

# CROP PRODUCTION SECTOR PLAN

July 2019

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# Preface

**SEPA has a strong track record of regulating to improve the Scottish environment. We are proud of what we have achieved since we were set up just over two decades ago in 1996. We know we need to do more over the next two decades to build on this success. Much more.**

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The mounting scientific evidence about climate change, plastics in our oceans, the pressure on our freshwater and more shows us that humanity must rise to tackle major environmental challenges. This scientific knowledge underpins SEPA's strategy for how we will regulate – One Planet Prosperity. If everyone in the world lived as we do in Scotland, we would need three planets. There is only one.

So, we will regulate to help Scotland prosper within the means of our one planet. Successful businesses in future will be those that practice efficient resource use and successfully minimise the use of water, materials and carbon-based energy and create little waste. Prosperous societies will be comprised of these businesses. This can be Scotland.

In every sector we regulate, this means we will have two simple aims. We will:

1. ensure that all businesses fully meet their environmental compliance obligations;
2. help as many businesses as possible move beyond their environmental compliance obligations.

This sector plan outlines how we will do this in regulating the crop production sector. As the world's population grows beyond seven billion people and the global and local stresses on our environment increase, the challenge of how humanity feeds itself will be a tough one. In growing crops, as in all agricultural production, we will need to continue to look for ways to minimise environmental impact while ensuring successful production. Excellence in stewardship and the search for new forms of innovation will be the hallmarks of a vibrant crop production sector.

The crop production sector has made great strides in improving environmental performance and together with stakeholders we will build on this and identify win: win opportunities that benefit farm businesses and the environment.

Our plan is ambitious. It spells out how we will use traditional environmental protection agency (EPA) regulatory tools, such as permits and enforcement, in clearer and more powerful ways.

As SEPA is not the main influencer in the crop production sector, we need to work extensively in partnerships, which we will further develop and use to support innovation in this sector.

**Terry A'Hearn**  
SEPA Chief Executive Officer

# 1. Introduction

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SEPA's statutory purpose is to protect and improve the environment in ways that, as far as possible, create health and wellbeing benefits and sustainable economic growth. To help create a prosperous Scotland that lives within the means of our one planet, we need to radically change the way we work. In the past our approach to regulation has been grounded in different sets of rules to protect the environment. This has helped us to deliver, for example, improvements in water quality. However, it will not enable us to make the transformational changes needed to tackle today's problems.

We are moving instead to ground our regulation in working across whole sectors. In this way we can systematically identify the compliance issues that need to be tackled by the sector. This new way of working by SEPA started in 2017. It is being rolled out across all sectors we regulate and will mean we deliver our duties efficiently within existing budgets. All SEPA regulated activities will fall within a sector plan by March 2021 and the crop production sector is one of the first agricultural plans. This document explains how SEPA organises itself.

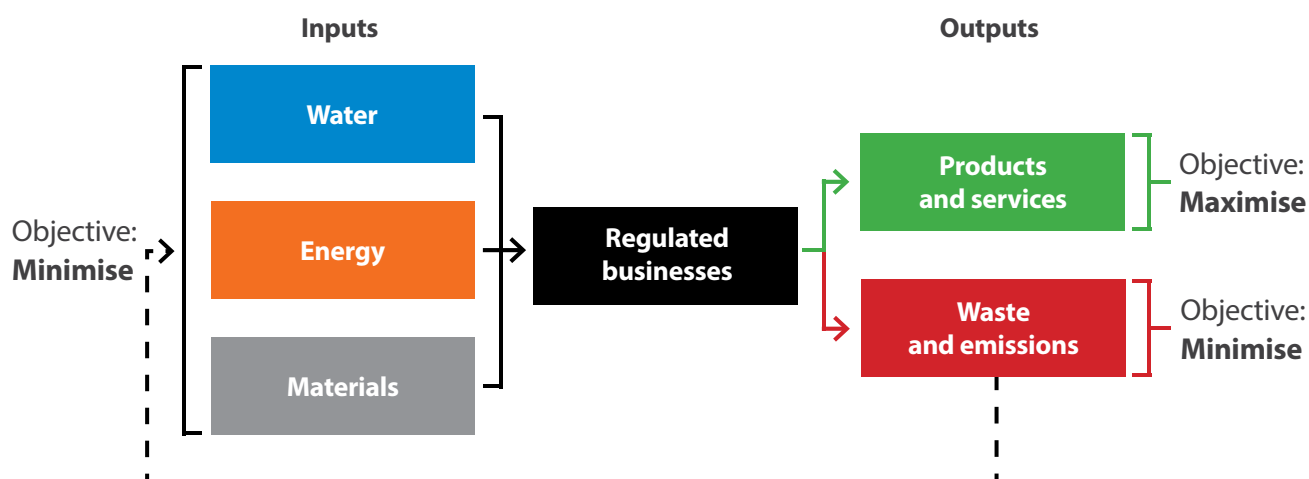
However, mere compliance and small scale incremental change will not be enough. The crop production sector is continuously improving the efficiency of its operation and this plan wants to support this. Efficiency must be rooted in a healthy environment and thus ensure a long-term sustainable industry and society. Further change needs to focus on the most pressing issues, such as climate change, and the best opportunities in the short and longer term. We want to help businesses and sectors to implement successful innovation and support them in their ambitions to do more than they are required to by regulation.

We call this **moving beyond compliance:** helping already high performing businesses to do more for the environment because it makes sense for them to grow in a sustainable manner. We can also identify where the biggest opportunities are for us to help the sector to go beyond compliance. In both ways this will help regulated businesses operate successfully within the means of one planet.

Within this plan the reference to move beyond compliance simply means good farming practice, voluntary action or activities that involve going beyond the legal minimum and often include win-win situations for the farmer and the environment. Focused funding can help facilitate uptake. Many farmers regularly practice farming techniques or management that do this. This may be due to a number of reasons, for example, the financial savings the activity will provide (e.g. soil testing) or how the action or investment will contribute to the long-term viability of their business (e.g. carbon audits). In many cases, it may just be because they feel it is the right thing to do for the environment or their local community.

All businesses that we regulate in a sector use water, energy and raw materials (e.g. fertilisers), to produce the products and services they sell. In doing so, they also create waste and emissions. We can think of these as environmental flows that need to be managed by the business (Figure 1).

## Environmental flows (Figure 1)



We want to help as many businesses as possible to manage these flows effectively. Reducing their use of natural resources and reducing the creation of waste, we will enable them to meet their legal obligations, drive further improvements and operate their business successfully. To facilitate this, we are preparing sector plans for every sector that we regulate.

Working with partners and major stakeholders, such as National Farmers' Union of Scotland (NFUS) and Scotland's Rural College (SRUC), we have made great strides to improve the environmental footprint of the sector. We have seen significant improvement in compliance and we want to build on this success and help ready the industry for the future. For example, the industry has made significant improvements in how it assures the quality of certain types of anaerobic digestion products and thus acceptability by the end users. Another example is farmers sharing limited water during the water scarcity situation that we experienced in 2018. We want to work with the industry to further these kind of initiatives and avoid duplicate effort.

SEPA shares many of the aims and objectives for sustainable farming that have been identified by the sector and by Scottish Government (NFUS Steps to Change: A New Agricultural Policy for Scotland<sup>1</sup> and A Future Strategy For Scottish Agriculture: final report<sup>2</sup>). Our recent diffuse pollution catchment work has shown how effective good partnership working can be. We believe it is essential that the delivery of the sector plan builds on strong partnerships with our major stakeholders.

Sector plans are at the heart of everything we do, shaping the interactions with every sector and the businesses in them. Through them, operators will get the relationship that their attitude and performance earns. Those that demonstrate a commitment to good environmental performance and to delivering solid outcomes will receive powerful support through guidance and advice. Those that demonstrate behaviour that leads to significant or chronic non-compliance can expect SEPA to use the most appropriate enforcement tools to bring them into compliance.

<sup>1</sup> <https://www.nfus.org.uk/userfiles/images/Policy/Brexit/STEPS%20FOR%20CHANGE%20March%202018%20-%20for%20email.pdf>

<sup>2</sup> <https://www.gov.scot/publications/future-strategy-scottish-agriculture-final-report-scottish-governments-agriculture-champions/>

Sector plans are strategic documents, their aims and aspirations will evolve over time. Implementation of the plans will take account of opportunities, for example, to work across different sectors, improve communications and develop partnerships. SEPA will also consider the relative corporate priority of different work areas.

### **Scope of the Crop production sector plan**

This is our plan for the crop production sector. It details how we are going to regulate the sector and work with it to protect and improve the environment. The plan focuses on key areas in the crop production sector such as soils, nutrients, water and energy as these are essential elements for successful crop production and key aspects where the crop sector interacts with SEPA. It applies across the whole sector from cereals to high value crops such as vegetables and soft fruit. It explains how we will continue to work directly with farmers, and includes ways that we will use our shared influence to improve environmental performance throughout the industry supply chain.

To make changes we often need cooperation and facilitation of all partners, including Scottish Government and the supply chain, as this enables the crop production sector to make the most of the opportunities that benefit the sector and the environment. Funding schemes such as SRDP (Scottish Rural Development Program) can have an important role to play in the implementation of specific measures.

#### **Example of guidance and information**

SEPA currently works with partners through the Farming and Water Scotland (FWS)<sup>3</sup> programme to help farmers reduce diffuse pollution risks and benefit their farm business. Farming and Water Scotland disseminate information by attending agricultural shows, running farmer workshops and producing booklets such as 'Diffuse Pollution – Know the Rules'.



<sup>3</sup> <https://www.farmingandwaterscotland.org/>





## 2. Our vision for the crop production sector

**A prosperous and resilient sector that produces high quality crops to feed Scotland and beyond and recognises that protecting and improving the environment is fundamental to its future success and where partnership and open communication are the norm.**

**Healthy soils are valued as the farmer's cornerstone. Good land management practices prevent soil degradation and loss, ensuring long-term crop growing success.**

**Nutrients are used efficiently and circulated within the economy for optimum crop growth and yield while minimising impacts on the environment and safeguarding limited global stores.**

**Water is managed effectively and efficiently; ensuring the right amount and quality of water is available at the right time at the right place to grow high value crops whilst safeguarding the needs of other users and the environment.**

**Energy is used efficiently and greenhouse gas emissions are minimised. Opportunities are identified to reduce energy usage and produce energy on-farm: reducing costs and dependence on fossil fuels.**

Innovation and knowledge transfer is key to help achieve the vision. We will work with all stakeholders to accelerate the transition of knowledge into practice to help ready the sector for future challenges.

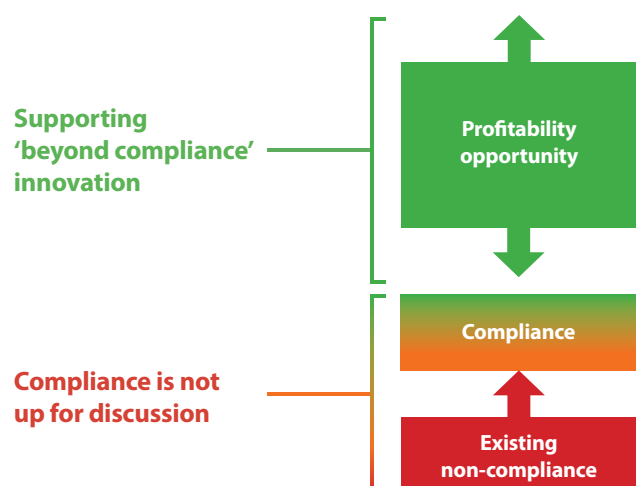
### Our objectives

The objectives of the Crop production sector plan are to:

- ensure that all businesses fully meet their environmental compliance obligations;
- help as many businesses as possible move beyond their environmental compliance obligations.

This is illustrated by the sector roadmap (Figure 2).

**Sector roadmap (Figure 2)**



This sector plan sets out how we will work with the crop production sector. The sector has made great strides in making their business more efficient and improving environmental performance. For our vision and objectives to be achieved, it is essential to build on our work with partners and identify win-win opportunities that benefit farm businesses and the environment.

Efficiency is already central to the crop production sector as this reduces the resource need per unit of produce, which will be fundamental to help businesses to reduce their impacts on the environment. SEPA's sector plans will deliver the ambitions set out in many SEPA and Scottish Government policy frameworks and strategies including for example, the river basin management plans<sup>4</sup>, the Waste to Resources Framework<sup>5</sup>, the Energy Framework<sup>6</sup>, the Climate Change Commitment Statement<sup>7</sup> and the flood risk management strategies<sup>8</sup>. We want to bring together skilled, experienced and innovative people from across the sector to understand key challenges and opportunities to create innovative solutions. If we get this right, it will mean that the environment is not seen as a constraint, but a platform on which economic and social success can be built, putting the crop production sector on a pathway to becoming a one planet sector.

### Example of One Planet Prosperity in action

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Global supplies of naturally occurring mineral phosphates are likely to run out in the next 80 years. Using nutrients that are recycled is not new in the farm business. For example, farm manure is used widely. We wish to make more sources of recycled nutrients, which are acceptable by the end user, available to farmers. The recent SQC Digestate standard is a good example. This will help make the sector less dependent on a non-renewable resource, creating a long-term sustainable business model and reduce its environmental footprint.

4 <https://www.sepa.org.uk/environment/water/river-basin-management-planning/the-current-plans/>

5 <https://www.sepa.org.uk/media/219528/one-planet-prosperity-a-waste-to-resources-framework.pdf>

6 [https://www.sepa.org.uk/media/383806/sepa\\_energy\\_framework.pdf](https://www.sepa.org.uk/media/383806/sepa_energy_framework.pdf)

7 <https://www.sepa.org.uk/media/369292/climate-change-commitment-statement.pdf>

8 <http://apps.sepa.org.uk/frmstrategies/>





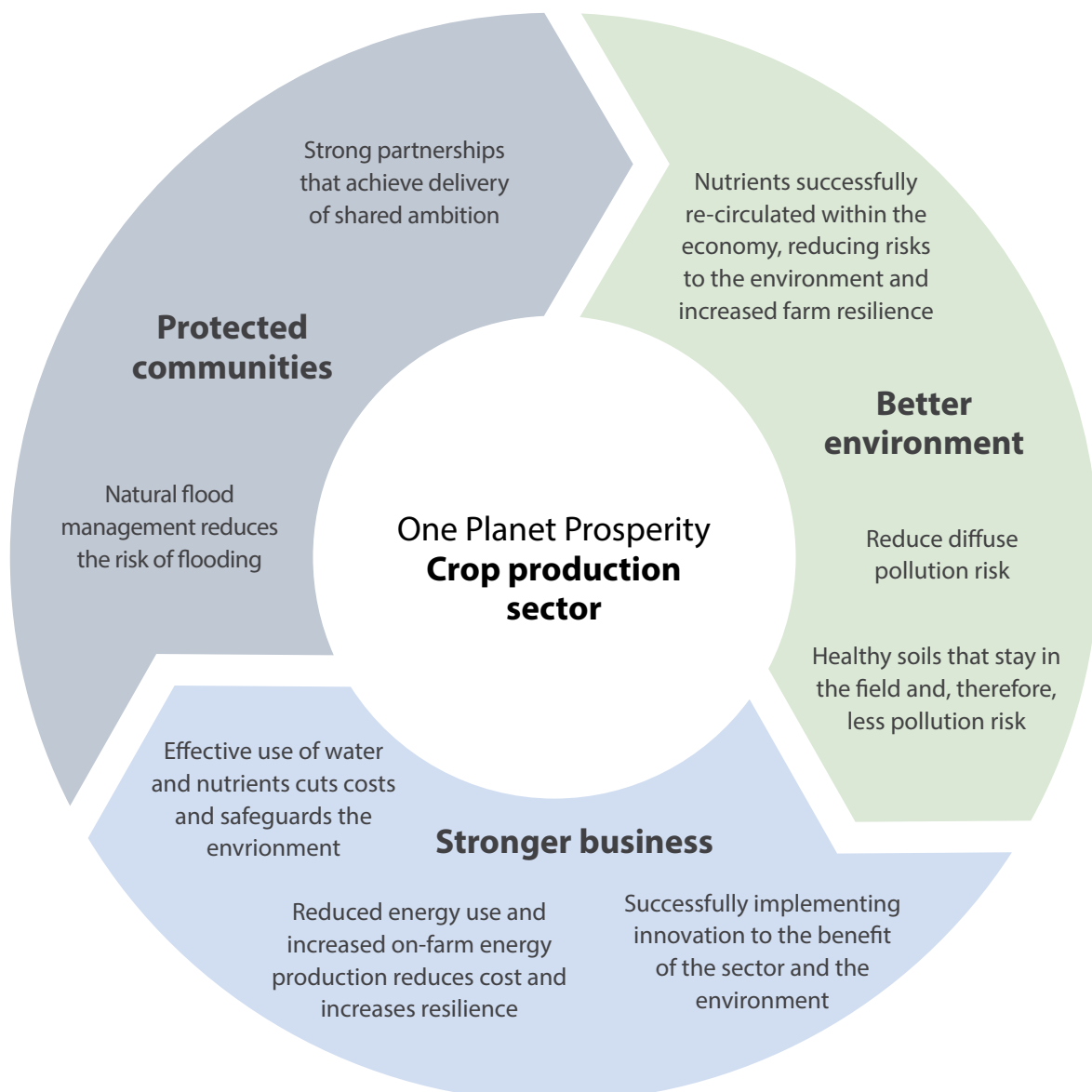
# 3. Outcomes

If we achieve the vision we have set out in this plan, we expect that we will help to:

- **protect and improve the environment;**
- **protect communities;**
- **further enable businesses to operate effectively and successfully in their markets.**

The figure below shows the outcomes we would like to help the crop production sector achieve. These are linked to actions that we will take as outlined in Section 6 of the plan and all contribute towards achieving United Nations (UN) Sustainable Development Goals and targets set in the Scottish National Performance Framework<sup>9</sup>.

**Outcomes (Figure 3)**



<sup>9</sup> <https://nationalperformance.gov.scot/>



## 4. The crop production sector

Scotland's farmers produce a wide range of crops that are sold to supermarkets, input to the food and drink sector, feed livestock or produce energy.

Approximately 10% of agricultural land (7.5% of Scotland's total land area) is used for crop production; employing up to 20,000 people<sup>10</sup>. Most of this takes place on the east coast of Scotland (Figure 4) where the land and climate is more suitable to producing a wider range of crops.

This plan deals with all arable crops (including energy crops), potatoes, vegetables and soft fruits, but not with grass for grazing, which will be covered in other sector plans, such as the Dairy production sector plan<sup>11</sup>.

The main crop grown in Scotland is barley, with the majority being spring barley (250,500 ha planted in 2018). A third of the barley is used for malting for the whisky industry and over half is used as animal feed. Potatoes are also an important crop for Scotland, particularly seed potatoes, which make up just under half of the planted area of potatoes (12,100 ha of seed potatoes in 2018). Soft fruit production occupies an area of approximately 2,100 ha predominantly in the most fertile areas, such as Tayside and Angus. Although this is a relatively small area, it is a significant crop in terms of value. Figure 5 specifies the area for each individual crop in hectares and Figure 6 shows the financial output generated from the main crops grown in Scotland (source Scotland's Agricultural Census, June 2018) and Total Income From Farming: estimates for Scotland 2015-2017<sup>12</sup>, January 2018.



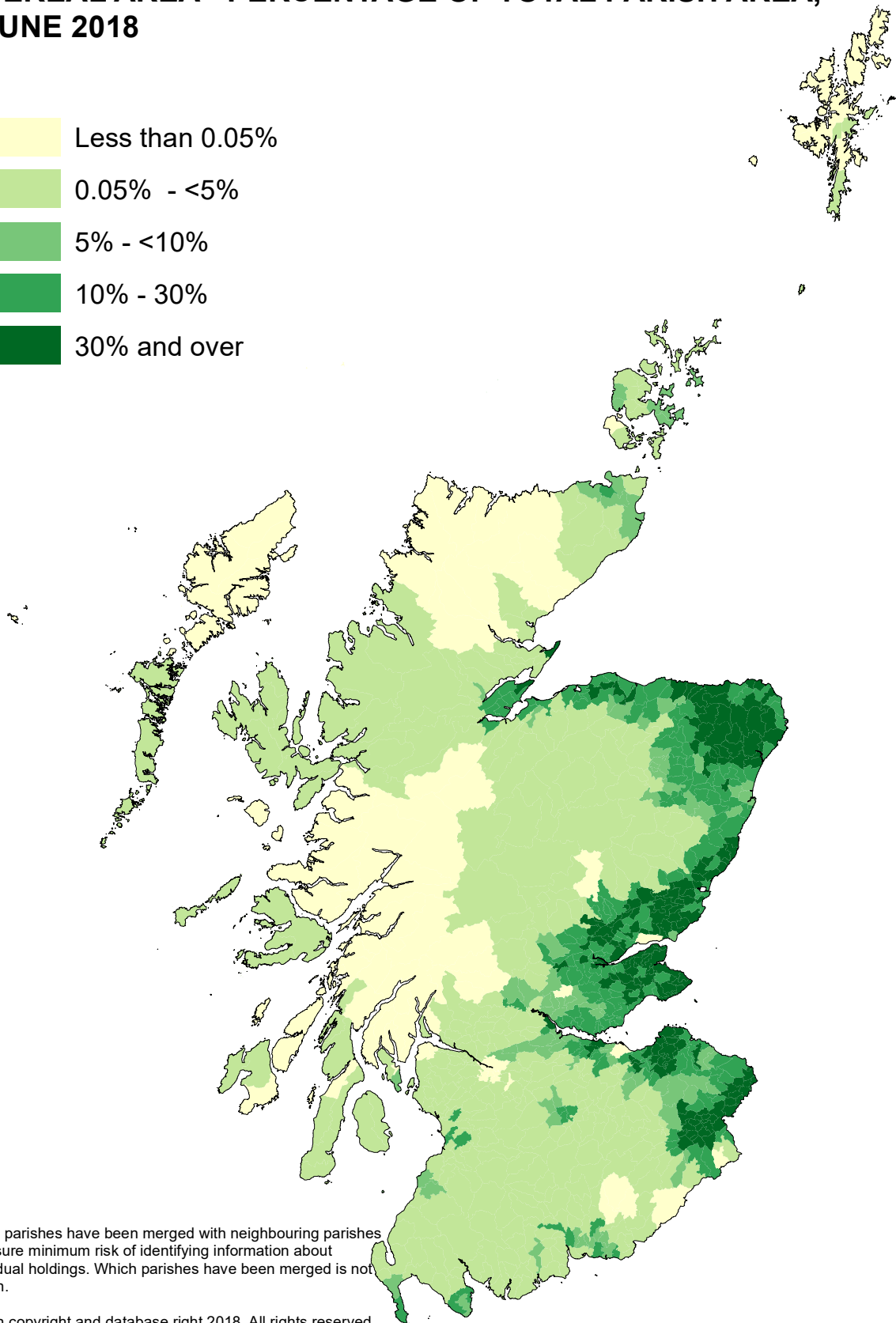
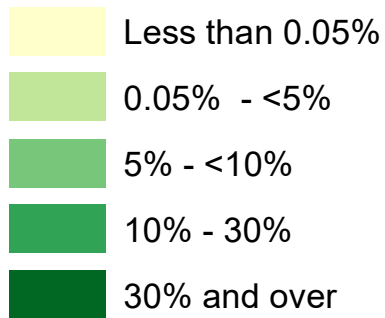
<sup>10</sup> <https://www.gov.scot/publications/results-june-2018-scottish-agricultural-census/pages/2/>

<sup>11</sup> Sector plans are available from [sectors.sepa.org.uk](https://sectors.sepa.org.uk)

<sup>12</sup> <https://www.gov.scot/publications/total-income-farming-estimates-fo-scotland-2015-2017/>

Cereal producing areas of Scotland (Figure 4)

## CEREAL AREA - PERCENTAGE OF TOTAL PARISH AREA, JUNE 2018

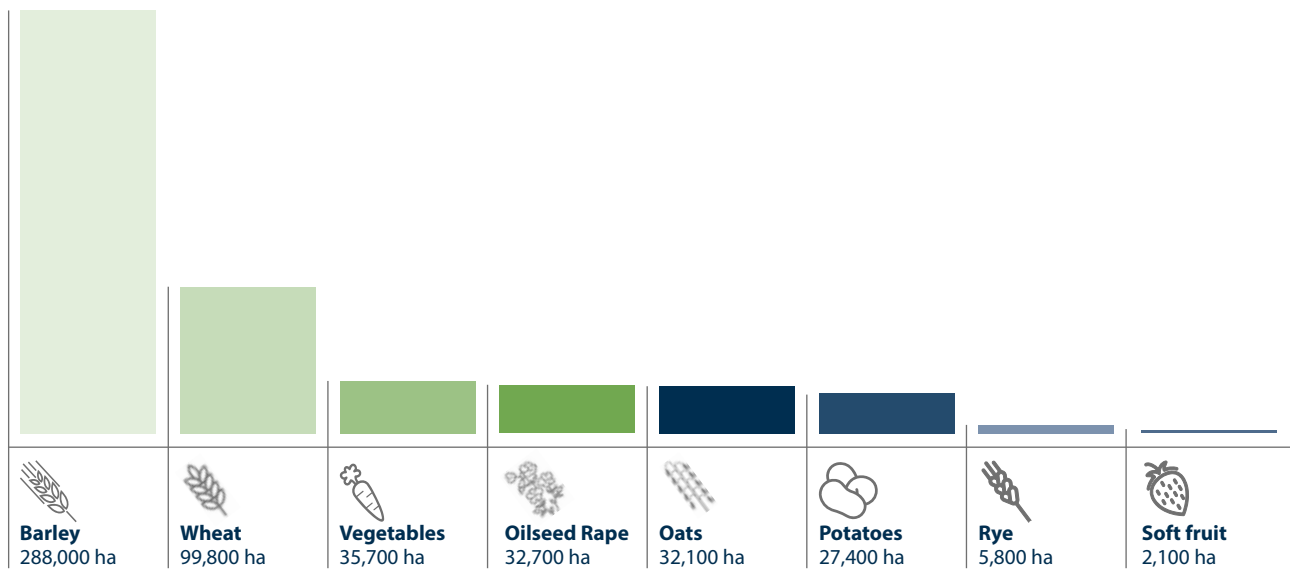


Some parishes have been merged with neighbouring parishes to ensure minimum risk of identifying information about individual holdings. Which parishes have been merged is not shown.

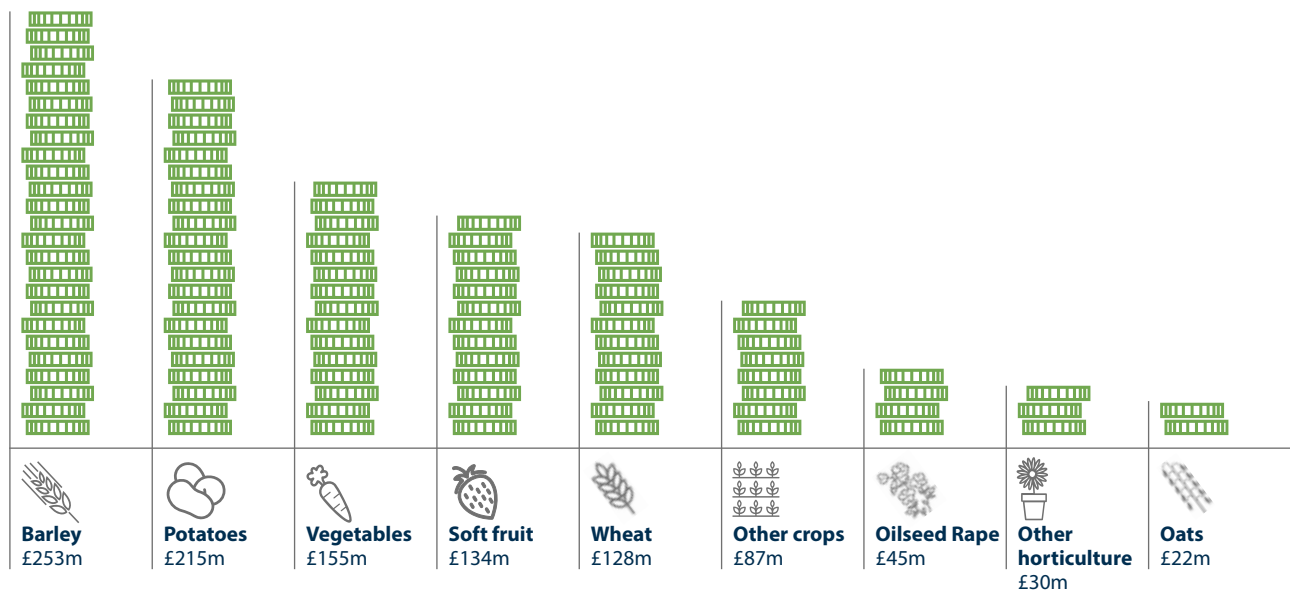
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Source: Scottish Government RESAS, October 2018

## Crop area (ha) 2018 (Figure 5)



## Farm output 2017 (£ million)<sup>13</sup> (Figure 6)



<sup>13</sup> Total income from farming: estimates for Scotland 2015-2017

Crop production in Scotland is diverse in terms of type and size of farm. Some farms concentrate solely on crop production with a typical rotation including spring barley, wheat and oil seed rape. Many cereal farmers will also grow an area of potatoes or let land on a short-term basis to specialist potato growers.

Mixed farming is also common in Scotland; much of this will involve keeping beef cows and growing barley for malting and animal feed.

Figures 7a and 7b provide an indication of the size of the sector.<sup>14</sup>

#### Number of crop producing holdings by farm type, 2018 (Figure 7a)

	No. of holdings	Area (ha)	Total std outputs (£000)
<b>Specialist cereals</b>	2,344	238,714	194,506
<b>General cropping</b>	1,633	260,110	345,986
<b>Specialist horticulture and permanent crops</b>	720	22,539	247,305
<b>Mixed holdings<sup>1</sup></b>	4,362	282,019	317,864

1 Not all mixed holdings will produce crops.

#### Number of businesses (BRN) cultivating these crops (Figure 7b)

Crop <sup>2</sup>	Business <sup>3</sup>
<b>Fruit</b>	562
<b>Vegetables</b>	1,579
<b>Potatoes</b>	2,088
<b>Cereals</b>	6,934

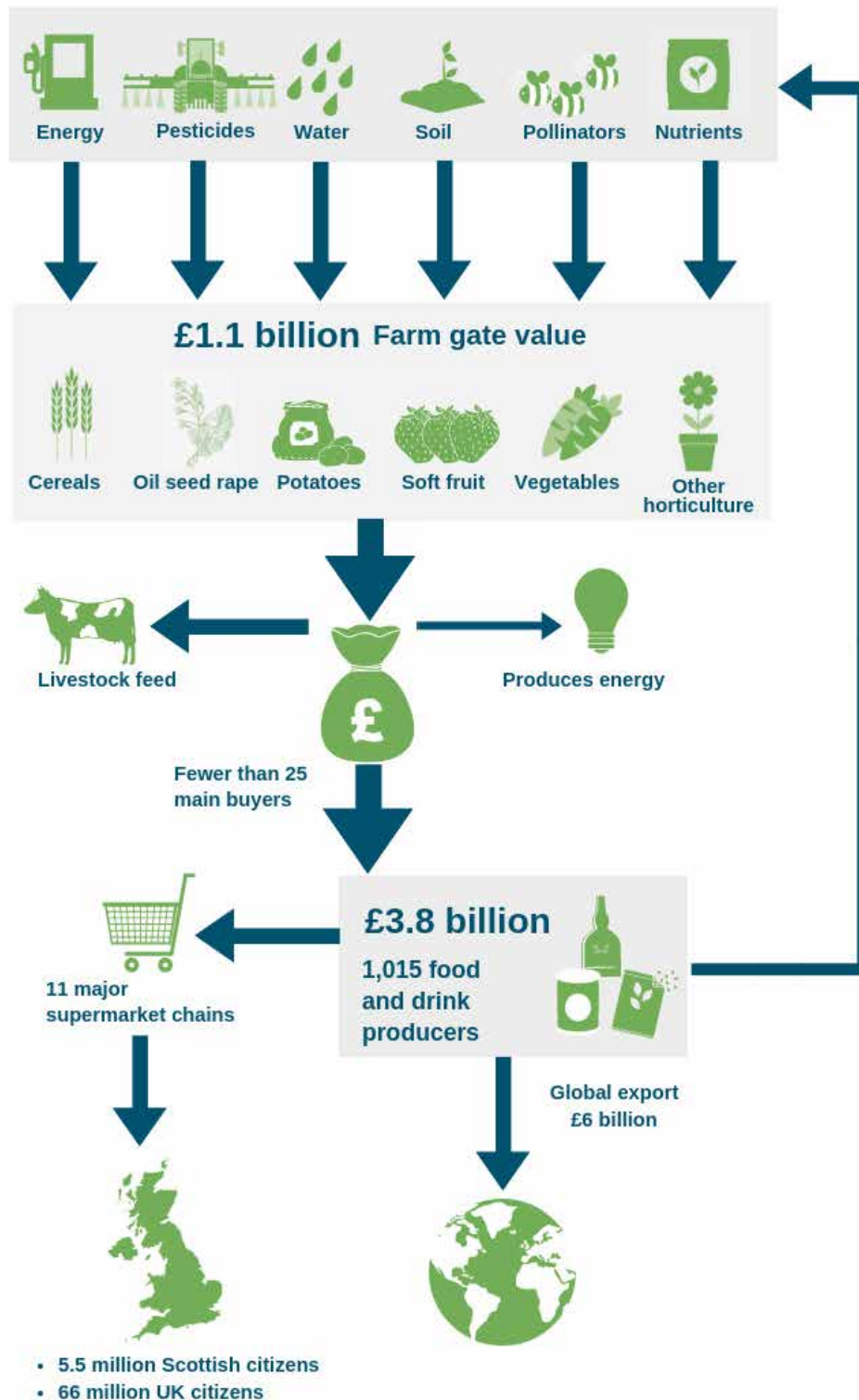
2 Businesses are not mutually exclusive. They may cultivate one or more of these crops.

3 Businesses can be made up of multiple holdings.

BRN = Business reference number

Figure 8 illustrates how the inputs of soil, nutrients, energy, water, pollinators and biodiversity drive successful crop production. Crops are sold through a relatively small number of merchants, to the food and drink industry, retail and energy producing companies or as feed for livestock.

**Crop production value diagram (Figure 8)**



Data sources: [Scotland's Agricultural Census, June 2018](#)),  
[Total Income from Farming: estimates for Scotland 2015-2017](#) and [Food and drink Federation](#)



## 5. Potential environmental impacts and how they are managed

### Environmental impacts throughout the supply chain

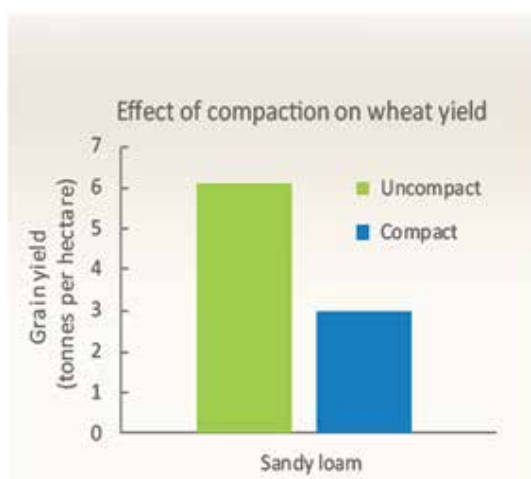
Modern crop production typically involves the use of nutrients, pesticides, water, energy and heavy machinery to cultivate the land and to grow and harvest crops. The way these activities are carried out and how inputs and outputs are managed will significantly influence the environmental impacts from the sector.

As Scotland's environmental regulator, it is our job to help protect the environment from the impacts of crop production and ensure compliance with environmental legislation. The plan focuses on the potential impacts at all stages of crop production on-farm; other sector plans (e.g. Scotch Whisky sector plan<sup>15</sup>) will deal with the potential environmental impacts of the use of the crops during processing and manufacture.

The sector has significant potential to impact water quality and quantity, soil health, biodiversity, air quality and has a role to play in addressing causes and solutions to climate change. However, the sector has already made great strides in avoiding these impacts and reducing the risks (Figure 9). We want to build on this success and work with stakeholders within the sector to help further minimise impacts while successfully producing high quality crops. Figure 10 shows the main potential environmental impacts associated with the sector.

Soil is a valuable natural resource and its health is important for crop production. Maintaining a healthy soil, such as avoiding compaction can help increase yields as well as reduce the risk of diffuse pollution (Figure 9).

### Example impacts from damaged soils on wheat yield and water quality (Figure 9)<sup>16</sup>



#### Loss of crop yield

Soil compaction can reduce crop yield by half.



#### Poor water quality

Erosion, run off and nutrient losses can be 10 x worse from damaged soils than from healthy soils.

<sup>15</sup> Sector plans are available from [sectors.sepa.org.uk](https://sectors.sepa.org.uk)

<sup>16</sup> From the Soil infographic on Scotland's soils website: <https://soils.environment.gov.scot/soils-in-scotland/our-soils/#>

## Overview of potential environmental impacts associated with crop production (Figure 10)

### Cultivation

#### Impact on soil from:

- loss of soil caused by water and wind erosion;
- compaction due to trafficking (e.g. plough pans).

#### Impacts on water from:

- cultivating too close to watercourses increasing the risk of diffuse pollution and erosion of the banks;
- nitrogen leaching exacerbated by poor nutrient management or inadequate vegetation cover.

#### Impacts on air and climate from:

- greenhouse gas emissions emitted by farm machinery, soil disturbance and fertilised soils;

#### Impacts on habitats and biodiversity:

- soil loss to waterbodies smothering gravel beds and reducing light penetration.

### Growing

#### Impacts on soil from:

- application of inappropriate materials to land causing soil contamination;
- compaction caused by farm machinery;
- farming practices increasing the risk soil erosion.

#### Impacts on water from:

- application of fertilisers causing eutrophication in watercourses;
- pesticide use contaminating public and private drinking water supplies;
- application of nitrogen fertilisers contaminating groundwater;
- abstraction of water for irrigation reducing available capacity to other water users.

#### Impacts on air and climate from:

- fertiliser application and use of machinery producing greenhouse gas emissions;
- organic manure and fertiliser use emitting ammonia.

#### Impacts on habitats and biodiversity from:

- application of pesticides reducing terrestrial biodiversity including pollinators;
- over abstraction of water for irrigation reducing habitat value;
- fertiliser application reducing variety of plant species.

### Harvest and Storage

#### Impacts on soil:

- soil loss and compaction due to harvesting crops, such as potato and root crops when soils are wet.

#### Impacts on water:

- harvesting potato and vegetable crops increasing the risk of soil erosion into watercourses.

#### Impacts on air and climate:

- greenhouse gas emissions from machinery use, drying grains and refrigeration.

#### Impacts on habitats and biodiversity:

- direct habitat and species loss during harvesting.

## Case study: environmental impact from cultivation – soil erosion

In Scotland, soils develop slowly and it can take hundreds of years to form a few centimetres. However, soils can be damaged or lost very quickly, e.g. significant quantities of soil can be eroded from a field in a few minutes during a heavy rain storm.

This represents a loss for the farm business and a threat to the long-term viability of the farm but can also increase the risk of diffuse pollution. Eroded soils are not only a pollutant in their own right but can also carry with them other pollutants such as nutrients and pesticides.



## Environmental regulation of the crop production sector

The Crop production sector plan will focus on compliance under the regulations that SEPA is responsible for enforcing. We will work in partnership with other organisations to help them to deliver their regulatory requirements. A brief summary of how SEPA and partner organisations regulate the crop production sector is set out in the following section and illustrated in figure 11 and 12.

SEPA regulates the pollution of the water environment principally through the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR). These regulations contain a number of diffuse pollution General Binding Rules (GBRs) that control activities such as cultivation, fertiliser storage and application and the storage and use of pesticides. These rules form a minimum base line of performance that operators are required to meet. Many of the GBRs state minimum widths of buffers from watercourses, which must be maintained when carrying out activities. They are designed primarily to protect water quality, however, many will also have benefits for biodiversity and soil health.

CAR also regulates engineering activities relating to rivers and lochs, for example bank protection and dredging. Farmers that abstract water for irrigation are required to hold a licence under CAR. The licence details the maximum volume of water they can abstract and contains conditions that must be met. This helps to ensure that the needs of the licence holder are balanced with the needs of other water users and the environment across a catchment.

The application of non-agricultural waste materials to land for agricultural benefit is regulated by the Waste Management Licensing (Scotland) Regulations 2011. Waste materials that meet PAS 100 compost and PAS110 anaerobic digestate standards are no longer regarded as waste and can be applied to land without a waste exemption. However, storage and use will still be subject to regulation under CAR as for any other fertiliser.

## SEPA's remit: principal environmental regulations (Figure 11)

Environmental legislation within SEPA's remit	
■	Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) – General Binding Rules (GBRs), registrations, licences: <sup>17</sup> <ul style="list-style-type: none"><li>• cultivation;</li><li>• fertiliser storage and application;</li><li>• oil storage;</li><li>• abstraction;</li><li>• pesticide storage and application;</li><li>• river engineering works.</li></ul>
■	The Sludge (Use In Agriculture) Regulations 1989
■	Environmental Protection Act 1990 & Waste Management Licensing (Scotland) Regulations 2011 – waste management licenses and waste exemptions: <ul style="list-style-type: none"><li>• imported wastes;</li><li>• disposal of waste;</li><li>• duty of care for waste segregation.</li></ul>
■	Nature conservation legislation: <ul style="list-style-type: none"><li>• Nature Conservation (Scotland) Act 2004</li><li>• Wildlife and Countryside Act 1981 as amended</li><li>• Conservation (Natural habitats, &amp;c.) Regulations 1994 as amended</li><li>• Wildlife and Natural Environment (Scotland) Act 2011</li></ul>

## Other organisations' remit: principal environmental regulations (Figure 12)

Environmental Regulations and standards administered by other regulators	
■	Action Programme for Nitrate Vulnerable Zones (Scotland) Regulations 2008
■	The Common Agricultural Policy (Cross Compliance) (Scotland) Regulations 2014
■	Plant Protection Products (Sustainable Use) Regulations 2012
■	EU Plant Protection Products Regulations 1107/2009 (for placing plant protection products on the market) and the Plant Protection Products Regulations 2011
■	Nature conservation legislation: <ul style="list-style-type: none"><li>• Nature Conservation (Scotland) Act 2004</li><li>• Wildlife and Countryside Act 1981 as amended</li><li>• Conservation (Natural habitats, &amp;c.) Regulations 1994 as amended</li><li>• Wildlife and Natural Environment (Scotland) Act 2011</li></ul>

<sup>17</sup> <https://www.sepa.org.uk/regulations/water/>

The storage and application of farm yard manure and slurry is regulated through the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003 (as amended) and CAR GBRs. These are discussed more in detail in the Dairy production sector plan.<sup>18</sup>

The Sludge (Use in Agriculture) Regulations 1989 control the application of sewage sludge to agricultural land and require testing of sludge and soils to prevent soil contamination from heavy metals.

SEPA has a biodiversity duty under nature conservation legislation and uses this particularly during the environmental impact assessments that are carried out as part of our permitting process.

There are also a number of environmental regulations and standards that crop producers must comply with that are enforced by other organisations that SEPA work in partnership with. For example, crop producers in nitrate vulnerable zones (NVZ) must comply with the NVZ Action Programme<sup>19</sup> and those producers, which claim under support schemes such as the Basic Payments Scheme, must comply with the standards of cross compliance.<sup>20</sup> Both regimes are enforced by the Scottish Government Rural Payments and Inspections Division.

The principal regulations that relate to pesticide use are the Plant Protection Products (Sustainable Use) Regulations 2012. It requires pesticides are used safely and responsibly to protect human health and the environment. Pesticide legislation is enforced primarily by the Health and Safety Executive (HSE), Chemical Regulatory Division (CRD), RPID and local authorities. Nature conservation legislation is regulated primarily by Scottish Natural Heritage (SNH) and local authorities.

## EU exit

Around 80% of environmental legislation in Scotland originates from the European Union. As the UK leaves the EU, environmental legislation is being corrected to make sure the law keeps working as it has been to ensure that the standards of environmental protection we enjoy today, and the principles upon which they are based are maintained. Therefore, while some of the detail of the legislation we use to regulate may change, our work to protect Scotland's environment will not. Our commitment to tackling non-compliance and to work with as many businesses as possible to help them to go further will not diminish as a result of the UK leaving the EU.

## Wider influences on environmental performance of the crop production sector

Full compliance with environmental regulations will not, by itself deliver the transformational change required to secure our One Planet Prosperity objectives. The Crop production sector plan needs to further unlock the potential for businesses to gain strengths in resource efficiency and environmental innovation that will help them to succeed in their markets.

<sup>18</sup> Sector plans are available from [sectors.sepa.org.uk](https://sectors.sepa.org.uk)

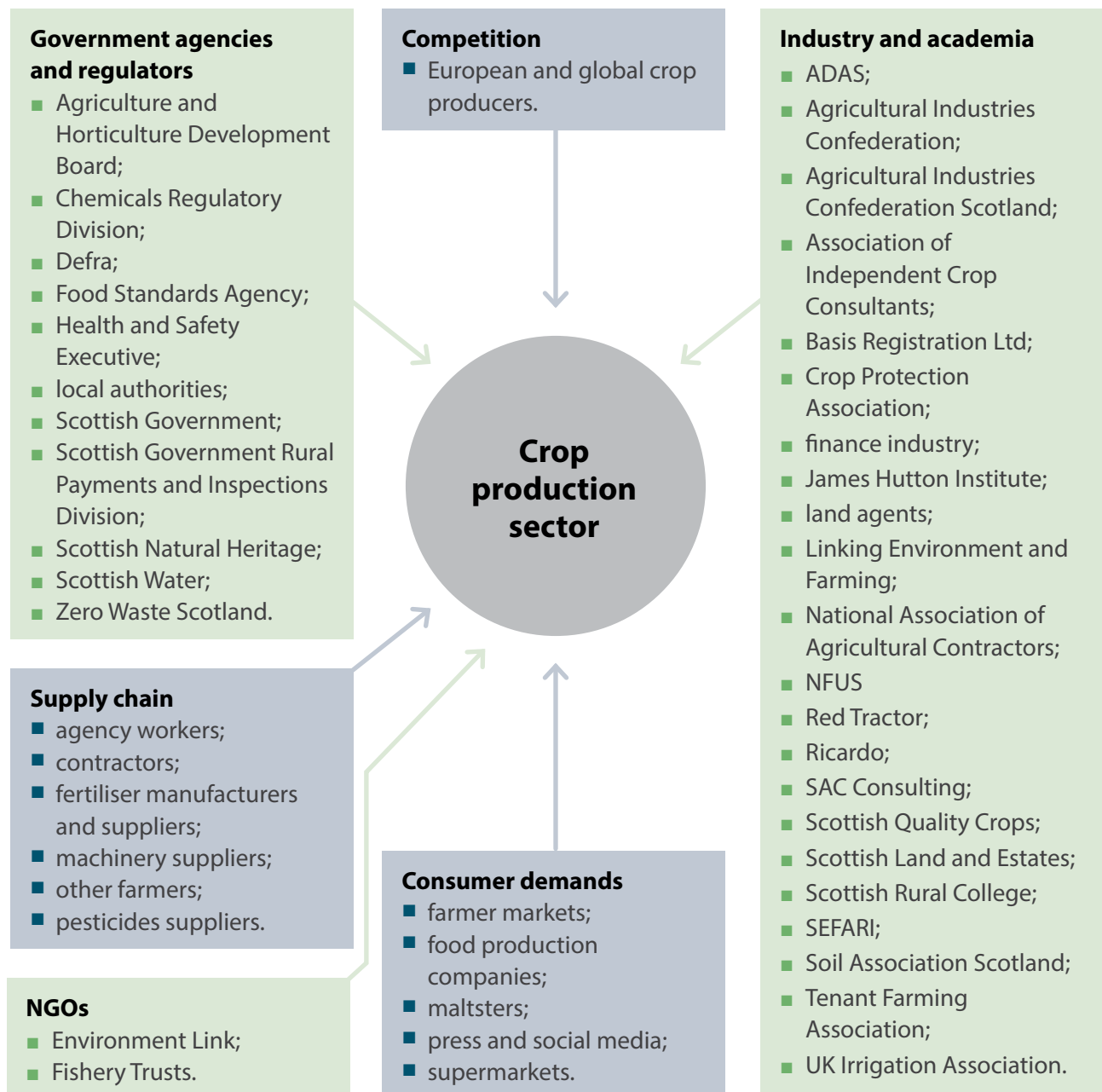
<sup>19</sup> <https://www.gov.scot/policies/agriculture-and-the-environment/nvz/>

<sup>20</sup> <https://www2.gov.scot/Topics/farmingrural/Agriculture/grants/Schemes/Crosscompliance/ccompliance>

To secure full compliance and help as many businesses as possible to move beyond compliance we will build on existing relationships with partners and other stakeholders and develop new relationships where needed.

Figure 13 summarises the main organisations that influence and are influenced by operators in the crop production sector. It also identifies those that we may work with in both the short and longer term. As we implement the plan we will consider the opportunities these relationships provide and how we would like to develop them further.

### Key influences on the Crop Production Sector (Figure 13)







## 6. Tackling non-compliance and taking opportunities to go beyond

**Compliance with environmental law is non-negotiable and regulated businesses in the sector need to comply. However, the crop production sector has made great strides in improving environmental performance and together with stakeholders we will build on this and identify win-win opportunities that benefit farm businesses and the environment.**

### Compliance in the sector

#### Water quality

In Scotland, rural diffuse pollution is one of the main environmental challenges and is the single biggest pollution pressure on water. To tackle this problem the diffuse pollution priority catchment approach was developed as outlined in the river basin management plans (RBMPs)<sup>21</sup>. This approach was agreed in partnership with the Diffuse Pollution Management Advisory Group (DPMAG<sup>22</sup>), whose members include key stakeholders within the sector and represent a cross section of rural, environmental and wildlife conservation interests. The approach identified priority catchments where rural diffuse pollution was a significant cause of failures of environmental objectives. This could include rivers at less than good status or Natura 2000 sites in unfavourable condition.

#### What is diffuse water pollution?

Often driven by rainfall, water pollution from diffuse sources arises from the loss of potential pollutants such as nutrients, chemicals, livestock derived bacteria and soil, into the local water environment. Individually, losses from land use may be of little risk to water quality, but when combined across a river catchment they can significantly impact on ecology, drinking and bathing water quality.

To achieve compliance with environmental regulations the priority catchment initiative successfully employs an integrated approach involving monitoring, awareness raising, economic incentives and one-to-one farm visits. In implementing this plan we want to build on this to ensure full compliance with environmental legislation.

Figure 14 identifies the catchments where waterbodies are failing environmental standards due to rural diffuse pollution and indicates the principal sources. However, it should be highlighted that there can be a number of contributing factors that cause catchments to fail including non-agricultural sources such as soil loss from forestry, phosphates from waste-water treatment works or septic tanks.

Rural diffuse pollution is regulated principally through CAR, which sets out rules (GBRs<sup>23</sup>) that all farmers must comply with. We assess compliance with GBRs during targeted one-to-one farm visits within priority catchments.

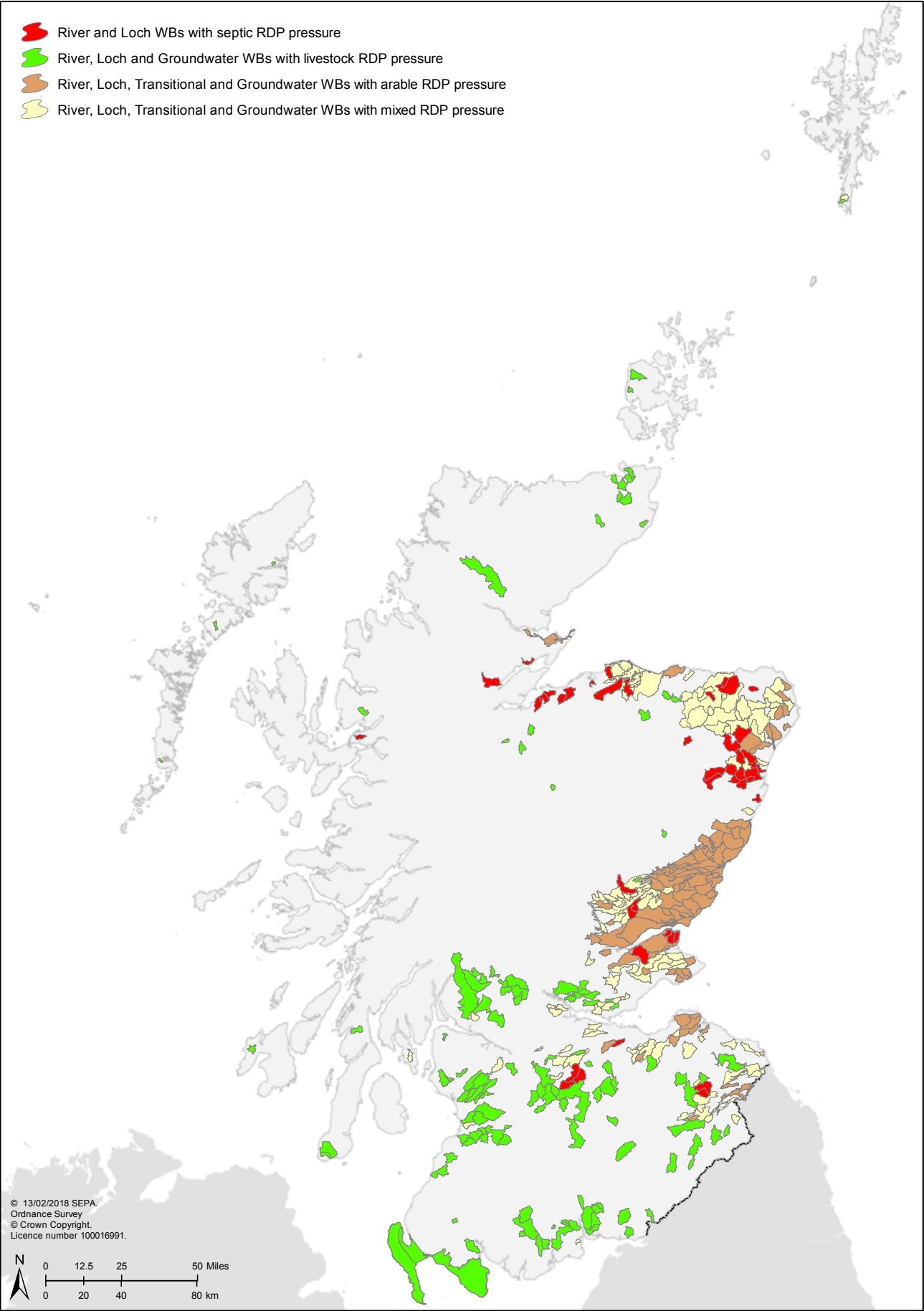
SEPA started one-to-one farm visits in 2011, and compliance with GBR 20 (which focuses on diffuse pollution risks from cultivation) has improved significantly since then. This is particularly evident in arable catchments such as the South Esk and the Tay, where compliance with GBR 20 has increased from 62% to 94% (Figure 15).

<sup>21</sup> <https://www.sepa.org.uk/environment/water/river-basin-management-planning/the-current-plans/>

<sup>22</sup> <https://www.sepa.org.uk/environment/water/river-basin-management-planning/who-is-involved-with-rbmp/dpmag/>

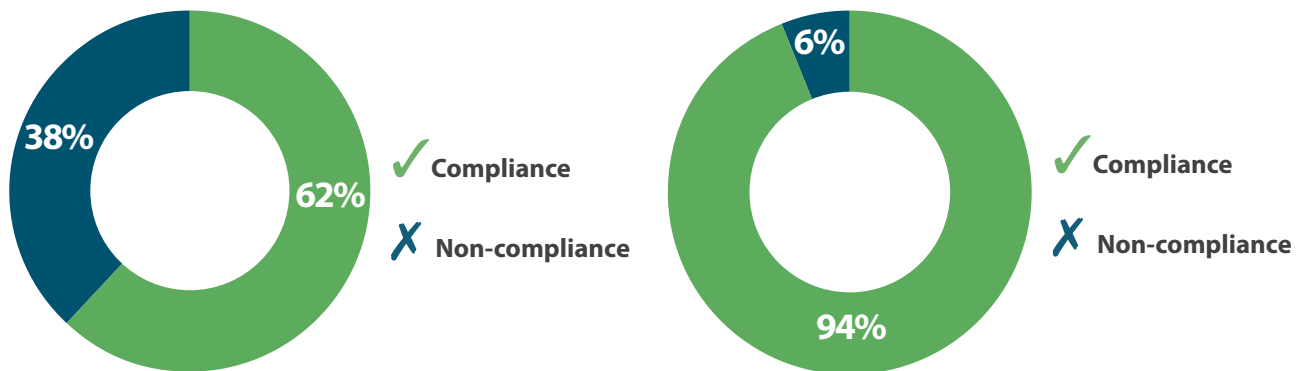
<sup>23</sup> [https://www.sepa.org.uk/media/34761/car\\_a\\_practical\\_guide.pdf](https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf)

**Catchments where waterbodies are failing environmental standards due to rural diffuse pollution (Figure 14)**



We are now also seeing much higher initial compliance rates with GBR 20 in arable catchments that we are working in for the first time. For example, in the East Lothian coastal catchment compliance rate is over 80% at first visit.

### Compliance with GBR 20 in the South Esk and Tay catchments (Figure 15)



#### Compliance at initial farm visit:

#### Compliance at farm revisit:

#### Key issues contributing to non-compliance:

- cultivation too close to waterbodies;
- inappropriate cultivation practices on slopes resulting in soil erosion.

#### How we will fix remaining compliance issues

SEPA will:

- celebrate together with partners the success of the improvement in CAR GBR 20 compliance and identify how we can build on this approach and deliver full compliance across the sector.

### Examples of compliance and non-compliance with GBR 20 (Figure 16)

(a) Compliance: cultivation >2m from top of bank



(b) Non-compliance: cultivation too close to water course



This improvement in compliance (Figure 15) illustrates the positive action that farmers within the sector have taken over recent years and the progress they have made to improve compliance with GBR 20. This positive response should be fully recognised, together with the effort the sector has taken to achieve these improvements. However, there is evidence that crop production remains a significant source of rural diffuse pollution.

In order to tackle diffuse pollution and achieve the objectives stated within Scotland's river

## Water quantity

Growing healthy crops requires sufficient water and for most crops in Scotland rainfall is usually adequate. However, in particularly dry years some crops, such as potatoes, require irrigation to maintain yields and achieve the quality demanded by the market.

The abstraction of water for all purposes, such as drinking water, hydropower generation and cooling water for the distilling industry, is regulated by SEPA through CAR. This ensures that the resource is managed in an equitable way across all sectors and sufficient remains for the environment which, for example, supports ecosystems and recreational fishing. Currently over 600 businesses have licences to abstract water for irrigating crops. SEPA's data shows that in a normal year, four to five million m<sup>3</sup> of water is abstracted for irrigation. In a dry year, such as 2018, this increases substantially to nearly 12 million m<sup>3</sup>.

The potential environmental impact of abstractions is assessed when applying for a new licence and during license reviews. The use of irrigation water is reported to SEPA on an annual basis. In 2017, 94% of operators complied with their licenses (Figure 17).

basin management plans, we need to better understand:

- which catchments require extra effort to reduce diffuse pollution and meet river basin management plans objectives;
- the diffuse pollution pathways, such as drain-flow or bank erosion, that are significant contributors to agricultural diffuse pollution and what practical methods can be implemented to disrupt these pathways.

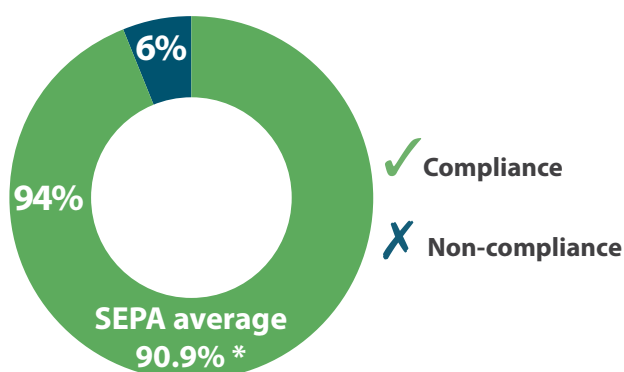
### Example of good industry initiative

Water was scarce in the summer of 2018 and irrigators worked together to share the available water between farms. We want to build on these great industry led initiatives and see how we can facilitate this happening on a wider scale.

### Increasing irrigation efficiency

Efficient application of irrigation water is key to ensure security of supply when water becomes scarce. However, these techniques are expensive. SEPA wants to work with the irrigators and Scottish Government to understand how we can help the industry to make changes where they are needed, for example, explore opportunities to create incentives.

## Compliance rate with abstraction licences for irrigation in 2017 (Figure 17)



### Key issues contributing to non-compliance:

- failure to submit annual data returns.

\* Average compliance with all licences that SEPA issues.  
Data from the SEPA compliance assessment scheme (CAS) 2017

## How we will fix remaining compliance issues

SEPA will:

- review the reason for failure to submit water abstraction data returns and explore other methods of submitting data to SEPA;
- review our abstraction licensing system to ensure it uses up-to-date information about resources, promotes efficient irrigation and enables, where appropriate, the development of groundwater sources and storage to deal with water scarce situations.

Engineering of watercourses requires an authorisation under CAR. Our evidence shows that in a small number of cases land managers carry out engineering activities without the necessary authorisation. We will help build awareness of regulatory requirements for engineering activity and SEPA will take appropriate action where required.

## Nutrient management

Healthy crop growth requires sufficient plant nutrients such as nitrogen and phosphorus. Many crop producers use nutrient management planning (NMP) to ensure fertilisers are used efficiently and are accurately applied in line with crop needs. This is important not only to minimise costs but also to minimise losses to the environment. For example, soil phosphorus compounds are particularly prone to loss where the phosphorus status of the soil is higher than that required by the crop or where there is a risk of soil erosion. There are tools, techniques and free advice available to help farmers manage nutrients efficiently. SEPA wish to further promote NMP and engage with others who encourage efficient nutrient use to avoid any duplication of effort.

GBR 18 controls the application of fertiliser (including manures, slurry and non-agricultural materials) to land. We are aware that in some instances nutrients are being applied at times or in quantities that cannot be utilised effectively by the crop. This can lead to pollution of surface and groundwaters and in some cases, depending on the material, land contamination.

## How we will fix remaining compliance issues

SEPA will:

- review compliance with the GBRs relating to fertiliser application (GBR 18);
- review waste-to-land regulation to ensure it is sufficient to protect the environment from contamination such as micro plastics.

To ensure a level playing field and to reassure businesses who do fully comply with environmental legislation, we will take appropriate action against those businesses who persistently fail to comply with environmental legislation. We will achieve this by increasing scrutiny, prescription, fees and the use of enforcement and monetary penalties for those who fail to comply.



## Where are the opportunities to go further?

We believe that those societies and economies that use resources efficiently, and successfully minimise energy and water usage while also minimising waste, will be the most successful in the 21st century. Businesses that are the most innovative will best rise to the challenges of our time, such as over use of resources and climate change, and create sustainable economic growth.

Going beyond compliance is voluntary. In this section we describe opportunities and our aspirations to help businesses do more for the environment by building upon current good practices and choosing to move beyond compliance because it makes sense for them to grow in a sustainable manner. Many of these opportunities will also help to improve compliance by businesses in the crop production sector. Focused financial incentives, such as SRDP could also help farmers make these transitions.

There are major stakeholders in this sector who have strategies and policies that aim to deliver long-term environmentally and economically sustainable crop production (e.g. A Future for Scottish Agriculture from Scottish Government's Agriculture Champions, and Steps to Change: A New Agricultural Policy for Scotland from the NFUS).

Our plan will only be successful if our work with partners and other stakeholders is based on mutual understanding of the issues and opportunities, and is rooted in sound science.

We will therefore continue to work with existing and new partners and stakeholders to help the sector go beyond compliance. For example, Scottish Government, NFUS, SRUC, quality assurance schemes and agricultural consultants.

There are many beyond compliance opportunities that help make farm businesses more prosperous, resilient and protect the environment such as protecting soil, recirculating nutrients, using water and materials efficiently and reducing reliance on fossil fuels.

### **The Agricultural Champions report states one of its ambitions as:**

**"Scottish Farming's stewardship of the countryside will protect and enhance our natural assets and will be valued and supported by society."**

### **The NFUS Steps for Change document states:**

**"A new Scottish agricultural policy can ensure that farmers and crofters continue to deliver for Scotland's environment and enhance it further", "viable agricultural businesses and food production need not run contrary to achieving positive environmental outcomes and public goods".**

## Water

**Water in the right place, in the right amount and of the right quality underpins Scotland's society and economy. Our water environment provides us with vital supplies for drinking and food production; supports business, industry and tourism; maintains places that benefit the health and wellbeing of communities and sustains wildlife.**

**Our sector plans aim to ensure we live and prosper within our environmental water limits; maximising the efficiency of its use, reducing the input of waste, creating better places for people to thrive and protecting and restoring habitats for wildlife. By doing so, our plans will support and complement the ambitious targets set out in Scotland's river basin management plans (RBMPs) and flood risk management plans (FRMPs).**

SEPA is committed to reducing the impacts of flooding. We have a central role in identifying and promoting the most sustainable actions to help deliver a flood resilient Scotland. We are developing a flood strategy that describes how we will work with partners to manage flood risk now and in the future. SEPA will continue to promote avoidance of flood risk as the priority. If risk can't be avoided then adaptation and defence is key. Where it is not possible to completely avoid or eliminate the flood risk then we will give communities and emergency responders advance notice of flooding to help them prepare and protect themselves. To understand areas at greatest flood risk, we will use the best available evidence. We will continue to work with partners to improve Scotland's FRMPs. Early and strong links between this sector plan and flooding will strengthen opportunities and necessitate engagement and communication between key partners.

Flood risk management strategies published in 2015 identified 200,000 ha of agricultural land at risk of flooding. Approximately 50,000ha of this land will be used for crop production and flooding could be a significant issue. However, agricultural practices can also be part of the solution for reducing flood risk for example by increasing the ability of the soil to store water.

Clean water is important to the crop production sector and in dry periods a significant amount of water is abstracted from watercourses to irrigate crops such as potatoes. The water scarcity experienced during the summer of 2018 highlighted the importance of efficient water management. Good communication amongst farmers enabled them to share the available water and made best use of the reduced supply. Using a combination of stored water, groundwater and river water, creates resilience during water scarce situation and helps protect the environment. SEPA's evidence shows that these water scarcity situations are likely to occur twice as frequently by 2050<sup>24</sup>.

<sup>24</sup> [https://www.sepa.org.uk/media/159070/climate\\_change\\_water\\_scarcity.pdf](https://www.sepa.org.uk/media/159070/climate_change_water_scarcity.pdf)

There are opportunities to improve irrigation methods by delivering water more directly to the roots of crops where it can be absorbed more efficiently and minimise loss to the atmosphere. This has been shown to save significant quantities of water with the same or better growth benefits. When used in conjunction with integrated surface, ground and stored water management on a catchment basis water security could be better achieved under all climate scenarios.

SEPA has, for example, modelled irrigation water use and availability from surface, ground and stored water for a river catchment in Angus. This shows that doubling storage capacity could resolve the supply deficit under water-scarce situations. Practical water management actions such as improving soil condition and increasing irrigation efficiency would further reduce additional storage capacity requirements.

SEPA's aspirations are to:

- during farm visits, discuss opportunities to implement good practice that helps identify win-win situations whereby both farmer and the environment benefit;
- working in partnership, promoting water efficiency in crop irrigation to farmers;
- working with Scottish Government and others, SEPA wish to explore how we can help the sector further enhance its resilience to water scarcity. This could involve, for example, influencing schemes within the Scottish Rural Development Programme (SRDP) to include options to help fund the creation of irrigation lagoons;
- work with partners to explore practical and innovative solutions for irrigation water management at a catchment scale that ensures security of supply and protects the environment and other water users;
- work with experts to understand the opportunities and risks associated with increased soil water storage;
- work with land managers to identify the best opportunities for the delivery of natural flood management solutions in catchments with potentially vulnerable areas (PVAs).

There are also number of opportunities that producers can take to reduce diffuse pollution, help protect and improve water quality, and benefit their business. These are discussed within the following sections on soils and nutrients.

## Energy and climate change

**Energy is an essential resource that enables social and economic development and is one of the most important aspects of the transition to a sustainable low carbon economy. However, electricity and heat production, transmission, storage, and use can have significant environmental impacts. SEPA's Energy Framework<sup>25</sup> recognises that how we use and manage our energy resources is central to our ability to live within the resources of our planet. Cost savings and other benefits for businesses can be made by improving energy efficiency and making use of low carbon sources of energy.**

The emission of greenhouse gases from agriculture is significant for Scotland. SEPA does not regulate greenhouse gas emissions from the crop production sector directly, but there are clear opportunities to support the industry to reduce emissions and become more energy efficient.

SEPA regulates most electricity and heat generation opportunities on a farm, such as anaerobic digestion plants that are regulated under waste management licensing regulations, hydropower plants that are regulated under CAR and medium combustion plants that are regulated under PPC. The Farming for a better climate<sup>26</sup> initiative already shows practical ways to move towards profitable and low carbon farming and we will continue to play our part in this. In addition, the Climate Change Plan for Agriculture<sup>27</sup> sets out the path to a low carbon economy while helping to deliver sustainable economic growth and secure the wider benefits to a greener, fairer and healthier Scotland in 2032.

### Case study: energy re-circulation

Tomatoes were once grown in greenhouses within the Clyde Valley. However, the industry collapsed due to high costs. New opportunities now exist where materials from distilling (excess heat, nutrients and carbon dioxide) or geothermal heat can be re-circulated to drive the greenhouse and could make this profitable again.

### Energy

SEPA's aspirations are to:

- support existing initiatives that reduce energy use and costs on the farm;

### Climate Change mitigation and adaptation

SEPA's aspirations are to:

- explore how the crop production sector can help Scotland to reduce greenhouse gas emissions and what our role is in this;
- continue to work with partners, e.g. supporting the Farming for a Better Climate initiative to help promote profitable, low carbon farming.

<sup>25</sup> [https://www.sepa.org.uk/media/383806/sepa\\_energy\\_framework.pdf](https://www.sepa.org.uk/media/383806/sepa_energy_framework.pdf)

<sup>26</sup> <https://www.farmingforabetterclimate.org/>

<sup>27</sup> <https://www.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/>



## Materials

**SEPA views the circular economy as a game-changing opportunity to manage resources within planetary limits. Our Waste to Resources Framework<sup>28</sup> recognises that reducing the harms associated with waste management can create economic opportunities. We must dramatically cut waste production across the economy, recover more and dispose of only the very minimum. If waste is produced, we will encourage its productive use within a framework of strong environmental protection.**

Successful crop production requires the use of a number of materials. Within this section, by materials we are referring to soils, nutrients (organic and in-organic) and pesticides.

### Soils

Soils are the cornerstone on which crop production depends. Healthy and biodiverse soils produce higher quality and a greater yield of crops using fewer resources such as nutrients, water, energy and pesticides. They also store more water, reducing the need for irrigation and reducing the risk of flooding. Soils have a key role in protecting water quality by filtering water before it reaches ground and surface waters and regulating climate change by storing carbon and exchanging greenhouse gases with the atmosphere.

However, soils are a non-renewable resource and can be vulnerable to loss through erosion or damage due to poor management. There are a number of opportunities crop producers can take to help keep their soils healthy and to prevent erosion. This will provide benefits for the environment and benefit the long-term sustainability of the business.

#### Case study: soil management

In central Fife, one farm in particular is now 'reaping' the rewards of good soil management. By gradually increasing the organic matter content of their soils and taking steps to reduce compaction through reduced traffic and using non-inversion tillage, they are producing high quality crops and experiencing less soil erosion and soil loss via field drains.

SEPA's aspirations are to:

- increase our work with partners to understand the cause, location and extent of soil degradation and loss from arable fields and how this affects crop production, the wider environment and flood risk;
- work with partners to improve soil health and promote the importance of soil and ensure it is appropriately valued as an essential non-renewable resource;
- work in partnership to stimulate research and translation into practice.

#### Case study: reduction of soil erosion – tramline management

Soil erosion within fields can be significantly reduced by using tramline management techniques. These can include fitting specially designed low ground pressure tyres, increasing tramline spacing and avoiding tramlines running up and down slopes. Mechanical methods of disrupting compacted tramlines (such as a single tine operating in the wheelings behind the sprayer) can relieve compaction and encourage rainfall to infiltrate the soil. This not only provides benefits to the environment but can help improve crop yields and protect the soil resource.

<sup>28</sup> <https://www.sepa.org.uk/media/219528/one-planet-prosperity-a-waste-to-resources-framework.pdf>

## Nutrients

Nutrients are essential to grow healthy crops. Scotland applies approximately 17 million tonnes of slurry and farm yard manure to agricultural land annually. In 2016, approximately 65,000 tonnes of mineral nitrogen and around 30,000 tonnes of mineral phosphate fertiliser were applied to arable land. Efficient fertiliser use will help protect the environment, help reduce costs, increase resilience and viability of the farm.

Studies indicate that globally we will run out of naturally occurring rock phosphates in 80 to 100 years<sup>29</sup>. Supplies of nutrients such as nitrogen and phosphorous are potentially available in Scotland from a number of sources (such as organic waste materials) and there are clear opportunities to circulate these nutrients within the economy. Traditionally farmers extensively use recycled nutrients such as farm-yard manure and slurries.

Use of certain types of recycled nutrients is limited by the acceptability of the produce grown using these nutrients by the end user. The new SQC Digestate standard enables the use of certain anaerobic digestion products and we want to work with the industry, supply chain and Scottish Government to explore further opportunities.

SEPA's aspirations are to:

- work with partners to explore how to further promote efficient fertiliser use and good land management practices (e.g. extending buffer strips, precision farming);
- build on SEPA's Materials to land strategy and work with partners to deliver an action plan for circular use of nutrients in Scotland. This aims to minimise mineral fertiliser use and maximises the safe and end-user acceptable use of all recirculated nutrients within the economy.

### Case study: reducing diffuse pollution and increasing biodiversity

Taking advantage of options within the Scottish Rural Development Programme (SRDP) to create water margins in arable fields beyond the required 2 m minimum on cultivated land near watercourses can help reduce diffuse pollution. This can reduce the risk of nutrients and pesticides directly contaminating water and can provide habitat for wildlife. Infield buffers can also play an important role in the prevention of soil erosion by intercepting and slowing overland run-off and filtering out eroded soils.

### Case study: precision farming

An increasing number of arable farmers are using precision farming methods to better manage their land. This helps to maximise yields while using inputs as efficiently as possible. It involves techniques such as assisted steering, soil and yield mapping, and the variable rate application of fertilisers, lime and pesticides. This can help farmers to better understand and manage the specific requirements of individual parts of their fields: reducing costs of inputs and pollution risk.

<sup>29</sup> <http://web.mit.edu/12.000/www/m2016/finalwebsite/solutions/phosphorus.html>

## Pesticides

Many producers employ pesticides to help protect their crops from pests and diseases.

The Integrated Pesticide Management (IPM) approach focuses on mechanical, cultural and biological methods of pest control rather than relying solely on pesticides. For example, hedgerows, buffers and healthy water courses provide habitats for birds, insects and other animals that naturally help keep pests under control. This helps to minimise pesticide usage and reduce risks to biodiversity and water quality. The vast majority of producers employ some IPM methods (e.g. crop rotation), however there is scope to significantly improve uptake. SQC standards, for example, play a role in implementing IMP. We want to work with the industry and Scottish Government to explore how we can help promote IPM.

The Voluntary Initiative<sup>30</sup> (VI) plays an important role in raising awareness of legal requirements and of good practice amongst crop producers to ensure pesticides are used safely. In addition to guidance material, the VI has also established an operator training scheme and a sprayer testing system.

The mixing and handling of pesticides and wash down activities can be responsible for a significant proportion of pesticide losses to the environment. Taking steps beyond the legal minimum, such as using a biobed or biofilter to treat washing from handling areas, can further reduce risks of pesticide pollution.

SEPA's aspirations are to:

- help build on existing initiatives and approaches to promote IPM techniques;
- work with partners to better understand the environmental impacts and risks associated with pesticides.

### Case study: minimising pollution from pesticides – biobed/biofilter systems

Taking advantage of options within SRDP to install a biobed or biofilter is a practical method of safely dealing with any drips, spills or splashes that can occur when handling and mixing pesticides. They can also collect and deal with sprayer washings, reducing the risk of pesticide contamination of the water environment and providing a convenient method of disposing of pesticide washings for the farmer.

<sup>30</sup> <https://voluntaryinitiative.org.uk/>

## Ready for the future

The future holds many challenges, not least of which will be the new agricultural policy and climate change. To be ready for future challenges and to be in a position to take advantage of future opportunities it is important that the crop production sector is as robust and as resilient as possible, and is able to take advantage of innovations such as developments in plant breeding.

SEPA's aspirations are to:

- ensure our regulatory approach is open to new innovative systems that are of benefit to the sector and the environment;
- work with the Scottish Government to ensure policy alignment and future agricultural support is outcome focused to help deliver Scotland's objectives for the environment and flood risk management;
- work with our partners, such as Scottish Government Rural Payments and Inspections Division (RPID), key stakeholders, such as NFUS, and quality assurance schemes to understand how we can best work together within the sectors supply chain to help promote sustainable and resilient farming;
- explore opportunities to encourage cooperation between groups of farmers for landscape scale action (flooding, abstraction, diffuse pollution and biodiversity);
- explore how we can support businesses in the uptake of innovative techniques.



## 7. Summary of actions and aspirations



"Before I moved to Scotland to join SEPA as its Chief Executive in April 2015, I was constantly told about the great approach that SEPA had adopted in the way it worked with the farming community in Scotland. It was one of the best 'assets' existing at SEPA when I took up the reins. This sector plan entrenches this approach – we will continue to provide helpful support and guidance to farmers and use enforcement powers only in those cases where it is necessary to achieve compliance outcomes. We are also keen to help those farmers who want to move 'beyond compliance'. This is a 100% voluntary area of work in which enforcement has no place at all. Instead, this beyond compliance work is where SEPA is ready to help farmers explore 'win-win' opportunities that make farms more profitable through sound environmental practice."

**Terry A'Hearn**  
SEPA Chief Executive Officer

The following table summarises the actions that we have described in previous sections to address non-compliance in the sector and aspirations to help businesses take opportunities to go beyond compliance. These are described according to the key outcomes introduced in Section 3 that we would like to achieve for this sector.

The table combines actions to address compliance and to help achieve beyond compliance. This is because the same action can often both improve compliance and help businesses to move beyond compliance. Similarly, actions that businesses choose to take to move beyond compliance can improve their compliance with environmental regulations.

We will prioritise them alongside those in other sector plans and progress powerful actions that contribute towards achieving our One Planet Prosperity goal for Scotland.

Many actions contribute to multiple outcomes, we have positioned them to the most relevant outcome.

Better environment	
Outcome sought	Actions and aspirations
Reduce diffuse pollution risk	<p>Effective use of water and nutrients cuts costs and safeguards the environment.</p> <ul style="list-style-type: none"> <li>■ We will celebrate together with partners the success of the improvement in CAR GBR 20 compliance and identify how we can build on this approach and deliver full compliance across the sector.</li> <li>■ We will take action to better understand which catchments require extra effort to reduce diffuse pollution and meet RBMP objectives and thus improve compliance.</li> <li>■ We will take action to better understand the diffuse pollution pathways, such as drain-flow or bank erosion, that are significant contributors to agricultural diffuse pollution and what practical methods can be implemented to disrupt these pathways and thus improve compliance.</li> <li>■ We will review compliance with the GBRs relating to fertiliser application (GBR 18).</li> <li>■ We aspire during farm visits, to discuss opportunities to implement good practice that help identify win-win situations where both grower and the environment benefit.</li> <li>■ We aspire to work with partners to explore how to further promote efficient fertiliser use and good land management practices (e.g. extending buffer strips, precision farming).</li> <li>■ We aspire to help build on existing initiatives and approaches to promote IPM techniques.</li> <li>■ We aspire to work with partners to better understand the environmental impacts and risks associated with pesticides.</li> </ul>
Healthy soils that also stay in the field and, therefore, less pollution risk	<ul style="list-style-type: none"> <li>■ We will review waste-to-land regulation to ensure it is sufficient to protect the environment from contamination such as micro plastics.</li> <li>■ We aspire to increase our work with partners to understand the cause, location and extent of soil degradation and loss from arable fields and how this affects crop production, the wider environment and flood risk.</li> <li>■ We aspire to work with partners to improve soil health and promote the importance of soil and ensure it is appropriately valued as an essential non-renewable resource.</li> </ul>
Nutrients successfully re-circulated within the economy, reducing risks to the environment and increased farm resilience	<ul style="list-style-type: none"> <li>■ We aspire to build on SEPA's Materials to land strategy and work with partners to deliver an action plan for circular use of nutrients in Scotland. This aims to minimise mineral fertiliser use and maximises the safe and end-user acceptable use of all recirculated nutrients within the economy.</li> </ul>

<b>Stronger business</b>	
<b>Outcome sought</b>	<b>Actions and aspirations</b>
Effective use of water and nutrients cuts costs and safeguards the environment	<ul style="list-style-type: none"> <li>■ We will review the reason for failure to submit water abstraction data returns and explore other methods of submitting data to SEPA.</li> <li>■ We will review our abstraction licensing system to ensure it uses up-to-date information about resources, promotes efficient irrigation and enables, where appropriate, the development of groundwater sources and storage to deal with water scarcity situations.</li> <li>■ Working with Scottish Government and others, SEPA wish to explore how we can help the sector further enhance its resilience to water scarcity. For example, this could involve influencing schemes within the Scottish Rural Development Programme (SRDP) to include options to help fund the creation of irrigation lagoons.</li> <li>■ We aspire to work in partnership, promoting water efficiency in crop irrigation to farmers.</li> <li>■ We aspire to work with experts to understand the opportunities and risks associated with increased soil water storage.</li> </ul>
Reduced energy use and increased on-farm energy production reduces cost and increases resilience	<ul style="list-style-type: none"> <li>■ We aspire to support partners to identify options to increase the amount of energy that is generated on-farm.</li> <li>■ SEPA will continue to work with partners, e.g. supporting the 'Farming for a Better Climate' initiative to help promote profitable, low carbon farming.</li> </ul>
Strong partnerships that achieve delivery of shared ambition	<ul style="list-style-type: none"> <li>■ We aspire to work with partners to explore practical and innovative solutions for irrigation water management at a catchment scale that ensures security of supply and protects the environment and other water users.</li> <li>■ We aspire to explore how the crop production sector can help Scotland to reduce greenhouse gas emissions and what SEPA's role is in this.</li> <li>■ We aspire to ensure our regulatory approach is open to new innovative systems which are of benefit to the sector and the environment.</li> <li>■ We aspire to explore how SEPA can support businesses in the uptake of innovative techniques.</li> </ul>

Protected communities	
Outcome sought	Actions and aspirations
Strong partnerships that enable delivery of the plan	<ul style="list-style-type: none"> <li>■ We aspire to work with the Scottish Government to ensure policy alignment and future agricultural support is outcome focussed to help deliver Scotland's objectives for the environment and flood risk management.</li> <li>■ We aspire to work with our partners such as Scottish Government Rural Payments and Inspections Division (RPID) and key stakeholders such as NFUS and quality assurance schemes to understand how we can best work together within the sectors supply chain to help promote sustainable and resilient farming.</li> <li>■ We aspire to explore opportunities to encourage cooperation between groups of farmers for landscape scale action (flooding, abstraction, diffuse pollution and biodiversity).</li> </ul>
Natural flood management reduces the risk of flooding	<ul style="list-style-type: none"> <li>■ We aspire to work with land managers to identify the best opportunities for the delivery of natural flood management solutions in catchments with potentially vulnerable areas.</li> </ul>



