

Harrogate Borough Council
Climate Change Action Plan
Climate Change Action Plan Report

215109

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Job number 215109

ARUP

Executive Summary

Purpose of the action plan

The purpose of this report is present the results of modelling carbon emissions from activity in Harrogate Borough and to identify the actions that need to be implemented to achieve the following carbon dioxide (CO₂) emissions reductions from consumption: 40% by 2020 and 80% by 2050 compared with 2005 levels. This report also documents how the emissions reductions associated with different actions have been calculated as well as the approach used to model the likely levels of future emissions against which emissions reductions have been compared.

Why use a consumption based approach?

Currently, there are two distinct approaches to calculating and describing the CO₂ emissions associated with our activities: production based and consumption based carbon footprinting. Production based carbon footprinting measures all of the CO₂ emissions that occur within a given spatial boundary. For this action plan the production based footprint would include all of the CO₂ emitted within HBC's boundary. This would include emissions from all of the transport that moves within the boundary, the emissions from the use of grid electricity and direct gas or other fuel use for heating as well as, commercial and industrial emissions.

Consumption based carbon footprinting uses the same basis for calculating CO₂ emissions from fossil fuel use, grid electricity use and transport. However, in addition to these emissions, a consumption based carbon footprint also includes the emissions associated with providing all of the goods and services we use as individuals as well as the embodied impacts associated with capital investment and maintaining existing infrastructure such as road-building schemes. For example, the emissions associated with buying a pint of milk will include those from processing and transport. Consequently it is easier to relate individuals' actions to emission reductions and provides a sound basis for identifying the actions that Harrogate Borough Council (HBC) and the residents of the borough to implement.

How we developed the action plan

The action plan has been developed modelling the future CO₂ emissions based on a continuation of the 'business as usual' scenario. This assumes that the housing numbers identified in the Local Development Framework Core Strategy are built to the relevant Code for Sustainable Homes standard. It also assumes that population growth will follow the trends in the population forecasts predicted by the Office of National Statistics. From this baseline we have modelled the potential emission reductions that could occur if HBC and other partner organisations implement the interventions that have been identified.

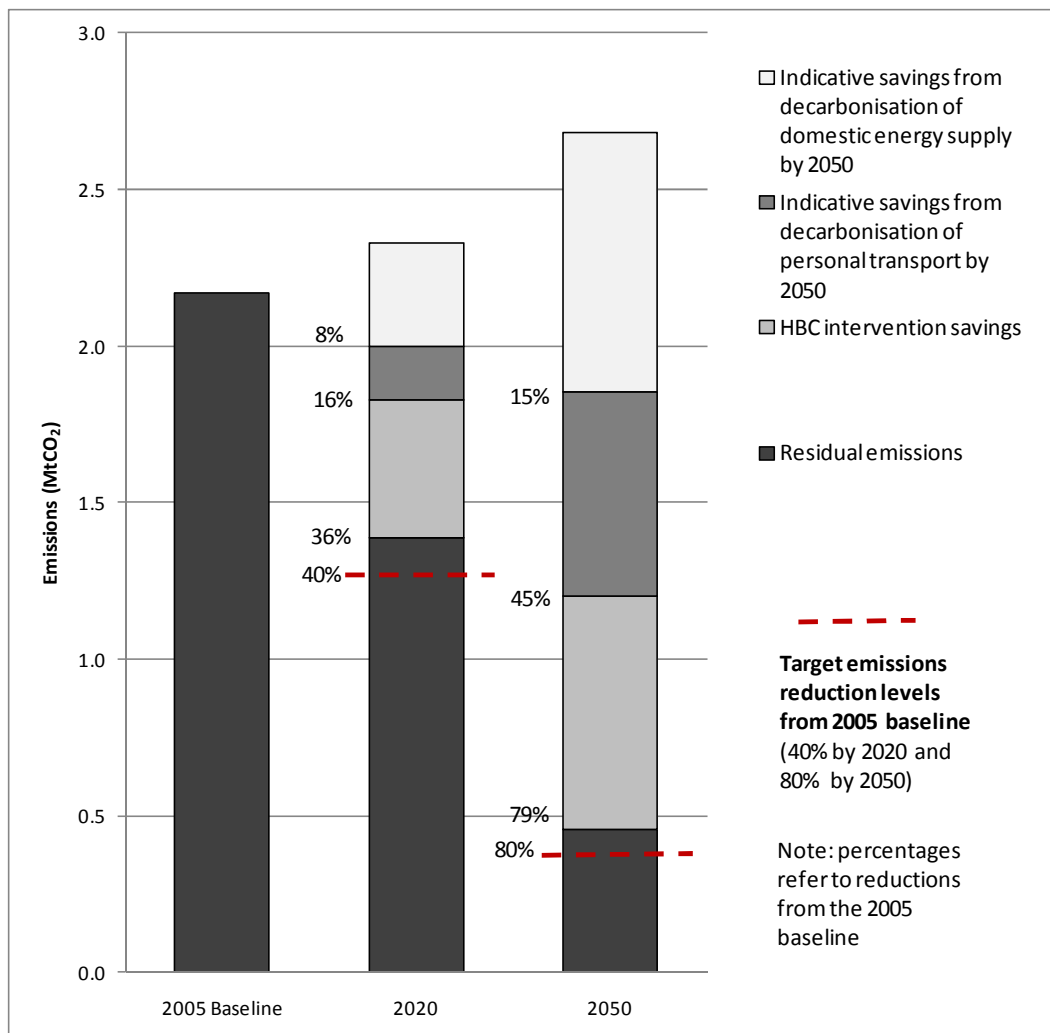
To model the reductions in CO₂ emissions the Resource and Energy Analysis Programme (REAP) Version 2.14 has been used. This software tool has been developed by the Stockholm Environment Institute (SEI) at the University of York. Using this and an additional tool to predict changes in energy usage from

different housing energy interventions the CO₂ emission reductions from the different interventions have been calculated.

The CO₂ emissions reduction measures

Using the tools described above the CO₂ emission reductions illustrated in the graph below have been calculated. The results show clearly that the emission reduction interventions identified in this action plan are vital if we are to even get close to the targets for 2020 and 2050. It also helps to illustrate the fact that in order to get close to these targets there needs to be a combined effort from national Government, local government, residents, transport and energy suppliers and cannot be left to one organisation or sector.

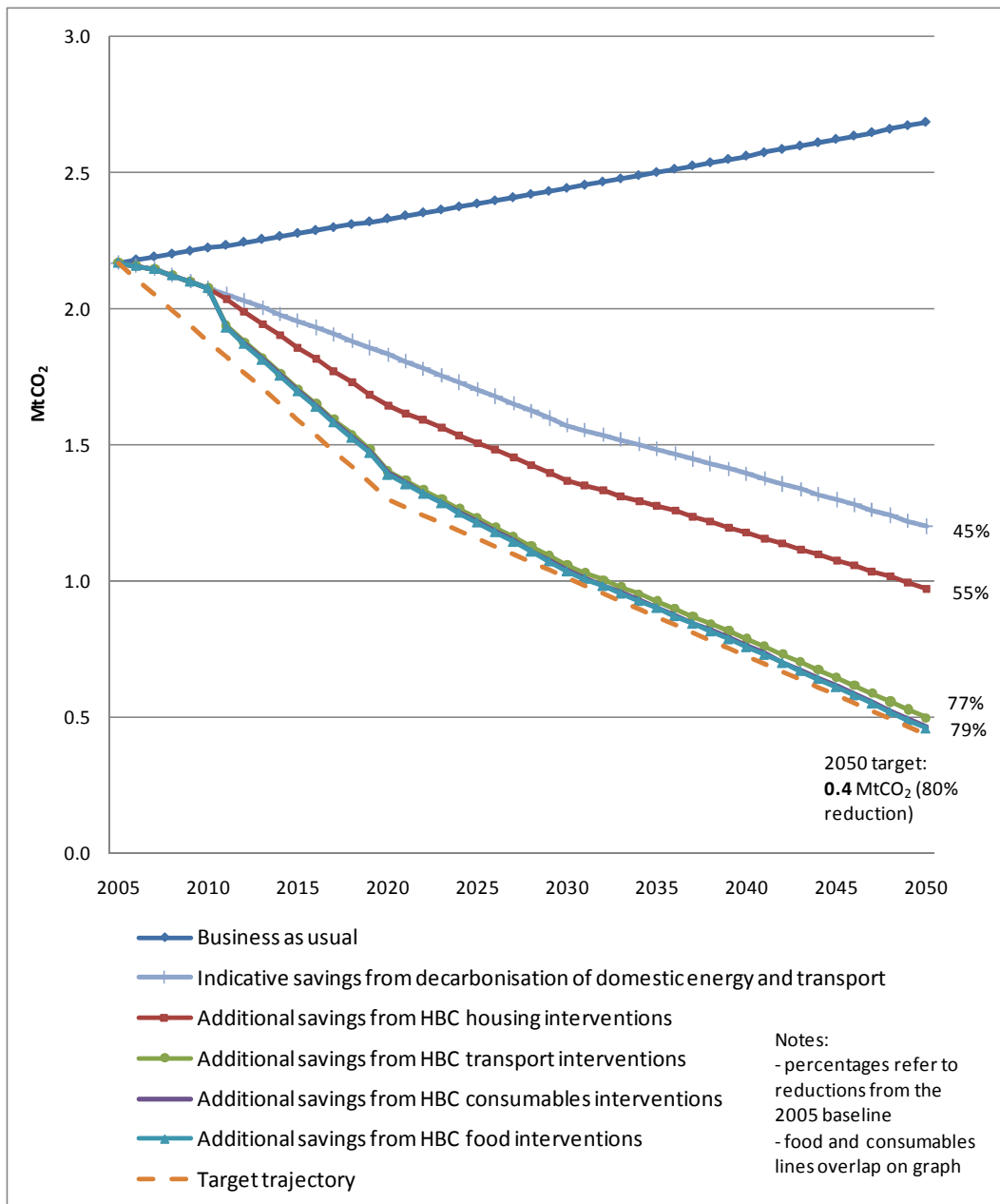
Modelled CO₂ emission reductions in 2020 and 2050 compared against the emissions baseline in 2005 for the population of Harrogate Borough.



The emission reduction measures associated with the interventions in this action plan have also been broken down further and are illustrated in the graph on the next page. The reductions are split as follows:

- housing interventions are:
 - (Retrofitting cavity wall insulation, loft insulation, double glazing, new boilers and energy efficient lights and domestic appliances to existing homes.
 - Installing micro-renewable energy supplies that include solar photovoltaic panels, solar water heaters and ground source heat pumps to existing homes.
 - Behaviour change activities consisting of running a campaign to get people to change their behaviour e.g. reducing the temperature on their heating thermostats by 1 °C and turning off appliances when they are not being used);
- transport interventions are:
 - Facilitating the Department for Transport's 'Smarter Choices' scheme,
 - extending the successful car share scheme already running in Harrogate to achieve an 18% increase in private car occupancy rate to 50% by 2020 (or an average of 2.5 people per car as compared with 1.6 current occupancy level).
 - Activities to encourage residents to take one less flight per year as part of a sustainable lifestyle campaign.
- consumables intervention which aims to achieve a 10% reduction in expenditure on consumables and durables through reduce and re-use campaign work (as part of a sustainable lifestyles campaign).
- food intervention which promotes one meat and poultry free day per week (also as part of a sustainable lifestyle campaign).

Contribution of HBC interventions to overall emissions reductions.



Of these interventions it is transport interventions that have the potential to contribute the most towards achieving the action plan targets (see table overleaf). It should however be noted that the modelling represents a ‘best case’ implementation of interventions. The interventions assume that maximum uptake of all retro-fit and behaviour change is achieved. Therefore, the modelling represents the highest possible carbon savings that the borough could expect to achieve from implementing the interventions.

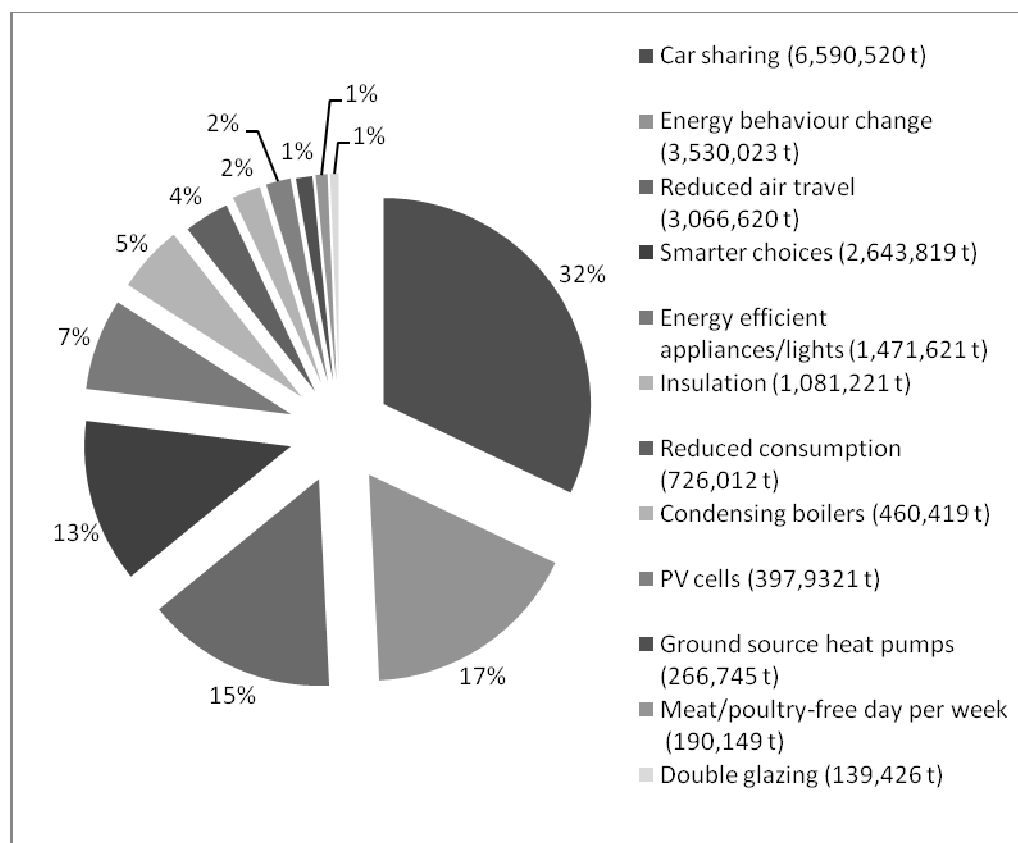
Contribution of national and HBC measures compared to 2005 baseline.

	2020	2050
Baseline emissions (2005) (Mt CO ₂)	2.3	2.7
Targets (Mt CO ₂)	1.3 (40%)	0.4 (80%)
Emissions with decarbonisation of domestic energy (Mt CO ₂)	2.0 (8%)	1.9 (15%)
Emissions with decarbonisation of domestic energy and personal transport (Mt CO ₂)	1.8 (16%)	1.2 (45%)
Emissions with decarbonisation measures and HBC interventions (Mt CO ₂)	1.4 (36%)	0.5 (79%)

Note: values in () represent the % reduction against the 2005 baseline and includes the predicted increases in population and traffic over the 40 year timeframe from 2010.

The measures described above that are directly attributed to HBC can also be broken down further according to the categories set out on page iii. The proportion of total CO₂ reductions in 2050 from these interventions is also illustrated in the pie chart below.

Proportion of total CO₂ reductions (2011 to 2050) from all of HBC’s interventions.¹



¹ Only the Solar PV intervention is shown as the other two solar interventions use the same resource. .

Indicative costs and priority for implementation

In order to prioritise the interventions that have been identified their costs over the 40 year lifetime of this Action Plan have been calculated. This has then allowed the cost per tonne of CO₂ saved to be calculated. This combined with the ranked score for total CO₂ saved and total costs to 2050 have been used to generate the sum ranked score for each action. The lower the score the greater the priority for action in terms of CO₂ reduction and costs. The costs include positions for HBC officers as well as the capital investment required to fund energy efficiency retrofitting measures and micro-renewables. The prioritised list of actions is set out in the table overleaf.

Prioritised action plan interventions, total emission savings over 40 years and total cost per tonne of CO₂ saved (ranked by cost/tonne CO₂ saved).

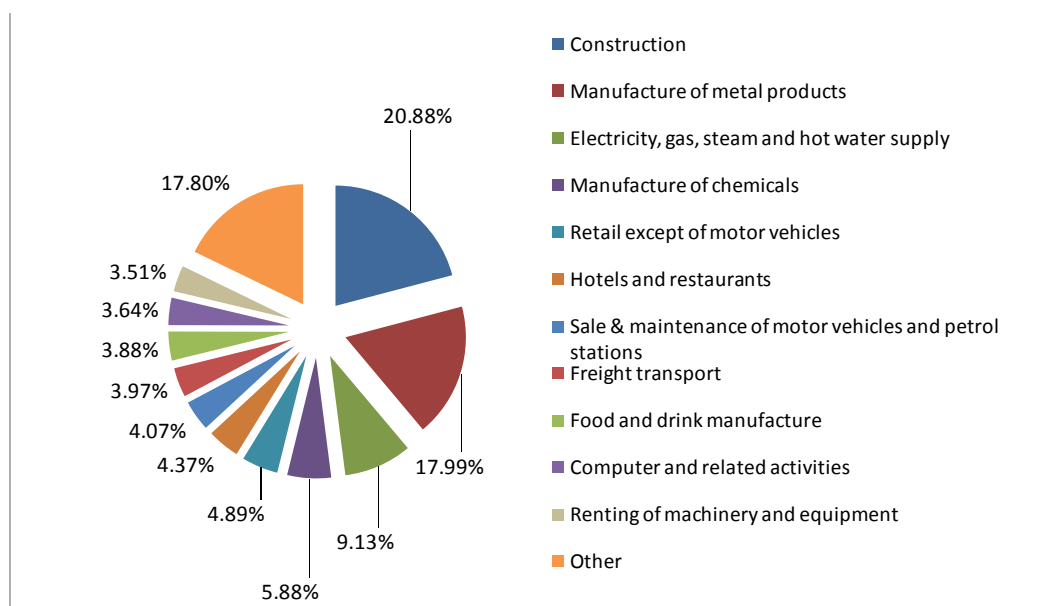
CO ₂ saving to 2050 (t)	Total cost/tonne CO ₂ saved	Total cost (2011-2050)	Sum of Ranked Scores	Prioritised list of Carbon Reduction Action
3,530,023	£0.20	£703,980	4	Energy consumption behaviour change
6,590,520	£0.32	£1,386,600	8	Car sharing
3,066,620	£0.68	£1,386,600	12	Air travel behaviour change (part of a sustainable lifestyle intervention).
726,012	£1.43	£1,039,950	15	Reduced overall consumption (part of a sustainable lifestyle action)
2,643,819	£0.79	£1,386,600	15	Smarter Choices (modal shift and no growth in travel) (part of a sustainable lifestyle action)
1,471,621	£54.90	£703,980	16	Energy efficient appliances/ lights
190,149	£5.47	£1,039,950	22	Promote 1 meat/poultry-free day per week per person (part of a sustainable lifestyle action)
1,081,221	£8.90	£9,627,980	22	Insulation (loft/ cavity)
460,419	£105.96	£48,783,980	29	Condensing Boilers
139,426	£16.98	£2,367,980	30	Double Glazing
266,745	£126.29	£33,687,586	32	Ground source heat pumps
397,921	£409.13	£162,799,950	36	PV cells
268,594	£418.77	£112,479,950	37	Combined solar (PV/HW)
148,715	£332.45	£49,439,950	37	Solar hot water

Actions for business

The consumption based footprint is concerned with the CO₂ emissions associated with the things we consume and do as individuals. As a result the emissions associated with business and industry is accounted for in the footprint as the ‘embodied emissions’ within the goods and services we buy and use.

Nevertheless a review of the contribution that different business sectors present in Harrogate borough make towards CO₂ emissions in general has been undertaken. The majority of the emissions (approximately 82%) come from manufacturing, construction, agriculture, the hospitality sector, retail (wholesale trade), utility supplies and the transport of freight. The remaining 18% of emissions (classified as other in this analysis) includes a variety of sectors such as the financial and professional services and some niche manufacturing sectors. The total emissions calculated for businesses in Harrogate is approximately 2.7 million tonnes of CO₂. The following chart displays percentage contributions from individual sectors.

Contribution of sectors to overall business emissions



Specific recommendations for actions by businesses include improved monitoring of energy and fuel consumption, undertaking energy audits and use of sustainable construction materials.

Actions for waste management.

Similarly, waste is treated as an industrial sector, it doesn't have a discrete footprint separate from the footprint of consumption because as individuals we don't buy or use waste directly. The waste sector's impact is taken into account as an indirect or supply chain impact. It is also important to understand that the way household waste is disposed of will have a very small impact on the total footprint of an area. Only measures taken at the top of the waste hierarchy (e.g. avoiding waste creation within manufacturing and food processing) will have a significant

impact on the size of an area's footprint because they help to prevent CO₂ emissions from occurring in the first instance when products are manufactured or processed.

HBC in its role as a waste collection authority has already investigated the CO₂ savings that can be achieved from changing the collection regime. Likewise, the emission reductions from North Yorkshire County Council's proposed Energy from Waste plant should also help to reduce greenhouse gas emissions associated with waste by increasing recycling rates and reducing the amount of waste that is sent to landfill.

Conclusions – main findings and next steps

The modelling that has been carried out to quantify the reductions in the CO₂ emissions related to the energy and transport that people living Harrogate Borough use and the embodied CO₂ highlights the following:

- To achieve the targets set by the Committee on Climate Change everybody needs to contribute if we are to get anywhere close to where we need to be in 2020 and 2050.
- Even with national interventions such as decarbonising electricity supply and transportation we cannot achieve the 2020 or 2050 targets. Therefore interventions that are facilitated by local authorities, partners and communities are also critical.
- Without any interventions (i.e. with 'business as usual') population growth and increased road traffic mean that the baseline CO₂ emissions in 2020 and 2050 (against which the CO₂ reductions are measured) are greater than in 2005 (2.3Mt CO₂ by 2020 and 2.7Mt CO₂ by 2050) and therefore it is more difficult to achieve the 40% and 80% reductions.
- The emission reduction interventions that offer the greatest reductions per pound invested are all grouped under behaviour change. However, there is significantly less certainty whether or not these interventions will actually deliver the predicted emission reductions. Conversely, the capital investment measures offer less value for money but are not reliant on behaviour change and therefore are more likely to deliver the predicted emission reductions.
- The models show that by 2020 an estimated 36% CO₂ reduction can be achieved and by 2050 an estimated 79% CO₂ reduction can be achieved.
- If HBC is to maximise its chances of achieving the 40% target by 2020 the action in the early years is essential.

During the process of analysing the potential emission reductions from different interventions it has become clear that HBC will need to gain access to funding because many of the interventions identified do not form part of core services. It is recommended that HBC investigates this further. The cost of implementing these changes is given in the table below overleaf.

Total and annual intervention costs

Action	Total cost (2011-2050)	Annual cost (averaged to 2050)
Energy consumption behaviour change	£703,980	£17,600
Energy efficient appliances/ lights	£703,980	£17,600
Reduced overall consumption (part of a sustainable lifestyle action)	£1,039,950	£25,999
Promote 1 meat/poultry-free day per week per person (part of a sustainable lifestyle action)	£1,039,950	£25,999
Car sharing	£1,386,600	£34,665
Air travel behaviour change (part of a sustainable lifestyle intervention).	£1,386,600	£34,665
Smarter Choices (modal shift and no growth in travel) (part of a sustainable lifestyle action)	£1,386,600	£34,665
Double Glazing	£2,367,980	£59,200
Insulation (loft/ cavity)	£9,627,980	£240,700
Ground source heat pumps	£33,687,586	£842,190
Condensing Boilers	£48,783,980	£1,219,600
Solar hot water	£49,439,950	£1,235,999
Combined solar (PV/HW)	£112,479,950	£2,811,999
PV cells	£162,799,950	£4,069,999

HBC itself may be able to secure public sector funding for the interventions. If this is not possible HBC may instead be able to help residents make applications to sign up to a FIT scheme or obtain grants for retrofitting insulation. It is recommended that HBC explores whether or not there are opportunities to secure investment from the private sector and other funders such as the Green Infrastructure Bank.

The above actions can feed into the development of a risk based costed action plan that builds on this action plan with a view of identifying which partners can contribute finances or staff resources to achieve the actions that have been identified. It is also recommended that any such business plan also considers the economic implications of not taking action so that the costs of the interventions described in the table above can be viewed in context.