2.5 – 7.5 m³ per 100 m²), or in a one metre circle around a singular plant (20 – 60 litres per tree). Apply mulch as soon as possible after planting, applying it closely around plant stems but not against them. Water plant(s) in thoroughly prior to mulching, then again after mulching.

Sold By:
Compost will be measured by the cubic metre or the tonne at the point of loading.

Information for Use:

Cultural Practices:
Take note that the addition of a compost mulch will reduce the required frequency of watering. In many cases, applying a compost mulch may reduce post planting fertilization, as the compost mulch will supply some soluble nutrients (when a stable compost is applied at recommended rates).

Footnotes:
1The Landscape Architect/Designer shall specify the compost mulch application rate depending upon soil conditions and quality, plant tolerances, and manufacturer’s recommendations.

For most projects, uniformly apply a 25 - 75 mm layer of compost mulch over the area to be treated, (2.5 – 7.5 m³ per 100 m²). The application rates above are typical for many plant species and sites.
Manufacturing Topsoil on site using Compost (In-Situ)

This task consists of blending excavated soil, at its point of origin, with compost to create a soil media suitable for landscape establishment. This specification applies to the manufacturing of soil for the installation of various types of plant materials, including, grasses, trees and shrubs.

Compost standards:

Compost that meets the requirements of the British Standards Institution Publicity Available Specification (PAS) 100 (October 2002) will guarantee an appropriate and safe product. PAS 100 covers the range of materials used to make the compost, their quality and traceability, the minimum requirements for the process of composting and the quality of the end product. The PAS 100 specification is a minimum specification and other requirements can be added by the specifier. The compost shall meet the minimum standards of PAS 100, and the PAS 100 specification limits on stones, weed seeds and physical and chemical contaminants. The compost shall contain no substances toxic to animals or plants and possess no objectionable odours. The compost shall be of a friable texture and without excessive moisture, so that it can easily be blended and applied. No fertilisers or other conditioners shall be added to the compost unless specified.

The specification below sets out further requirements for the use of compost in topsoil manufacturing. This compost specification is designed to be used in addition to the requirements of PAS 100 for this application.

Compost specification for use in topsoil manufacturing:

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
<td>6.5 – 8.7</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>3000† µS/cm or 300 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;25</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>95% pass through 25mm screen 90% pass through 10mm screen</td>
</tr>
<tr>
<td>C:N Ratio</td>
<td></td>
<td>20:1 maximum</td>
</tr>
<tr>
<td>Contaminant Parameters</td>
<td>Various</td>
<td>Meet BSI PAS 100° Criteria</td>
</tr>
</tbody>
</table>

†If compost possesses a conductivity of above 2000 µS/cm or 200 mS/m, apply it at proportionally reduced application rate

°The Composting Association Certification Scheme provides a third-party, independent verification of conformity with BSI PAS 100. This is useful for quick and easy identification of products that comply with this PAS. Such products carry the Composting Association’s certification mark on packaging and/or printed information accompanying the product.

Contact the Composting Association on 01933 227777 for a list of certified suppliers.
How to Use:
Analyse existing soil characteristics to determine necessary additions. Cultivate the soil using a one or three tine ripper, or equivalent, to a minimum depth of 300 mm (300 mm to 900 mm) in two directions obliquely, when ground conditions are reasonably dry. Using excess site soil, grade the soil to smooth flowing contours that are within 25 - 75mm from the specified finished soil level. Immediately before spreading compost (and other soil materials, if necessary) remove stones larger than 25 mm. Uniformly apply compost. Application rates will be based on current soil conditions, expected use of the treated site¹ (e.g., vegetation/plants to be established, intensity of activity on site, and the basic BS 3882 topsoil standard). Follow by applying any imported soils necessary to meet the required soil grade or the textural requirements of the ‘finished’ manufactured topsoil. Uniformly incorporate compost to a minimum depth of 150 mm for areas to be seeded or turfed, and 300 mm for areas to be planted. Through cultivation, break up soil into particles of 10 mm, and under. Complete a minimum of two weeks prior to seeding, turfing or planting. Analyse manufactured soil.

Sold By:
Compost will be measured by the cubic metre or the tonne at the point of loading.

Information for Use:

Soil Analysis:
When considering topsoil manufacturing for a specific site, more thorough soil sampling and evaluation is suggested on both the topsoil and subsoil. This will allow for a more precise estimation of soil textures and volumes. When manufacturing topsoil on a brownfield site, perform a soil investigation to include all relevant horticultural soil parameters, including those referenced in BS 3882 and the SGV table. Refer to BS 10175:2001, Investigation of Potentially Contaminated Sites Code of Practice and BS 5930:1999, Code of Practice for Site Investigations for additional information.

Cultural Practices:
Take note that the addition of compost may reduce the required frequency of watering. In almost all non-grassing landscape applications, the addition of pre-plant fertilizer can be eliminated when a stable compost is applied at recommended rates. When establishing grass some additional fertilization may be required.

Footnotes:
¹The Landscape Architect/Designer shall specify the compost application rate depending upon soil conditions and quality, plant tolerances, and manufacturer’s recommendations. Goal: to create a soil medium possessing characteristics that more closely resembles a loam soil, and possessing a minimum of 5% organic matter (on a dry weight basis). [Rule of thumb: Where a typical compost possessing an organic matter content of 30% on a dry weight basis (other 70% is water and mineral particles) is applied at a 50 - 75 mm depth (2 - 3”) and incorporated to a depth of 150 mm, the organic matter content of the soil will be increased by approximately 2% (use the higher rate for soils with a higher bulk density).]

These recommendations are suited for most swards, established through seeding, turfing, or hydraulic seeding and planting areas, and for most external planting beds. However, recommendations may require modification for areas used to develop sportsfields, and for planting areas used to grow plant species requiring low nutrient levels, and those that are lime-hating, such as rhododendrons, camellias, etc.
Manufacturing Topsoil on site using Compost (Ex-Situ)

This task consists of excavating and stockpiling soil on a particular site, then blending it with compost to create a soil media suitable for landscape establishment. This specification applies to the manufacturing of soil for the installation of various types of plant materials, including, grasses, trees and shrubs.

Compost standards

Compost that meets the requirements of the British Standards Institution Publicity Available Specification (PAS) 100 (October 2002) will guarantee an appropriate and safe product. PAS 100 covers the range of materials used to make the compost, their quality and traceability, the minimum requirements for the process of composting and the quality of the end product. The PAS 100 specification is a minimum specification and other requirements can be added by the specifier. The compost shall meet the minimum standards of PAS 100, and the PAS 100 specification limits on stones, weed seeds and physical and chemical contaminants. The compost shall contain no substances toxic to animals or plants and possess no objectionable odours. The compost shall be of a friable texture and without excessive moisture, so that it can easily be blended and applied. No fertilisers or other conditioners shall be added to the compost unless specified.

The specification below sets out further requirements for the use of compost in topsoil manufacturing. This compost specification is designed to be used in addition to the requirements of PAS 100 for this application.

Compost specification for use in topsoil manufacturing:

<table>
<thead>
<tr>
<th>Horticultural Parameters</th>
<th>Reported as (units of measure)</th>
<th>Recommended Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH units (1:5 water extract)</td>
<td>6.5 – 8.7</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>µS/cm or mS/m (1:5 water extract)</td>
<td>3000† µS/cm or 300 mS/m max</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% m/m of fresh weight</td>
<td>35 – 55</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>&gt;25</td>
</tr>
<tr>
<td>Particle Sizing</td>
<td>% m/m of air-dried sample passing the selected mesh aperture size</td>
<td>95% pass through 25mm screen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90% pass through 10mm screen</td>
</tr>
<tr>
<td>C:N Ratio</td>
<td></td>
<td>20:1 maximum</td>
</tr>
<tr>
<td>Contaminant Parameters</td>
<td>Various</td>
<td>Meet BSI PAS 100† Criteria</td>
</tr>
</tbody>
</table>

†If compost possesses a conductivity of above 2000 µS/cm or 200 mS/m, apply it at proportionally reduced application rate

†The Composting Association Certification Scheme provides a third-party, independent verification of conformity with BSI PAS 100. This is useful for quick and easy identification of products that comply with this PAS. Such products carry the Composting Association’s certification mark on packaging and/or printed information accompanying the product.

Contact the Composting Association on 01933 227777 for a list of certified suppliers.
How to Use:

Analyse existing soil characteristics to determine the appropriate ratio of existing soil and imported materials (e.g., compost, soil) necessary to manufacture an acceptable soil. Identify a site location to complete on-site stockpiling of materials and blending activities. Begin the process by cultivating the soil using a one or three tine ripper, or equivalent, to a minimum depth of 300 mm (300 mm to 900 mm) in two directions obliquely, when ground conditions are reasonably dry. Strip this existing, loosened, soil to a depth adequate to obtain the appropriate volume and quality of subsoil needed for the project. Stockpile stripped (and imported) soils, and compost, at the identified location on the site, preferably, at or near the location for blending.

Using a 360 degree excavator, front-end loader or equivalent, or customised blending plant, uniformly blend existing soil with compost (on a volume to volume basis [or equivalent weight basis]). All materials must be thoroughly blended, but not ‘over mixed’ (not blended to the extent that soil structure is destroyed). Compost inclusion rates will be based on current soil conditions, expected use of the treated site (e.g., vegetation/plants to be established, intensity of activity on site, and the basic BS 3882 topsoil standard you are trying to meet). Also, blend in any imported soils necessary to meet the required soil grade or the textural requirements of the ‘finished’ manufactured topsoil.

Subsoil by ripping the area, if required, and then spread the full quantity of manufactured topsoil and gently firm (do not compact manufactured topsoil with machinery). Manufactured topsoil should be applied to a minimum depth of 150 mm for areas to be seeded or turfed, and 300 mm for areas to be planted. Complete a minimum of two weeks prior to seeding, turfing or planting. Analyse manufactured soil.

Sold By:

Compost will be measured by the cubic metre or the tonne at the point of loading.
Information for Use:

Soil Analysis:
When considering topsoil manufacturing for a specific site, more thorough soil sampling and evaluation is suggested on both the topsoil and subsoil. This will allow for a more precise estimation of soil textures and volumes. When manufacturing topsoil on a brownfield site, perform a soil investigation to include all relevant horticultural soil parameters, including those referenced in BS 3882 and the S6V table. Refer to BS 10175:2001, Investigation of Potentially Contaminated Sites Code of Practice and BS 5930:1999, Code of Practice for Site Investigations for additional information.

Cultural Practices:
Take note that the addition of compost may reduce the required frequency of watering. In almost all non-grassing landscape applications, the addition of pre-plant fertilizer can be eliminated when a stable compost is applied at recommended rates. When establishing grass some additional fertilization may be required.

Footnotes:

1. Areas which possess hardstanding are preferred for stockpiling and blending, however other compacted surfaces are acceptable.

2. The depth to which the soil should be stripped is based on the depth and quality of the existing soil materials, and the finished levels of the final proposals, as well as the quantity (depth) of manufactured topsoil specified. Excavate to a greater depth if necessary to win the most suitable subsoils and make up levels with less suitable soils.

3. The customised blending plant should use paddles, or other mechanisms, that do not grind the soil components.

4. The Landscape Architect/Designer shall specify the compost inclusion rate depending upon soil conditions and quality, plant tolerances, and manufacturer’s recommendations. Goal: to create a soil medium possessing characteristics that more closely resembles a loam soil, and possessing a minimum of 5% organic matter (on a dry weight basis). [Rule of thumb: Where a typical compost with an organic matter content of 30% on a dry weight basis (other 70% is water and mineral particles) blended at 65-84 m³ (33 - 42 tonnes of moist compost) with 100 m³ (100 - 133 tonnes dry weight) of soil would raise the organic matter of a soil with low organic matter content, e.g. 2%, up to 5%.]

These recommendations are suited for most swards, established through seeding, turfing, or hydraulic seeding and planting areas, and for most external planting beds. However, recommendations may require modification for areas used to develop sportsfields, and for planting areas used to grow plant species requiring low nutrient levels, and those that are lime-hating, such as rhododendrons, camellias, etc.
APPENDIX II

Background Data

• Landscape and Topsoil Background Data
• Topsoil Manufacturing Technical Data and Background
1 Landscape and Topsoil Background Data

1.1 Electrical Conductivity

The following table allows for the interpretation of electrical conductivity analysis using the calcium sulphate extraction method for soil testing (1:2.5 dilution).

**Interpretation of indices for conductivity**

<table>
<thead>
<tr>
<th>Crop growth</th>
<th>All seedlings, bulbs, containerised nursery stock, lettuce</th>
<th>All other soil grown vegetables and flowers</th>
<th>Carnations, tomatoes, peppers</th>
</tr>
</thead>
<tbody>
<tr>
<td>No growth restriction</td>
<td>0 to 2</td>
<td>0 to 3</td>
<td>0 to 4</td>
</tr>
<tr>
<td>Possible growth restriction, especially with young plants</td>
<td>3 and 4</td>
<td>4 and 5</td>
<td>5 and 6</td>
</tr>
<tr>
<td>Severe damage likely</td>
<td>Over 4</td>
<td>Over 5</td>
<td>Over 6</td>
</tr>
</tbody>
</table>

**Soil and loam-based composts may be analysed according to MAFF Reference Book RB427 The Analysis of Agricultural Materials. The index table for soil conductivity (RB209 (1988) Fertilizer Recommendations for agricultural and horticultural crops) is shown below.**

**Classification of soil and loam based composts**  
(analysis on dried, ground samples, CaSO₄ extraction method)

<table>
<thead>
<tr>
<th>Index</th>
<th>Conductivity (µS cm⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1900-2200</td>
</tr>
<tr>
<td>1</td>
<td>2210-2400</td>
</tr>
<tr>
<td>2</td>
<td>2410-2600</td>
</tr>
<tr>
<td>3</td>
<td>2610-2700</td>
</tr>
<tr>
<td>4</td>
<td>2710-2800</td>
</tr>
<tr>
<td>5</td>
<td>2810-3000</td>
</tr>
<tr>
<td>6</td>
<td>3010-3300</td>
</tr>
<tr>
<td>7</td>
<td>3310-3700</td>
</tr>
<tr>
<td>8</td>
<td>3710-4000</td>
</tr>
<tr>
<td>9</td>
<td>over 4000</td>
</tr>
</tbody>
</table>

When soils are analysed for electrical conductivity using the water extraction method (1:2.5 dilution), the following should be considered:

- Typical UK soils possess an electrical conductivity of < 700 µS cm⁻¹
- A suggested maximum electrical conductivity for general landscape planting soils (and manufactured topsoil) is 1,500 µS cm⁻¹ and 2,200 µS cm⁻¹ for grass/turf and tolerant plant species.

**Analysing for pH and soluble salts**

Be advised that pH and soluble salts (electrical conductivity) are analysed using specific testing procedures. The amount of water (dilution factor) used in the testing procedures is based on the particular product:

**Industry standards**

- Soil testing – 1 : 2.5 dilution v/v (soil : water)
- Compost testing – 1 : 5 dilution v/v (compost : water)
1.2 Organic Matter

Compost can be applied successfully at a rate of up to 75 mm depth, with incorporation into the soil to an approximate depth of 150 - 200 mm. Quantities required to cover 100 m² are detailed below.

Figure 1 - Cubic Metres of Compost Required to Cover 100 m²

<table>
<thead>
<tr>
<th>Cubic metre</th>
<th>0.5 m³</th>
<th>1.0 m³</th>
<th>2.5 m³</th>
<th>5.0 m³</th>
<th>7.5 m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 mm layer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 mm layer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 mm layer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 mm layer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75 mm layer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Typical garden compost has an organic matter content of 30% in the dry matter (20% on a fresh weight basis) at a moisture content of 36%. An average bulk density is 500 kg/m³ on a fresh weight basis.

Soil has a bulk density of approximately 1-1.5 tonne per m³ on a dry weight basis. If a poor quality soil has an organic matter content of only 2%, the following table may be used to estimate the quantities of compost required per 100 m³ of soil:

Figure 2

<table>
<thead>
<tr>
<th>Desired soil organic matter content %</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubic metres of compost required</td>
<td>40</td>
<td>65</td>
<td>90</td>
<td>120</td>
<td>160</td>
<td>200</td>
<td>250</td>
</tr>
<tr>
<td>Tonnes of compost required</td>
<td>20</td>
<td>33</td>
<td>45</td>
<td>60</td>
<td>80</td>
<td>100</td>
<td>125</td>
</tr>
</tbody>
</table>

*Based on soil at 1 tonne/cubic metre on a dry weight basis; for soil with a higher dry weight bulk density, add proportionally more compost

To calculate the amount of compost required to raise the organic matter content of the same soil on an area basis, use the following table per 100 m² area:

Figure 3

<table>
<thead>
<tr>
<th>Desired soil organic matter content %</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubic metres of compost required</td>
<td>6</td>
<td>10</td>
<td>14</td>
<td>18</td>
<td>24</td>
<td>30</td>
<td>38</td>
</tr>
<tr>
<td>Tonnes of compost required</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>19</td>
</tr>
</tbody>
</table>

*Based on soil at 1 tonne/cubic metre on a dry weight basis; for soil with a higher dry weight bulk density, add proportionally more compost

1.3 Nutrients

Compost can provide substantial quantities of nutrients when it is applied in the typical application rates used in landscaping and soil improvement. These nutrients should be considered when developing future fertilization programmes.

Figure 4 - Typical nutrient contents of compost

<table>
<thead>
<tr>
<th>Depth over an area</th>
<th>Cubic metres per 100m²</th>
<th>Cubic metres per hectare</th>
<th>Tonnes per hectare</th>
<th>Tonnes dry matter per hectare</th>
<th>N</th>
<th>P₂O₅</th>
<th>K₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>6mm 1/4&quot;</td>
<td>0.6</td>
<td>60</td>
<td>30</td>
<td>19</td>
<td>24</td>
<td>45</td>
<td>144</td>
</tr>
<tr>
<td>12mm 1/2&quot;</td>
<td>1.2</td>
<td>120</td>
<td>60</td>
<td>38</td>
<td>48</td>
<td>90</td>
<td>288</td>
</tr>
<tr>
<td>25mm 1&quot;</td>
<td>2.5</td>
<td>250</td>
<td>125</td>
<td>79</td>
<td>100</td>
<td>190</td>
<td>600</td>
</tr>
<tr>
<td>50mm 2&quot;</td>
<td>5.0</td>
<td>500</td>
<td>250</td>
<td>158</td>
<td>200</td>
<td>380</td>
<td>1200</td>
</tr>
</tbody>
</table>
2 Topsoil Manufacturing Technical Data and Background

Technical Data
Excerpt from: BS 3882 Specification for Topsoil

Section 6 - Topsoil Characteristics

6.1 General

6.1.1 Results for extractable phosphorus, potassium and magnesium contents determined in accordance with this standard shall be expressed as a dimensionless index as given in table 1.

<table>
<thead>
<tr>
<th>Index</th>
<th>Concentration of extractable elements in milligrams per litre of soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 to 9 ( ) 0 to 60 ( ) 0 to 25 ( )</td>
</tr>
<tr>
<td>1</td>
<td>10 to 15 ( ) 61 to 120 ( ) 26 to 50 ( )</td>
</tr>
<tr>
<td>2</td>
<td>16 to 25 ( ) 121 to 240 ( ) 51 to 100 ( )</td>
</tr>
<tr>
<td>3</td>
<td>26 to 45 ( ) 241 to 400 ( ) 101 to 175 ( )</td>
</tr>
<tr>
<td>4</td>
<td>46 to 70 ( ) 401 to 600 ( ) 176 to 250 ( )</td>
</tr>
<tr>
<td>5</td>
<td>71 to 100 ( ) 601 to 900 ( ) 251 to 350 ( )</td>
</tr>
<tr>
<td>6</td>
<td>101 to 140 ( ) 901 to 1500 ( ) 351 to 600 ( )</td>
</tr>
<tr>
<td>7</td>
<td>141 to 200 ( ) 1501 to 2400 ( ) 601 to 1000 ( )</td>
</tr>
<tr>
<td>8</td>
<td>201 to 280 ( ) 2401 to 3600 ( ) 1001 to 1500 ( )</td>
</tr>
<tr>
<td>9</td>
<td>over 280 ( ) over 3600 ( ) over 1500 ( )</td>
</tr>
</tbody>
</table>

6.1.2 The topsoil shall conform to the requirements given in table 2 determined in accordance with relevant method of test.

6.2 Weeds and foreign matter

When inspected visually, all grades of topsoil shall be free from propagules of aggressive weeds (see N.6.4.5), fragments of glass, bricks, concrete, wire of other potentially hazardous foreign matter and bulk vegetative growth, in order to ensure negligible risk of subsequent weed problems (introduced in the soil) of traumatic injury.

NOTE. Soil should contain no undesirable concentrations of contaminants. The current Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL) Guidance [3] assists in interpreting soil analyses. The potential acidity (usually due to sulfide) should be less than that which would cause the pH to fall to 4.5.

Where grass/turf or landscape plantings are to be established, it is suggested that any manufactured topsoil contain a minimum of 5% organic matter (as measured by Loss On Ignition) and a 2-2-1 P-K-Mg (and ideally 3-3-2) nutrient index (from table 1 above). The minimum nutrient index levels will usually be surpassed when compost is used as a component in the manufactured topsoil, therefore additional fertilization will not typically be necessary.
Table 2. Topsoil characteristics

<table>
<thead>
<tr>
<th>Source</th>
<th>Premium grade Origin to nearest 100 m</th>
<th>General Purpose grade ---</th>
<th>Economy grade (Low clay-- High Clay) ---</th>
<th>Method of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textural classification (see figure 1)</td>
<td>See figure 2a</td>
<td>See figure 2b</td>
<td>See figure 2c</td>
<td>BS 1377: Part 2: 1990 (see also annexes K and P)</td>
</tr>
<tr>
<td>Maximum stone content % (m/m) Stone size: &gt;2 mm</td>
<td>30</td>
<td>60</td>
<td>65</td>
<td>BS 1377: Part 2: 1990</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>30</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;20 mm</td>
<td>10</td>
<td>30</td>
<td>60</td>
<td>BS 1377: Part 2: 1990</td>
</tr>
<tr>
<td>&gt;50 mm</td>
<td>0</td>
<td>10</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>pH value</td>
<td>5.5 to 7.8</td>
<td>5.0 to 8.2</td>
<td>5.0 to 8.2</td>
<td>BS 1377: Part 3: 1990</td>
</tr>
<tr>
<td>Nutrient content</td>
<td>P index min. 2</td>
<td>2</td>
<td>N/A</td>
<td>Annex C</td>
</tr>
<tr>
<td></td>
<td>K index min. 1</td>
<td>2</td>
<td>N/A</td>
<td>Annex E</td>
</tr>
<tr>
<td></td>
<td>Mg index min. 0.2</td>
<td>1</td>
<td>N/A</td>
<td>Annex G</td>
</tr>
<tr>
<td></td>
<td>N % (m/m) min.</td>
<td>0.2</td>
<td>N/A</td>
<td>Annex B</td>
</tr>
<tr>
<td>Loss on ignition % (m/m) (see note 3 and figure 1)</td>
<td>See figure 2</td>
<td>See figure 2</td>
<td>See figure 2</td>
<td>Annex M</td>
</tr>
<tr>
<td>Exchangeable sodium percentage (ESP) % (see note 4)</td>
<td>&lt; 10</td>
<td>&lt; 15</td>
<td>&lt;15</td>
<td>Annex J (Annex L)</td>
</tr>
</tbody>
</table>

NOTE 1. If the final land use is to be playing fields or if visual or other factors are important, a purchaser may specify screening (see N.4) to a maximum stone size (see N.6.3) or particular particle size distribution.

NOTE 2. Premium grade topsoil should have a structure comprising strong, fine to medium sized granular peds or fine subangular blocky peds [2].

NOTE 3. Soils with greater than 20% (m/m) organic matter content can be described as peaty.

NOTE 4. If the specific electrical conductivity of a calcium sulfate extract is greater than 2800 µS.cm⁻¹, the ESP should be determined.
Soil Textural Classification Triangle

Figure 1 - Textural classification (limiting percentage of sand silt and clay sized particles for the mineral texture class)

Note: Examples of textural classification:
- Soil A with 30% sand, 20% silt and 50% clay is in the ‘Clay’ textural class;
- Soil B with 55% sand, 30% silt and 15% clay is in the ‘Sandy loam’ class;
- Soil C with 45% sand, 50% silt and 5% clay is in the ‘Sandy silt loam’ textural class.
Premium grade topsoil must have between 5 and 50% organic matter content (m/m) and the soil texture must be within the following ranges:

- Clay between 5 and 27%
- Silt not more than 82%
- Sand would make up remainder of mineral content

*The goal of the topsoil manufacturing process will be the creation of a blended topsoil that meets the BS 3882 Specification for a Premium Grade Topsoil. However, this may not always be achievable, or necessary to ensure the success of a particular project.
References


2,3,4US Composting Council, Field Guide to Compost Use, 1996

BSI Publicly Available Specification for Composted Materials - PAS 100 (October 2002)
ISBN 0-580-40590-7

BS3882: Specification for Topsoil: 1994