Natural England Commissioned Report NECR120

Climate change farm resilience planning

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Farm Resilience Plans are a concept initially developed by Natural England as a way of raising awareness among farmers and land managers of climate change threats and opportunities for their faming and land management systems.

The aim of this pilot was to consider whether a planning approach can be developed that uses the best available evidence, integrates the natural environment and agricultural systems, recommends adaptive actions and is a practical training tool for farm managers planning the future management of their holdings.

It builds on the work of Cheviot Futures and is informed by previous Natural England assessments of climate change impacts and adaptation at the landscape scale.

The findings will be used to develop proposals for the Rural Development Programme for England 2014-2020, and help to implement one of the actions set out in Natural England's *Climate Change Embedding Risk Assessment and Adaptation Report* (NE318).

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Natural England Project Officer - Trevor Mansfield, Senior Advisor, Taunton - 2nd Floor, Riverside Chambers, Castle Street, Taunton, Somerset, TA1 4AP **trevor.mansfield@naturalengland.org.uk**

Contractors - Ruth Kendal & Ian Cairns, SAC Consulting, Divisional Marketing Unit, Ferguson Building, Craibstone Estate, Aberdeen, AB21 9YA

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Further information
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Climate change farm resilience planning

Prepared for: **Natural England**

Prepared by: **Ruth Kendal and Ian Cairns**

SAC Consulting

A report detailing the findings of the Natural England Climate Change Farm Resilience Planning Pilot Project completed in February 2013. It details the background to the project, the methodology, the findings and an assessment of the approach including its validity, impact on farm and practicality.

Summary

Farm Resilience Plans are a concept initially developed by Natural England as a way of raising awareness among the farming population of climate change threats and opportunities for their faming and land management systems. The aim of this pilot project is to consider whether a planning approach can be developed that uses the best available evidence, integrates the natural environment and agricultural systems, recommends adaptive actions and is a practical training tool for farm managers planning the future management of their holdings.

The project ran between October 2012 and February 2013. It involved completing Farm Resilience Plans (FRP's) on ten farms in the North West Region within the Morecambe Bay Limestone's and Eden Valley National Character Areas. The ten farms that participated included a range of type and size of holding and are representative of the type and size of farms in these areas. All the farms had HLS agreements.

The project included testing whether the FRP approach is valid, practical and how it would impact on the farm.

The FRP approach consists of a visit to a farm by a suitably qualified consultant to discuss, on a one to one basis, climate change predictions, potential climate change impacts on the natural environment and farming systems and the possible mitigation measures that can be taken on the farm to reduce negative impacts of climate change and to realise positive impacts. This is informed by information on the environmental features on the farm (in this pilot we used the HLS Farm Environment Plan), and information on likely climate change impacts relevant to the area (Natural England's Climate Change Adaptation assessments for the north-west were used). For this project we developed a Farm Questionnaire, designed to obtain information about current farm management practices. The one to one discussions are then followed by a walk of the farm to assess the likely impact of climate change and determine suitable and practical adaptation actions. This is followed by the production of an individual farm report detailing the findings and discussions and suggesting possible adaptation actions. This approach allows a comprehensive understanding of the farming systems and habitats to be formulated and detailed discussions to take place with the farmer.

The report concludes that the FRP approach, with some minor changes and refinements, will be a valid approach that achieves the objectives of climate change farm resilience planning. It is an effective and practical way of raising awareness among the farming population of climate change threats and opportunities for their faming and land management systems. It is a useful way to enable individual land managers to interpret climate change projections and identify appropriate adaptation measures for their farm. It increases a farmer's knowledge of climate change and provides them with an opportunity to discuss issues specific to their farm with industry expert.

The pilot has demonstrated that it is possible to incorporate an assessment of the natural environment with an assessment of farming systems and that doing these both in tandem ensures that climate change adaptations suggested seek to safeguard both the interests of the natural environment and the farming business.

The pilot was complete on farms with HLS agreements, but there is scope, with some refinements, for the FRP approach to be used as a training tool for wider uptake possibly through inclusion in the next RDPE.

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1 Introduction

Background

1.1 The impacts of Climate Change are already starting to be felt in relation to farming practices and the natural environment. It is important for land managers to understand the potential impacts of climate change on their holdings so enabling them to plan for climate change and adapt appropriately with consideration for potential impacts on the natural environment and farming systems.

1.2 Between October 2012 and February 2013 Natural England piloted an approach to Farm Climate Change Resilience Planning that provided information to land managers enabling them to plan for climate change adaptation at the level of the individual farm. This involved completing Farm Resilience Plans (FRP's) on ten farms in the North West Region within the Morecambe Bay Limestone's and Eden Valley National Character Areas.

1.3 Farm Resilience Plans are a concept initially developed by Natural England as a way of raising awareness among the farming population of climate change threats and opportunities for their farming and land management systems. The concept seeks to replicate climate change risk (and opportunity) assessments conducted recently by many national organisations at a strategic level at the local and practical level. Initial work by Cheviot Futures has suggested that the concept has potential to develop a useful planning tool where farmers are seeking to address climate change related issues such as increasing flood risk due to disruption of rainfall patterns, heat stress in livestock and increasing risk of wind-borne erosion of drier soils.

Aims of the project

1.4 The project evaluates the concept of Farm Resilience Plans as a means for enabling individual land managers to interpret climate change projections and identify appropriate adaptation measures for their farm.

1.5 This pilot project examines how well the Cheviot Futures approach transfers to different geographical locations, how well it can fully incorporate an assessment of the natural environment with the assessment of farming systems and the practicality of the FRP's as a training tool for wider uptake, possibly through inclusion in the next RDPE.

1.6 The aim of this pilot project is to consider whether a planning approach can be developed that uses the best available evidence, integrates the natural environment and agricultural systems, recommends adaptive actions and is a practical training tool for farm managers planning the future management of their holdings.

2 Methodology

2.1 In order to develop a suitable approach to completing the Farm Resilience Planning Pilot project the following material and references were consulted:

- Natural England Technical Information Note TIN108, (4th April 2012, Planning for climate change: North Doddington Farm Edition 1).
- Character Area Climate Change Project NE115R (31st March 2009), responding to the impacts of climate change on the natural environment: The Cumbria High Fells.
- Natural England (July 2010), responding to the impacts of climate change on the Morecambe Bay Limestone's NCA
- www.cheviotfutures.co.uk
- UK Climate Change Projections http://ukclimateprojections.defra.gov.uk

These documents were used to inform the approach to Farm Resilience Planning adopted and as a basis to the visit schedule and questionnaire designed.

Visit schedule and questionnaire design

2.2 Using the information from the reports a visit schedule and questionnaire was designed. This was designed to gather information on the farms current farming systems, the likely climate changes that would impact on the farm, the farms current understanding of climate change risks and opportunities, the current position of the farm in relation to vulnerability to climate change and to determine any potential adaptations that the farm could adopt to mitigate against negative climate change impacts. The visit schedule and questionnaire can be viewed in Appendix 1.

2.3 The questionnaire was designed to capture information regarding the farms current resilience to climate change and to also help identify possible areas where adaptations could take place. The questions formulated were influenced by the reports reviewed and fell into five main categories: soils, water, biodiversity, agronomy and animal health and welfare. The questionnaire covered these five categories.

2.4 Under each category eight questions were formulated. The answers to these questions were evaluated and scored between 0 – 3. A total of 24 points was available for each category and a total of 120 points available for the questionnaire. The scores were used to assign a resilience rating to the farm which determined the farms position in relation to its understanding of and how prepared the farm is to deal with climate change. Details of the scoring mechanism can be seen in Appendix 2.

Pilot farm selection

2.5 Natural England contacted farms with Higher Level Stewardship Agreements in the Morecambe Bay Limestone's and Eden Valley National Character Areas with details of the pilot project and seeking participants in the pilot. A list of potential participants was supplied to the project deliverer.

2.6 Ten farms were selected to take part in the project and have a Farm Resilience Plan produced for their holding. These farms all had Higher Level Stewardship agreements. The farms participating are representative of the type and size of farm and landscapes farmed in this National Character Area.

Farm Number	Farm Type	Land Area (ha)	National Character Area
1	Dairy/Sheep	137	Morecambe Bay Limestone's
2	Beef	1000	Morecambe Bay Limestone's
3	Arable/Beef/Sheep	7000	Morecambe Bay Limestone's
4	Arable/Dairy/B&B Pigs/ OW Sheep	173	Eden Valley
5	Dairy/Arable/Beef/Sheep	1170	Eden Valley
6	Beef/Sheep/Arable	258	Morecambe Bay Limestone's
7	Nature Reserve/Grass Lets	323	Morecambe Bay Limestone's
8	Nature Reserve/Grass Lets	9.5	Morecambe Bay Limestone's
9	Dairy/Beef/Sheep	220	Morecambe Bay Limestone's
10	Dairy/Beef/Sheep/Arable	202	Morecambe Bay Limestone's

2.7 The table above shows that the ten farms visited cover a broad range of farm types and sizes. This is representative of the type and variations of farms in the Morecambe Bay and Eden Valley NCA's.

2.8 All the farms visited had HLS agreements in place and had FEP maps. Natural England supplied the FEP maps and associated information for the 10 farms to be visited. This information was then reviewed prior to the visits and used when on the farm.

On farm resilience plan visit

2.9 The on farm visits consisted of 2 elements. Firstly walking the land and secondly discussions with the farmer.

2.10 During the visit the whole farm was walked to assess the habitat condition, land use and farming systems/management practices. The FEP map was reviewed and any changes to features recorded. During the farm walk any areas or farming practices where climate change may have a potential impact were recorded. These were identified as a result of the contents of the NCA report (which highlighted key impacts likely to occur in different habitats), an assessment of the current condition of habitats and features to assess vulnerability and an assessment of current farming practice taking place and the potential impacts of these practices under different climate change scenarios. The current impacts of extreme weather events were also identified.

2.11 Discussions then took place with the farmer to gather background information on the farm including stocking rates, crops grown and cultivation techniques used. Questions were also asked about the farmers understanding of climate change and any concerns that they had. During this meeting the Climate Change Resilience questionnaire was completed.

Farm resilience plan report

2.12 A template farm resilience plan report was designed and was used as the basis for each of the ten reports written. This template can be seen in Appendix 3.

3 Main findings of the reports

Key climate change impacts

3.1 The key impacts of climate change that could occur on the farms visited may vary depending upon the farms type, location, management systems, topography and habitats. Below is a table of all the main impacts that were highlighted/discussed during the farm visits:

Climate Change	Impact on Farm/Habitats
Drought (particularly spring drought)	Reduced crop yields. Failure of crops to establish. Reduced availability of stock drinking water. Using drought resistant crop varieties.
Increased Summer Rainfall	Reduced ability to access land. Reduced crop yields – possible destocking. Damage to soil structure. Timings of sowing and harvesting negatively affected with failure to plant or harvest crops. Increased soil erosion. Reduced working days. Using varieties of crops less prone to lodging.
Increased Winter Rainfall	Reduced ability to access land. Reduced ability to over winter stock outside. Increased soil erosion particularly from bare arable sites. Reduced crop yields – possible destocking. Damage to soil structure. Timings of sowing and harvesting negatively affected with failure to plant or harvest crops. Reduced working days. Reduced out grazing days.
Warm/Wet Conditions	Increased incidence of animal diseases (fluke and vector borne disease). Increase in invasive weeds.
Harsh Winters with heavy snow	Ability to access land and stock affected. Reduced working days.
Increased Summer Temperatures	Impact on animal health and welfare where shade is limited. Increase of heat stress and related fatalities in stock.
Rising Sea Levels	Loss of land areas to rising sea levels. Salt water incursion.
Flooding	Loss of crops to flooding. Deposits of sediment onto land. Risk to animals. Loss of land due to erosion/ permanent flooding. Loss of arable land due to flood risk.

3.2 The table below shows the climate change impacts that were classed as relevant to each farm.

		1	2	3	4	5	6	7	8	9	10
Drought (particularly spring drought)	Reduced crop yields.	X	X	X	X	X	X			X	X
	Failure of crops to establish.	X		X	X	X	X			X	X
	Reduced availability of stock drinking water.		X								
	Using drought resistant crop varieties.	X		X	X	X					
Increased Summer Rainfall	Reduced ability to access land.	X	X	X		X	X	X		X	X
	Reduced crop yields – possible destocking.									X	
	Damage to soil structure.	X	X	X	X	X	X		X	X	X
	Timings of sowing and harvesting negatively affected with failure to plant or harvest crops.	X		X	X	X	X			X	
	Increased soil erosion.	X	X	X	X	X	X				
	Reduced working days.			X				X			
	Using varieties of crops less prone to lodging.			X	X	X					
Increased Winter Rainfall	Reduced ability to access land.	X	X	X	X	X	X			X	X
	Reduced ability to over winter stock outside.	X	X	X		X	X			X	
	Increased soil erosion particularly from bare arable sites.	X		X	X	X	X			X	X
	Reduced crop yields – possible destocking.			X						X	
	Damage to soil structure.	X	X	X	X	X	X				X
	Timings of sowing and harvesting negatively affected with failure to plant or harvest crops.	X		X	X					X	
	Reduced working days.			X							
	Reduced out grazing days.	X	X				X			X	X
Warm/Wet Conditions	Increased incidence of animal diseases (fluke and vector borne disease).	X	X	X	X	X	X		X	X	X
	Increase in invasive weeds.	X	X	X	X			X	X	X	X
Harsh Winters with heavy snow	Ability to access land and stock affected.		X						X	X	
	Reduced working days.		X								
Increased Summer Temperatures	Impact on animal health and welfare where shade is limited.		X								
	Increase of heat stress and related fatalities in stock.		X								
Rising Sea Levels	Loss of land areas to rising sea levels.			X				X		X	
	Salt water incursion.			X				X		X	
Flooding	Loss of crops to flooding.			X						X	
	Deposits of sediment onto land.			X		X				X	
	Risk to animals.									X	
	Loss of land due to erosion/ permanent flooding.							X		X	
	Loss of arable land due to flood risk.			X						X	

Farm resilience plan questionnaire scores

3.3 Using the results from the Farm Resilience Plan questionnaire a resilience score was calculated for each farm on an overall basis and for each category of questions (Water, Soils, Animal Health and Welfare, Biodiversity and Agronomy. The results of the questionnaire are summarised below.

	Number of Farms scoring a Low Resilience to Climate Change Score	**Number of Farms scoring a Medium Resilience to Climate Change Score**	**Number of Farms scoring a High Resilience to Climate Change Score**
Soil	0	5	5
Water	0	5	5
Biodiversity	0	3	7
Animal Health and Welfare	1	4	5
Agronomy	1	1	8
Overall Scores	0	4	6

Adaptation actions suggested

3.4 On each farm visited there were a range of potential adaptation measures that could be implemented. In the farm report priority or key adaptations were recommended for implementation on each farm.

3.5 The decision about which potential adaptations were suggested was based on an assessment of the adaptations potential to protect the natural environment, their potential impact on the farming practices and discussions with the farmer about likelihood of uptake and how the adaptations would work within their farming system or their future plans and objectives for their holdings. Similar enterprises, for example the farms with dairy, saw different adaptations being put forward. This is because some farms had already some adaptation where others had not. An assessment of the farms farming practice/systems and what would be feasible and practical on that particular holding also influenced the recommendations meaning different adaptations were put forward.

3.6 There was a need to consider the adaptations suggested carefully as it was important to balance the impact on the natural environment with the impact on the farming business. Adaptations suggested aimed to protect and enhance the existing habitats on the farms while limiting the negative impact on the farms profitability and maximising any positive impacts. In some cases there was a trade off to be made between the two and in order to make a decision a wider understanding of the natural environment and farming economy is required.

3.7 Below is a table which lists the key adaptation measures suggested and the number of times that they were suggested as a main adaptation action on the 10 pilot farms. Is also shows the level of change to farming practice (investment and time) that will be required to implement these changes.

Adaptation Measure Suggested	Number of times suggested a main action.	Farms on which option suggested	Level of change to farming practice required*
Produce a biosecurity plan	5	1, 2 ,3,4,	Low
Assess soil structure and consider remedial action	4	1, 2, 3,10	Medium
Improve drainage	3	1, 3, 7	Medium
Produce/update and animal health and welfare plan	3	3, 9, 10	Low
Reduce the amount dirty water and slurry produced	3	5, 6, 7	Medium
Rainwater harvesting	2	1, 7	High
Resurface gateways, tracks, feeders, troughs	2	2, 4	Medium
Reduce herd size and investigate financial implications	2	6, 7	High
Assess impact of changes in management and climate change on species and habitats (e.g. butterfly)	2	7, 8,	Low
Assess suitability of rotation and consider if some areas are best removed from rotation to permanent pasture	2	8, 10	High
Increase slurry storage	1	1	High
Sample slurry and FYM	1	1	Medium
Increase animal housing	1	2	High
Increase shade and shelter	1	2	High
Produce a pesticide management plan	1	3	Low
Consider using drought resistant varieties of crop	1	4	Medium
Sample soils for organic matter	1	4	Medium
Invest in irrigation	1	4	High
Adjust arable area and drilling season	1	5	High
Alter herd management to restore habitats	1	5	High
Move to home reared replacements in the dairy herd	1	5	Medium
Management plan for marginal river fields	1	6	Low
Create adaptable grazing agreements with graziers	1	7	Low

* Based on an assessment of the level of financial (income foregone/investment) and time investment (set up/management) required by the farmer to make these changes.

Analysis of findings

3.8 The climate change impacts that were highlighted as being key issues on the farm varied according to key factors such as farm soil type, elevation, farming system, cropping and stocking intensity. Issues surrounding prolonged spells of wet weather seemed the primary concern (this is likely to have been influenced by the timing of the pilot post the 2012 higher than average rainfall). This was not always the farmer's primary concern with drought and prolonged periods of snow being also cited as primary concerns.

3.9 The overall climate change resilience scores were all either medium or high. The majority of the scores for the 5 sub sections of the questionnaire were also medium or high. This is likely to be a result of the fact that all the farms participating in the pilot had HLS agreements and as a result had already taken some positive climate adaptations on their farms as promoted through these schemes. Farmers with HLS agreements may also be more interested in biodiversity and as a result may score higher in this area. It would be interesting to determine if FRP's completed on non HLS farms or a mix of farms achieved a more diverse spread of scores.

3.10 The adaption actions suggested varied greatly as they were specifically tailored for each farm. However there were a few actions that were recommended 3 to 5 times on the farms visited. These relate to biosecurity, soil structure, animal health and welfare planning, drainage and reducing the amount of dirty water produced on farms. These are more general actions that farms can take to build their resilience to climate change. The reports however did mention more specific actions individual to that farm that are of equal importance.

3.11 Adaptations suggested would help to build a farms resilience to climate change both in terms of its viability as a business and also as a custodian of the natural environment. The adaptation actions vary between holdings and therefore the extent to which the adaptations would build resilience also differs. Many of the adaptations put forward could be built into the existing farm practices without the need for significant alterations to practices, stocking or cropping. These adaptations are more likely to be the low cost options. However adaptations such as reducing herd size, removing areas from rotation and moving to permanent pasture would require more investment, planning and time input if the natural environment and the farms are going to benefit.

4 Validity of the farm resilience planning approach

4.1 **Identification of impacts of climate change:** The identification of the potential impacts of climate change requires a significant level of understanding of the range of potential impacts and adaptation strategies that can be adopted. This approach is a valid approach providing that the person delivering has appropriate knowledge of climate change impacts and adaptations relevant to farming systems and environmental management. There is a wealth of knowledge available on the potential impacts of climate change on farming systems and environmental management and knowledge in excess of that included in the NCA adaptation reports is required to make a fully informed assessment. The NCA reports are a starting point for highlighting relevant climate change risks and opportunities for the farms in the locality and will help to provide a degree of local tailoring. However the NCA report should be used in line with other sources of information as its focus is not specifically agricultural (although this was covered) and there is more detail in other documents specifically relating to the impacts of climate change on agriculture and the natural environment which if utilised by a suitably experienced person can be interpreted at a local level.

Overall this approach was successful in highlighting all the relevant issues for the farming system and environmental management. The approach was able to overcome any focus on the 2012 weather events as discussions were steered by the advisor who discussed all the relevant climate changes likely to occur in the locality.

4.2 **Face to face meeting:** The face to face meeting approach allows for in depth discussions to take place with the farmer about climate change which enables the key issues that are likely to affect that particular farm to be identified and potential adaptation strategies to be discussed. The ability to tailor discussions to an individual farm situation ensures that the most will be achieved from a visit. The wide variety of knowledge on climate change and adaptations means that in order to keep the validity of this approach the deliverer will need to be able to steer discussions.

4.3 **Farm resilience questionnaire:** The questionnaire approach has a number of benefits. It ensures structure to the visit and ensures that all the topics are covered and discussed in detail. Having completed the 10 pilot FRP's these questions should be revisited and reworked with some questions being changed or removed and additional questions put forward. The scoring of the questionnaire is useful as it clearly indicates the areas where farmers need to focus their attention in order to adapt to climate change. The use of the colour coded traffic light system provides a clear point of reference. The scoring system allows a clear comparison to be made between farms. If FRPS were rolled out more widely, they could be used to encourage adaptation across several farms in one area, whilst the results could be mapped to help target training.

Following delivery of the pilot project, the delivery team would suggest a rationalisation and simplification of the questionnaire. The 5 technical areas should remain, but the number of questions in each section should be reduced from 8 to 6. The following changes are proposed in the table below.

Section	Proposed change	Resulting question
Water	Combine questions 1-3	Have you implemented water efficiency measures? (e.g. water audit, assessment of system for leaks)
Soil	Combine questions 1,2 and 6	Have you assessed all soil erosion and management risks? (e.g. using SPR or other soil management planning)
Biodiversity	Combine questions 1 & 4 and drop question 3	Are you aware of the biodiversity on your farm and its national importance? (e.g. BAP Species)
Animal health & Welfare	Drop questions 6 & 7 and replace question 2	Do you use an up to date animal health & welfare plan?
Agronomy	Drop question 8 and combine questions 6 and 7.	Do you implement a pesticide management plan? (e.g. Planning using weather forecasts and application techniques on recommendations of BASIS qualified adviser)

4.4 **Walking the Farm:** Walking the entire area of the farm is a time consuming process but does have significant benefits in regards to getting a full understanding of the farms topography, layout, farming systems and also provides a opportunity to identify issues relating to, for example, soil structure, erosion and flooding. It is therefore an essential part of the visit.

5 Farm level impact of the FRP approach

5.1 All of the farmers who agreed to participate in the pilot project fully engaged with the process. They were very open and willing to discuss issues and concerns on their farms and were keen to learn more about how climate change may affect their business and how they could adapt to the changes.

5.2 During the visits the farmers asked many questions about climate change predictions and potential adaptations that could take place. Therefore in terms of raising awareness and educating farmers about climate change and its impacts the FRP approach had the desired effect. If after the visit a summary document about climate change predictions and potential impacts on different farm types could be left at the farm this would be a useful and interesting reference document for the farm.

5.3 The participants were keen to hear about the things that they could potentially do to mitigate against the negative effects of climate change, and were willing to consider new ideas and adapt where necessary. The limiting factors to adapting to climate change included an uncertainty about the validity of climate change predications and a lack of understanding of which effects were the most likely to occur. During the visit it was possible to make farmers aware of the main climate change impacts likely to occur, however there were some restrictions in terms of time and farmer engagement to go into detail and statistics. If an information document with further details could be left after the visit this may help educate farmers on the validity and scientific evidence behind the climate change predictions. Financial constraints of funding the adaptations were also a limiting factor. Signposting to grant schemes and detailing option payback periods may help to improve uptake.

5.4 The approach taken was heavily focused on open discussions with farmers and this ensured that the farmers were engaged in the process and were open to suggestion. Their own views and ideas were discussed and considered as well as new ideas put forward by the advisor. The visit suggested new adaptation ideas as well as reinforced the increasing importance of actions already being considered by farmers in response to climate change and directives such as the Water Framework Directive. This approach has raised awareness about the potential adaptation actions that can be taken and this will ensure that farmers can build this into their forward planning. This is vital if the natural and the farmed environment are to remain viable in light of climate change.

5.5 As the farms have not been visited after receiving their reports it is difficult to discuss the likelihood that potential adaptations will be taken forward. There is a need to revisit farms to discuss the reports in more detail. The potential adaptations that were put forward were discussed during the farm visit and priority adaptations were determined by taking into account the favoured options of the farmers. This approach should result in a better uptake of adaptions post the FRP report.

5.6 If farms were to implement all the recommendations in the reports then their resilience to climate change should be enhanced and farmed and natural environment as well as their livelihoods should be better positioned to respond favourably to climate changes. However the recommendations were made according to the farms current systems or planned systems of production. Socio-economic changes could mean that significant unforeseen changes to farming practices may occur and this may result in a change in potential impacts of climate change. Therefore farm resilience planning needs to be an on going responsive process.

5.7 The timescale for many of the adaptations put forward was over a number of years so the full impact of the FRP approach would not be felt for many years.

5.8 Many of the adaptations suggested will not only help to raise awareness of climate change but will also help to work towards the objectives of other directives such as the Water Framework Directive and the Nitrates Directive.

6 Practicality of the FRP approach

6.1 **Pre visit information:** The pre visit information supplied consisted of the farm address and contact details and the farm FEP maps and eFEP details. This information was very useful to have before the visit to enable some basic preparation to take place such as examining OS maps and satellite images. Additional information that would have been beneficial would have been details on the farms stocking/cropping and basic farm details. It would also have been useful to have the HLS agreement maps.

6.2 **Farmer engagement:** At first it was difficult to get farmer engagement in the project as farmers were not familiar with the project. Once farmers had more information about the project and understood its aims then they were keen to participate and engaged with the process.

6.3 **The visit:** The open nature of the discussions held with the farmers indicated that the farmers were comfortable with the nature of the approach and were willing to discuss the issues in detail being frank and open about their systems and practices. In practice the questionnaire could be stream lined and the number of questions reduced. The face to face meeting took between 1 and 2 hours and this seemed a suitable length of time. It would not be practical for the farmers to accompany the deliverer on the walk of the farm due to the time commitment that it would involve. The farmers were however very willing for the advisor to walk the farm independently. In most cases the one to one meeting with the farmer happened prior to the walk of the farm land. This was practical as then the farmer could point out areas of concern on the map so the advisor could focus on these areas.

6.4 **Time allowances:** FRP's are taking longer to complete than the original half day expected. Visits during the pilot report lasted between 3.5 hours and 6 hours (plus travelling). In order to get a full and comprehensive understanding of the farm it is important to spend time with the farmer to discuss all the potential climate change issues associated with the farm. During the pilot project this took between 1 and 2 hours of face to face discussions with the farmer. This places a significant time requirement on the farmer but is necessary if a comprehensive and practical individually tailored FRP is to be compiled. Walking the farm land to assess the condition of the habitats and the farming system is a valuable exercise. Depending upon the farm size/ layout this task takes a considerable time. During the pilot this was taking between 2 and 4 hours. It maybe possible to prioritise areas to examine prior to a visit but this approach risks missing some of the issues that may otherwise have been overlooked such as issues with location of ring feeders and water troughs.

6.5 **Season of Visit:** Concerns were raised that the farm was only visited once and this will only provide a snapshot view of the farm. Different issues will be evident during the farm walk during different seasons and weather conditions. While this concern is partly shared, advisors should be able to use their understanding of climate change and farming systems to assess the potential risks to the habitats, farming systems and practices from an assessment of the land made during any weather condition/ seasons by looking at topography, soil type and structure, management practices and habitat conditions.

6.6 **Report Writing and feedback to the farmer:** During the visit to the farm discussions were made about the potential adaptations that would be listed in the report and the practicalities of these adaptations determined. It is however very important to provide the farmer with a written report detailing the discussions made and presenting the findings. As the farm walk was usually carried out after the meeting with the farmer this often identified issues on the farm that had not been discussed with the farmer. There is therefore an argument that a second meeting should occur with the farmer to discuss the findings. This could coincide with the delivery of report. Delivering the report in person could have its benefits as it would provide the farmer with a second chance to discuss issues and a chance to discuss the report.

6.7 **Signposting:** There is a huge amount of literature in the public domain about the impact of climate change on farming and the natural environment. It would be useful to be able to signpost

farmers to the further information available. In the reports farmers were signposted to possible funding streams where appropriate. This is a very valuable exercise.

6.8 **FRP Approach on a non HLS Farm:** The farms in the FRP pilot project all had HLS agreements. Natural England provided the farmer with the farms FEP maps and e-FEP documents which gave the advisor information on the habitats/features and the farm prior to the visit. This was useful but it would be possible to adopt the FRP approach on non HLS farms. There would be additional work involved on non HLS farms as an assessment of the habitats and features would have to be completed by the advisor during the visit. This would not need to be in as much detail as the FEP maps but would need to at a minimum identify the different habitats and habitat conditions on the farm and this would need to be mapped.

7 Conclusions

7.1 This approach is a valid approach that achieves the objectives of climate change farm resilience planning. It is an effective and practical way of raising awareness among the farming population of climate change threats and opportunities for their faming and land management systems.

7.2 It is a useful way to enable individual land managers to interpret climate change projections and identify appropriate adaptation measures for their farm. It increases a farmer's knowledge of climate change and provides them with an opportunity to discuss issues specific to their farm with an industry expert.

7.3 This pilot project demonstrates that an approach originally formulated in the Cheviots can transfer to a different geographical area and produce useful and informative outcomes. The use of face to face farmer meetings coupled with walking the farm allowed a comprehensive understanding of the farming systems and habitats to be formulated and detailed discussions to take place with the farmer.

7.4 The pilot has demonstrated that it is possible to incorporate an assessment of the natural environment with an assessment of farming systems and that doing these both in tandem ensures that climate change adaptations suggested seek to safeguard both the interests of the natural environment and the farmers.

7.5 The approach on the whole seemed practical and there were few difficulties encountered in completing the visits and reports. There are some minor changes and refinements needed to the approach to increase its practicality. These include revisiting the FRP questionnaire and amending/replacing some questions and possibly reducing the number of questions asked, discussing the need to increase the time allowance for the visits or tailoring it to the size of the farm and determining if there would be benefit in having a second visit to discuss the farm report once it had been produced. If these refinements were made then there is scope for the FRP approach to be used as a training tool for wider uptake possibly through inclusion in the next RDPE.

7.6 This approach was piloted on farms with HLS agreements. The information was useful in completing the FRP. However it would be possible to complete an FRP on a farm without a HLS agreement as many of the same principles still apply. There may however be a greater time input required to identify and map some of the habitats and features on the farm and this would have to be factored in to the time allocation.

7.7 Consideration should be given to a second (follow up) farm visit in the delivery protocol, which would enable the recommendations to be discussed with the farmer and subsequently ranked according to priority and/or farmer likelihood to implement the recommendations.

Appendix 1 – Farm visit schedule and questionnaire

Climate change farm resilience planning

Farm Visit Schedule

Date: 26.11.12 Version 2

Section 1: Farm Enterprise

Gather the following information from the farmer.

Farm size and Location

Enterprises with a description of hectare given over to each enterprise and description of system (e.g. arable rotations, number of livestock, grazing periods).

Farming inputs (e.g. fertilisers type, volume and fields where applied).

Current HLS application and options

Section 2: Farm Environmental Information

Gather the following information from the farmer.

Brief summary of main feature on farm including:

Habitats – presence, condition and current management

Notable Species – presence, trends in population, habitat associations.

Soils – Extent of different soil types, current use and condition including any evidence of erosion and compaction.

Section 3: FEP

Walk the farm and assess the farms current FEP noting any changes in condition of features or additional features that have not been recorded. Look for any signs of erosion, compaction etc.

Section 4: Assessment of farms resilience

Ask the farmer the following questions and discuss the issues with the farmer.

Farm Resilience Planning: Water

Q1) Have you completed a water audit on your holding?

Score	Comments
0 (no action)	*E.g. What is a water audit*
1 (aware but no action)	*E.g. Farmer aware of what a water audit is but not completed one.*
2 (moderate action)	*E.g. Farmer has completed a water audit but has not adopted any of the recommendations*
3 (actively mitigating)	*E.g. Farmer has completed a water audit and has acted on recommendations*

Q2) Have you taken any steps to improve the efficiency that water is used on your farm?

Score	Comments
0 (no action)	*E.g. Not aware of the steps that could be taken*
1 (aware but no action)	*E.g. Aware of steps that could be taken but has not implemented them.*
2 (moderate action)	*E.g. Has taken some basic steps to improve water efficiency. Such as repairing leaks*
3 (actively mitigating)	*E.g. Has taken large steps to improve water efficiency such as greywater recycling*

Q3) Have you assessed your farm water network for leaks?

Score	Comments
0 (no action)	*E.g. Not aware of the benefits of leak monitoring*
1 (aware but no action)	*E.g. Aware of the need to do this but no action taken*
2 (moderate action)	*E.g. Looks for signs of leaks but has never reviewed the whole system.*
3 (actively mitigating)	*E.g. Has completed a leak detection exercise on the farm.*

Q4) Do you rely on mains water or have you diversified your water source? E.g. Boreholes, irrigation reservoirs, rainwater harvesting.

Score	Comments
0 (no action)	*E.g. Farmer fully reliant upon one water source and plans to take no action.*
1 (aware but no action)	*E.g. Farmer aware of the benefits of having diversified water sources on the farm but has taken no action.*
2 (moderate action)	*E.g. Farmer has made enquiries into possible alternative water sources*
3 (actively mitigating)	*E.g. Farmer has diversified the water sources on the farm.*

Q5) Have you made any provision to ensure security of water supply during drought conditions?

Score	Comments
0 (no action)	*E.g. Farmer not aware that drought maybe an issue*
1 (aware but no action)	*E.g. Farmer aware of drought problems but has done nothing to mitigate*
2 (moderate action)	*E.g. Farmer has plans in place to mitigate against drought*
3 (actively mitigating)	*E.g. Farmer has completed mitigation measures such as increased winter rainfall storage.*

Q6) Have you made any provision to reduce the volumes of dirty water and slurry that are produced over winter?

Score	Comments
0 (no action)	*E.g. Farmer is not aware that this may be an issue*
1 (aware but no action)	*E.g. Farmer aware of potential increased volumes but has taken no action*
2 (moderate action)	*E.g. Farmer has taken some steps to divert clean water from stores*
3 (actively mitigating)	*E.g. Farmer has diverted clean water from slurry stores/ roofed slurry stores or has constructed extra storage.*

Q7) Have you considered using or implementing flood protection measures?

Score	Comments
0 (no action)	*E.g. Farmer not aware this maybe an issue*
1 (aware but no action)	*E.g. Farmer aware of the need but has taken no action*
2 (moderate action)	*E.g. Farmer has plans in place to protect against flooding but has taken limited action*
3 (actively mitigating)	*E.g. Farmer has taken action against flooding such as constructing flood defences, changing cropping patterns and increasing flood water storage.*

Q8) Have you considered the implications of drought/deluge on the crops they grow or animals they rear? Reduced yields/risk of flooding to livestock and crops.

Score	Comments
0 (no action)	*E.g. Farmer not aware that there maybe any issues*
1 (aware but no action)	*E.g. Farmer aware of the issues but has taken no action*
2 (moderate action)	*E.g. Farmer has plans in place such as changing varieties of crops or destocking but has not implemented them.*
3 (actively mitigating)	*E.g. Farmer has already altered practices to mitigate against the negative impacts of climate change on crops yields.*

Farm Resilience Planning: Soils

Q1) Have you completed your Soil Protection Review to the end of 2011?

Score	Comments
0 (no action)	*E.g. Farmer cannot find SPR*
1 (aware but no action)	*E.g. Farmer provides SPR but nothing been completed*
2 (moderate action)	*E.g. partially completed*
3 (actively mitigating)	*E.g. fully complete, incl. post harvest management and access to waterlogged land sections*

Q2) Do you have a separate soil management plan?

Score	Comments
0 (no action)	*E.g. soil management plan never been considered*
1 (aware but no action)	*E.g. been considered but never actioned*
2 (moderate action)	*E.g. ELS plan completed but not updated*
3 (actively mitigating)	*E.g. soil management plan in place and actively updated*

Q3) Have you ever done any soil texturing exercises?

Score	Comments
0 (no action)	*E.g. Farmer does not know what is meant by soil texturing.*
1 (aware but no action)	*E.g. farmer knows about it, but has never done any*
2 (moderate action)	*E.g. Farmer has marked fields according to SPR classifications*
3 (actively mitigating)	*E.g. Farmer knows the over-all soil type according to the soil texturing guidelines e.g. silty clay loam*

Q4) Where water collects or crops struggle, do you ever dig profile pits to assess soil structure?

Score	Comments
0 (no action)	*E.g. Wet areas ignored in general*
1 (aware but no action)	*E.g. these wet areas are known, but areas are worked less hard e.g. less fertiliser rather than looking at underlying problems.*
2 (moderate action)	*E.g. areas have been highlighted and small holes have been dug to look at topsoil*
3 (actively mitigating)	*E.g. proper profile pits are dug, down to the subsoil, and exposed face of hole assessed to show signs of compaction, poor soil structure and possible ways to remedy.*

Q5) Are your fields drained and regularly maintained?

Score	Comments
0 (no action)	*E.g. No idea*
1 (aware but no action)	*E.g. some outfalls known, but never investigated to see where drains are and no maintenance completed*
2 (moderate action)	*E.g. some fields have drainage maps, incomplete wet areas dug and broken drains fixed*
3 (actively mitigating)	*E.g. Full drainage map retained and updated as needed. drain outfalls regularly maintained, ditches cleaned, repairs made in a timely fashion, drains jetted if necessary*

Q6) Are you aware of any risk of soil erosion on your farm?

Score	Comments
0 (no action)	*E.g. Farmer not aware of any and unsure how to identify*
1 (aware but no action)	*E.g. Farmer aware of how to identify but has not assessed farm.*
2 (moderate action)	*E.g. Farmer has identified erosion risk*
3 (actively mitigating)	*E.g. Farmer has identified erosion risk and has acted to mitigate*

Q7) Do you have any compaction caused by machinery and/or livestock?

Score	Comments
0 (no action)	*E.g. No idea*
1 (aware but no action)	*E.g. some wheeling's noted but never remedied*
2 (moderate action)	*E.g. some damage, which is noted and acted upon*
3 (actively mitigating)	*E.g. no damage as a result of proactive management*

Q8) Do you monitor and manage levels of soil organic matter?

Score	Comments
0 (no action)	*E.g. Never and not aware as to why it would be a benefit*
1 (aware but no action)	*E.g. thought about it but never done anything*
2 (moderate action)	*E.g. Aware of the benefits and has visually assessed soils but never taken samples*
3 (actively mitigating)	*E.g. Taken samples and uses a manuring plan to build up OM*

Farm Resilience Planning: Bio-diversity

Q1) Are you aware of the Biodiversity on your farm including BAP species?

Score	Comments
0 (no action)	*E.g. No*
1 (aware but no action)	*E.g. Aware of some of it, just what they see on a day to day basis*
2 (moderate action)	*E.g. have a rough idea of BAP species on holding*
3 (actively mitigating)	*E.g. have a list of BAP species identified on the holding and protection plans in place.*

Q2) Do you have any protected habitats on your holding, SSSI or SAC?

Score	Comments
0 (no action)	*E.g. Don't know*
1 (aware but no action)	*E.g. yes, but don't know what should be doing with it*
2 (moderate action)	*E.g. yes, and try to avoid over stocking/reducing intensity of management*
3 (actively mitigating)	*E.g. yes, and have taken them out of production using a stewardship scheme.*

Q3) Do you use your FEP as a working document?

Score	Comments
0 (no action)	*E.g. What is a FEP?*
1 (aware but no action)	*E.g. know where it is but don't know what's on it*
2 (moderate action)	*E.g. look at it annually to remind where the main priorities are located.*
3 (actively mitigating)	*E.g. on an annual basis assess items on FEP in terms of condition and plans in place to protect and enhance these features.*

Q4) Are you aware of any notable species on your farm?

Score	Comments
0 (no action)	*E.g. No aware of any.*
1 (aware but no action)	*E.g. yes, but ignore them*
2 (moderate action)	*E.g. yes, and try to reduce inputs and stock to prevent damage.*
3 (actively mitigating)	*E.g. Try to encourage species.*

Q5) How do you manage your field boundaries?

Score	Comments
0 (no action)	*E.g. Do not take any specific steps*
1 (aware but no action)	*E.g. As required under cross compliance*
2 (moderate action)	*E.g. Use measures above those that are mandatory and some other small management steps.*
3 (actively mitigating)	*E.g. Taken significant steps to manage field boundaries above what is mandatory*

Q6) Are you aware of any invading species on your land?

Score	Comments
0 (no action)	*E.g. Not aware.*
1 (aware but no action)	*E.g. Aware but has taken no action.*
2 (moderate action)	*E.g. Aware and has taken some steps such as removal*
3 (actively mitigating)	*E.g. Aware and have taken management steps to remove and also steps to limit spread.*

Q7) How do you manage the habitats on your farm (including aquatic habitats)?

Score	Comments
0 (no action)	*E.g. No specific management*
1 (aware but no action)	*E.g. Aware of the need to manage but no actions taken*
2 (moderate action)	*E.g. Aware and makes some provision within day to day management*
3 (actively mitigating)	*E.g. Understands the issues and is actively managing habitats*

Q8) Do you manage your farm woodlands and trees?

Score	Comments
0 (no action)	*E.g. No management of woodlands/trees*
1 (aware but no action)	*E.g. Aware of the need to but currently no management...*
2 (moderate action)	*E.g. Aware and has taken steps to manage such as excluding stock.*
3 (actively mitigating)	*E.g. Aware and is actively managing trees and woodland*

Farm Resilience Planning: Animal Health and Welfare

Q1) Do you implement a biosecurity plan?

Score	Comments
0 (no action)	*e.g. not aware*
1 (aware but no action)	*e.g. aware but no action*
2 (moderate action)	*e.g. aware and have a plan*
3 (actively mitigating)	*e.g. aware, have a plan and regularly review this plan and enforce it.*

Q2) Have you completed and animal health and welfare plan?

Score	Comments
0 (no action)	*E.g. Not aware of what this is.*
1 (aware but no action)	*E.g. Aware but has not completed one.*
2 (moderate action)	*E.g. Has completed a plan*
3 (actively mitigating)	*E.g. Has completed a plan and has acted on the plan.*

Q3) Do you have a stock vaccination programme?

Score	Comments
0 (no action)	*E.g. Not aware of what this is.*
1 (aware but no action)	*E.g. Aware but has not completed one.*
2 (moderate action)	*E.g. Has completed a plan*
3 (actively mitigating)	*E.g. Has completed a plan and has acted on the plan.*

Q4) Have you considered the best production system for your land in relation to climate change? Intensive/Extensive.

Score	Comments
0 (no action)	*e.g. Not aware of the issues*
1 (aware but no action)	*E.g. Aware but does not plan to change.*
2 (moderate action)	*E.g. Has considered and may change slightly*
3 (actively mitigating)	*E.g. has assessed this and plans to change production as .a result.*

Q5) Do you analyse forages and feeds for nutritional value?

Score	Comments
0 (no action)	*e.g. Never analysed and not aware of the benefits*
1 (aware but no action)	*E.g. Aware of the benefits but no analysis completed*
2 (moderate action)	*E.g. Some foodstuffs have been analysed in past*
3 (actively mitigating)	*E.g. Regularly analyses foodstuffs.*

Q6) Do you purchase breeding livestock or do you have a self contained breeding policy?

Score	Comments
0 (no action)	*e.g. not aware*
1 (aware but no action)	*e.g. aware of the implications but have taken no action*
2 (moderate action)	*e.g. aware of the implications and have altered some practices/plans*
3 (actively mitigating)	*e.g. aware of the implications and have taken action or have contingency plans in place*

Q7) Do you have a high output system?

Score	Comments
0 (no action)	*e.g. not aware*
1 (aware but no action)	*e.g. aware of the implications but have taken no action*
2 (moderate action)	*e.g. aware of the implications and have altered some practices/plans*
3 (actively mitigating)	*e.g. aware of the implications and have taken action or have contingency plans in place*

Q8) Is shade and shelter available to livestock in all gazing areas?

Score	Comments
0 (no action)	*e.g. not considered*
1 (aware but no action)	*e.g. aware that areas lack shelter*
2 (moderate action)	*e.g. aware that areas lack shelter and have taken steps to provide some shade and shelter*
3 (actively mitigating)	*e.g. aware that areas lack shelter/shade and have embarked on a programme to rectify this e.g. planting shelter belts*

Farm Resilience Planning: Agronomy

Q1) Do you analyse your soils for nutrients/OM?

Score	Comments
0 (no action)	*E.g. Never been analysed*
1 (aware but no action)	*E.g. farmer acknowledges possibly benefits but never invested*
2 (moderate action)	*E.g. soils analysed >4 years ago, or free through CSF*
3 (actively mitigating)	*E.g. farmer analyses soils on a set 4 year rotation*

Q2) Do you analyse your slurry or farm yard manure for nutrients?

Score	Comments
0 (no action)	*E.g. Never been analysed*
1 (aware but no action)	*E.g. farmer acknowledges possibly benefits but never invested*
2 (moderate action)	*E.g. organic manures analysed >4 years ago, or free through CSF*
3 (actively mitigating)	*E.g. farmer analyses manures regularly*

Q3) Do you have a Whole Farm Nutrient Management Plan for your farm?

Score	Comments
0 (no action)	*E.g. What is a Nutrient Management Plan*
1 (aware but no action)	*E.g. Farmer aware of the benefits of a Nutrient Management Plan but has not got one.*
2 (moderate action)	*E.g. Partial Plan*
3 (actively mitigating)	*E.g. Full Nutrient Management Plan completed for the farm*

Q4) Do you use a planning tool such as PLANET, RB209 or Tried and Tested to plan your fertiliser applications?

Score	Comments
0 (no action)	*E.g. Not aware o these tools*
1 (aware but no action)	*E.g. Has got the tools to hand but has not used them*
2 (moderate action)	*E.g. Has tried to use the tools or has applied the tools on part of the farm*
3 (actively mitigating)	*E.g. Uses a tool to plan all the farms fertiliser applications.*

Q5) Do you seek advice on fertilisers from a FACTS qualified advisor?

Score	Comments
0 (no action)	*E.g. Not aware of FACTS*
1 (aware but no action)	*E.g. Aware of FACTS Qualification and advisors*
2 (moderate action)	*E.g. Has had advice from a FACTS advisor in the past or is FACTS qualified*
3 (actively mitigating)	*E.g. Regularly uses a FACTS qualified advisor to plan fertiliser applications*

Q6) Do you use weather forecasting data to plan nutrient, pesticide and herbicide applications?

Score	Comments
0 (no action)	*E.g. Does not recognise the need to consult weather forecasting data in relation to applications*
1 (aware but no action)	*E.g. Aware of the need to consult weather forecasting before applications but does not regularly do this.*
2 (moderate action)	*E.g. Consults national/regional weather forecasts before majority of applications*
3 (actively mitigating)	*E.g. Consults local weather forecasting data before applications*

Q7) Do you have a Pesticide Management Plan?

Score	Comments
0 (no action)	*E.g. Does not have a plan and does not need one*
1 (aware but no action)	*E.g. Aware of the need for a plan but has taken no action.*
2 (moderate action)	*E.g. Has a plan but does not keep it updates*
3 (actively mitigating)	*E.g. has a plan that is regularly updates and followed*

Q8) Are you aware of application techniques that can be used to prevent loss of pesticides/herbicides to the environment?

Score	Comments
0 (no action)	*e.g. Not aware*
1 (aware but no action)	*e.g. Aware but not using*
2 (moderate action)	*e.g. Aware and using some techniques*
3 (actively mitigating)	*e.g. Aware and using techniques*

Appendix 2 – Farm Resilience Rating Questionnaire Scoring

Farm Resilience Rating Score – Sub Categories (Soil, Water, Agronomy, Biodiversity and Animal Health and Welfare)

Score (max.24)	Rating	Description
0 – 7	Low	There is little or no understanding about how climate change may affect the (XX category). Few preparations have been made to adapt to or mitigate against climate change. The farm is not prepared to deal with the potential impacts of climate change on (XX category).
8- 16	Medium	There is a good level of understanding about how climate change may affect the (XX category). Small steps have been taken to adapt to or mitigate against climate change or plans have been drawn up to make changes. The farm is partially prepared to deal with the potential impacts of climate change on (XX category).
17 - 24	High	The farm has excellent understanding of how climate change will affect the (XX category). The farm has taken steps to adapt to and to mitigate against the effects of climate change and is well prepared to deal with these changes. The farm is fully prepared to deal with the potential impacts of climate change on (XX category).

Overall Farm Resilience Rating

Score (max. 120)	Resilience Rating	Comments
0 – 39	Low	There is little or no understanding about how climate change may affect the environment and farming practices. Few or no preparations have been made to adapt to or mitigate against climate change. The farm is not prepared to deal with the potential impacts of climate change.
40 – 80	Medium	There is a good level of understanding about how climate change may affect the environment and farming practices. Small steps have been taken to adapt to or mitigate against climate change or plans have been drawn up for changes to be made. The farm is partially prepared to deal with the potential impacts of climate change.
81 - 120	High	The farm has an excellent understanding of how climate change will affect the environment and farming practices. The farm has taken significant steps to adapt to and mitigate against the effects of climate change and is well prepared to deal with likely changes. The farm is fully prepared to deal with the potential impacts of climate change.

Appendix 3 – Report Template

SBI	
CPH	
Vendor number	
Agri-environment agreement number	

22nd January 2012

Climate Change Farm Resilience Plan

Dear,

Introduction

I visited your farm on the xxxxx to complete a Farm Resilience Plan. This plan forms part of a research and development project which looks at the expected impacts on farming practices and the natural environment. The plan investigates the climate change projections for the Morecambe Bay Limestone's National Character Area and identifies the likely impacts of climate change on farming and the natural environment on your farm. Potential adaptation actions have then been highlighted in response to the identified threats and opportunities climate change presents.

Farm Resilience Plan

Summary

XX is a XX ha lowland/upland dairy beef/arable farm…..

Soil and water management is generally XX, with some evidence of ……

Existing habitats include…..

Your farms overall farm resilience rating was classed as ….. This means….

Key climate change related risks likely to affect XXX are:

1.

2.

3. etc.

Key areas to address to build your farms resilience to climate change include:

1.

2.

3. etc.

Farm Description

Enterprises

Stock numbers, cropping etc.

Land Use 2013

Land use	Area	Use	Description
Arable			
Arable/Temporary Grass			
Permanent grass – semi improved			
Permanent grass – Unimproved			
Parkland			
Orchard			
Woodland			

Grazing management

Fertiliser and Manure management

Other inputs

Soils & Topography

Water

Natural environment and historic features

Assessed Farm Environment Plan

During the visit your existing FEP was reviewed any changes in the condition or location of features was recorded. Overall there were very few changes to the FEP features identified.

FEP Features Changes	**Details of Changes**

Predicted Climate Change for the Morecambe Bay Limestone's NCA

The predicted climate changes for the Morecambe Bay area have been formulated through extensive climate prediction modelling under the UKCP09 climate projections project. The headline impacts for the UKCP09 Climate Projections are as follows:

Uk-Wide

All areas of the UK get warmer, and the warming is greater in summer than in winter.

There is little change in the amount of precipitation that falls annually, but it is unlikely that more of it will fall in winter, with drier summers for much of the UK. In addition, the incidence and severity of extreme weather events will increase.

Sea level rises, are greater in the south of the UK than the north due to the effects of isostatic rebound in the north and down warping/subsidence in the south.

Impacts on the North West of England

The central estimate of increase in winter mean temperature is 2.6 degrees Celsius; it is very unlikely to be less than 1.4 degrees Celsius and is very unlikely to be more than 4.1 degree Celsius.

The central estimate of increase in summer mean temperature is 3.7 degrees Celsius; it is very unlikely to be less than 0.6 degrees Celsius and is very unlikely to be more than 5.8 degrees Celsius.

The central estimate of change in winter mean precipitation is 16% and is very unlikely to en less than 3% and is very unlikely to be more than 35%.

The central estimate of change in summer mean precipitation is -1%; it is very unlikely to be less than -42% and is very unlikely to increase.

In summary the Morecambe Bay Limestone's NCA, in which your farm is located is expected to see warmer winters and summers. Winters are expected to be wetter and summers drier with an increase in the severity of extreme weather events.

Farm Vulnerability to Climate change

Potential Vulnerability of FEP features.

Using a vulnerability index developed in the attached document, the features on your farm recorded on your FEP map have been categorised according to their vulnerability to climate change. The results of this categorisation can be seen in Appendix 2. A coded map of your farm can be seen in Appendix 3.

Habitat	Vulnerability Rating*	Comments

* This indicates how significant the impact of climate change will be on the habitats identified in the FEP. A low impact vulnerability rating indicates that this habitat has more resilience to climate change (if management of this habitat remains the same as present) than a habitat classed as high vulnerability. Changes in management practices can impact upon the vulnerability of different habitats. Priority should be given to managing high vulnerability habitats.

Climate Change Threats and Opportunities and Potential Adaptations.

In the table below is a summary of the priority climate change threats and opportunities that apply to your farm. This also includes details of possible adaptation responses that could be utilised.

Threats and opportunities relevant to farming	**Timescale on which they are anticipated to become significant.**	**Potential Adaptation Responses** **Ordered in Priority**

Farms Resilience to Climate Change

During the visit the farm's resilience to climate change was assessed through a visual inspection of the farm and also through discussions and questions asked during the visit. A total of 32 questions were asked to enable an assessment of the farms current position in relation to resilience to climate change to be made. These questions related to the farms current management practices relating to soils, water, biodiversity (habitats and species), animal health and welfare and crop agronomy. See Appendix 4 for questions.

Resilience Rating	**Section**	**Summary**	**Potential Adaptation Responses**

Farm Resilience Rating

The farms overall resilience to climate change was assessed and a rating was assigned to the farm. Your farm was rated as XXX.

Resilience Rating	Comments
Low	There is little or no understanding about how climate change may affect the environment and farming practices. Few or no preparations have been made to adapt to or mitigate against climate change. The farm is not prepared to deal with the potential impacts of climate change.
Medium	There is a good level of understanding about how climate change may affect the environment and farming practices. Small steps have been taken to adapt to or mitigate against climate change or plans have been drawn up for changes to be made. The farm is partially prepared to deal with the potential impacts of climate change.
High	The farm has an excellent understanding of how climate change will affect the environment and farming practices. The farm has taken significant steps to adapt to and mitigate against the effects of climate change and is well prepared to deal with likely changes. The farm is fully prepared to deal with the potential impacts of climate change.

Adaptation Plan

Below is a list of the priority adaptation actions for your farm. This is based on the assessment of the opportunities and threats for your farm alongside an assessment of your farms current resilience.

Adaptation Action	Implementation Timescales	Estimate of Financial Costs/Benefits	Anticipated impact on Farm Production	Anticipated impact on Ecosystem Services	Anticipated impact on Habitat Condition

Further assistance

Any queries you may have should be directed to your local Natural England office. Contact details are as follows:

Glen Swainson Tel. 0300 060 3970

Nigel Pilling Tel. 0300 060 4345

Useful websites:

Natural England www.naturalengland.org.uk

Campaign for the Farmed Environment www.cfeonline.org.uk

Copy sent to Natural England

Natural England works for people, places and nature to conserve and enhance biodiversity, landscapes and wildlife in rural, urban, coastal and marine areas.

www.naturalengland.org.uk