

Title: Ending the use of peat and peat containing products in the horticultural sector for England and Wales. IA No: RPC Reference No: Not Applicable Lead department or agency: Defra Other departments or agencies: N/A	Impact Assessment (IA)
	Date: 14/02/2022
	Stage: Consultation
	Source of intervention: Domestic
	Type of measure: Primary legislation
Contact for enquiries: horticultural.peat@defra.gov.uk	
Summary: Intervention and Options	RPC Opinion: Not Applicable

Cost of Preferred (or more likely) Option (in 2019 prices)			
Total Net Present Social Value	Business Net Present Value	Net cost to business per year	Business Impact Target Status Qualifying provision
£-32.7m	-£769m	£49.0m	

What is the problem under consideration? Why is government action or intervention necessary?

Peat extraction is responsible for emissions of greenhouse gases (GHG) contributing to climate change. 0.55MtCO₂e were emitted in 2019 due to peat extraction in the UK. Extraction also contributes to the destruction of important habitats, biodiversity and archaeological sites. This threatens the vital ecosystem services derived from peatlands, such as water regulation and flood defence. This is a market failure in the form of negative externalities, as climate change and natural environment degradation impose a cost on wider society. For instance, we predict that the sum of GHG emissions released under the baseline scenario from 2021-42 due to peat extraction are worth £993m using BEIS 2021 GHG Valuation guidance¹ (2021 prices 2020 PV base year). We use 2042 as the end point of the time series as that is when all current peat extraction licences will expire. To correct this, the Government is committed to protecting our vulnerable peatlands and phasing out damaging practices, including the use of peat and peat containing products in the horticultural sector. While there has been some progress, our voluntary target which we set in 2011 aiming to phase out the use of peat in horticulture by 2020 has not succeeded. Recent research statistics show that over 2.2 million cubic metres of peat was sold in 2020 in the UK amateur and professional markets². This was an increase over the volume sold in 2019 due to exceptional demand during lock-down and disruptions to the supply chains for alternatives. This led to further GHG emissions and other negative environmental outcomes explained above.

¹ BEIS, 2021

² UK GMM (2020)

What are the policy objectives of the action or intervention and the intended effects?

Through one or a combination of the measures in the consultation, the intention is to end the use of peat and peat containing products in the horticulture sector. The sector will switch to good quality peat-free products derived from more sustainable materials (e.g., wood fibre and bark, green compost, coir etc.). The policy objective is to reduce to zero the unsustainable use of peat by 2028, in order to eliminate the societal costs from GHG emissions and harm to the natural environment. Doing this will contribute to the protection of vulnerable peatland habitats which perform many functions, including the UK's largest terrestrial carbon store, water regulation and habitat for rare wildlife. This policy will contribute towards the Government's net zero carbon emissions target. The measure of success will be the significantly decreased extraction and use of peat measured by monitoring of statistics of the sale of peat by growing media producers.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

This consultation Impact Assessment follows a voluntary target set in 2011 to phase out the use of peat in growing media by 2020 for the amateur sector and 2030 for the professional sector in England. We recognise that this voluntary approach has not delivered, and that further action is needed.

We are considering the following policy options in this Impact Assessment:

Option 0: Do nothing (baseline, continuation of voluntary approach): This would rely on the current momentum in the demand for peat-free growing media to deliver change without further government intervention. However, this approach has not delivered sufficient change so far. This current approach is non-regulatory.

Option 1: Mandatory reporting of the volume of peat sold: This would see sellers of horticultural products containing peat required to publish their annual sales of peat (by volume). This follows a model used by government to encourage behaviour change, for example, the Equality Act 2010 (Gender Pay Gap Information) Regulations 2017.

Option 2: Point of sale charge for the purchase of any growing media bag containing peat: This option would mean all retailers selling growing media containing peat (or delivering growing media containing peat that originates from another country) will be required to apply a point-of-sale charge to each bag of peat or growing media containing peat sold. Peat-free growing media is often more expensive than growing media containing peat, and so there is no financial incentive for consumers to choose peat-free growing media. This option is aimed at overcoming that price differential, although it is very difficult to foresee consumer behaviour in response to this.

Option 3: Ban the sale of peat (all users, uses and sources-domestic and international, **preferred option**): This is a ban on the sale of peat in both the amateur and professional sectors. This option would create a level playing field for growing media manufacturers, growers and retailers selling peat and peat containing products (no matter their point of origin, i.e. including imports) and ensure the end of peat use in horticulture.

Will the policy be reviewed? Yes If applicable, set review date: 2026

Is this measure likely to impact on international trade and investment?	Yes			
Are any of these organisations in scope?	Micro Yes	Small Yes	Medium Yes	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)	Traded:		Non-traded: 4.084MtCO ₂ e	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible: Alastair Johnson Date: 11/02/2022

Summary: Analysis & Evidence

Policy Option 1

Description: Mandatory reporting of the volume of peat sold

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years 22	Net Benefit (Present Value (PV)) (£m)		
			Low: -£27.5m	High: £73.8m	Best Estimate: £10.0m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£1.0m	£0.5m	£8.7m
High	£3.7m	£2.2m	£34.4m
Best Estimate	£2.2m	£1.1m	£17.5m

Description and scale of key monetised costs by 'main affected groups'

Figures here are in 2021 prices, 2020 PV terms.

- 1) Up-front manufacturer transitional costs. We estimate that this affects 30 manufacturers, and the total estimated cost is £0.7m. Experienced in 2024.
- 2) Familiarisation costs. These impact retailers (estimated n=99,158) and the 30 growing media manufacturers. Total estimated cost is £1.6m. Experienced in 2022.
- 3) Additional manufacturer input costs. Compared to baseline, we estimate that the total cost of this to be £17.0m. Predicted to affect 30 manufacturers. Experienced from 2025-42.

Other key non-monetised costs by 'main affected groups'

N/A

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0m	£0.5m	£6.9m
High	£0m	£5.8m	£82.5m
Best Estimate	£0m	£2.0m	£27.5m

Description and scale of key monetised benefits by 'main affected groups'

Figures here are in 2021 prices, 2020 PV terms.

Greenhouse gas abatement occurs due to the reduction in extracted peat, estimated to be worth £30.3m. This is 0.158MtCO₂e valued using BEIS carbon values. This is of benefit to society, experienced from 2025-42.

Other key non-monetised benefits by 'main affected groups'

Biodiversity benefits will accrue due to improvements in peatland condition, in addition to other benefits such as improved water regulation.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5
<ul style="list-style-type: none"> • The fall in peat sales takes place within 3 years of the measure coming into force and then stabilises at the 10% reduction level. • All foregone peat sales are replaced by alternative growing media. • No enforcement costs as all businesses are assumed to oblige. 		

Summary: Analysis & Evidence

Policy Option 2

Description: Point of Sales (POS) charge (5p/litre)

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years 22	Net Benefit (Present Value (PV)) (£m)		
			Low: £8.2m	High: £162.3m	Best Estimate: £67.5m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£1.9m	£0.3m	£7.3m
High	£5.1m	£0.8m	£18.2m
Best Estimate	£3.4m	£0.5m	£11.9m

Description and scale of key monetised costs by 'main affected groups'

Figures here are in 2021 prices, 2020 PV terms.

- 1) Up-front manufacturer transitional costs. We estimate that this affects 30 manufacturers, and the total cost is £2.0m. Experienced in 2024.
- 2) Familiarisation costs. These impact retailers (estimated n=99,158) and the 30 growing media manufacturers. Total estimated cost is £1.6m. Experienced in 2022.
- 3) Additional manufacturer input costs. Compared to baseline, we estimate that this cost will total £5.7m. Predicted to affect 30 manufacturers. Experienced from 2025-42.
- 4) Manufacturer R&D costs. Predicted to equal £3.9m. Affects the 30 growing media manufacturers. Experienced from 2022-28.

Other key non-monetised costs by 'main affected groups'

N/A

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0m	£1.9m	£26.4m
High	£0m	£11.8m	£170.0m
Best Estimate	£0m	£5.6m	£79.3m

Description and scale of key monetised benefits by 'main affected groups'

Figures here are in 2021 prices, 2020 PV terms.

Greenhouse gas abatement occurs due to the reduction in extracted peat, worth £87.5m. This is 0.455MtCO_{2e} valued using BEIS carbon values. This is of benefit to society, experienced from 2025-42.

Other key non-monetised benefits by 'main affected groups'

Biodiversity benefits will accrue due to improvements in peatland condition, in addition to other benefits such as improved water regulation.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5
<ul style="list-style-type: none"> • The fall in peat sales takes place within 3 years of the measure coming into force and then stabilises at the 50% reduction level. • 2/3 of foregone peat sales are replaced by alternative growing media, 1/3 replaced by soil improvers. • No enforcement costs as all businesses are assumed to oblige. 		

Summary: Analysis & Evidence

Policy Option 3

Description: Ban on the trade of peat (preferred option)

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years 22	Net Benefit (Present Value (PV)) (£m)		
			Low: -£486.8m	High: £421.0m	Best Estimate: £-32.7m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£239.7m	2022-24	£32.9m
High	£242.7m		£44.5m
Best Estimate	£241.2M		£38.7m
			£680.9m
			£857.3m
			£769.1m

Description and scale of key monetised costs by 'main affected groups'

Figures here are in 2021 prices, 2020 PV terms.

- 1) Up-front manufacturer transitional costs. We estimate that this affects 30 manufacturers, and the cost to be £7.2m. Experienced in 2022.
- 2) Familiarisation costs. These impact retailers (estimated n=99,158), 30 growing media manufacturers and 15,464 professional growing businesses. Total estimated cost is £1.8m. Experienced in 2022.
- 3) Grower transitional costs. Predicted to impact a significant proportion of the 15,464 growing businesses. Estimated at £192.6m. Experienced 2025-34.
- 4) Additional manufacturer input costs. Compared to baseline, we estimate that this cost will total £154.5m. Predicted to affect 30 manufacturers. Experienced 2022-42.
- 5) Manufacturer R&D costs. Predicted to equal £35.7m. Affects the 30 growing media manufacturers. Experienced 2022-28.
- 6) Grower lost profit due to increased variable and fixed costs. Estimated at £456.1m, with certain growing sectors affected more than others. Experienced 2024-42.

Other key non-monetised costs by 'main affected groups'

There may be additional trialling costs faced by professional growers as they spend time trying different alternative combinations to get the best yield. There is ongoing research to try to quantify this

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0m	2022-24	£25.1m
High	£0m		£74.5m
Best Estimate	£0m		£49.8m
			£370.6m
			£1.1bn
			£736.4m

Description and scale of key monetised benefits by 'main affected groups'

Figures here are in 2021 prices, 2020 PV terms.

Significant greenhouse gas abatement occurs due to the reduction in extracted peat, estimated at 4.084MtCO_{2e}, experienced 2022-2042. This is of great benefit to society. The value of the carbon abatement is £806.3m.

Biodiversity benefits are here quantified as analysis is more robust. These benefits are estimated at £5.5m, experienced 2026-42.

Improved water regulation should also occur (although we cannot quantify this)

Other key non-monetised benefits by 'main affected groups'

N/A

Key assumptions/sensitivities/risks

Discount rate (%)

3.5

- Retail sales of peat to tend to 0 from 2021-24, professional sales tend to 0 from 2021-28. Linear trajectories of change are modelled, but it is more likely that change will occur in a series of steps as new products come to market. It has not been possible to model such steps.
- All sellers comply with the legal requirement of this measure.
- 2/3 of foregone peat sales are replaced by alternative growing media, 1/3 replaced by soil improvers.
- No enforcement costs as all businesses are assumed to oblige.

1. Problem under consideration and rationale for intervention

1.1 Introduction

Peat has been commercially extracted for growing media since the 1970s. It has been used as a replacement for loam (soil), which was becoming more difficult to source in sufficient quantities to meet a burgeoning demand for growing media and potted plants. The modern commercial horticulture sector has been developed around the use of peat and its properties for plant growing

Peat for horticulture is extracted from lowland peats, predominantly from lowland raised bogs, which occur in flat, low-lying inland locations or basins. Commercial extraction in England is now only licenced on approximately 627 ha of peatland across 24 sites (representing <0.1% of the peat area of England¹). All extraction licences expire by 2042 at the latest and no new licences will be granted². According to DLUHC data³, there was no commercial extraction in Wales in 2014. We compound this with the Growing Market Monitor⁴ (GMM) data which suggests that there has been no Welsh sales of growing media containing peat since then.

The National Planning Policy Framework is clear that planning policies should not identify new sites or extensions to existing sites for peat extraction and that mineral planning authorities should not grant planning permission for peat extraction from new or extended sites.

The UK consumed around 2.2 million cubic metres (m³) of peat in 2020 (1 cubic metre is equal to 1000 litres). This is down from a peak in consumption of 3.4 million m³ in 2005. These data, and all those in the rest of the section, are sourced from the GMM⁵, unless otherwise stated.

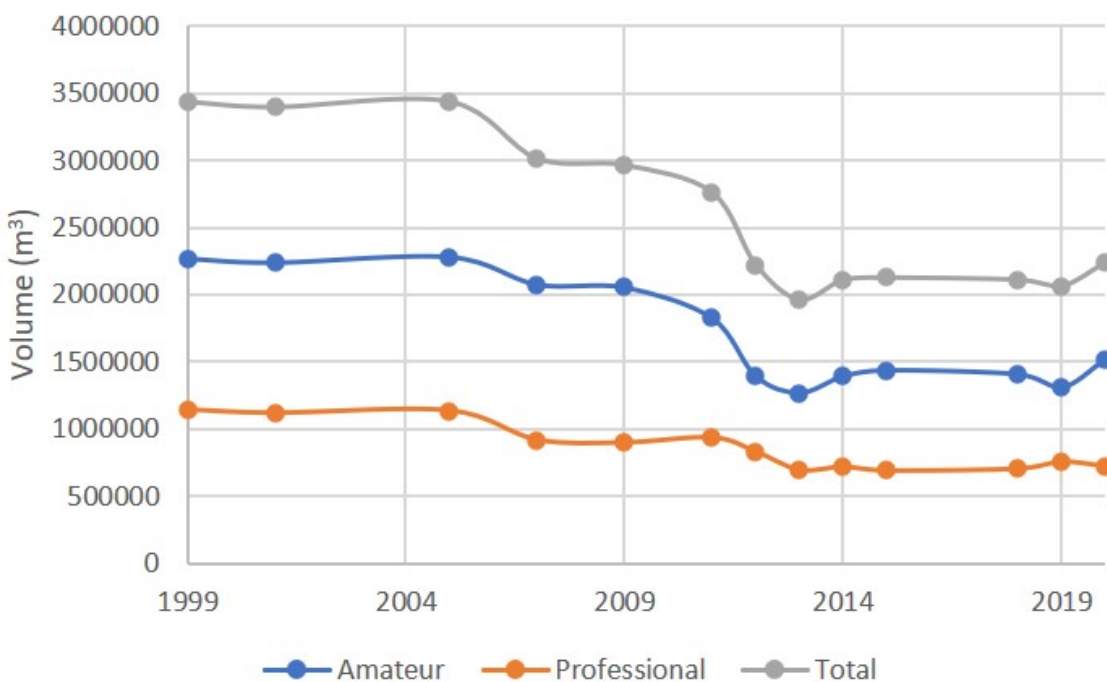


Figure 1: Volume of peat (m³) sold in the UK between 1999 to 2020⁵

¹ This data is not publicly available. It is an update on the data available in [this PQ](#).

² National Planning Policy Framework - GOV.UK (www.gov.uk)

³ Table 6. 2014 was the last year of collection for this data.

⁴ UK GMM

⁵ UK GMM

⁵ Data for 1999 to 2009 taken from Defra research (2010): Monitoring the horticultural use of peat and progress towards achievement of the UKBAP target (SP08020). Data from 2011 onwards taken from [UK GMM](#).

In 2020, 39% of the peat sold in the UK was extracted in the UK, 51% was imported from the Republic of Ireland and 10% from mainland Europe (Figure 2).

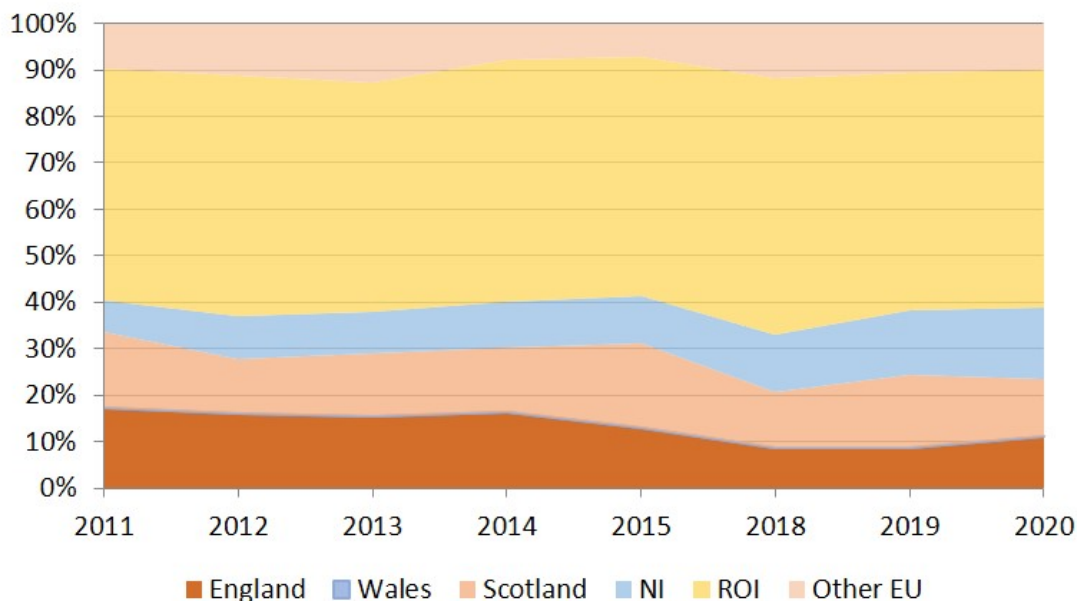


Figure 2: Sources of peat sold in the UK (data from UK GMM⁶) (No peat is reported as being extracted in Wales)

The sources of imported peat have varied over time, but to date the Republic of Ireland has been the main source (Figure 3). In 2017 the other sources of imported peat were from Germany, the Netherlands, Belgium and other. Now (2021) that the main supplier of peat in the Republic of Ireland has stopped peat extraction⁷ the relative proportion of peat sourced from other countries is set to change.

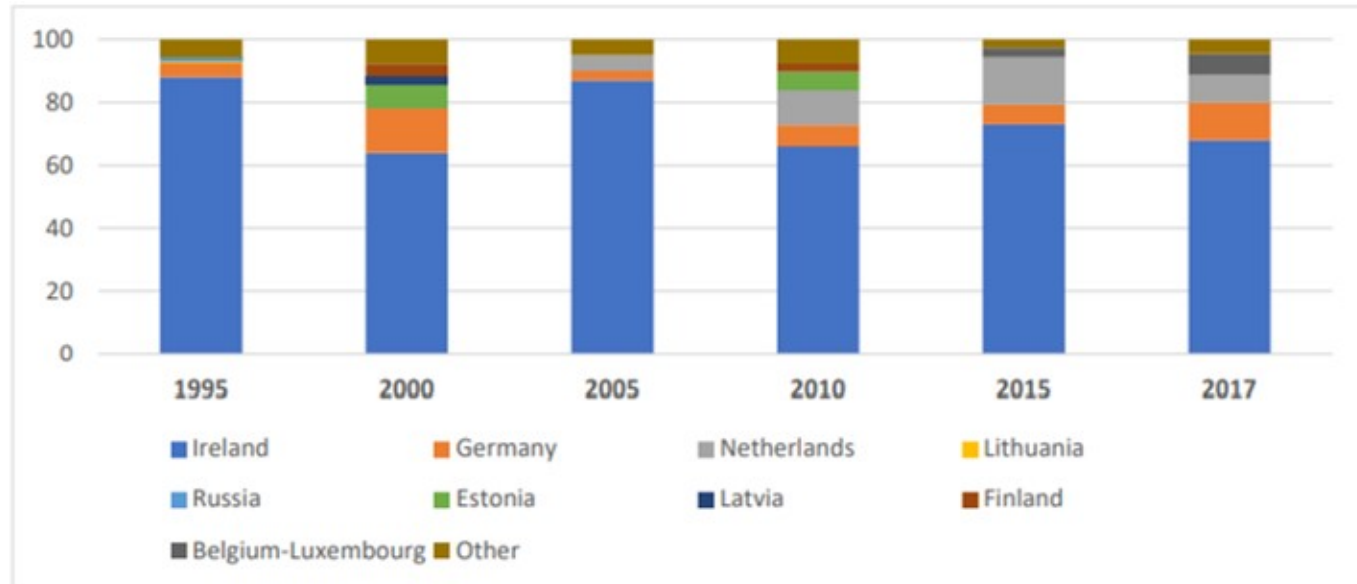


Figure 3: Sources of Imported Peat to the UK 1995-2017⁸

The trade of peat and growing media is not all in one direction, although exports are small. In 2019, exports of UK made growing media products were 131,880 m³ (3% as a proportion of

⁶ UK GMM

⁷ Bord na Móna confirms it has ended peat extraction - [Green News Ireland](#)

⁸ Bek, et al. (2020) Transitioning towards peat-free horticulture in the UK: an assessment of policy, progress, opportunities and barriers.

growing media sales), of which 25% was peat.⁹ Exports of peat were 2% as a proportion of peat sales, with only 32% of the exported peat being domestically extracted (Figure 4).

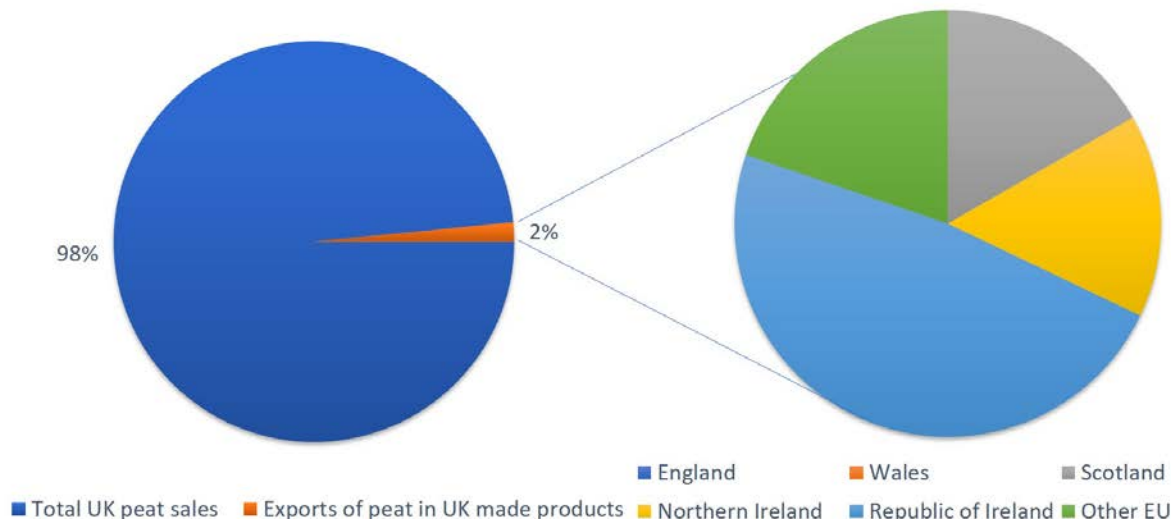


Figure 4: Peat exports as a proportion of sales and country of origin of exported peat (2019)¹⁰

In 2020, 30% of the peat sold in the UK was used by the professional sector (commercial growers of fruit, vegetables, and plants) and 70% was sold as bagged growing media (e.g., multi-purpose compost) to consumers via retail outlets (Figure 5)¹¹. This ratio of professional to amateur use has remained relatively stable over time.

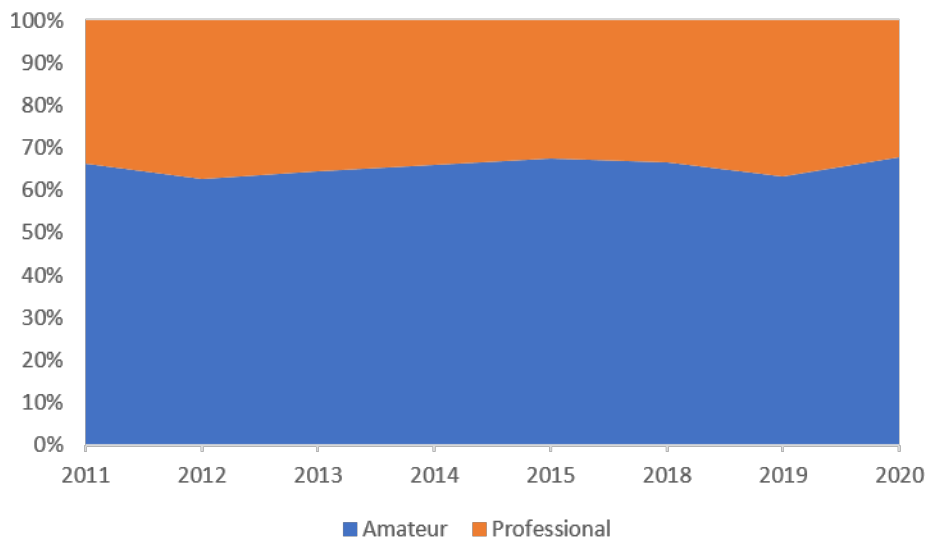


Figure 5: UK peat sales by sector, GMM

Whilst this policy area is a devolved matter much of the data collected by the sector is UK wide. Whilst it is possible to extract some nation specific data, it is of only limited use. Any policy solution that restricts the sale of peat in one nation will therefore influence the other nations to a greater or lesser degree; it will be highly problematic to try to understand this on a granular scale. Any policy solution will therefore be a matter for each nation, considering this impact assessment, and any consultation that they choose to conduct. The position of each nation is as set-out in Paragraph 1.2.

⁹ UK GMM

¹⁰ UK GMM

¹¹ UK GMM

1.1.1 The amateur/retail sector

The sale of peat and peat containing horticultural products to consumers is a 'Business to Consumer' transaction for growing media manufacturers via a retail outlet.

GMM data shows that in 2020, 80% of the peat sold in the retail sector was in bags of multi-purpose compost and 9% in bags of specific purpose compost (e.g., sowing, potting, ericaceous etc.). The remaining 11% of the peat sold are in smaller classes of products such as soil based growing media (e.g., John Innes) (4%), grow bags (3%) and soil improvers (2%).

Box 1: Definitions

Growing Media: is used to describe the material used in a container to grow a plant¹². Alternative terms that are also used are 'substrate' and 'potting soil'. In the UK some people still use the term 'compost' in the same context, however a compost is technically the product of a composting operation (e.g., the compost heap at the bottom of the garden) and can therefore be a misleading word to use. A composted material may be a component of a growing medium, but peat is not a product of composting and nor are many other ingredients used. Growing media are often formulated from a blend of different raw materials in order to achieve the correct balance of air and water holding capacity for the plants to be grown.

Soil Improvers: (or soil conditioners) are materials added to soil to improve its physical and/or chemical characteristics¹³. Soil improvers are generally used to improve the soil fertility by increasing the soil organic matter level. They improve the workability of the soil over time, for example making heavy clay soils more manageable and they can be used to improve the water holding capacity of light soils. There is no need for soil improvers to contain peat, and almost all soil improvers sold in the UK no longer do so¹⁴. Peat is actually a very poor soil conditioner as it is quickly broken down when dug into the soil¹⁵.

Multi-purpose composts: are growing media that are generally suited to a range of different uses.

Specific purpose composts: are growing media that have been specifically designed to deliver optimal plant performance in a single use, e.g., sowing seeds.

John Innes Composts: loam (soil) based growing media developed by the John Innes Institute¹⁶.

1.1.2 The professional sector

The sale of peat to commercial growers of fruit, vegetables and plants is a 'Business to Business' transaction between growing media manufacturers and growers. The eventual sale of the plants and food products to consumers via a retail outlet will be a 'Business to Consumer' transaction.

Commercial horticultural sectors reliant on growing media include:

- Hardy nursery stock (including container grown trees, shrubs and perennials)
- Bedding plants (including patio plants)

¹² [GMA | What is growing media?](#)

¹³ [GMA | What is growing media?](#)

¹⁴ [UK GMM](#)

¹⁵ [Holmes, S. & Bain, C. \(2021\) 'Peat-free Horticulture – Demonstrating Success', IUCN UK Peatland Programme, Edinburgh](#)

¹⁶ [The different John Innes Composts explained \(gardeningdata.co.uk\)](#)

- Pot bulbs
- Pot plants
- Mushrooms (casing layer over the mushroom compost)
- Glasshouse salads crops (mainly pot herbs for supermarkets)
- Soil-less soft fruit production (mainly strawberry production in grow bags (strawberry production is peat free in the UK))

Commercial horticultural sectors reliant on growing media for young plant-raising prior to planting in the soil include:

- Vegetable plant propagation
- Cut flower propagation

Table 1 shows the use of peat and peat-alternatives by each commercial horticulture sector in the UK in 2007¹⁷ (the latest year for which we have data). The data is in thousands of cubic metres.

Table 1. Use of peat and peat alternatives in horticulture in the UK

Commercial grower sector	Total growing media use in 2007 ⁴ 1000 m ³	Peat use in 2007 ⁴ 1000 m ³	Value of sector in UK, 2007 £m
Hardy nursery stock	450	385	473 ^{1,2}
Bedding plants	260	227	154 ^{1,2}
Bulbs	62	60	13 ^{1,2}
Pot plants	60	57	56 ^{1,2}
Cut flowers	10	10	16 ^{1,2}
Mushrooms	63	63	106
Vegetable propagation	74	74	798
Soft fruit	40	31	270
Glasshouse salad crops (inc. pot herbs)	13	13	178 ¹
Total	1,032	920	2,064

Notes 1 – 2005 not 2007; 2 - for England and Wales, not UK; 4 - ADAS estimate. Sources: peat use, Holmes (2004) and ADAS (2008); sector values, Defra Basic Horticultural Statistics 2008. This is an extract table, note 3 is not present as not relevant.

The supply chain for an individual plant sold at a retail outlet can be quite complex as the plant passes through different growers based in different parts of the country or different countries at different stages of its production cycle.

Peat is also imported into the UK as growing media in container grown ornamental plants. The total number of plants imported into the UK in 2009 was estimated at over 211 million along with 122,580 m³ of growing media of which 101,873 m³ was estimated to be peat¹⁸. Most of the plant material was sold either directly or indirectly onto retail businesses (garden centres, DIY outlets, supermarket retailers etc), but some (especially the young plant material) went to production nurseries for growing on.

1.2 The strategic context

1.2.1 England - 25 Year Environment Plan and England Peat Action Plan

¹⁷ Source: Defra research (2010): Costs to the horticultural sector of meeting the UKBAP target on peat use in horticulture. (SP0577)

¹⁸ Defra research (2010): Monitoring the horticultural use of peat and progress towards achievement of the UKBAP target (SP08020)

The 25 Year Environment Plan¹⁹ (25YEP) sets out the government's long-term approach to protecting and enhancing England's natural landscapes and habitats for the next generation. This includes a commitment to restoring our vulnerable peatlands and ending peat use in horticultural products by 2030. This commitment is driven largely by the knowledge that England's peatlands are important habitats that provide a range of benefits, including food and shelter for wildlife, flood management, water quality and sequestering carbon, thus playing a part in climate regulation. The 25YEP recognises that peatlands are our largest terrestrial carbon store, and yet only 13% of England's peatlands are in a near natural state²⁰.

The 25YEP acknowledges that we introduced a voluntary target to phase out the use of peat by 2020 for the amateur (sales direct to the end consumer) sector, and by 2030 for the professional sector (growers of fruit, vegetables and plants). It states that if by 2020, we have not seen sufficient movement to peat alternatives, we would look at introducing further measures. This consultation contains the further measures we would like stakeholders to consider.

In addition to this, the 25YEP stated that there would be the publication of an England Peat Strategy. This strategy, known as the England Peat Action Plan (EPAP), was published in May 2021. The Plan sets out the government's long-term vision for the management, protection, and restoration of our peatlands. This includes a commitment to undertake a full consultation in 2021 on banning the sale of peat and peat containing products in the amateur sector by the end of this Parliament. It will also consider measures to introduce a point-of-sale charge for the purchase of growing media containing peat, and also on mandating all sellers of horticultural products containing peat to publicly report on the volume of peat they sell each year. The Plan recognises that while there has been some progress by manufacturers, retailers and growers, the voluntary approach has not succeeded overall.

1.2.2 Wales –

Net Zero Wales commits Wales to consider a sales ban for peat and peat containing products. Whilst there is no current peat extraction in Wales, preventing sales of peat containing products is in line with our Well-being of Future Generations Act²¹ commitment to be globally responsible and to "support social, economic and ecological resilience through maintenance and enhancement of a biodiverse natural environment and healthy functioning ecosystems"²². Wales launched their National Peatland Action Programme (NPAP) in November 2020, which is an initial 5-year commitment and outlines a plan of action for restoration to be taken up to 2025, targeting those peatlands most in need of restoration.

1.2.3 Scotland –

The Scottish Government published their National Peatland Plan in 2015 which focuses on suitable management and restoration of Scotland's peatland and stated that they encouraged and supported the diminishing role for peat in horticulture.²³ In their programme for Scotland 2019-2020, the Scottish Government published a commitment to seek to phase out the use of horticultural peat by increasing uptake of alternative growing media substrate.²⁴ Their Peatland Action initiative works to improve the condition of degraded peatland across Scotland, setting 25,000 ha of degraded peatland on the road to recovery since 2012. In their 2020/21 Budget, the Scottish Government increased investment in peatland restoration to £20 million next year and

¹⁹ 25YEP

²⁰ England Peat Action Plan (2021)

²¹ Well-being of Future Generations Act (2015)

²² Well-being of Future Generations Act (2015)

²³ Scotland's Natural Peatland Plan (2015)

²⁴ Protecting Scotland's Future: the Government's Programme for Scotland 2019-2020 - gov.scot (www.gov.scot)

invest more than a quarter of a billion pounds in peatland restoration over the next ten years to enable large-scale restoration projects to be developed. This will deliver greenhouse gas emission reductions of up to 0.8 million tonnes a year by 2032.²⁵

1.2.4 Northern Ireland

The Northern Ireland Assembly's Department of Agriculture, Environment and Rural Affairs (DAERA) has recently closed a consultation exercise on a draft Peatland Strategy for Northern Ireland²⁶ that included a question on the use of peat in horticulture: priority action 4 under Strategy Objective 1 is to "Conduct a review and publish a key issues paper which should include the commercial extraction of peat in Northern Ireland, turbary rights (including their historic and cultural role) and the use of peat in horticulture."²⁷ The consultation response/strategy have not yet been published. The consultation document states that peatlands make a significant contribution to current emissions and as a potential carbon sink and important habitat are part of the solution to NI meeting its New Decade, New Approach²⁸ commitments and UK Net Zero commitments and programme for Government Outcomes. DAERA are also developing a Green Growth Strategy²⁹ and associated Climate Action Plan (currently unpublished).

1.2.5 European Union

EU policy regarding peat has been undergoing a shift as its importance as a carbon store and the role of peat restoration in achieving net zero has been recognised. What this means for the continued extraction and use of peat in horticulture remains unclear and Member States are themselves seeking answers from the European Commission on their intentions³⁰.

Individual Member States are already taking action. For example, the German Federal Government's Climate Action Plan 2050 has a goal to reduce peat use in the German horticultural sector as peat extraction is contributing 2 MtCO_{2e} per year to their national GHG emissions³¹.

1.3 Horticultural peat: current policy and practice

Government set voluntary targets in England in 2011³², aiming for a peat free amateur sector by 2020 and the professional sector by 2030. The voluntary target for 2020 was not met, with GMM statistics³³ showing that in 2019, over 2 million m³ of peat was sold in the UK (see Figure 1 for context). 63% of this was in the amateur sector and so the aim for a peat free amateur sector is still a long way off. Some significant progress was made, however, with the investment manufacturers and retailers made in peat alternatives starting to feed into the market: in 2019 the volume of peat sold in growing media was 2.06 million m³ compared with 2.76 million m³ in 2011³⁴. This represents a 25% decrease in the volume of peat sold in growing media from 2011 to 2019. However, the volume of peat sold in the UK rose by 9% in 2020 due to unprecedented demand throughout the year with more people taking up gardening as a hobby during lock-down and the impact of the global pandemic on the supply chains for alternative materials. It is unclear whether this increased demand will be sustained³⁵.

²⁵ [Scottish Budget 2020-2021 statement - gov.scot \(www.gov.scot\)](#)

²⁶ [DAERA, 2021](#)

²⁷ [Northern Ireland Peatland Strategy 2021-2040. Consultation Document.pdf \(daera-ni.gov.uk\)](#)

²⁸ [NDNA, 2020](#)

²⁹ [DAERA, 2021](#)

³⁰ [Alignment of EU climate goals with the extraction of peat for horticultural use and jobs \(europa.eu\)](#)

³¹ [Thünen-Institut: Reduction of peat use in Germany \(thuenen.de\)](#)

³² [Page 29](#)

³³ [UK GMM](#)

³⁴ [UK GMM](#)

³⁵ [UK GMM](#)

For many years now Government has engaged with industry stakeholders both formally and informally, including discussions in advance of the publication of the EPAP³⁶ within which Government announced its intention to end peat use by the end of the current parliament. This engagement has led to some degree of success as has previously been indicated. Collaboration on industry initiatives, primarily with the Horticultural Trades Association and the Growing Media Association, and also with large retailers acting in response to their own sustainability policies, has encouraged peat use reduction and increased public awareness around the use of peat. While the industry is making a conscious effort to transition to peat alternatives, and is working closely with Government to do so, progress has been slow. Government has repeatedly stated that if the voluntary targets to phase out the use of peat and peat containing products set in 2011 did not succeed, that further measures would be considered³⁷.

Industry stakeholders have this year created a taskforce focused on ending the use of peat as early as 2025 and no later than the end of 2028³⁸. While these proposals by the industry are promising, further Government action is needed to ensure the entire industry continues to make progress in switching to peat alternatives, thus ending the use of peat and peat containing products.

However, it is important to note that the market itself is currently undergoing change following company Bord na Mona (in Ireland) announcing in 2021 that they are ending peat extraction³⁹. Most of the peat sold in the UK is imported from Ireland (Figure 2). This will have a big impact on the horticultural industry, particularly as there will be long waiting times and cost implications for importing peat from mainland Europe. We have carefully considered this context for this IA.

1.4 Rationale for intervention

Peat is extracted in the UK for, primarily, horticultural purposes. It serves other purposes, such as its role in whisky production, but these types of uses represent only a very small proportion of the total use of peat (4% in 2014⁴⁰). Most of the peat is extracted and used within the Horticultural sector and that is where our focus for intervention lies.

Peatlands are the UK's largest stores of carbon⁴¹. They also provide vital ecosystem services, such as supplying over a quarter of the UK's drinking water and decreasing flood risk. When peat is extracted, the carbon stored inside the bog is released as carbon dioxide, contributing to climate change. Peat extraction also degrades the state of the peat mass which threatens biodiversity and the efficacy of their ecosystem services across a larger area.

Two thirds of the peat sold in the UK is imported from the rest of Europe⁴². This means that our peat use is directly contributing to carbon emissions and habitat loss outside of the UK; we are exporting the carbon footprint.

As such, extraction is a market failure - those extracting peat impose a third-party cost in the form of damage to the climate and natural environment. There is also information failure, where consumers are not always aware of the environmental impact of purchasing peat containing growing media. For instance, in 2021 the Royal Horticultural Society reported that 57% of

³⁶ [England Peat Action Plan \(2015\)](#)

³⁷ [25 Year Environment Plan - GOV.UK \(www.gov.uk\)](#)

³⁸ [HTA | Growing media taskforce announces horticulture's commitment to responsible sourcing](#)

³⁹ [Bord na Móna confirms it has ended peat extraction - Green News Ireland](#)

⁴⁰ [DLUHC \(2014\)](#)

⁴¹ [Natural England \(2021\)](#)

⁴² [UK GMM](#)

gardeners did not know what was in the compost they were buying⁴³. Even in the case of perfect information, we believe that peat-containing products would dominate the market due to their perceived superior efficacy and price relative to alternatives. Government intervention to render horticulture peat free is necessary to correct this market failure.

1.4.1 GHG emissions from alternatives vs extracted peat

The greenhouse gas emissions associated with the processing and transport of alternatives are unlikely to be significantly different to those of processing and transporting peat, therefore, we have not assumed any change in emissions from these stages of production in our analysis. The emission savings arise when you consider the nature of the carbon locked up in peat (essentially fossil) compared to the biogenic carbon cycling through the alternatives and how these are treated in the UK Greenhouse Gas Inventory. Emissions from peat extracted for horticultural use arise on-site through the drainage of the site for extraction (whether any volume of peat is removed) and off-site from the decomposition of the extracted volume of peat. For annual crops, the basis of many peat alternatives, the increase in biomass stocks in a single year is assumed equal to biomass losses from harvest and mortality in that same year – therefore there is no net change of biomass carbon stocks and no associated emissions from consumption of the biomass.

2. Description of options considered

We have considered a range of regulatory and non-regulatory options, which will be included in consultation. These were:

Option 0: Business as usual/continuation of voluntary approach

Option 1: Mandatory reporting of the volume of peat sold

Option 2: Point of sale charge for the purchase of any growing media bag containing peat

Option 3: Ban the sale of peat (all users, uses and sources)

2.1. Option 0: Business as usual/voluntary approach

Since 2011, we have had in place voluntary targets in England to phase out the use of horticultural peat in the amateur sector by 2020 and the professional sector by 2030. We can now conclude that the voluntary approach has not succeeded although there has been some positive progress; the total volume of peat sold in the UK is 25% lower in 2019 compared to 2011 (Figure 1), with 41.5% of the volume of growing media sold in the UK comprised of peat. In 2020, during the COVID-19 pandemic, an increase in demand for gardening saw a 36% increase in the volume of all amateur growing media, including peat and peat alternatives⁴⁴. This resulted in an increase of 9% in the volume of peat sold; with disruptions in the supply chain for peat alternatives manufacturers turned to peat to make up the shortfall in inputs.

Changes within the horticultural industry and supply chain are taking place; growing media manufacturers and retailers are reacting to both the policy intentions expressed by government (in the 25YEP and EPAP) and increased consumer demand for peat free growing media. However, without further government intervention it is unclear how much of this momentum would be sustained.

The monetised impacts of this option are explored in Section 5.

2.2. Mandatory reporting of the volume of peat sold

⁴³ [Half of gardeners unaware of what's in their shop-bought compost, finds RHS / RHS Gardening](#)

⁴⁴ [UK GMM](#)

Whilst some retailers have engaged with government and responded positively to the voluntary target to end the use of horticultural peat, there are still many retailers for whom this issue is not a priority. When a retailer or company must report on an issue they have to monitor and understand how it affects their business, this requires greater engagement with the issue. Some retailers already track the volume of peat that they sell and are making efforts to reduce this year on year. However, for some, particularly smaller retailers, the issue of peat is not currently a top priority given other competing demands for their attention. A historic lack of demand for peat-free products throughout the supply chain has been identified by the industry as one of the barriers to change. However, it is not clear if this lack of demand is due to deliberate consumer choice or due to a lack of awareness of the peat content of the growing media they are purchasing, and the environmental issues associated with peat. In 2021, the Royal Horticultural Society reported that 57% of gardeners did not know what was in the compost they were buying⁴⁵. This option would create the necessary pull-through within the supply chain to drive change.

This option would see sellers of horticultural products containing peat required to publish their annual sales of peat (by volume). The information could be published by the retailers or government. This will create pressure to act throughout the supply chain (making all parts take ownership of the issue) and increase the demand for peat-free products. This model of tracking and public reporting of an issue is being used by government to encourage behaviour change, seen for example in the Equality Act 2010 (Gender Pay Gap Information) Regulations 2017⁴⁶.

If all sellers of peat must report on their annual sales, they will need to understand which products they sell that contain peat and the quantity of peat. This on its own may do little to encourage efforts to reduce their peat use and sales. Although, having this data available in the public domain should stimulate improvements, e.g., by highlighting differences to consumers between competitors.

The measure would be introduced in a phased manner with sales of peat in bagged and bulk growing media being reported on initially. This is because the supply chain for growing media is relatively simple, and information required to report on sales will be comparatively easy to obtain. The reporting of peat sold in potted plants will be considered at a later date as it is more complicated, especially for retailers selling imported plants. The supply chain for potted plants can be quite complicated (with each plant passing through different businesses (and in different countries) at different growth stages, e.g. propagation, young plants and more mature plants) and tracking the volume of peat in these products has not previously been attempted or required. Therefore, new systems to collect this data throughout the supply chain will need to be established.

The intention is to limit this measure to horticultural products containing peat. However, there are other products being sold containing peat, e.g., animal bedding. We will use the consultation to explore what other peat containing products could/should be included in this measure.

The monetised impacts of this option are explored in Section 5.

2.3. Point of sale charge for the purchase of any growing media bag containing peat

Bagged retail growing media accounts for 70% of the peat sold in the UK (Figure 5). There has been some progress made by suppliers/retailers in the production and sale of peat-free growing media to consumers (Figure 1). With modern formulations consumers will see peat-based and peat-free growing media as fully substitutable based on performance; peat-free products are

⁴⁵ [Half of gardeners unaware of what's in their shop-bought compost, finds RHS / RHS Gardening](#)

⁴⁶ [Equality Act 2010 \(Gender Pay Gap Information\) Regulations 2017](#)

designed to look, feel and perform the same as the peat-based products they are replacing, with some providing even better performance. Therefore, for most consumers, the main factors influencing choice is the price and accessibility⁴⁷. Peat-free growing media is often more expensive than growing media containing peat, and so there is no financial incentive for consumers to choose peat-free growing media. This price differential is backed up by unpublished audit data of growing media retailers. This option is aimed at overcoming the price differential by increasing the price of peat-based growing media.

This option would mean all retailers selling growing media containing peat (or delivering growing media containing peat that originates from another country) will be required to apply a point-of-sale (POS) charge to each bag of peat or growing media containing peat sold. This is not a tax and the money from the charge would not go to the government. Retailers would collect the charge at the till and would be encouraged to use the funds to pay for good causes, following the model of the plastic carrier bag charge. The level of the charge will be set to overcome the price differential between peat-based and peat-free growing media. It would apply to any bagged growing media containing peat irrespective of the volume of peat in the bagged product.

The intention is to limit this measure to retail bags of growing media containing peat. The measure could also be extended to potted plants containing peat at a later date, depending on the practical feasibility of such an extension.

The monetised impacts of this option are explored in Section 5.

2.4. Ban the sale of peat (all users, uses and sources) - Preferred option

The issue of peat use in horticulture has been ongoing since the 1990s and there is widespread frustration that the issue has yet to be resolved; there is recurrent media coverage and Defra receives regular correspondence about this issue. There have also been several parliamentary petitions published, the latest of which (June 2021) sought to ban the use of peat in horticulture and all growing media by 2023. This petition gained over 11,000 signatures and required government response.⁴⁸ Government has concluded that the voluntary approach has not delivered. The horticultural peat industry identify that one of the key barriers to phasing out peat use in horticulture has been the lack of a level playing field (Box 2) and a perceived first mover disadvantage due to the increased price of alternatives compared to peat and increased production costs. To address this concern, we've decided that this option should level the playing field and ensure that further progress was made to end peat use.

⁴⁷ [Half of gardeners unaware of what's in their shop-bought compost, finds RHS / RHS Gardening](#)

⁴⁸ [Ban the use of peat in horticulture and all growing media by 2023. - Petitions \(parliament.uk\)](#)

Box 2: A level playing field

A key ongoing industry concern expressed to Defra, starting with the consultation on the voluntary approach back in 2010, is the impact of unilateral action on the domestic horticultural sector in a global market.

They state that a unilateral phase out of peat use by UK growers will seriously reduce their ability to compete with imported plants if overseas growers have a cost advantage by continuing to use peat-based growing media.

UK retailers chiefly focus on plant quality, price and reliability of supply when selecting the plants that they stock. To date they have had limited regard for the growing media used, although this is starting to change.

To address industry concerns, short of a global agreement to end peat use in horticulture, we would need an approach that treats domestically produced and imported products in the same way so that domestic production is not at a competitive disadvantage. As such, we have decided that the ban on the trade of peat will apply to domestic and imported peat, alike.

This option would mean all sellers of peat (and peat containing products) would no longer be able to legally sell, or offer to sell, peat from 2024 in the amateur (Business to Consumer) and from 2028 in the professional (Business to Business) sectors. This would end the sale of peat (and peat containing products) but may not on its own end the domestic extraction of peat. This measure will create a level playing field for growing media manufacturers, growers and retailers selling peat products (whether domestically produced or imported). It would not affect the sale of peat products which use peat in the production process as long as there is no peat in the final product as sold (e.g., whisky and lettuces) but will impact on production of these products. It is recognised that small scale exceptions to any ban may be necessary; these exceptions will be explored in through public and stakeholder consultation.

The measure would be introduced in a phased manner, with a ban on retail sales of bagged product being introduced first, by the end of this Parliament. This is because the retail sector was set an earlier voluntary phase out date for peat use in horticulture as the difficulties to ending peat use in other sectors are believed to be more challenging. Some of the challenges to ending peat use in professional horticulture are being addressed, but there are some sectors of the industry (e.g., mushroom production and plant propagation) for which significant hurdles remain to finding viable alternatives to peat that work within their production systems or mimic the specific properties of peat they rely on, these sectors will require targeted engagement to understand the sector specific difficulties. Bans on the sale of potted plants containing peat and other products containing peat would be introduced at the same time as the ban on sale of peat-based growing media to professional growers.

The consultation will act as a call for evidence to help us understand what other uses of peat that will be captured by this option. For example, we have a very limited understanding of the use of peat within cosmetics (e.g., masks and cleansers) and other niche uses such as animal bedding.

The monetised impacts of this option are explored in Section 5.

3. Policy objective

To end the use of peat and peat containing products by the end of this Parliament in the retail bagged growing media sector and by 2028 in the professional horticulture sector. This will end greenhouse gas emissions from the extraction and use of peat domestically, contributing towards the governments net zero carbon emissions target, as well as ending the offshoring of our

greenhouse gas emissions through the use of imported peat. This will also end an action which is continuing to degrade our peatlands and their archaeological and palaeo-environmental records and remove a significant barrier to these sites being restored to peat-forming habitats.

In doing so we want to see a thriving horticultural sector where growing media manufacturers and growers can compete within a level playing field whether the products are produced domestically or imported, as outlined in box 2.

The voluntary approach set in 2011 has not delivered and while the market is making progress in the right direction this has been driven in large part by government signals of our intention to introduce further measures. These measures, singly or in combination, are designed to deliver the transition to peat-alternative. The measure of success will be the end of the use of peat and peat containing products, measured by monitoring of statistics of sale of peat by growing media producers.

4. Summary and preferred option with description of implementation plan

In January 2019, a series of roundtables was held by Defra to engage with stakeholders and discuss potential further measures in order to achieve our target of phasing out the use of peat in horticulture. The feedback received from these roundtables was used to inform a long list of measures that was subject to scrutiny and policy development, found below:

- Option 0: Business as usual (continuation of the voluntary approach)
- Option 1: Revoke peat extraction licences in England
- Option 2: Capping the proportion of a bag of growing media that is peat
- Option 3: Set standards for the labelling of growing media products
- Option 4: Set a maximum bag size for growing media
- Option 5: Mandatory reporting of the volume of peat sold (all sellers)
- Option 6: Ban the sale of peat (all users and uses)
- Option 7: Ban the sale of peat (all users, horticultural use only)
- Option 8: Ban the sale of peat (retail bagged media only)
- Option 9: Point of sale charge for the purchase of any growing media bag containing peat

From these, a short list was developed by selecting the options which we, and stakeholders, felt were most feasible and impactful. This short list is comprised of options **0**, **5**, **9**, and **6**, outlined as options **0**, **1**, **2**, and **3** below, respectively. In February 2020, we held another series of stakeholder roundtables to discuss the short list measures, gaining valuable feedback on the measures and identifying areas for further analysis and consultation. We continue to engage regularly with key stakeholders in the horticulture industry, including the Horticultural Trades Association and Growing Media Association.

The consultation IA assessed a range of regulatory and non-regulatory options:

- Option 0: Business as usual (continuation of the voluntary approach)
- Option 1: Mandatory reporting of the volume of peat sold (all sellers)
- Option 2: Point of sale charge for the purchase of any growing media bag containing peat
- Option 3: Sales ban on peat (all users, uses and sources, **preferred option**)

Option 3 (a statutory sales ban on peat for all users, uses and sources) is the preferred option, although all options will feature in the consultation. Option 3 would achieve the greatest reduction in peat volume sold (Table 2) and would achieve our policy objectives of ending the use of peat and peat containing products in the horticulture sector, creating a level playing field for growing

media manufacturers, growers and retailers selling products (whether domestically produced or imported).

This option would require primary legislation. It would apply in the first instance to the retail sale of growing media, gradually extending the ban to other areas of the sector as the availability of peat free alternatives increase, and technical expertise is developed. The first element of this ban, the sale of growing media in the amateur sector, would be introduced by the end of this Parliament (2024). This approach to implementation would enable sufficient flexibility and time for those areas of the sector who will find it more difficult to find alternatives due to the complex growing nature of their produce (e.g., mushrooms and plant propagation).

Table 2: Comparison of the estimated peat volume reductions for each option (2021-42)⁴⁹

		Option 1	Option 2	Option 3
Amateur	Starting peat volume (m ³)	22,964,455	22,964,455	22,964,455
	Reduction (after transition period)	10%	29% ^a	100%
	Remaining peat (m ³)	21,224,289	17,944,745	2,346,753
Professional	Starting peat volume (m ³)	13,280,627	13,280,627	13,280,627
	Reduction	0% ^b	0% ^c	100%
	Remaining peat (m ³)	13,280,627	13,280,627	2,589,078
Total	Remaining peat (m ³)	34,504,916	31,225,372	4,935,831 ⁵⁰

Notes:

- a) With a Price Elasticity of Demand (PED) of 0.75 and a 5p/litre POS charge. The reason for modelling a central PED of 0.75 is outlined in 5.3. A 5p/litre POS charge is modelled because this is what we would likely propose in practice.

Based on our modelling, the POS charge would need to be ~14p/litre to theoretically achieve an 80% reduction in demand, and ~17p to achieve a 100% reduction. In reality, estimated PED is an average of every consumer in the market; there are consumers with more inelastic demand curves than 0.75, who would continue to purchase peat. To achieve 100% elimination of peat via a POS charge would require a charge that matches the most inelastic consumers demand profile, which is highly unrealistic in reality.

- b) Although, this measure is not initially targeted at peat sold in potted plants, it is possible that some retailers might want to extend the measure voluntarily. However, we assume that the remaining barriers that need to be overcome to go peat-free in the professional sector and the complexity of reporting will be too great for this measure to affect any change in that sector.
- c) This measure is not initially targeted at peat sold in potted plants. We would need to consider an appropriate POS charge for different units of plants (e.g., for pack bedding vs individual potted plants), however, not all of the peat used in the professional sector will be sold on to consumers. Cut flowers, mushrooms, field vegetables and soft fruit are not sold

⁴⁹ Figures are taken from Defra's internal modelling.

⁵⁰ This is greater than 0 due to the predicted transition period towards 0 sales.

with growing media. In 2007, these sectors represented 19% of the peat used in the professional sector (Table 1).

Following this consultation, should we proceed with the preferred option, there will follow another, more targeted, consultation and closer consideration of who will be responsible for ongoing operation and enforcement of the new arrangements, once put into place.

5. Monetised and non-monetised costs and benefits of each option (including administrative burden)

We outline costs and benefits for all proposed options below. These are quantified wherever possible, however there are certain evidence gaps. We are actively seeking to address them during consultation. Our modelling used 2021 prices and, as such, figures are presented in 2021 terms within the text, unless stated otherwise. We deflate these to 2019 for final cost/benefit comparison (BCR calculation and figures provided in the summary section). Costs and benefits are discounted to a 2020 present value base year throughout the IA. Sensitivity analysis is also applied to test assumptions made throughout modelling (Section 5.5). All costs and benefits are analysed up to and including 2042, because this is where all current peat extraction licences expire, and new extraction licences are unlikely to be granted given the content of the National Planning Policy Framework⁵¹. We have no reason to believe that this situation will change.

5.1. Option 0: Do nothing/Continuation of voluntary approach.

No difference from baseline, 0 costs/benefits.

Under our baseline assumption, we assume that the size of the growing media market stays constant from now until 2042 (the time series considered in this IA). We make this assumption based on the GMM data⁵², showing that the total volume of growing media sold was nearly identical in 2011 as in 2019⁵³. We assume, however, that the peat market share will decrease annually by 4% from 2019⁵⁴-2025 before remaining constant until 2042. This fall in peat sales is offset entirely by increased alternative sales. Data on soil improvers is not currently collected, but we see no reason to think that a shift away from peat or alternatives to soil improvers would occur in the baseline-as such they remain constant.

GMM data⁵⁵ shows that the share of the market made up of peat between 2011 and 2019 fell annually by 4% on average. We believe that this fall was due to the investments made by industry into the capital and R&D necessary to make alternatives more competitive. In the 2011 Natural Environment White Paper⁵⁶, the UK government set out a voluntary approach aimed to phase out peat use in amateur gardening by 2020, and that we would be exploring other measures if the voluntary approach failed. This was followed by the publication of the 25YEP in 2018 which reiterated these targets and stated that “if by 2020 we have not seen sufficient movement to peat alternatives, we will look at introducing further measures”. We believe that this momentum in policy message has had an impact in stimulating such investment mentioned, as businesses prepared for potentially tougher approaches in the near future.

⁵¹ [Page 59](#)

⁵² [UK GMM](#)

⁵³ 2011 was the first year of the GMM time series. 2019 is the penultimate year, but we do not include 2020 figures in our analysis due to the lockdown driven boom in gardening. As a result, we believe that 2020 sales figures poorly reflect the future of the market.

⁵⁴ We forecast this decreasing peat market share to continue for 5 years from 2020 but forecast 6 years from 2019 because 2020 was an anomalous year. As such, we calculate 2020 sales to be (2019 sales) * (0.96), as opposed to using actual 2020 figures.

⁵⁵ [UK GMM](#)

⁵⁶ [The Natural Choice: securing the value of nature \(2011\)](#)

However, further investment is necessary for the market share of alternatives to continue growing. Under the baseline, stakeholders would likely see that Defra is not acting on its word to explore other options, and so investment is unlikely to remain worthwhile. As such, the increased market share of alternatives would plateau. We assume this to take 5 years, from 2020-25, as this is how long we estimate the competitive gains to last. 2020 is selected because this is the year outlined in the white paper, so if there was no communication from government this year, we suspect that stakeholders may begin the process of halting investment. [The England Peat Action Plan \(2021\)](#) has also since stated that we would consult on a ban in 2021, but we do not factor this plan into the baseline because it is part of the same policy process by virtue of mentioning this consultation.

We also include 2019 because 2020 figures on growing media sales are likely anomalous; there was a large increase in peat demand in 2020 due to increased gardening from Covid-19 restrictions and disruptions to the supply chains for alternatives. As such, we forecast 2020 peat sales to equal $(0.96) * (2019 \text{ sales})$. This matches the average annual trend, as seen above.

As domestic peat extraction permits expire over this 2021-42 time series, we assume that domestically extracted peat is replaced by peat imports (we already import the majority of our peat).

Reality may differ from our forecasts; we are unable to predict how the market will shift over the next two decades.

Option 1: Mandatory reporting of the volume of peat sold

We model 3 scenarios under the mandatory reporting option in order to conduct sensitivity analysis. The best estimate is outlined here, with the other two in section 5.5. A variety of assumptions are also tested in the sensitivity analysis of 5.5. These scenarios relate to the extent to which the policy reduces the sale of peat. They were selected after discussions with industry and peat experts internal to Defra.

Our best estimate/central scenario leads to 10% reduction in peat sales in the amateur sector after 2024 (implementation year). We assume that the professional sector is unaffected (see bullet point 4 below). We also assume:

- That the fall in peat sales takes place within 3 years of the measure coming into force and then stabilises at the 10% reduction level. This is an estimate based on internal expertise and industry engagement.
- All retailers comply with the legal requirement of this measure, but only a proportion of them will actually prioritise reducing the volume of peat they sell and this is likely to occur in the initial years.
- 100% of the foregone peat sales are replaced by alternative growing media. No increase in soil improvers is predicted, because we believe that this would only happen if consumers were prompted by an educational campaign or other point of sale information (see option 2).
- Although, this measure is not initially targeted at peat sold in potted plants, it is possible that some retailers might want to extend the measure voluntarily. However, we assume that the remaining barriers that need to be overcome to go peat-free in the professional sector and the complexity of reporting will be too great for this measure to affect any change in that sector.
- These assumptions are all based upon interaction with industry representatives and expertise internal to Defra. We welcome further comments/evidence during consultation to test these assumptions.
- Exports of peat remain small (Figure 4) and unaffected. It is possible that businesses will try to export more to make up for lost domestic demand, but we cannot accurately predict to what extent this would happen.

- Peat imports will be displaced to other markets internationally. We do not model GHG reductions here as that would be misleading - these emissions would still exist just outside of the UK's audit. However, measures would reduce the greenhouse gas footprint of the UK and end the offshoring of our emissions.

5.1.1. Option 1 costs

5.1.1.1. Manufacturer input costs

Manufacturer input costs are predicted to rise under this policy option because alternatives are more expensive than peat. Therefore, if a greater proportion of growing media is made up of alternatives than previously was the case, input costs rise. Based on discussions with stakeholders, we believe peat to cost £30/m³ in 2021. Industry predict that this price will rise over the next 5 years in real terms (we have modelled this as a linear rise until 2026), at which point it will cost £45/m³, in both the baseline and all other options. Beyond this year they predict stable real prices.

We believe alternatives to cost £60/m³. Based on the same discussions, and cost is predicted to remain constant in real terms during our time series.

A transitional shift away from peat (by 10%) is predicted to occur from 2025-27, in addition to the transition away under the baseline that we have previously explored. We believe that alternatives will replace the entirety of the foregone peat sales, as mentioned in the assumptions.

Table 1 in the annex outlines our forecasted manufacturer input costs under this policy. Compared to the baseline, the sum of the increased manufacturer input costs from 2021-42 in NPV terms is estimated at **£17,032,360** (nearest £10). This, along with all analysis presented in the IA, uses a 3.5% discount rate (2020 PV base year). 2021 prices are used throughout the analysis and deflated to 2019 prices for final cost/benefit calculations using the ONS GDP deflator.⁵⁷

5.1.1.2. Manufacturer Research and Development costs

With only a 10% shift to peat alternatives we assume that there are no additional R&D costs for this option.

5.2.1.3. Manufacturer transition costs

To transition away from peat-based production requires the expansion of current alternative production facilities, or the redevelopment of current peat-based production facilities. There are approximately 30 growing media manufacturers who supply growing media in the UK who will face the cost increase⁵⁸. After conversations with industry, we predict that a complete transition away from peat would on average cost each manufacturer an additional £250,000 in transition costs. We believe that this transition cost will last for one year only, 2024 - the year of intervention.

Because our central estimate of option 1 results in a 10% reduction in peat sales, we scale the £250,000 figure accordingly to give the total transition cost of: £250,000 * 0.1 * 30 = £750,000. This is **£676,460** in 2020 PV terms, 2021 prices.

⁵⁷ ONS (2021), as at October 2021. We use a 2% GDP deflator for 2026 onwards, in line with the Bank of England's inflation target.

⁵⁸ Appendix 1. We rounded this up to 30 to account for non-respondents.

5.2.1.4. Familiarisation costs

Familiarisation costs represent the time taken by individuals to read and understand new government guidance. This is a cost because it represents time that could otherwise be spent working by the individual. As such, we cost it based on relevant hourly wages.

We do not know how long the published guidance of any of the 3 policy measures would be, and so assume that it takes 1 hour to read and understand in each case but test this estimate in the sensitivity analysis.

We split the audience into the three relevant categories: retailers, growing media manufacturers and professional growers.

Retail:

Retailers are required to read and understand the guidance for this measure. We do not have data on how many retailers of growing media there are. We estimate using ONS data⁵⁹. This data outlines the number of retail businesses broken up by the Standard Industrial Classification 2007. We use the most up to date figures (2019) for classifications 47.11, 47.19, 47.76, 47.79 and 47.91, as these are the classifications that we believe to be relevant to horticultural peat. This gives us a total estimate of 99,158 retail businesses that will need to self-familiarise. We assume 1 person will need to read at each retailer: the manager. There may be other senior staff members who require familiarisation too, but it is not possible to estimate how many.

The ONS Annual Survey of Hours and Earnings⁶⁰ (ASHE) outlines the median wage of retail workers in the sale of flowers, plants, seeds, fertilisers, pet animals and pet food in specialised stores⁶¹. It also outlines the median wage for retail managers⁶². We assume that only the manager of a given retail outlet would be required to read the guidance. As such, we use the ASHE median hourly gross wage for retail managers of £13.53 to calculate the familiarisation costs. This wage is in 2021 prices, inflated from 2020 prices using the same ONS deflator as the rest of the analysis.

We also include a non-wage cost uplift to reflect pension and NI contributions. We use 22% in line with RPC advice⁶³. As such, the final gross hourly cost of retail labour is estimated at (13.53) * [1+(0.22)] = £16.50.

Assuming 1 hour to familiarise, the total retail familiarisation costs = (16.50) * (1) * (99,158) = £1,636,360 (nearest £10, pre-discounting/deflating). We assume these costs to occur once only in 2022, as this is when guidance would be issued on the policy.

Growing media manufacturers:

Manufacturers are required to read and understand the guidance for this measure. As previously stated, we assume there to be 30 manufacturers. We use an hourly wage of £11.88 (ASHE reference A217) as we believe this most closely resembles the target population. This wage is in 2021 prices, inflated from 2020 prices using the same ONS deflator as the rest of the analysis. We assume 1 person from each manufacturer needs to familiarise themselves with the guidance. It may be more, but we cannot estimate how many more.

⁵⁹ [Non-financial business economy data, ONS \(2021\)](#).

⁶⁰ [ONS ASHE \(2021\)](#)

⁶¹ [ASHE reference A621](#).

⁶² [SOC code 1190](#).

⁶³ [Page 5](#)

We include the same non-wage uplift as before, turning the gross labour cost into $(11.88) * [1+(0.22)] = £14.49$.

As such, the total growing media manufacturer familiarisation costs = $(14.49) * (1) * (30) = £430$ (nearest £10, pre-discounting/deflating).

Growers

Growers are unaffected by this measure and so do not need to familiarise themselves with it.

The total, the familiarisation costs are estimated at £1,581,450 (nearest £10, 2021 prices 2020 PV base year).

5.2.1.5. Total and direct costs to businesses

Cost of Option (2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net direct cost to business per year	BIT Score
£10,003,052	-£17,500,346	£1,114,816	5574078
Appraisal Period (Years)	22		

Above are the total costs directly facing business. Zero business benefits accrue (there are social benefits), so the total annual and NPV costs to business equal the net costs displayed above. The NPV social value does, however, include social benefits which are explored below.

5.2.1.6. Benefits

5.2.1.7. GHG emissions savings

The primary quantified benefit of this policy is its GHG emissions reduction.

To quantify emissions from peat extraction we use the UK's GHG inventory⁶⁴ (2021). This shows that in 2019, there was 5910 ha of industrial peat extraction⁶⁵, although much of this area is no longer under active extraction (onsite GHG emissions continue post extraction until the peat is fully exhausted or the site is restored). Using the planning permission end dates of English extraction sites (data which is unpublished), we can model how this quantity would change under a baseline scenario. It slowly reduces before equalling 0 ha extraction in 2042.

The GHG inventory provides emission factors for onsite and offsite peat emissions. Off-site refers to emissions from removed peat itself. On-site refers to emissions from the remaining drained peat mass. The emission factor for onsite industrial peat extraction is $13.28 \text{ tCO}_2\text{e ha}^{-1} \text{ yr}^{-1}$,⁶⁶ It is $0.235 \text{ tCO}_2\text{e/m}^3$,⁶⁷ for offsite emissions. Multiplying these values by the quantity of

⁶⁴ [UK GHG inventory](#)

⁶⁵ Table A 3.4.26

⁶⁶ Table A 3.4.28

⁶⁷ [Page 865](#). We multiple 0.0641 by 11/3 to get 0.235 because this is how Carbon is converted to Carbon Dioxide.

extracted peat for the case of offsite emissions, and the area of UK extraction site for on-site emissions, allows us to quantify carbon benefits from abating this extraction.

To monetise benefits for this policy option, we estimate the reduction in emissions from a 10% reduction in peat sales compared to the baseline, and use the BEIS GHG Valuation guidance⁶⁸ (2021, annex 1).

GMM data⁶⁹ shows that from 2011-2019, 38.6% of the UK's peat sales came from UK sourced peat on average. Multiplying each years forecasted peat sales by 38.6% and adding each year's forecasted peat exports gives us the estimated quantity of peat produced by the UK for each year of 2021-42. Of the total estimated 34,504,916m³ of peat to be sold in the UK from 2021-42 (factoring in the estimated 10% reduction in retail sales from the policy), 14,035,504m³ is predicted to come from the UK. The emissions from this peat represent offsite emissions, so we multiply this by the emission factor of 0.235 tCO₂e/m³, to give us the total predicted offsite emissions factoring in the 10% decrease in retail sales, estimated at 3.298MtCO₂e.

We assume for this policy option that there is no increase in extraction site closure rate compared to the baseline. Therefore, multiplying the emission factor of onsite emissions by the area of extraction site available each year 2021-42 gives us the total onsite emissions. These are estimated at 1.412 MtCO₂e in total over this time period.

Summing these two sources of emissions gives us 4.710MtCO₂e. We estimate it to be 4.868MtCO₂e under the baseline scenario. As such, this policy saves an estimated 0.158 MtCO₂e to 2042 in the central case compared to the baseline. Using the respective BEIS GHG valuation prices for each year values this saving at £30,300,000 in NPV terms (nearest £100,000, 2021 prices 2020 PV base year).

5.2.1.8. Biodiversity gain

The restoration of peatlands that occurs due to reduced peat extraction has biodiversity benefits. This is because peatlands are a habitat for a variety of different species. Peatlands in better condition provide better habitats. It is very difficult to quantify improvements to biodiversity based off of a 10% reduction in peat sales because it is hard to quantify the impact of this on the quality of peatlands and relate it to biodiversity. As such, we keep this as a qualitative benefit, but note that the policy would likely lead to some biodiversity gains as peat extraction sites are closed and restored.

5.2.1.8. Water regulation

We may also see improved water regulation from this restoration because water derived from peatlands is naturally of high quality with few pollutants⁷⁰. We cannot robustly quantify this.

Given these costs and benefits, the benefit cost ratio (BCR) of this policy is **1.6**.

5.3. Option 2: Point of sale charge for the purchase of any growing media bag containing peat

As for option 1, three cases are modelled for the point-of-sale (POS) charge based on how effective the policy is at reducing peat sales. Based on unpublished audit data from a variety of

⁶⁸ [BEIS, 2021](#)

⁶⁹ [UK GMM](#)

⁷⁰ [IUCN](#)

growing media retailers, we estimate the cost of peat containing growing media to be ~13p/litre in 2021 prices (growing media is sold to consumers in litres whereas many growing media ingredients, including peat, are traded in m³). We are proposing a 5p/litre point of sales charge and estimate that this will reduce sales by 29% in the central case.

We calculate this to be the case based on our estimates of the price elasticity of demand (PED) for peat containing growing media. There is very limited evidence on this PED; Defra funded research from 2009 suggests a PED of 0.5⁷¹. This information is referenced as personal communications and so we cannot verify methodology. However, we do believe that peat containing growing media is a price inelastic good (PED<1), as there is a huge variety of products and prices on the market with consumers often willing to pay over the odds for a product because of its brand or perceived quality⁷². We scale the PED up slightly to 0.75 to factor in innovative progress in recent years since 2009 in the growing media market. Such innovations make alternatives a more suitable product and so likely make peat more price elastic. Nonetheless, we use a range of PEDs from 0.5-1 in the sensitivity analysis (5.5.) to test this assumption.

We assume:

- That the fall in peat sales takes place within 3 years of the measure coming into force and then stabilises at the 29% reduction level. This is a forecast based on a predicted PED of 0.75.
- All retailers comply with the legal requirement of this measure, but only a proportion of consumers determine their growing media purchases on the basis of price and a proportion of consumers have been put off by previous bad experience of early peat-free products such they will be willing to pay a higher price to continue to use peat (explaining the price inelasticity). Changes in purchasing behaviour are more likely to occur in the initial years.
- That the less-than-optimal use of growing media (designed for containerised growing) is corrected and that the approximately one third of peat-based multipurpose compost that is used as a soil improver is replaced by peat-free soil improvers (based on discussions with the sector). This leaves the remaining two-thirds of the peat-based growing media to be replaced by peat-free growing media. This replacement of one third of growing media by soil improvers is assumed to close the availability gap for peat-alternatives. Therefore, of the 29% reduction in peat in this measure, 1/3 is replaced by peat-free soil improvers and 2/3 is replaced by peat-free growing media.
- That the remaining barriers that need to be overcome to go peat-free in the professional sector will be too great for this measure to affect any change in that sector and the complexity of applying a POS to plants is such that they are not currently targeted by this measure.
- These assumptions are all based upon interaction with industry representatives and expertise internal to Defra. We welcome further comments/evidence during consultation to test these assumptions.
- Exports of peat are unaffected. It is possible that businesses will try to export more to make up for lost domestic demand, but we cannot accurately predict to what extent this would happen.
- Peat imports will be displaced to other markets internationally. We do not model GHG reductions here as that would be misleading - these emissions would still exist just outside of the UK's audit. However, measures would reduce the greenhouse gas footprint of the UK and end the offshoring of our emissions.

⁷¹ Defra research (2009): Basis of the UK BAP target for the reduction in use of peat in horticulture (SP0573) – Annex 8

⁷² [greening-uk-gardens.pdf \(rspb.org.uk\)](https://www.rspb.org.uk/greening-uk-gardens.pdf)

5.3.1. Option 2 costs

5.3.1.1 Manufacturer input costs

Manufacturer input costs are predicted to rise under this policy option because alternatives are more expensive than peat. Therefore, if a greater proportion of growing media is made up of alternatives than previously was the case, input costs rise. Based on discussions with stakeholders, we believe peat to cost £30/m³ in 2021. Industry predict that this price will rise over the next 5 years in real terms (we have modelled this as a linear rise until 2026), at which point it will cost £45/m³. Beyond this year they predict stable real prices.

We believe peat-alternatives to cost £60/m³ (on average) and soil improvers to cost £20/m³ (on average), based on the same discussions. Both costs are predicted to remain constant during our time series in real terms. Although the cost of soil improver ingredients are lower than peat, the net impact is an increase in input costs, due to the 2/3 to 1/3 split of alternatives to soil improvers and the price differentials relative to peat.

A transitional shift away from peat (by 29%) is predicted to occur from 2025-27, in addition to the transition under the baseline that we have previously explored. As outlined in the assumptions, we predict that 2/3 of foregone peat sales will be replaced by alternatives, 1/3 by soil improvers.

Table 2 in the annex outlines our forecasted manufacturer input costs under this policy. Compared to the baseline, the sum of the increased manufacturer input costs from 2021-42 in NPV terms is **£5,687,820** (2021 prices, nearest £10).

5.3.1.2. Manufacturer Research and Development costs

We have assumed that the estimated R&D costs for a complete replacement of peat in horticulture are scaled for this measure. We believe that 29% shift away from peat in the central case is enough to necessitate R&D spending unlike in option 1 (10% shift). Through initial discussions with the industry, we have come up with an estimate of £40m over 8 years to resolve technical issues associated with complete peat replacement (i.e., under a total ban like option 3), including, for example, the stability within a bag of growing made from mixing a range of biologically active ingredients.

Based on discussions we have not flat profiled this R&D across the 8 years (2022-2028) but assumed a greater proportion will be required in the earlier years. We decided to model this as 40% of the total cost in the first two years, 30% in the next two years, 12.5% in 2026, 10% in 2027, and 7.5% in 2028.

In order to calculate R&D costs under a POS charge, we scale down this figure based on the estimated extent to which alternative growing media and soil improver sales increase in this scenario.

As stated above, we expect option 2 to only affect retail sales only and not professional sales. The baseline volume of alternative sales is estimated to be 59,549,848m³ from 2021-2042. Under option 2, where we assume that alternatives replace 2/3 of foregone retail peat sales and 0% of professional sales, this volume rises to 62,896,321m³.

This is a 5.6% increase in alternative sales under option 2 compared to the baseline. We estimate that the full ban would increase alternative sales by an estimated 41.0%, explored in 5.4. We can use these two figures to weight the estimated £40m R&D costs from a full ban: $(5.6\% / 41.0\%) * 40,000,000 = £5,477,790$ (nearest £10). This figure includes the R&D that needs to be undertaken

by growing media manufacturers for both retail bagged growing media and growing media sold to professional growers, but only bagged retail products are affected by this policy. Retail sales make up 49,734,775m³ of the forecasted 62,896,321m³ alternative sales under option 2 (79.1%). $£5,477,790 * 0.791 = £4,331,517$. This is **£3,861,520** in NPV terms (2021 prices, nearest £10).

5.3.2.3. Manufacturer transition costs

To transition away from peat productions requires the expansion of current alternative production facilities, or the redevelopment of current peat production facilities. We believe there to be the 30 growing media manufacturers who will face these costs. After conversations with industry, we predict that a complete transition away from peat to alternatives/soil improvers would on average cost each manufacturer £250,000 in transition costs. We believe that this transition cost will last for one year only, 2024 - the year of intervention.

Because our central estimate of option 2 results in a 29% reduction in peat sales, we scale the £250,000 figure accordingly to give the total transition cost of: $£250,000 * 0.29 * 30 = £2,163,462$. This figure is **£1,951,320** (2021 prices, nearest £10) in NPV terms.

5.3.2.4. Familiarisation costs

Familiarisation costs represent the time taken by individuals to read and understand new government guidance. This is a cost because it represents time that could otherwise be spent working by the individual. As such, we cost it based on relevant hourly wages.

We do not know how long the published guidance of any of the 3 policy measures would be, and so assume that it takes 1 hour to read and understand in each case but test this estimate in the sensitivity analysis.

We split the audience into the three relevant categories: retailers, growing media manufacturers and professional growers.

Retail:

Retailers are required to read and understand the guidance for this measure. We do not have data on how many retailers of growing media there are. We estimate using ONS data⁷³. This data outlines the number of retail businesses broken up by the Standard Industrial Classification 2007. We use the most up to date figures (2019) for classifications 47.11, 47.19, 47.76, 47.79 and 47.91, as these are the classifications that we believe to be relevant to horticultural peat. This gives us a total estimate of 99,158 retail businesses that will need to self-familiarise. We assume 1 person will need to read at each retailer: the manager. There may be other senior staff members who require familiarisation too, but it is not possible to estimate how many.

The ONS Annual Survey of Hours and Earnings⁷⁴ (ASHE) outlines the median wage of retail workers in the sale of flowers, plants, seeds, fertilisers, pet animals and pet food in specialised stores⁷⁵. It also outlines the median wage for retail managers⁷⁶. We assume that only the manager of a given retail outlet would be required to read the guidance. As such, we use the ASHE median hourly gross wage for retail managers of £13.53 to calculate the familiarisation costs. This wage is in 2021 prices, inflated from 2020 prices using the same ONS deflator as the rest of the analysis.

⁷³ [Non-financial business economy data, ONS \(2021\)](#).

⁷⁴ [ONS ASHE \(2021\)](#)

⁷⁵ [ASHE reference A621](#).

⁷⁶ [SOC code 1190](#).

We also include a non-wage cost uplift to reflect pension and NI contributions. We use 22% in line with RPC advice⁷⁷. As such, the final gross hourly cost of retail labour is estimated at (13.53) * [1+(0.22)] = £16.50.

Assuming 1 hour to familiarise, the total retail familiarisation costs = (16.50) * (1) * (99,158) = £1,636,360 (nearest £10, pre-discounting/deflating). We assume these costs to occur once only in 2022, as this is when guidance would be issued on the policy.

Growing media manufacturers:

Manufacturers are required to read and understand the guidance for this measure. As previously stated, we assume there to be 30 manufacturers. We use an hourly wage of £11.88 (ASHE reference A217) as we believe this most closely resembles the target population. This wage is in 2021 prices, inflated from 2020 prices using the same ONS deflator as the rest of the analysis. We assume 1 person from each manufacturer needs to familiarise themselves with the guidance. It may be more, but we cannot estimate how many more.

We include the same non-wage uplift as before, turning the gross labour cost into (11.88) * [1+(0.22)] = £14.49.

As such, the total growing media manufacturer familiarisation costs = (14.49) * (1) * (30) = £430 (nearest £10, pre-discounting/deflating).

Growers

Growers are unaffected by this measure and so do not need to familiarise themselves with it.

The total, the familiarisation costs are estimated at £1,581,450 (nearest £10, 2021 prices 2020 PV base year).

5.3.2.5. Total and direct costs to businesses

Above are the total costs directly facing business. Zero business benefits accrue (there are social benefits), so the total annual and NPV costs to business equal the net costs displayed above. The NPV social value does, however, include social benefits which are explored below.

Cost of Option (2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net direct cost to business per year	BIT Score
£67,468,499	-£11,868,226	£756,036	3780178
Appraisal Period (Years)		22	

5.3.2.6. Benefits

5.3.2.7. GHG emissions savings

The primary quantified benefit of this policy is its GHG emissions reduction.

⁷⁷ Page 5

To quantify emissions from peat extraction we use the UK's GHG inventory⁷⁸. This shows that in 2019, there was 5910 ha of industrial peat extraction, although much of this area is no longer under active extraction (onsite GHG emissions continue post extraction until the peat is fully exhausted or the site is restored). Using the planning permission end dates of English extraction sites (data which is unpublished), we can model how this quantity would change under a baseline scenario. It slowly reduces before equalling 0 ha extraction in 2042.

The GHG inventory provides emission factors for onsite and offsite peat emissions. Off-site refers to emissions from removed peat itself. On-site refers to emissions from the remaining drained peat mass. The emission factor for onsite industrial peat extraction is 13.28 tCO₂e ha⁻¹ yr⁻¹. It is 0.235 tCO₂e/m³ for offsite emissions. Multiplying these values by the quantity of extracted peat for the case of offsite emissions, and the area of UK extraction site for on-site emissions, allows us to quantify carbon benefits from abating this extraction.

To monetise benefits for this policy option, we estimate the reduction in emissions from a 29% reduction in peat sales compared to the baseline, and use the BEIS GHG Valuation guidance⁷⁹ (2021, annex 1).

GMM data⁸⁰ shows that from 2011-2019, 38.6% of the UK's peat sales came from UK sourced peat on average. Multiplying each years forecasted peat sales by 38.6% and adding each year's forecasted peat exports gives us the estimated quantity of peat produced by the UK for each year of 2021-42. Of the total estimated 31,225,372m³ of peat to be sold in the UK from 2021-42 (factoring in the estimated 29% reduction in retail sales from the policy), 12,769,600m³ is predicted to come from the UK.

The emissions from this peat represent offsite emissions, so we multiply this by the emission factor of 0.235 tCO₂e/m³, to give us the total predicted offsite emissions factoring in the 29% decrease in retail sales, estimated at 3.001 MtCO₂e.

We assume for this policy option that there is no increase in extraction site closure rate compared to the baseline. Therefore, multiplying the emission factor of onsite emissions by the area of extraction site available each year 2021-42 gives us the total onsite emissions. These are estimated at 1.412M tCO₂e in total over this time period.

Summing these two sources of emissions gives us 4.413 MtCO₂e. We estimate it to be 4.868 MtCO₂e under the baseline scenario. As such, this policy saves an estimated 0.455 MtCO₂e in the central case compared to the baseline. Using the respective BEIS GHG valuation prices for each year values this saving at **£87,500,000** in NPV terms (2021 prices, nearest £100,000).

5.3.2.8. Biodiversity gain

The restoration of peatlands that occurs due to reduced peat extraction has biodiversity benefits. This is because peatlands are a habitat for a variety of different species. Peatlands in better condition provide better habitats. It is very difficult to quantify improvements to biodiversity based off of a 29% reduction in peat sales because it is hard to quantify the impact of this on the quality of peatlands and relate it to biodiversity. As such, we keep this as a qualitative benefit as peat extraction sites are closed and restored but do note that it will be less significant than under the full ban (option 3).

⁷⁸ [UK GHG inventory](#)

⁷⁹ [BEIS, 2021](#)

⁸⁰ [UK GMM](#)

5.3.3.9. Water regulation

We may also see improved water regulation from this restoration because water derived from peatlands is naturally of high quality with few pollutants⁸¹. We cannot robustly quantify this.

Given these costs and benefits, the BCR of this policy is **6.7**.

5.4. Option 3: Sales ban on peat (all users, uses and sources), *preferred option*

Option 3 is a ban on the trade of peat for all users and uses and from all sources. This would come into force in 2024 for retail sales, and 2028 for the professional sector.

We assume:

- Retail sales of peat to tend to 0 from 2021-24, professional sales tend to 0 from 2021-28. Linear trajectories of change are modelled, but it is more likely that change will occur in a series of steps as new products come to market. It has not been possible to model such steps due to uncertainty of how this would occur.
- All sellers comply with the legal requirement of this measure.
- That the less-than-optimal use of growing media (designed for containerised growing) is corrected and that approximately one third of the peat-based multipurpose compost that is used as a soil improver is replaced by peat-free soil improvers (based on discussions with the sector). This leaves the remaining two-thirds of the peat-based growing media to be replaced by peat-free growing media. This replacement of one third of growing media by soil improvers is assumed to close the availability gap for peat-alternatives. Therefore, of the 100% reduction in peat, 1/3 is replaced by peat-free soil improvers and 2/3 is replaced by peat-free growing media.
- The professional sector is affected under this policy, unlike options 1 & 2.
- Baseline growing media prices to be the same as outlined in option 1 & 2.
- These assumptions are all based upon interaction with industry representatives and expertise internal to Defra. We welcome further comments/evidence during consultation to test these assumptions.
- Exports of peat would no longer be possible under the sales ban.
- Peat imports will be displaced to other markets internationally. We do not model GHG reductions here as that would be misleading - these emissions would still exist just outside of the UK's audit. However, measures would reduce the greenhouse gas footprint of the UK and end the offshoring of our emissions.

We test assumptions in 5.5.

5.4.1 Option 3 costs

5.4.1.1. Manufacturer input costs

Table 3 in the annex outlines our forecasted manufacturer input costs (pre-discounting/deflating). These are predicted to rise under this policy option because peat-alternatives for use in growing media are more expensive than peat. Soil improvers are cheaper than peat per m³, but the net effect is still greater costs. A complete transitional shift away from peat to alternatives and soil improvers can be observed from 2021-27, with input costs remaining stable from 2028 onwards. This time period onwards is not shown in the table in order to save space. The final column shows the increased input costs relative to the baseline. This is the increased costs that manufacturers of growing media will face as they shift inputs away from peat to more expensive inputs, due to this elimination of peat sales.

⁸¹ [IUCN](#)

Compared to the baseline, the sum of the increased manufacturer input costs from 2021-42 in NPV terms is **£154,456,710** (2021 prices, nearest £10).

5.4.1.2. Research and Development costs

Through initial discussions with industry, we have come up with an estimate of £40m over 8 years to resolve technical issues associated with a complete peat ban. This includes, for example, the stability within a bag of growing media made from mixing a range of biologically active ingredients.

Based on discussions we have not flat profiled this R&D across the 8 years (2022-2028) but assumed a greater proportion will be required in the earlier years. We decided to model this as 40% of the total cost in the first two years, 30% in the next two years, 12.5% in 2026, 10% in 2027, and 7.5% in 2028.

Using these weights above, we forecast that £8m in R&D costs will be incurred in 2022 & 2023, £6m in 2024 & 2025, £5m in 2026, £4m in 2027, and £3m in 2028.

This cost equals **£35,659,710** in NPV terms (2021 prices, nearest £10).

5.4.1.3. Manufacturer transition costs

To transition away from peat productions requires the expansion of current alternative production facilities, or the redevelopment of current peat production facilities. As previously stated, we believe there to be the 30 growing media manufacturers who will face these costs. After conversations with industry, we predict that a complete transition away from peat to alternatives would on average cost each manufacturer £250,000 in transition costs. We believe that this transition cost will last for one year only, 2024-the year of intervention.

As such, the total manufacturer transition costs for this policy option equal $30 * £250,000 = £7,500,000$. This equals **£7,246,380** (2021 prices, nearest £10) in NPV terms.

5.4.1.4. Familiarisation costs

Familiarisation costs represent the time taken by individuals to read and understand new government guidance. This is a cost because it represents time that could otherwise be spent working by the individual. As such, we cost it based on relevant hourly wages.

We do not know how long the published guidance of any of the 3 policy measures would be, and so assume that it takes 1 hour to read and understand in each case but test this estimate in the sensitivity analysis.

We split the audience into the three relevant categories: retailers, growing media manufacturers and professional growers.

Retail:

Retailers are required to read and understand the guidance for this measure. We do not have data on how many retailers of growing media there are. We estimate using ONS data⁸². This data outlines the number of retail businesses broken up by the Standard Industrial Classification 2007. We use the most up to date figures (2019) for classifications 47.11, 47.19, 47.76, 47.79 and 47.91,

⁸² [Non-financial business economy data, ONS \(2021\)](#).

as these are the classifications that we believe to be relevant to horticultural peat. This gives us a total estimate of 99,158 retail businesses that will need to self-familiarise. We assume 1 person will need to read at each retailer: the manager. There may be other senior staff members who require familiarisation too, but it is not possible to estimate how many.

The ONS Annual Survey of Hours and Earnings⁸³ (ASHE) outlines the median wage of retail workers in the sale of flowers, plants, seeds, fertilisers, pet animals and pet food in specialised stores⁸⁴. It also outlines the median wage for retail managers⁸⁵. We assume that only the manager of a given retail outlet would be required to read the guidance. As such, we use the ASHE median hourly gross wage for retail managers of £13.53 to calculate the familiarisation costs. This wage is in 2021 prices, inflated from 2020 prices using the same ONS deflator as the rest of the analysis.

We also include a non-wage cost uplift to reflect pension and NI contributions. We use 22% in line with RPC advice⁸⁶. As such, the final gross hourly cost of retail labour is estimated at (13.53) * [1+(0.22)] = £16.50.

Assuming 1 hour to familiarise, the total retail familiarisation costs = (16.50) * (1) * (99,158) = £1,636,360 (nearest £10, pre-discounting/deflating). We assume these costs to occur once only in 2022, as this is when guidance would be issued on the policy.

Growing media manufacturers:

Manufacturers are required to read and understand the guidance for this measure. As previously stated, we assume there to be 30 manufacturers. We use an hourly wage of £11.88 (ASHE reference A217) as we believe this most closely resembles the target population. This wage is in 2021 prices, inflated from 2020 prices using the same ONS deflator as the rest of the analysis. We assume 1 person from each manufacturer needs to familiarise themselves with the guidance. It may be more, but we cannot estimate how many more.

We include the same non-wage uplift as before, turning the gross labour cost into (11.88) * [1+(0.22)] = £14.49.

As such, the total growing media manufacturer familiarisation costs = (14.49) * (1) * (30) = £430 (nearest £10, pre-discounting/deflating).

Growers

Growers need to read and understand the guidance for this policy option.

We use an hourly wage of £10.24, representing Plant Propagation (ASHE reference A31⁸⁷) as we believe that to represent the profession most closely in the data. This wage is in 2021 prices, inflated from 2020 prices using the same ONS deflator as the rest of the analysis.

We believe there to be 15,464 growing businesses. This is calculated using the Farm Business Survey⁸⁸ 2019-20 and DEFRA agricultural data⁸⁹. The Horticulture Production in England section of the Farm Business Survey, table 2.4, shows that of those “all specialist glass” businesses surveyed the productive cropping area was 4.16ha on average. Using the DEFRA agriculture data for the same year, the total cropping area for UK glasshouse crops was 2,911ha. We use the

⁸³ [ONS ASHE \(2021\)](#)

⁸⁴ [ASHE reference A621.](#)

⁸⁵ [SOC code 1190.](#)

⁸⁶ [Page 5](#)

⁸⁷ [Annual Survey of Hours and Earnings, ONS \(2021\)](#)

⁸⁸ [Farm Business Survey \(2019-20\)](#)

⁸⁹ [Structure of the agricultural industry in England and the UK at June \(2021\)](#)

sampled average of 4.16ha per English business to estimate that there are $(2,911 / 4.16) = 700$ “all specialist glass” businesses in the UK.

Repeating this for all four horticulture groups gives an estimated 15,464 growing businesses.

We assume 1 person from each growing business needs to familiarise themselves with the guidance. It may be more, but we cannot estimate how many more.

We include the same non-wage uplift as before, turning the gross labour cost into $(10.24) * [1+(0.22)] = £12.49$.

As such, the total growing media manufacturer familiarisation costs = $(12.49) * (1) * (15,464) = £193,100$ (nearest £10, pre-discounting/deflating).

As such the total estimated familiarisation costs for this measure are £1,768,010 in NPV terms (2021 prices, nearest £10).

5.4.1.5. Grower input costs

The ban, unlike options 1&2, affects professional growers. Conversations with industry have enabled us to estimate how the input costs of growers will be affected by no longer being able to use peat. These increased costs are ongoing from the point of the ban to 2042. As a result of discussions with industry representatives, we estimate that:

- 1) All types of growers that currently use peat will need to spend an increased 20% on fertilizer to yield the same results with peat-alternatives. It is assumed based on industry discussions that direct peat use is limited to a proportion of blueberry production in the fruit sector (propagation is assumed to be captured in the glass sector) and that there is no direct peat use in the field vegetable sector (propagation is assumed to be captured in the glass sector).
- 2) machinery repair costs will increase by 1% for hardy nursery stock⁹⁰ (HNS) businesses due to increased repair frequency (e.g., replacing ball bearings on conveyer belts). This stems from alternatives being more abrasive to machinery than peat.
- 3) Contract and hire costs, as well as machinery depreciation costs, to increase by 50% for all specialist glass businesses (i.e. greenhouse based horticultural businesses).

We now break these costs down by each of the grower business types, excluding field vegetable growers as explained above.

Specialist glass businesses

The total area of UK land occupied by specialist glass businesses in 2020 was 2,911 hectares⁹¹. The average cost of fertilizers and compost in 2019 was £6,415/hectare⁹². As such, the estimated cost of fertilizers/compost to specialist glass businesses in this year was $2,911 * £6,415 = £18,537,248$. The 20% increase in this cost from 2024 onwards results in a predicted annual cost of £22,408,880 (nearest £10, pre-discounting/deflating).

In 2019, the average cost of contract and hire for power & machinery requirements was £2,064/hectare⁹³. Multiplying this by the 2,911 hectares as in the paragraph above gives us an estimated 2020 cost of contract and hire equal to £6,008,304. Factoring in the 50% increase per year, the estimated annual cost becomes £9,012,460 (nearest £10, pre-deflation/discounting).

⁹⁰ [University of Warwick overview of the HNS sector](#)

⁹¹ [Structure of the agricultural industry in England and the UK at June \(2021\)](#)

⁹² [Table 2.4.](#)

⁹³ [Table 2.4.](#)

In 2019, the average cost associated with machinery depreciation was £4,850/hectare⁹⁴. Multiplying this by the 2,911 hectares as above gives us an estimated 2019 cost pertaining to machinery depreciation of £14,118,350. Factoring in the 50% increase per year, the estimated annual cost becomes £21,177,530 (nearest £10, pre-discounting).

Compared to the 2020 baseline, the sum of all these additional annual costs come to an increase of £13,798,140 each year from 2024-2042 in 2019 prices.

Specialist fruit businesses

We estimate the total number of UK hectares occupied by specialist blueberry growers assumed to still be using peat in 2019 was 130. This is based on industry discussions. Blueberry production is the only significant fruit growing sector that still uses peat as most other soft fruit production has already shifted to coir and there is no direct use of peat in top fruit (propagation is assumed to be captured in the glass sector).

The average cost of fertilizers and compost in 2020 was £279/hectare⁹⁵. As such, the estimated cost of fertilizers/compost to specialist fruit businesses in this year was $130 * £279 = £36,270$. The 20% increase in this cost from 2024 onwards results in a predicted annual cost of £43,524 (nearest £10, pre-deflation/discounting). Compared to the baseline, this is an additional £7,254 annual cost in 2019 prices for the industry (2024-2042).

Specialist HNS businesses

The total number of UK hectares occupied by specialist HNS businesses in 2020 was 10,310⁹⁶.

The average cost of fertilizers and compost in 2019 was £9,334/hectare⁹⁷. As such, the estimated cost of fertilizers/compost to specialist HNS businesses in this year was $10,310 * £9,334 = £96,228,873$. The 20% increase in this cost from 2024 onwards results in a predicted annual cost of £115,474,650 (nearest £10, 2019 prices, pre-discounting). Compared to the baseline, this is an additional £19,245,775 annual cost for the industry (2024-2042, 2019 prices pre-discounting).

Also, HNS businesses will likely face increased machinery repair costs due to the abrasive nature of alternative growing media. We estimate this to be an additional 1% per year after the ban's introduction, based on industry discussions. The average annual cost of such repairs in 2019 was £3,972⁹⁸. Multiplying this by the 10,310ha gives a total repair cost to HNS businesses of £40,949,334 for 2019 (pre-discounting). Factoring in the 1% increase, this becomes £41,358,827. This is an additional £409,493 per year in 2019 prices.

In total, HNS businesses will face increased annual costs estimated at £19,655,268 in 2019 prices.

The sum of all these additional grower input costs equal an estimated **£635,800,000** in 2019 prices (nearest £100,000). This is **£456,100,000** in 2021 price PV terms (nearest £100,000).

5.4.1.7. Professional grower trialling cost

⁹⁴ [Table 2.4.](#)

⁹⁵ [Table 2.13](#)

⁹⁶ [Structure of the agricultural industry in England and the UK at June \(2021\)](#)

⁹⁷ [Table 2.17.](#)

⁹⁸ [Table 2.17.](#)

We are currently funding a research project to investigate whether professional growers may face an additional trialling cost. This trialling cost relates to the effort spent learning how to attain the same yield using alternatives as using peat. We cannot yet quantify this or propose scale as research is still ongoing, but it is possible that this cost will occur.

5.4.1.8. Grower transitional costs

There are two types of transitional cost that may face growers specifically. These are categorised as:

- 1) Mixing hub costs
 - 2) Glasshouse expansion costs
- 1) Certain industry members are advising growers that it may be better to mix their own growing media rather than buying it pre-mixed. This is due to the biological activity that occurs in bales of ready mixed growing media that can be avoided by the separate storage of the individual ingredients. We believe this to be predominantly relevant to HNS. As there are 6 larger concentrations of HNS growers (Chichester, Kent, Spalding, Lancashire, the Midlands, and East Yorkshire), industry suggested a model to us of building regional mixing hubs to supply these 6 grower groups. This is instead of each grower needing to invest in their own mixing machinery, which we estimate to cost £100,000 each based on industry discussions (2021 prices). Based on the same discussions, we believe the total costs of each of the 6 hubs to be £500,000 (2021 prices). We assume this cost to be split over 2 years to allow for building time. Modelling assumes the professional ban to occur in 2028, so costs are incurred in 2027 & 2028. So £3m of costs total (2021 prices, pre-discounting) are spread across 2 years.

We cannot know for certain whether industry will incur these costs. They may decide that the benefits of mixing their own growing media do not outweigh the costs associated. We cannot accurately quantify the benefits of doing so. The fact that industry discussions suggested this as a smart approach does, however, suggest there may be merit in doing so. As such, we will include these costs.

- 2) Some plants grow slower in alternatives than in peat, they will take more time to achieve marketable size and quality. Therefore, to allow for overlapping production cycles glasshouses will need to be expanded. This is a transitional cost. Through industry discussions and internal expertise, we have concluded that a 10% glasshouse expansion across the ornamentals sector is necessary to meet previous production rates.

The Farm Business Survey 2019-20⁹⁹ tables 2.5 and 2.6 show that the ratio of edible to ornamental crops grown by specialist glass businesses is 18:24 (57% ornamental). The total area of UK glasshouses is 2910 hectares¹⁰⁰, so a 10% increase would require 291 new hectares of glasshouses. We weight this by the proportion of glasshouse used to grow ornamental crops because edible crops' growth speed is assumed to be less affected by alternatives use. Therefore, we estimate that $(0.57) * (291) = 166$ hectares of new glasshouse will be needed by growers.

Page 91 of a West Sussex growers report¹⁰¹ states that a typical glasshouse of more than 2 hectares for young plant production would cost over £1.14m/hectare to establish. We

⁹⁹ [Farm Business Survey](#) (2019-20).

¹⁰⁰ [Structure of the agricultural industry in England and the UK at June](#) (2021)

¹⁰¹ [West Sussex Growers Association](#) (2009).

use this as our estimated per hectare cost of construction plus heating, energy etc. This assumes that these land prices can be extrapolated to the entirety of England. Land prices vary across England. Using pastureland prices as a proxy, the price of land in West Sussex is above the English average¹⁰². Therefore, this may be a slight overestimate of glasshouse costs when applied to England as a whole. The West Sussex growers report also suggests that the land on which such glasshouses are built would be worth £40,000-£100,000 if sold. We take the mid-point of £70,000 and use this as the cost of purchasing new land to build new glasshouses.

Therefore, multiplying (£1,140,000 + £70,000) by 166 hectares = £200,900,000 (2009 prices, nearest £100,000). Once inflated to 2021 prices, this is 253,500,000 (nearest £100,000). We assume that this process takes 10 years to complete as building glasshouses is laborious, and so model this from 2025-2035. There may also be opportunity costs associated with diverting resources away from BAU to achieve this, but we cannot accurately quantify an estimate of these.

The sum of these transitional costs pre-discounting/deflating is £256,500,000 (2021 prices). This is **£192,600,000** in NPV terms (nearest £100,000).

5.4.1.9. Total and direct costs to businesses

Cost of Option (2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net direct cost to business per year	BIT Score
-£32,717,564	-£769,121,706	£48,994,966	244974828
Appraisal Period (Years)	22		

Above are the total costs directly facing business. Zero business benefits accrue (there are social benefits), so the total annual and NPV costs to business equal the net costs displayed above. The NPV social value does, however, include social benefits which are explored below.

5.4.1.10. Benefits

5.4.1.11. GHG emissions savings

The primary quantified benefit of this policy is its GHG emissions reduction.

To quantify emissions from peat extraction we use the UK's GHG inventory¹⁰³. This shows that in 2019, there was 5910ha of industrial peat extraction. Using the planning permission end dates of English extraction sites, we can model how this quantity would change under a baseline scenario. It slowly reduces before equalling 0ha extraction in 2042.

¹⁰² [Farmers Weekly](#) (2021)

¹⁰³ [UK GHG inventory](#)

The GHG inventory provides emission factors for on-site and off-site peat emissions. Off-site refers to emissions from removed peat itself. On-site refers to emissions from the remaining drained peat mass. The emission factor for on-site industrial peat extraction is 13.28 per tCO_{2e} ha⁻¹ yr⁻¹, 0.235 per tCO_{2e}/m³ for off-site emissions. Multiplying these values by the quantity of extracted peat for the case of offsite emissions, and the area of UK extraction site for off-site emissions, allows us to quantify carbon benefits from abating this extraction.

To monetise benefits for this policy option, we estimate the reduction in emissions from a ban of peat sales compared to the baseline, and use BEIS GHG Valuation guidance¹⁰⁴ (2021, annex 1).

GMM data¹⁰⁵ shows that from 2011-2019, 38.6% of the UK's peat sales came from UK sourced peat on average. Multiplying each years forecasted peat sales by 38.6% and adding each year's forecasted peat exports gives us the estimated quantity of peat produced by the UK for each year of 2021-42. Of the total estimated 4,935,831m³ of peat to be sold in the UK from 2021-42 (factoring in the elimination in sales from the policy), 2,035,523m³ is predicted to come from the UK.

The emissions from this peat represent offsite emissions, so we multiply by the emission factor of 0.235 for every year from 2021-42, to give us the total predicted offsite emissions factoring in the total ban, estimated at 0.478 MtCO_{2e}.

We assume that the total area of UK extraction sites falls linearly from 2021-2028 until it reaches only 5ha still for extracting post-2028. This 5ha decreases linearly from 2028-2042 until there's no area of extraction sites left. Multiplying the emission factor of onsite emissions by the area of extraction site available each year 2021-42 gives us the total onsite emissions. These are estimated at 0.306 MtCO_{2e} in total over this time period.

Summing these two sources of emissions gives us 0.784 MtCO_{2e}. We estimate it to be 4.868 MtCO_{2e} under the baseline scenario. As such, this policy saves an estimated 4.084 MtCO_{2e} in the central case. Using the respective BEIS GHG valuation prices for each year values this saving at £1,199,400,000 (nearest £100,000, 2021 prices). This is **£806,300,000** in NPV terms (nearest £100,000).

This is a significant GHG abatement. This is why option 3 is our preferred policy option despite the costs being so high. The goal is abatement of GHG emissions and to improve the condition of peatlands at risk of extraction. Although doing this is a highly costly policy measure, a total ban is the only option that will derive such benefits and support the government to meet its 25YEP and Net Zero 2050 commitments.

5.4.1.12. Biodiversity gain

The restoration of peatlands that occurs due to reduced peat extraction has biodiversity benefits. This is because peatlands are a habit for a variety of different species. Peatlands in better condition provide better habitats.

This option is quantifiable as we are able to more accurately predict the degree of restoration following a complete ban compared with alternative options avoiding concerns relating to spurious accuracy.

In 2020 there were 5910 hectares of peatland extraction site in the UK with planning permission. Assuming the total area of UK extraction sites decreases linearly from 2021-2028 down to 5 hectares results in an annual decrease of approximately 819 hectares per year. From

¹⁰⁴ [BEIS, 2021](#)

¹⁰⁵ [UK GMM](#)

2028 the final 5 hectares will decrease to 0 linearly also by 2042. With these data we are able to model the hectares of extraction site closed or peatland restored following the sales ban.

In line with modelling for the GHG benefits, the biodiversity benefits are borne 4 years after a given hectare is closed or restored. A central value of £110/ha/year¹⁰⁶ (2021 prices) is used for the biodiversity benefit, hence the previous focus on cumulative totals as the biodiversity benefits arise every year.

By multiplying the above value per hectare per year with the cumulative amount of closed or restored peatland we arrive at an annual biodiversity benefit as a result of the ban. Benefits increase quickly from 2026 to 2032 and plateau after this as can be seen in the second rows of the tables below.

The sum of these biodiversity benefits from 2021-2042 = £8,867,950 (nearest £10, 2021 prices, undiscounted value). This is £5,470,490 in NPV terms (nearest £10).

5.4.1.13. Water regulation

We may also see improved water regulation from this restoration because water derived from peatlands is naturally of high quality with few pollutants¹⁰⁷. We cannot robustly quantify this.

Given these costs and benefits, the BCR of this option is **1.0**. This is lower than the other two policies. Nonetheless, it remains our preferred approach because it is the only option that will bring significant GHG reductions and improvements to our peatlands. This is crucial for meeting the government's Net Zero 2050 requirements and 25YEP ambitions.

5.4.2. Why a full ban?

There is a case to be made that a full ban is not the most economically efficient policy measure. For instance, we could *theoretically* levy a POS charge such that it fully incorporates the societal cost of the extracted peat's GHG emissions. However, due to the uncertainty about the demand for peat a charge on sale would not provide the certainty of outcome. The UK government has publicly committed to ending the sale of extracted peat. It is likely that some consumers within the market would tolerate significant price rises before switching, and so we do not believe the POS charge could achieve this outcome.

5.5. Sensitivity analysis

There is limited data for much of our economic appraisal. A variety of judgements have been made throughout the modelling process, based largely on industry engagement and internal Defra expertise. We include a high and a low estimate in this section in order to test a range of possibilities, acknowledging the limitations of our evidence portfolio.

5.5.1. Option 1

We here challenge assumptions by providing the following ranges:

¹⁰⁶ This value is average of suggested values from Christie, M et al. (2011) Valuation of the Benefits of Ecosystem Services delivered by the UK Biodiversity Action Plan and Morris, J & Camino, M. (2011) Economic Assessment of Freshwater, Wetland and Floodplain Ecosystem Services.

¹⁰⁷ [IUCN](#)

- 1) A halving and doubling in the shift in retail sales stemming from the policy
- 2) +/- 10% for estimated manufacturer transition costs
- 3) +/- 10% for estimated manufacturer R&D costs
- 4) +/- 30 minutes for familiarisation
- 5) High and low BEIS carbon values

Below is a summary of NPV to society and direct costs to business (NPV) in the low and high case.

Low scenario:

Cost of Option (2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net direct cost to business per year	BIT Score
-£1,846,373	-£8,719,489	£555,453	2777266
Appraisal Period (Years)		22	

High scenario:

Cost of Option (2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net direct cost to business per year	BIT Score
£48,083,430	-£34,406,078	£2,191,753	10958764
Appraisal Period (Years)		22	

The BCR of this option ranges from **0.8-2.4** under the low-high scenarios.

5.5.2. Option 2

We here challenge assumptions by providing the following ranges:

- 1) +/- 19 percentage point shift in retail sales stemming from the policy. This comes from an estimated PED range of 0.5-1 (0.75 central estimate).
- 2) +/- 10% for estimated manufacturer transition costs
- 3) +/- 10% for estimated manufacturer R&D costs

- 4) +/- 30 minutes for familiarisation
- 5) High and low BEIS carbon values

Below is a summary of NPV to society and direct costs to business (NPV) in the low and high case.

Low scenario:

Cost of Option (2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net direct cost to business per year	BIT Score
£19,123,636	-£7,311,425	£465,756	2328780
Appraisal Period (Years)	22		

High scenario:

Cost of Option (2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net direct cost to business per year	BIT Score
£151,381,542	-£18,235,070	£1,161,619	5808097
Appraisal Period (Years)	22		

The BCR of this option ranges from **3.6-9.3** under the low-high scenarios.

5.5.3. Option 3

We here challenge assumptions by providing the following ranges:

- 1) +/- 10% for estimated manufacturer transition costs
- 2) +/- 10% for estimated manufacturer R&D costs
- 3) +/- 30 minutes for familiarisation
- 4) For specialist glass businesses: +/- 5 percentage point fertiliser cost, +/- 5 percentage point contract and hire costs, +/- 5 percentage point machinery depreciation cost.
- 5) For specialist fruit businesses and specialist hardy nursery stock businesses: +/- 5 percentage point fertiliser cost.

6) High and low BEIS carbon values

Below is a summary of NPV to society and direct costs to business (NPV) in the low and high case.

Low scenario:

Cost of Option (2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net direct cost to business per year	BIT Score
-£310,359,444	-£680,919,473	£43,376,264	216881320
Appraisal Period (Years)		22	

High scenario:

Cost of Option (2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net direct cost to business per year	BIT Score
£244,610,286	-£857,323,938	£54,613,667	273068336
Appraisal Period (Years)		22	

The BCR of this option ranges from **0.5-1.3** under the low-high scenarios.

6. Impact on small and micro businesses

All policy options considered will impact SMBs. They will also impact medium-large corporations, but we believe most businesses to be SMBs. For instance, it is estimated that 92% of ornamental horticultural businesses are SMBs¹⁰⁸. Unfortunately, we see no feasible way of achieving our policy outcomes without using a full ban on the sale of peat, which will inevitably impose costs on a range of stakeholders, including smaller businesses.

We have been in regular contact with stakeholders to discuss our proposed policies, and so this should not come as a shock. Various areas of the industry have already started to go peat free, perhaps because they knew that this shift was inevitable in order to achieve the government’s environmental and climate targets.

We will seek to further understand SMB impacts through the consultation process.

¹⁰⁸ Royal Horticulture Society, 2019. Original data by NOMIS.

7. Wider impacts (consider the impacts of your proposals)

We consider wider impacts for our preferred policy option.

This policy imposes costs on various areas of the sector. These will likely be passed on in the form of higher prices to consumers who purchase horticultural goods. This represents a welfare shift away from peat consumers towards general society in the form of environmental benefits. It is hard to know how significant any price rises would be. Additionally, as innovations in the horticultural sector continue, alternatives may become a more cost-effective option than they currently are, potentially leading to lower prices for consumers in the long run.

Ending the extraction of peat would mean that those employed in this sector will lose their job. We believe that these jobs should transfer fairly smoothly into the newly growing alternative growing media sector, and it may even be that this policy results in a net gain of jobs because greater innovation is required for alternatives than peat. The industry is more laborious and therefore may demand a greater number of workers. Similarities between the two sectors means it should not be too difficult to transfer skills across.

8. A summary of the potential trade implications of measure

Point of sale charge for the purchase of any growing media bag containing peat

An assessment will be required under the Trade and Cooperation Agreement with the EU since this measure would have an impact on trade with the EU. If it is shown that this point of sale charge would afford protection to similar or competing domestic products compared with imported products, such indirect discriminatory action might result in a breach of the relevant provisions of the TCA unless it can be objectively justified and demonstrated to be proportionate. The most relevant justification is likely to be environmental protection.

Sales ban on peat (all users and uses)

A sales ban on all peat products would amount to a total restriction on exports and goods in transit and therefore would raise potential issues under the Trade and Cooperation Agreement with the EU. We are using the consultation to ask stakeholders for views on whether exemptions to any such ban should also be accommodated.

9. Monitoring and Evaluation

The purpose of this consultation is to get stakeholder views on a range of measures to end the use of peat and peat containing products in the horticulture sector in England. Should we proceed with our preferred option, and there will be a consultation on this option alone, we will propose monitoring and evaluation processes to ensure the effectiveness of the new arrangements. We are currently co-funding with the horticultural industry monitoring of the composition of growing media (including peat) supplied for amateur and professional use in the horticultural market. We intend to continue funding monitoring to allow us to assess the effectiveness of current (voluntary) measures and any new arrangements.

Measure	Potential method of monitoring
Mandatory reporting	<ul style="list-style-type: none">• Number of mandatory reports published on website• Total volume of peat reported• Annual change in volume per reportee

Point of sale charge	<ul style="list-style-type: none"> Continuation of monitoring of the composition of growing media. Reporting of retailers on charges collected.
Sales ban (all users and uses)	<ul style="list-style-type: none"> Continuation of monitoring of the composition of growing media. We are expecting a high degree of compliance with any ban, this assumption will be tested through social science research in due course. We will be exploring through targeted engagement the most appropriate enforcement methods once this research has been concluded.

Annex

Table 1: Estimated manufacturer input costs under option 1 (2021 prices)

Year	Peat Input Costs	Alternatives Input Costs	Soil Improver input costs	Total input costs	Additional manufacturer input costs (compared to baseline)
2021	£57,065,168	£147,128,564	£0	£204,193,732	£0
2022	£60,260,817	£151,693,778	£0	£211,954,595	£0
2023	£63,109,510	£156,076,383	£0	£219,185,893	£0
2024	£65,633,891	£160,283,683	£0	£225,917,574	£0
2025	£66,422,268	£166,369,946	£0	£232,792,214	£614,176
2026	£69,631,274	£168,417,201	£0	£238,048,475	£1,023,627
2027	£68,095,833	£170,464,455	£0	£238,560,289	£1,535,441

Table 2: Estimated manufacturer input costs under option 2 (2021 prices)

Year	Peat Input Costs	Alternatives Input Costs	Soil Improver input costs	Total input costs	Additional manufacturer input costs (compared to baseline)
2021	£57,065,168	£147,128,564	£0	£204,193,732	£0
2022	£60,260,817	£151,693,778	£0	£211,954,595	£0
2023	£63,109,510	£156,076,383	£0	£219,185,893	£0
2024	£65,633,891	£160,283,683	£0	£225,917,574	£0
2025	£63,721,466	£168,259,720	£656,171	£232,637,357	£459,320
2026	£63,843,843	£172,196,748	£1,312,343	£237,352,934	£328,086
2027	£59,414,687	£176,133,775	£1,968,514	£237,516,976	£492,128

Table 3: Estimated manufacturer input costs under option 3 (preferred approach, 2021 prices)

Year	Peat Input Costs	Alternatives Input Costs	Soil Improver input costs	Total input costs	Additional manufacturer input costs (compared to baseline)
2021	£57,065,168	£147,128,564	£0	£204,193,732	£0
2022	£44,379,645	£172,855,396	£2,571,080	£219,806,121	£7,851,526
2023	£29,845,674	£196,706,689	£4,936,474	£231,488,836	£12,302,943
2024	£13,742,305	£218,791,324	£7,108,522	£239,642,152	£13,724,578
2025	£10,655,572	£225,564,109	£6,824,182	£243,043,863	£10,865,825
2026	£7,611,123	£230,638,191	£6,824,182	£245,073,496	£8,048,648
2027	£3,805,562	£235,712,273	£6,824,182	£246,342,016	£9,317,168