Appendix 4

Impacts of climate change and how we can adapt to these changes and create opportunities.

Theme	Impacts	Adaptation / Opportunities
Energy use	Increase damage and disruption to infrastructure from an increase in flooding and strong winds. Warmer, drier summers increase the demand for energy for cooling (air conditioning, refrigeration); transport to rural areas for leisure. The sagging of electricity distribution cables and subsidence.	Milder, wetter winters reduce the demand for energy for heating, reduce fuel poverty and damage to infrastructure from freezing weather. Increase in the potential use of solar power and biofuels.
Waste	Warmer drier summers increases rate of decomposition of waste, levels of waste treatment, production of landfill gas, odour generation and pests. Flooding and storms increase damage to waste facilities and transport. Increase in summer temperatures and more intense rainfall may affect landfill design and operation.	There are opportunities for developing technologies to adapt to the impacts.
Planning and land use	Increase of flooding makes more land unusable or of limited use. Increase of flooding in urban developments. Under a changing climate the floodplain may increase in size and the frequency of floods may increase as well. Developments in the flood plain will be at risk from flooding and may require protection.	Warmer summers increase the demand for green, open spaces in urban areas for outdoor activities.

Transport	Increase in the severity of flash flooding events, cause drainage systems to overflow and cause severe disruption to transport networks and potential damage to their foundations. Flooding increases the likelihood of landslips in railway cuttings and road embankments. Warmer, drier summers increase disruption to road, rail and air transport from melting and buckling of surfaces and damage to infrastructure from subsidence. An increase in temperature causing heat stress to traveling public.	Increase in the number of journeys by cycling, walking and by road. Reduction in demand for European and international flights. Milder winters reduce gritting of roads, de-icing aircraft and runways, and accidents from ice. Avoid exposed places and provide cooled/shaded waiting areas.
Air Quality	Increase in windier winters will reduce stagnant air at ground level where pollution lies, improving air quality. Increase in summer temperatures lead to an increase in smog. Increase in summer ozone linked to temperature changes.	Use of new technologies in transport eg Hybrid cars reduce CO_2 and Nitrogen oxides. Technological developments in efficiency and energy conservation of domestic appliances will reduce emissions and improve air quality. Targets set by Government to reduce CO_2 emissions of air quality pollutants may also have effect on the reduction of air quality pollutants since many have the same sources.
Buildings	Warmer drier summers increase building subsidence as soils shrink in hotter drier summers. The demand for cooling of buildings and worker discomfort will also increase. Milder winters increase growth of mould in houses, encouraging respiratory illness.	Reduced damage to buildings from frost. We need to plan for preventative and remedial maintenance of existing buildings when renovating or extending homes. Use the thermal properties of materials to improve cooling and retrofit energy efficient air conditioning.

Agriculture	Summer droughts will offset the benefits of longer growing seasons. Soil erosion and deteriorating water quality will affect what can be grown. Changing rainfall patterns may require irrigation/water storage facilities to ensure summer water supplies. New pests and diseases affect crops and livestock.	Opportunities to diversify and grow a greater range of crops. Plant varieties that require less water e.g. drought tolerant species and use shelter and shade to reduce the amount of water lost through evapotranspiration. Improving the organic soil content will help to improve its water capacity. The growing season for plants has lengthened by one month since 1900.
Natural Habitat	Changes in the wildlife population as a result of changes in habitats and food stocks. Loss of wetland habitats and species. Loss of native species through competition with invading species more suited to changed conditions. Loss of trees/shrubs due to drier summers and wetter winters.	Plant trees and shrubs now which will tolerate future conditions. Plan for wildlife corridors to allow for natural migration. Wider range of exotic species will become more common. Fewer frosts mean more reliable crops eg Plums/Cherries but plants that need cold to initiate flowering may struggle.
Water	Warmer, drier conditions and increase in the demand for housing will increase pressure on already stressed water resources. Drier summers will lead to extended restrictions on water use for domestic, agriculture and business sectors. An increase in the frequency of droughts will increase soil moisture deficits, limit groundwater recharge, increase the risk of fish kills from a reduction in dissolved oxygen and create an increase in the risk of pollution from storm water and reduced dilution. Increase in the risk of localised flooding from increased rainfall intensity.	The installation of Sustainable Drainage Systems (SUDS) can help reduce surface run-off, reducing the risk of flooding, and can also help with improving the quality of water, especially when low river levels occur during the summer. An increase in ditch clearing and gully emptying may be needed to avoid blockages.

Health	Increase risk of skin cancer/sun burn due to hotter summers. Increase in outdoor recreation. Heat stress to old/poor/vulnerable communities likely to increase.	Consider ways to increase awareness of dangers of exposure. Provide more shade in public recreational areas.