Catchment Sensitive Farming

Air Quality Delivery Strategy 2018-2021

A clear solution for farmers

CATCHMENT SENSITIVE FARMING

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Contents

Section 1: overview

1.1 Introduction, aims and objectives of CSF

This document outlines the proposals for introducing air quality into Phase 4 of Catchment Sensitive Farming (CSF) and for integrating it with the existing water quality work. It describes the outline evidence of the air quality issues, the mechanisms and measures CSF will deliver and the resources we will use to support and achieve our objectives and underpin partnership and liaison arrangements. It will also outline what we will achieve by 1st April 2021 which is the end of Phase 4 and how we will measure progress towards those goals.

Since 2006 the CSF programme has helped farmers take action to address agricultural diffuse water pollution using advice and incentives. CSF has been working in specific Priority Catchments where agriculture is having the most significant impact on rivers, lakes and estuaries. Programme evaluation has demonstrated the effectiveness of CSF's approach in reducing pollutant loads and improving water quality. CSF Phase 4 builds on this previous work but brings several new features which improve the effectiveness of the programme.

The key features of the approach are as follows:

- The basic unit of CSF delivery is the Water Framework Directive Water Management Catchment. Within each catchment are areas defined as a high priority for water quality for the Countryside Stewardship scheme. These are the priority areas for CSF, which are termed here Water Priority Areas.
- CSF mainly works in the Water Priority Areas. We look for partnership opportunities to increase the intensity of our work in these areas and to extend the approach to other areas.
- CSF deploys measures to address water quality objectives for Protected Areas (Natura 2000 sites, Bathing Waters, Shellfish Waters and Drinking Waters) and Good Ecological Status. The incentives element of CSF is provided through Countryside Stewardship, using mainly the Mid-Tier with Higher Tier where there are opportunities to do so, and the Countryside Productivity Scheme. Capital items in Countryside Stewardship are available either as part of Mid-Tier, as a 2 year agreement, or with land management options in Mid-Tier and Higher Tier.
- We provide advice through direct delivery by CSF Officers and contracted through the Farm Advice Framework (until early 2019) and then through the Farm and Land Management Advice (FaLMA) framework.
- We are as clear as possible over what we can achieve in terms of environmental outcomes. We then assess our progress and continue to evaluate CSF alongside the water elements of Countryside Stewardship.

- We develop partnerships with a wide range of organisations, including NE, EA & FC, where we have shared objectives. Some of this partnership work may be outside Water Priority Areas where funding allows.
- We deliver advice to improve air quality, specifically to reduce emissions of ammonia from agriculture. Driven by the Clean Air Strategy, this expands and builds on the initial pilot work carried out in 2017 in Cumbria, Shropshire and Dorset and the work carried out by CSF to support the Farming Ammonia Reduction Grant (FARG). This expanded piloting of the air quality work will inform future work that supports the achievement of the targets described in Section 1.2.
- We maximise the gains of CSF work beyond air and water quality, including farm business benefits, resilience to hazards and ecosystem services such as flood mitigation, climate change adaptation, fisheries and land biodiversity.
- Where opportunities allow, we develop pilots to test new ways of working and to assist in the transfer of research findings to widespread practical application. Opportunities are sought to integrate piloting work into the wider work described in this document.
- This plan is underpinned by a series of local, River Basin District (RBD) level plans which describe in detail the approach along with the underpinning evidence base.

1.2 Evidence and Drivers

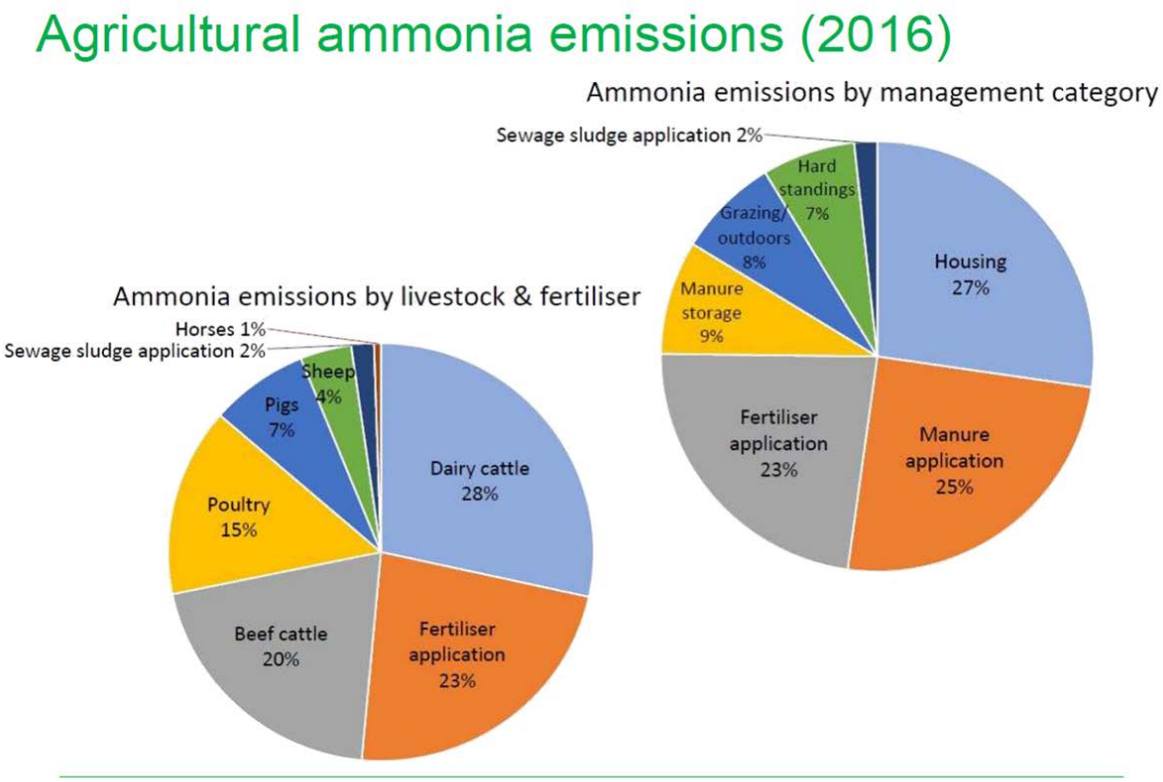
Ammonia is a key air pollutant which affects both human health and the environment. The UK has signed up to limits for emissions of ammonia in 2020 under the Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution and has also agreed an amendment to the EU National Emission Ceilings Directive (NECD) for 2030. These ceilings require the UK to reduce ammonia emissions by 8% by 2020 and 16% by 2030 compared to the 2005 level.

Defra's 25 Year Environment Plan, published in 2018, makes a commitment to "meeting legally binding targets to reduce emissions of five damaging air pollutants; this should halve the effects of air pollution on health by 2030". As part of this, the Plan introduces a commitment to publish a Clean Air Strategy. This was published in January 2019 and includes a number of proposals aimed at reducing agriculture's ammonia emissions including the expansion of CSF advice to cover air quality from the end of 2018.

Agriculture is the dominant source of ammonia emissions, with the sector accounting for 87% of total UK emissions in 2017. Ammonia contributes to air

pollution, which alongside cancer, heart disease and obesity, is a major public health risk. It also forms a significant component (approximately 65%) of total nitrogen deposition in the UK. In 2014, 63% of the area of nitrogen-sensitive habitat in the UK received more nitrogen than it could cope with effectively, ie, they received enough nitrogen to have an adverse effect on the habitat. This figure rises to 96% in England.

The agricultural sectors and operations that are responsible for ammonia emissions are shown in the following diagrams taken from the Clean Air Strategy. This information will influence who we engage with and the mechanisms we use.



Air quality advice is being delivered within the existing areas covered by CSF, ie, the High Water Priority Areas. These are shown in red in the map overleaf.

The Water Priority Areas have been developed to target both Countryside Stewardship (CS) and CSF using a range of evidence. Water Priority Areas represent the places where diffuse water pollution from agriculture is a significant water quality issue and where CS and CSF can be most effective to help achieve Water Framework Directive (WFD) outcomes. A range of evidence has been layered to create a thorough understanding of each High Water Priority Area, including pollutant, modelled farm losses and priority environmental receptors, pressures, farm types, soil and rainfall.

From this the Environment Agency CSF Evidence Team has developed a prioritisation to focus advice and some specific Countryside Stewardship grant funding to priority farm holdings.

Selecting areas to work in based on water catchments and selecting holdings to work with based on risk to water are not an immediately logical basis for targeting air quality advice. The pilot work carried out in Cumbria, Shropshire and Dorset, however, has shown that air quality advice is a logical add-on to water quality advice and so targeting work in this way provides a simple means of delivering air quality advice to 60% of the agricultural land area using existing staff resources.

There is limited CSF water quality delivery in the medium priority area (shown in yellow) except where the project work is funded by an external source such as a water company. Delivery of air quality advice in this area may take place in two situations. The first is where there is external funding for CSF delivery and where the external funder is willing to include air quality advice in the work they are paying for. The second is where there is need to target farms in the medium priority area to achieve air quality objectives in the high priority area as described at the end of Section 1.3.

1.3 Delivery Approach and Mechanisms

Overview

A number of factors have shaped the approach to CSF Phase 4:

- the implementation of Countryside Stewardship (CS) and associated targeting changes;
- river basin planning priorities;
- evidence from previous CSF evaluations;
- opportunities for closer working with a range of partners to achieve common goals; and
- opportunities to deliver for a wider range of objectives including air quality, natural flood management and water resources.

Phase 4 of CSF has given the opportunity to optimise our delivery and build on the expertise gained since 2006 to improve outcome delivery for water and air quality, and other ecosystem services, along with economic benefits for farmers and the wider economy.

Our approach is outcome-based, working with stakeholders to provide national and locally derived benefits over the period to 2021. The CSF evaluation[1] shows the outcome benefits of working for a long period (4+years) in a catchment to drive the uptake of measures. The air quality work will operate for the final three years of Phase 4. By operating in the same areas used for water quality advice, and by incorporating the air quality work with water quality, it will be possible to benefit from the long term engagement that has occurred in many of the catchments. This will ensure that air quality outcomes are achieved and that that we can gain sufficient information about delivering air quality advice to inform future expansion of this work area.

The overall CSF approach will be to work with farmers who will benefit the most from the measures and mechanism to reduce DWPA and air pollution (termed Priority Farms). In all cases we will be clear why we are working with specific farmers. One to one advice will be provided to prioritised farmers to support the uptake of Countryside Stewardship and to help farmers to adopt measures to improve farm businesses and improve the environment. For non-priority farms in Water Priority Areas the emphasis will be on providing general advice on Countryside Stewardship and land management for water and air through a variety of mechanisms including group events, newsletters and training to advisers.

Up to 20% of the overall CSF resource can be dedicated to local campaigns and priorities that address specific issues in the High Water Priority Areas. This approach could bring together farms referred by EA and NE, local CSFO knowledge and scattered Priority Farms to form a more meaningful campaign area where CSF can support air and water quality improvement.

CSF staffing will be determined initially on the number of Priority Farms in an area. The implication of this is that Catchment Sensitive Farming Officers (CSFOs) or partners may cover more than one catchment.

CSF Partnerships

CSF is a collaboration between Defra, Environment Agency and Natural England and partnership working is embedded across the programme. CSF seeks opportunities to work with partners at national, regional and local level to enhance delivery of shared water and air outcomes. CSF partnership working integrates planning; improves delivery of water and air outcomes; ensures join up with partners; avoids duplication; pools resources, information and expertise and adds value to CSF and our objectives.

CSF partnerships include both formal and informal arrangements. Resources for partnerships will be prioritised according to those that best align with CSF outcome delivery. CSF will seek opportunities for sponsorship, funding bids with partners, co-funded partnership projects and no-cost partnerships.

Key CSF partners include (but not exclusively):

- Farmers and farming associations
- Government bodies: Environment Agency, Natural England, Forestry Commission, AHDB
- Water companies
- Farm advisers and companies - agronomists, farm advisers, vets, machinery/input distributors, land agents
- Local Authorities, National Parks, Areas of Outstanding Natural Beauty and Regional Parks
- Environmental organisations such as Rivers Trusts, Wildlife Trusts, Woodland Trust, CFE
- Catchment Based Approach partnerships
- Food and drink industry
- Internal drainage boards

[1] http://publications.naturalengland.org.uk/publication/6510716011937792

Air Quality Delivery Objectives

Air quality forms an integral part of CSF's delivery and in the main its delivery will follow the model established for delivering water quality advice. Air pollution does present a number of different challenges for collecting evidence, developing targeting, delivering effective advice and demonstrating the effects of that advice due to its transboundary nature. The air quality work will therefore act as an extended pilot following on from the previous work carried out in 2017 and will aim to achieve the following:

- demonstrate the role of long term farm advice in the uptake of air quality mitigation measures by farmers;
- demonstrate the potential role of farm advisers / industry in ammonia mitigation;
- show the benefits of integrating water and air advice on farm;
- demonstrate the uptake of AQ measures on farm and benefits for reducing ammonia; and
- show the role of existing measures and mechanism on the reduction of ammonia and the gaps in existing provision.

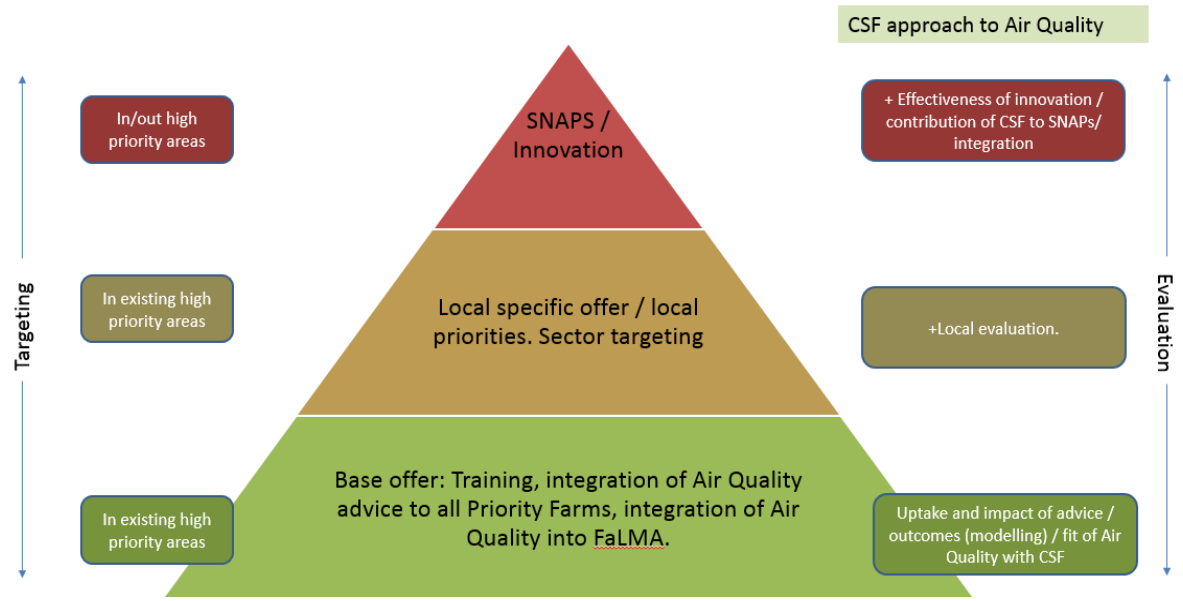
To measure how far these objectives have been met CSF's air quality work will be evaluated. This will use information on farmer engagement, advice delivery and advice uptake that is captured in the CSF Reporter Database together with information from the Farmer Telephone Survey which will establish a baseline of farmer understanding of air quality. In the short-term, there will be separate water quality (spring 2019) and air quality (summer 2020) evaluation reports. However, we will also to plan for the longer-term evaluation of air quality benefits, including a feedback loop, to drive continuous improvement of CSF advice delivery.

The full CSF Air Quality Monitoring and Evaluation Plan is at Appendix 2.

Air Quality Delivery Mechanisms

Air Quality advice and training will be delivered across all River Basin Districts and across all High Water Priority Areas (HWPA). Ammonia will be a targeted pollutant across all HWPAs as opposed to the water pollutants which are targeted in specific catchments. This means that measures for ammonia can be advised and put into place across all HWPAs.

The delivery of advice can be split into three distinct layers or approaches as illustrated in the following diagram.



Base Offer

Air quality advice will be delivered by CSFOs to their priority farmers as part of an integrated advice offer with water quality. Air and water issues will have equal priority.

The relationship between air and water advice will take one of three forms.

- Air and water advice are the same, eg, covering a slurry store or injecting slurry. In this case air quality benefits will be achieved from the actions recommended for water quality but it is advantageous to explain the air quality benefits to the farmer.
- Air and water advice are different but relate to the same area or activity, eg, a feed area may be roofed over to address water quality issues but further advice is needed on regular scraping of the area to reduce ammonia emissions.
- Air and water advice are separate, eg, water advice may relate to a pesticide handling area whilst air advice may relate to scraping and washing down of livestock housing.

The existing mitigation measures that are used to record CSF activity will be reviewed to highlight those that give benefits for both ammonia and water and those that only give benefits for ammonia. This will allow CSFOs to be aware of when water and air benefits will accrue from the same advice and what courses of action are available to deal with separate air issues. An analysis of how often the mitigation measures have been recommended and actioned will provide an indication of how much air quality benefit is accruing already from existing water advice and will also highlight areas where increasing CSFOs' awareness of mitigation measures for air quality may be beneficial.

Advice delivery will be using the existing CSF tools, ie, CSFO (including partnerships CSFO) advice, FaLMA contracted advice (both 1:1 and events) and national and regional partnerships. The advice delivery specifications for contracted advice will be reviewed and air quality incorporated where appropriate to ensure that contracted advice will address both water and air issues in an integrated way.

An additional CSFO post has been created in each RBD team to support the introduction of air quality work and the provision of the base offer. These posts will raise the profile of air quality within the team, ensure that air quality is considered alongside water quality in the teams' work and provide access to training and technical support on air quality. It's envisaged that this work will take approximately 60% of these CSFOs' time although this will vary across teams depending on factors such as the level of experience within the RBD teams and the fit of air quality with the existing water quality work. It's not envisaged that these new CSFO posts will directly deliver any significant amount of work under the base offer.

Local Specific

Priority farmers are identified based on risk factors associated with water pollution. There may, therefore, be farmers who are not identified as being priorities at the moment but who we will want to engage with as their holdings are potentially important emitters of ammonia, for example pig or poultry units, indoor beef units and possibly smaller dairy units. These farms will then become priority farms. The usual range of tools will be employed in engaging these farms although in some cases we may be dealing with farms who have no land, apart from that housing the units, and this may require a different approach and may require the development of new tools. Whilst the aim will still be to deliver integrated air and water advice the likelihood is that advice to these farms will be focussed more closely on air quality and may involve the use of specific air quality visits by CSFOs or FaLMA contractors.

Protected sites and areas of priority habitat that are being adversely affected by ammonia will be identified together with the farms that are likely to be responsible. Some of these farms will be existing priority farms and will be targeted as part of the Base Offer. To ensure that the issues affecting the sites are properly addressed it may be more efficient to target all the farms affecting the site together as a group. It may, therefore, be necessary to target a number of non-priority farms as well; these farms would then become priority farms.

Staff resource for this work will come either from the additional CSFO resource provided for the air quality work or from the existing CSFOs (who have the flexibility to spend up to 20% of their time on local campaigns). Where the resource comes from the new CSFO posts it is anticipated that this work will take up approximately 20% of their time.

SNAPs/Innovation

Although CSF advice is restricted to the HWPAs there may be some occasions where air quality advice needs to be delivered outside these Areas. This is most likely to occur where a protected site or area of priority habitat within a HWPA is being adversely affected by ammonia from farms that lie outside the Area. Sites with a Shared Nitrogen Action Plan (SNAP) would be a high priority for this approach if part of the site lies within a HWPA.

There may be other occasions when working outside of the HWPA could bring benefits. This work would need to be in the form of a particular project and would need to be focussed on addressing specific issues. These would be considered on a case by case basis.

Staff resource for this work will come from the additional CSFO resource provided for the air quality work. It is anticipated that this work will take up approximately 20% of their time.

1.4 Advocacy & Promotion

Engaging with farmers and land managers to raise awareness of air quality and encouraging voluntary action is a principal communication objective for CSF. The outcome for our communication work is that the CSF's air quality work and role is understood and valued.

Our communication approach will come mainly from the River Basin District (RBD) level and RBCs will consider appropriate communication activities to support the following communication objectives.

- Raise awareness amongst farmers and land managers and their advisers and contractors of the impact of ammonia emissions from agriculture. In most cases this will sit alongside messages about diffuse water pollution but where a farm is receiving the local specific or SNAPs/innovation offer the message may be a more bespoke one concerning the specific air quality issues for their area.
- Encourage farmers and land managers in catchments to take voluntary action to mitigate ammonia emissions. Facilitate synergy and integration with related programmes and mechanisms by ensuring CSF air quality work is embedded within relevant local policies and initiatives.
- Work with stakeholders to develop and deliver partnerships to encourage action to address ammonia emissions from agriculture. As with awareness raising this may sit alongside diffuse water pollution activity or it may be bespoke ammonia activity.

Communication at a national level will be needed in the early stages of the work to raise awareness with farmers and the wider agricultural industry of both of the air

quality issue and CSF's involvement in it. A press launch in September 2018 and a series of farm events in late 2018 and early 2019 will aim to do this. A series of case studies to showcase examples of new practices to reduce ammonia emissions will also be produced to publicise and promote the work.

Although it is envisaged that most advocacy and promotion will take place through RBD teams there is likely to be a continued need for work at a national level to allow CSF to maintain and develop awareness of its presence in this area of work and to allow for exchange of information and ideas.

Section 2: Detailed Approach

2.1 River Basin Districts covered by this strategy

River Basin District	*Number of priority farms*	*Number of priority farms to be engaged 2018-21*
Northumbria	921	553
North West	3070	1842
Humber	4870	2922
Anglia	9572	5743
Severn	2427	1456
South East & Thames	2593	1556
South West	6500	3900

Natural England Area Team	*Number of priority farms*	*Number of priority farms to be engaged 2018-21*
Northumbria	921	553
Cumbria	1603	962
Yorkshire & northern Lincolnshire	3426	2056
Cheshire to Lancashire	1839	1103
East Midlands	1513	908
West Midlands	2510	1506
West Anglia	4686	2812
Norfolk & Suffolk	5020	3012
Thames	545	327
Somerset, Avon & Wiltshire	2500	1500
Devon, Cornwall & Isles of Scilly	2000	1200
Dorset, Hampshire & Isle of Wight	3134	1880
Kent & Sussex	256	154

2.2 Resources

River Basin District	*Air Quality CSFO (FTE)*	*RBD Team CSFO*	*Partnership CSFO*
Northumbria	Covered by Humber	3.0	0
North West	1.0	10.0	0
Humber	1.0	10.0	2.0
Anglia	2.0	13.0	0
Severn	1.0	13.0	0
South East & Thames	1.0	21.0	2.6
South West	2.0	17.0	0

2.3 Communication actions for Air Quality

About air quality	Your main audiences	Stakeholder engagement	Successful communication activities	How did you measure success?	Key milestones 2018-2019
• Covers 60% of the country; all of areas currently covered by CSF. • Outcomes aimed at both environment and human health. • Integral part of Clean Air Strategy. • New area of work for CSF.	• Priority farmers in existing catchments, especially those with dairy, intensive beef, pigs, poultry or arable. • Non-priority farmers identified as being potentially large emitters of ammonia. • Non-priority farmers identified as potentially affecting protected sites	• 1:1 engagement with priority farms. • Targeted group events for farmers identified as affecting specific sites followed by 1:1. • General communications, such as newsletters, for non-priority farms without signposting to further CSF activity. • Regular meetings with other organisations, such as AHDB,	• Catchment newsletters • Targeted workshops • Group events with specialist speakers • Group events covering a number of topics • Joint attendance at shows with partner organisations	• Requests for further advice/training • Implementation of advice • Show enquiries • Improvement in condition of protected sites	• Attendance at UK Dairy Day on 12th September 2018 for 'soft' launch. • Press release and launch on 17th September 2018. • Pig & Poultry Event on 5th December 2018. • Dairy and arable demonstration events in February and March 2019. • Production of 10 case studies by April 2019.

2.3 Communication actions for Air Quality

	or priority habitat. • Agricultural supply industry. • Agricultural colleges	and groups to update on CSF planning and activity and to coordinate activity. • Natural England (land management and sustainable development) • Environment Agency • Catchment Partnership partners • Water companies			

2.4 How can you help?

This Strategy has been produced in consultation with our partners, including Environment Agency, Natural England and Defra. It aims to develop a framework over the next 3 years to deliver voluntary action on farms to reduce air pollution from ammonia. We're always happy to hear from others that want to share our objectives and may want to contribute to further work. If you would like further information, please contact the Project Manager (Air Quality), Paul Arnold, on 07775 706850 or e-mail *CSFphase4planning@naturalengland.org.uk*

Appendix 1: Risks and Issues

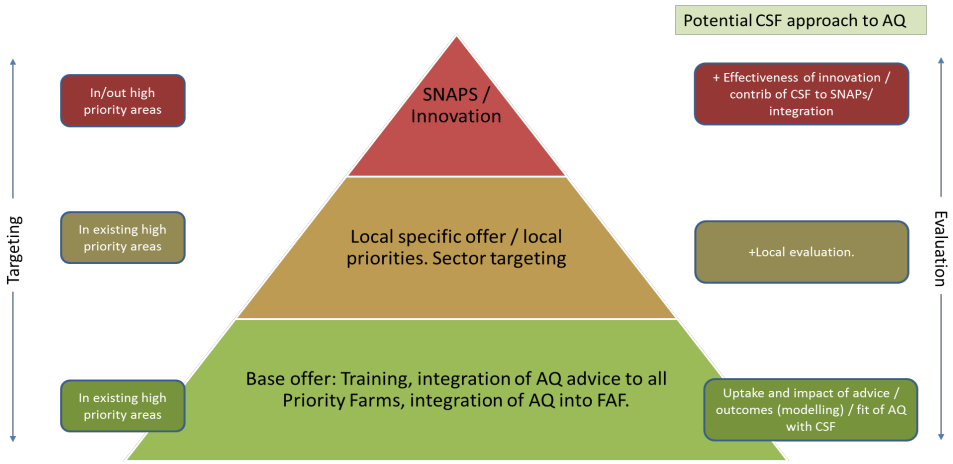
Risk/Issue	Consequence	Impact	Mitigation
Air quality CSFO posts not filled	Work not delivered and outcomes not achieved Budget not spent	H H	Vacant posts opened to external recruitment.
CS capital items not available to address air quality issues due to targeting of the items being determined by effectiveness for water pollution	Capital items not universally available across High Water Priority Areas to address air quality issues	M	Encourage 5 year mid-tier agreements. Seek inclusion of air quality into CS capital item targeting criteria
Contractor delivery delayed due to late issue of FaLMA ITT	Ability to provide specialist visits and events delayed	M	Concentrate work on advice that can be offered directly by CSFO
Voluntary approach of CSF becomes confused with regulatory measures introduced through Clean Air Strategy	CSF is seen as a regulatory measure with consequent difficulties in farmer engagement	L	Clear messaging about CSF's role alongside other measures in CAS

Appendix 2: CSF Air Quality Monitoring & Evaluation Plan

1. Background

The CSF Programme has successfully delivered targeted support enabling farmers to take action to reduce water pollution since 2006. This has been achieved through raising farmers' awareness of water pollution and encouraging voluntary action to mitigate the problem, as well as developing partnerships with other initiatives that have similar objectives.

Following successful piloting and support for the Farming Ammonia Reduction Grant, CSF will deliver air quality advice to farmers (specifically aimed at reducing ammonia emissions from agriculture) from April 2019. The approach is outlined in the *CSF Air Quality Delivery Strategy 2018-2021.* In summary, the nature of the advice and its alignment with existing water quality advice delivery will depend on the spatial scale. The "base offer" will be aligned with current water quality delivery across the Countryside Stewardship High Priority Areas for Water; there will be a "local specific offer" to address local priorities that may not be priorities for water; as well as a focus on specific Shared Nitrogen Action Plan Sites (SNAPS) that may also require advice delivery to areas that are not priorities for water:



CSF's air quality work will be evaluated. In the short-term, there will be separate water quality (spring 2019) and air quality (summer 2020) evaluation reports. However, we also want to plan for the (potential) longer-term evaluation of air quality benefits, including a feedback loop to drive continuous improvement of CSF advice delivery. It will be essential to build on / learn from successful previous water quality evaluations of CSF and maximise efficiency by using common monitoring activities, where appropriate.

2. This contract

This contract will deliver:

(1) an initial modelling assessment of the air quality benefits of CSF to inform (2) below
(2) an initial CSF Air Quality Evaluation Report that includes results from farmer telephone surveys; farmer engagement and advice delivery and uptake data, as well as the modelling assessment (1 above) and providing a weight of evidence for the benefits of CSF to air quality (to inform a summer 2020 business case for potential longer-term delivery of air quality advice through CSF i.e. from 2022)
(3) a longer-term Air Quality CSF Monitoring & Evaluation (M&E) Plan that: (a) addresses the (potential) need for a longer-term approach to evaluation (i.e. assuming CSF delivery continues into the longer-term) and (b) will generate the evidence to support continuous improvement of CSF delivery (e.g. to 'better' target advice delivery by identifying the most polluting farms and the most effective mitigation measures)

2.1 Initial CSF Air Quality Evaluation

The initial evaluation (2 above) will include farmer engagement, advice delivery, advice uptake and environmental benefits:

(1) Farmer Surveys

A set of additional questions will be added to an existing annual CSF survey exploring farmer awareness and action taken to address air quality:

- agriculture's contribution to the issue
- how well informed farmers are of actions to mitigate issue
- action taken to mitigate issue
- schemes prompting any action taken

The full questions are available in Annex 1.

A baseline survey will be undertaken in Spring/Summer 2019 and repeated annually. It will be targeted to farmers within CS High Priority Areas for Water. The survey will be reported by the appointed CSF Farmer Survey consultant.

(2) Farmer engagement / advice provision

This will be based on both existing and new engagement / advice delivery / recommended practices recorded in the CSF Reporter database by CSF Officers.

We are currently identifying a list of air quality mitigation measures (Practices). Any new air quality-specific practices will be added to CSF Reporter. Air quality farmer engagement / advice delivery / recommended practices will be reported by EA's CSF Evidence Team.

(3) Advice uptake

Uptake of air quality advice will be assessed alongside that for water through annual CSF advice audits. The next audit will be undertaken in autumn 2019. Results will be reported by the appointed CSF Advice Audit consultant.

(4) Environmental assessment

A modelling assessment will be based on that used successfully by CEH for NE's "Assessment of the effects of RDPE environmental land management schemes on air quality" (AROMA) project. It should aim to separate the impact of CSF advice from related Rural Development Programme schemes (ES, CS, CP, FARG) as far as possible and provide assessments of the:

- mitigation potential of each relevant CSF mitigation measure
- uptake of CSF mitigation measures (based on 2 and 3 above) including identifying any obvious trends by farm type, size or geographic location
- benefits to ammonia emissions (including relative to both current agricultural emissions and targets) concentrations and loads (including relative to critical exceedances) at both national and local (i.e. protected sites / SNAPS) scales
- potential longer-term benefits of CSF based on future scenarios / extrapolations

The appointed consultant will identify the limitations and uncertainties associated with the modelling assessment.

2.2 Longer-term Air Quality M&E Plan

The longer-term Air Quality CSF Monitoring & Evaluation (M&E) Plan will determine how the initial Air Quality CSF Monitoring & Evaluation (M&E) Plan should be developed to address the potential longer-term requirement to evaluate CSF air quality benefits as well as to provide priority evidence to increase the efficacy of future CSF advice delivery. This could include, but would not be limited to:

- Uncertainty analysis of emissions estimates i.e. of the data, assumptions and extrapolations that combine to give national emission estimates, so research can be focussed as cost-effectively as possible. This kind of analysis will make UK emissions estimates more robust and authoritative; there will be remaining uncertainties but UK's estimates can be "state of the science". Analysis should cover key steps like original experimental data on emissions, extrapolation to UK.

- Uncertainty analysis of impact estimates e.g. of atmospheric dispersion modelling to convert emissions into ambient impacts
- Review of existing ammonia monitoring networks / studies and how well they inform on impacts / potential to validate model outputs at a range of spatial scales (i.e. from local case study to national assessment, linked to CSF base, local and SNAPs offers)
- Review of metadata needed to interpret environmental evidence e.g. data on ventilation rates (pig/poultry), feed stocks; slurry practices/covers; livestock numbers [We believe VERA is doing some of this].
- Potential use (and design) of local air quality monitoring campaigns to provide local evidence e.g. on effectiveness of measures / local validation of modelling assessments; attribution of impacts to different directions farms; import/export analysis for specific sites/interventions
- SNAPS case studies to inform how comprehensive data/assessment at SNAPS (e.g. Sherwood Forest, Pigs in E Anglia, Poultry in Midland, Beef/Dairy in Shropshire) can be designed to test evaluation methods (e.g. how do uncertainties increase elsewhere where data/assessment is less comprehensive)
- Review of simple ecological indicators (biomonitors) to identify local ammonia-stressed ecosystems and/or provide early evidence of local improvements and effectiveness of measures
- Deployment of simple monitors e.g. directional and non-directional passive monitors at protected sites (*receptor deployment*) and around potential ammonia sources (*source deployment*) to show how directional accounting can evaluate important pathways, sources, and changes/improvements. For example, to help identify "supermitters", and "angular prioritisation" of directional impacts into a protected site to target advice delivery. Includes use of Numerical Weather Prediction data to support directional analysis and interpretation (so no need for meteorological measurements).

A prioritised plan will be produced identifying the issues and specific proposed solutions. Relevant actions by others (both current and planned) should be captured in the plan.

In order to explain and scope the longer-term approach to evaluation, it would help to have a space/time chart that summarises how evaluation can address different spatial scales (e.g. from individual slurry store, via farm, local district, agricultural region to UK total) and timescales (1 year, 2 years, 5 years, etc).

It would also help to develop a flowchart that shows how different strands of evidence and evaluation support the ultimate goals of protected ecosystems and protected human health. For example, there could be a flowchart that shows how the goal of being able to report lower UK emissions authoritatively depends on several strands of

evidence, including modelling, monitoring and validation studies. The goals of ecosystem and health protection are long-term strategic ambitions that the evaluation process should keep in mind. But the process must also look for intermediate "milestones" that demonstrate progress towards these ultimate goals.

2.3 Reporting

The contractor will provide two separate reports:

- an initial evaluation of CSF air quality benefits, providing a weight of evidence drawn from the environmental modelling (undertaken under this contract) combined with the CSF Farmer Surveys, CSF Reporter data and CSF Advice Audits (delivered by others as outlined above)

- a longer-term Air Quality CSF Monitoring & Evaluation (M&E) Plan, detailing how CSF air quality benefits could be robustly evaluated over the long-term and what specific learning will be generated from implementing the plan to drive continuous improvement of CSF advice delivery

2.4 Implementation

Implementation of this plan will be led by a CSF Air Quality Specialist with technical support co-ordinated by the CSF Evidence Team. Delivery is envisaged to be via an external contractor. The mechanism for this (e.g. MoA, consultant contract, etc) has yet to be decided as has the duration of the arrangement (e.g. 1 year to deliver initial evaluation and develop longer-term evaluation plan or longer-term arrangement that also includes implementing the longer-term evaluation plan).

Annex 1 – DRAFT CSF AQ questions to be added to annual CSF Farmer Surveys

ASK ALL
2019 Q8AIR **To what extent if at all do you think that agriculture contributes to air pollution in your area? Would you say agriculture contributes…**
READ OUT. SINGLE CODE REVERSE FOR 50%

a. **A great deal**
b. **A fair amount**
c. **A little**
d. **Not at all**
e. DO NOT READ OUT: Don't know – GO TO Q10AIR

ASK IF CODED A-C AT Q8AIR
2019 Q9AIR. **To what extent, if at all, do you think agricultural activity on your own farm contributes to air pollution in your area? Would you say activity on your farm contributes…**
READ OUT. SINGLE CODE. REVERSE FOR 50%

a. **great deal**
b. **A fair amount**
c. **A little**
d. **Not at all**
e. DO NOT READ OUT: Don't know

CURRENT UNDERSTANDING
ASK ALL
2019 Q10AIR. **How well informed, if at all, do you feel about ways you could adapt your farming methods to prevent or reduce air pollution in your area? Would you say that you are....**
READ OUT. SINGLE CODE. REVERSE FOR 50%

a. **Very well informed**
b. **Fairly well informed**
c. **Not very well informed**
d. **Not informed at all**
e. DO NOT READ OUT: Don't know

CHANGES MADE

ASK ALL
2019 Q11AIR. **Have you made any changes to your farm or the way that you have farmed in the last two years, with the aim of reducing air pollution in your area?**
READ OUT. SINGLE CODE.

a. **Yes**
b. **No**
c. DO NOT READ OUT Don't know

ASK IF CODE A AT Q11

2019 Q12AIR **In the last two years, what changes have you made with the aim of reducing air pollution?**

MULTICODE. PROBE. DO NOT READ OUT.

a. Reduced N inputs from mineral fertiliser application
b. Reduced N inputs from manure/slurry application
c. Reduced emissions at source (e.g. slurry store covers, farm yard/drainage improvements)
d. Reduced emissions associated with livestock (e.g. livestock exclusion / reduction)
e. Recaptured atmospheric NH_3 (e.g. tree planting)
f. Other SPECIFY:……
g. SINGLE CODE ONLY. Don't know / not sure
h. SINGLE CODE ONLY. Prefer not to say

ASK IF CODE A AT Q11

TREND

2015 Q13 (2013 Q12). **Did any agricultural scheme or initiative help or prompt you to make any of these changes? If yes, which scheme or initiative was that?**

DO NOT READ OUT. MULTICODE. PROBE.

a. Catchment Sensitive Farming (CSF) Project / England Catchment Sensitive Farming Delivery Initiative (ECSFDI)
b. Cross Compliance / Single Payment Scheme (SPS)
c. Farm Assurance Scheme
d. Improved farming practice
e. Countryside Stewardship (CS)
f. Environmental Stewardship (ES)
g. Farming Ammonia Reduction Grant (FARG)
h. Countryside Productivity Scheme
i. English Woodland Grant Scheme
j. Other SPECIFY:……
k. SINGLE CODE ONLY: (Not been prompted by initiative or scheme)
l. SINGLE CODE ONLY: (Don't know)

Cover photo:
Tractor & fertiliser applicator
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Catchment Sensitive Farming (CSF) is delivered in partnership by Natural England, the Environment Agency and Defra.

Department for Environment Food & Rural Affairs

NATURAL ENGLAND

The European Agricultural Fund for Rural Development: Europe investing in rural areas

Environment Agency