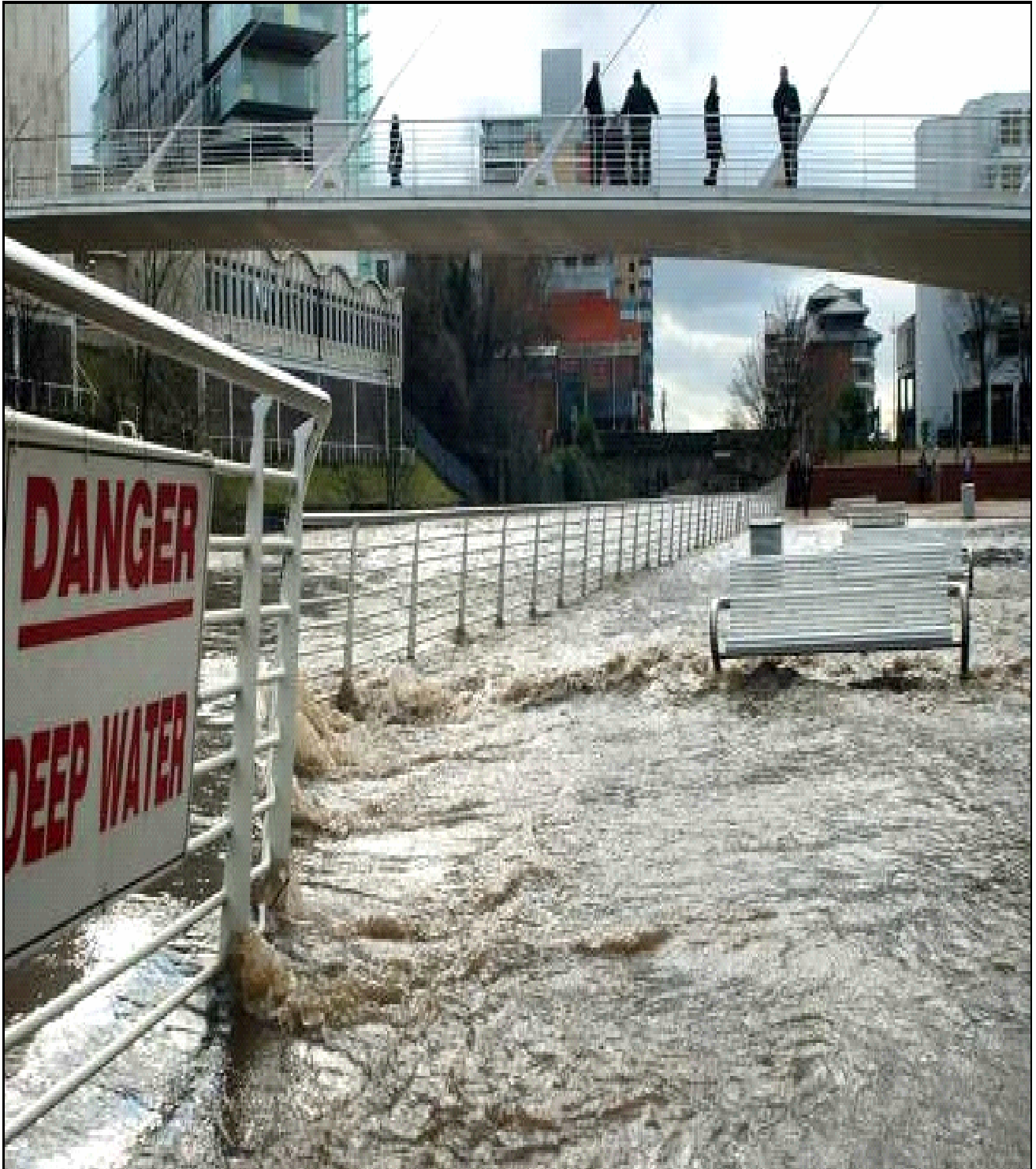


ADAPTING TO CLIMATE CHANGE IN TRAFFORD

A strategy to identify and deal with the new risks and challenges.



Climate Change Adaptation – Strategic Importance

In 2009, Trafford Council published its first Sustainability Strategy, designed to tackle the issues of climate change mitigation, energy security, and fuel poverty.

The new National Performance Framework and Comprehensive Area Assessment contain a number of new Sustainability indicators, as follows:-

- NI185 – Reduction in carbon emissions from council operations.
- NI186 – Reduction in per capita carbon emissions in the Local Authority area. Comprises emissions from:-
 - Domestic housing
 - Business and industry
 - Transport
- NI187 – Percentage of households suffering from fuel poverty
- NI188 – Planning to adapt to climate change

The council's Sustainability Strategy, together with its previously adopted Energy and Water Management Plan, aim to tackle NI185-NI187. This Climate Change Adaptation Strategy aims to satisfy NI188.

NI188 is designed to ensure that the council can deliver its services in light of the new challenges which a changing climate brings. A number of studies have been completed, which give us some idea of what to expect: hotter, drier summers; warmer, wetter winters; more unpredictable weather patterns and more extreme weather events.

Each of these new challenges brings with it implications for different council service areas and budgetary pressures, and in the development of this strategy, Trafford hosted a workshop where officers from across the different service areas identified the various risks to their service and the different options for tackling these risks. The most appropriate options for Trafford were then selected and an action plan drawn up, to ensure that the council is fully prepared to deal with all future climate scenarios, and is able to continue to deliver reliable and high-quality front-line services even in the face of the extra challenges posed by a changing climate in North West England.

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1. Introduction

1.1 Projections for the UK

Climate forecasting is a notoriously difficult business, but most climate projections from organisations such as the Met Office, UK Climate Impacts Programme and the Tyndall Centre for Climate Research focus on three main themes for the UK:-

- Warmer, wetter winters with increased rainfall and flooding.
- Hotter, drier summers with increasing dry spells and drought.
- More extreme weather events such as storms, hurricanes and flash floods.

1.2 Projections for the North West

In the past climate change analysts have only been able to predict the impact of global warming on temperature and rainfall by examining the output of global climate models every 250 km.

This large scale analysis meant that temperature and rainfall trends were averaged out resulting in generalizations about the impact of climate change on local regions.

The STARDEX project was the first European-wide study to apply a large variety of the best statistical and modelling techniques to determine the likely impact of climate change at specific sites. The project's seven European research teams, led by the University of East Anglia, narrowed down evidence of changing weather patterns to predict the occurrence of floods, heat waves and drought on even smaller regions across the UK and Europe.

The UK based teams' report reveals that by 2100 the North West of England could see up to 25 per cent increase in heavy rainfall during five-day periods in winter - which leads to flooding - and up to 25 per cent decrease in rainfall in summer causing drought.

It has also been suggested that more land will become available for arable farming due to the decreased competitiveness of dairy farming, and that around a third of conifer forests in the region will be replaced by deciduous and mixed forests, which are more tolerant of higher temperatures.

A more recent study by the UK Climate Impacts Programme and DEFRA, called REGIS, generally supports the findings of STARDEX.

Changes in key climate variables in Northwest England (1961-2006)

	Spring	Summer	Autumn	Winter	Annual
Mean temperature (°C)	1.44	1.45	1.07	1.81	1.40
Daily max temperature (°C)	1.67	1.63	1.13	1.93	1.55
Daily min temperature (°C)	1.25	1.31	1.03	1.70	1.29
Days of air frost	-5.9	-0.1	-3.2	-13.1	-24.4
Total precipitation (% change)	6.3	-13.2	5.6	43.0	8.8
Days of rain > 1mm	0.4	-1.1	2.9	6.8	7.5

1.3 Implications for Trafford

It is expected that the implications for Trafford will follow the predictions for the North West and the UK as a whole, with the additional issue of the 'urban heat island effect', which increases the risk of damage to people and property from heat in built-up areas. It is expected that the changing climate will impact the delivery of Trafford Council's services, and this strategy aims to identify these impacts and formulate an action plan to mitigate these impacts.

2. Flood Risk

The Greater Manchester Strategic Flood Risk Assessment has identified Trafford as being a High Risk area for future flooding. Further work is being carried out to identify specific areas within the borough which are vulnerable to flooding due to increased rainfall and waterlogging.

DEFRA currently require all local authorities to submit a flooding preparedness report, containing surface water management plans and multi-agency flooding plans. These plans are managed by the local authority's emergency planning section, in partnership with other agencies such as the emergency services and the Environment Agency.

2.1 Homes and Businesses

In 2007, the direct cost of the damage caused by the flooding in England came to a total of £1.5 billion (source: Channel 4 News). This figure does not include the amount of business lost as a result of the flooding, and many small businesses will have been forced to cease trading as a result. The social, environmental and economic damage from flooding can be devastating to a community.

Precautions can be taken to minimise the effects of flooding, but the first step is to identify which areas are most at risk. Then measures can be put in place to provide some protection against potential flooding, but equally as important are the emergency procedures for not only coping with the incidence of flooding but the repair and clean-up operations afterwards.

It may be easier to repair buildings which have already been affected by flooding, and prepare them for a reoccurrence, for example by rewiring electrical sockets so that they are high up the walls on the ground floor. Simple measures such as this and installing extra walls and other flood-resistant constructions around the property can help to minimise damage and the cost of repair.

There is a risk that in future, homes and businesses in areas of high flood risk may not be able to obtain insurance for their properties. This could result in areas of the borough becoming uninhabited and derelict.

Trafford Council, in line with National guidance, has recently identified those homes and businesses which lie on the floodplain between Stockport and the Manchester Ship Canal, this area is known as the Mersey Floodplain.

This means that, under certain extreme conditions, there is a risk that some buildings may be flooded. The areas which are at risk consist of a small number of residential and/or commercial properties around Sale and Chorlton Water Parks, Flixton and Carrington around Flixton Gold Course. A downloadable leaflet is available from the council for householders whose homes may be affected.

2.2 Key infrastructure

Flooding does not pose a risk only to individual buildings and transport routes; it can pose a potentially far larger risk to whole areas and communities if it threatens key infrastructure such as electricity substations or water treatment plants.

In the 2007 floods in the South of England, whole counties were left without fresh tap water for days due to the pollution of water treatment facilities by the floodwaters, and at one stage the potential flooding of an electricity substation threatened millions of people with power cuts, until the threat was averted with emergency last-minute sandbagging and pumping measures.

Where key infrastructure is threatened by potential flooding, preparations should be made either to move the infrastructure to a more secure site on higher ground, or to put in place measures which would protect the facility in the event of flooding. Emergency procedures should also be drawn up as to what course of action would be taken in the event of a failure of key infrastructure due to flooding.

2.3 Procedures and Emergency Planning

The council's Emergency Planning section will need to prepare for higher incidences of flooding in the borough, and lessons can be learned from the floods of 2007 which hit areas of Yorkshire and Southern England.

Procedures to tackle flooding incidents should be coordinated with the respective emergency services, and should identify alternative routes to and around areas of potential flooding, as well as key infrastructure which might need to be protected as a priority in a flooding event.

Current activities around emergency planning for flooding include:

- Review of PPD Emergency Plan (procedures & resources) then exercising of plan.
- Distribution of 'Flooding Advice for Householders' leaflets for the general public.
- Discussions with Environment Agency to institute flood warnings for the Sinderland Brook basin.
- Co-ordination of assessing the recommendations for the Pitt Report (review of the national response to the 2007 floods).
- Continual promotion of Business Continuity Advice to local business (as per the Civil Contingencies Act 2004)



Indicative Flood Zones

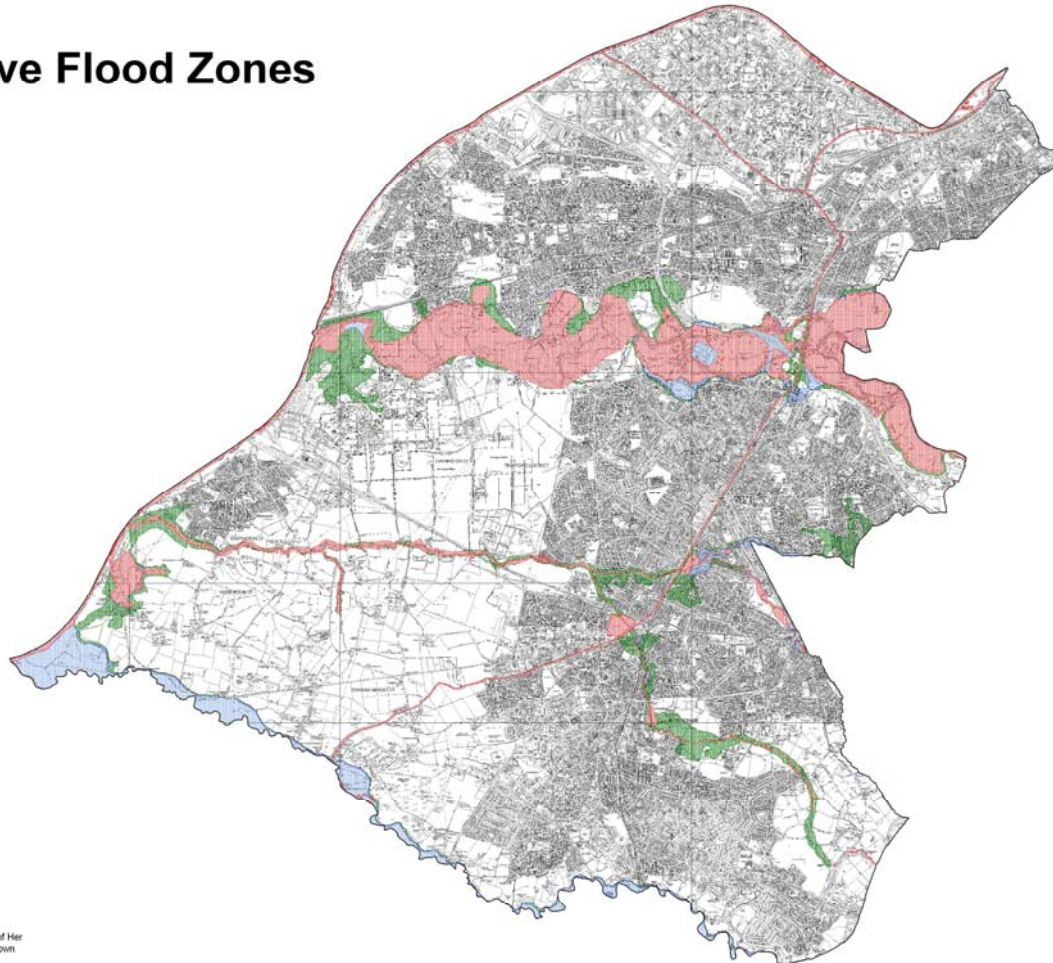
KEY

-  **Flood Zone 3b**
Functional Floodplain.
Land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency.

-  **Flood Zone 3a**
High Probability of Flooding.
Land having a 1 in 100 annual probability of river flooding (>1%)

-  **Flood Zone 3 plus allowance for Climate Change**
No modelled data currently available. Flood Zone 2 used as a proxy and is not shown separately.

Date: December 2008
Source: Strategic Flood Risk Assessment, Greater Manchester, 1st August 2008.



Areas that are susceptible to surface water flooding

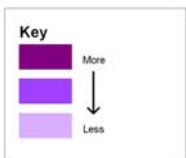
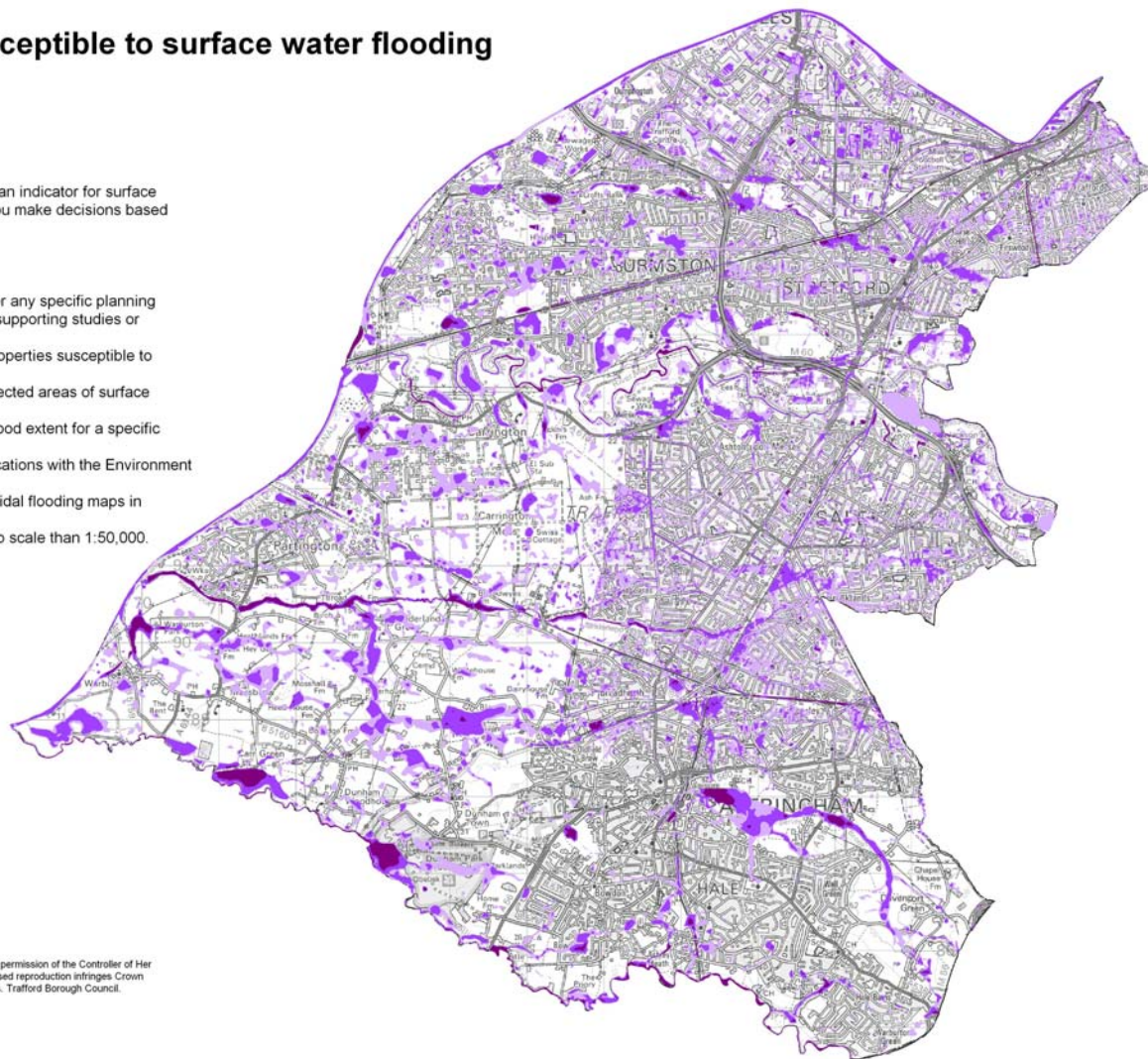
Do's and Dont's

Do:

- assess the suitability of the map as an indicator for surface water flooding for your area before you make decisions based upon it;
- use it to inform RFRAs, SFRAs.

Don't:

- use the map as the sole evidence for any specific planning decision at any scale without further supporting studies or evidence;
- use the map to identify individual properties susceptible to surface water flooding;
- rely on the maps alone to show expected areas of surface water flooding;
- interpret the maps as defining the flood extent for a specific probability;
- use the map for consulting on applications with the Environment Agency;
- incorporate the maps into fluvial or tidal flooding maps in SFRAs, keep them separate;
- use it with a more detailed base map scale than 1:50,000.



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3. Water Resources

3.1 Gardens and Allotments

Domestic gardens and allotments have a critical role to play in tackling the effects of climate change.

Installing water butts on drainpipes helps to catch a lot of water during a downpour, and can help to attenuate the run-off into drains and sewers, reducing the risk of flooding. Similarly, garden ponds and well-planned drainage incorporating ditches and other natural soakaway areas can also prevent sewerage systems being overcome by large volumes of water run-off.

Water butts also help with irrigation of gardens during dry spells, and keeping the soil in gardens well-watered is essential to keep it absorbent, so that water can soak through it during downpours. Hard, dry soil tends to be impervious to water, acting like a paved surface.

It is also possible to buy valve attachments for bathwater waste pipes, so that the waste water can be diverted to the water butt outside. Most waste bathing and sink water can be used to water the garden once it is cool.

These measures for domestic homes should be promoted throughout Trafford, and householders should be encouraged to install them in their own properties.

Wherever possible, areas of hard standing for cars and front gardens should be avoided, as these paved areas increase surface water run-off. New planning regulations require planning permission for the conversion of gardens into paved areas of 5 squared metres or more if they are not made of a permeable (or porous) surface which allows water to drain through or if water is directed to a naturally draining areas e.g. a lawn. Wherever possible, existing paved areas should be returned to being either porous or with areas of open soil.

Allotments are similar to gardens in that water butts can be installed to collect rainwater from the roofs of sheds and greenhouses, and ponds can also be used to collect storm rainwater and encourage frogs and toads for pest control at the same time. Hosepipe bans apply equally on allotments as they do in domestic gardens, so a method of water storage and distribution is essential for dry spells to avoid damage to food crops.

Crops on allotments and in gardens can be ruined by flooding, but there are certain crops which can be planted in the immediate aftermath of flooding to fix the soil and mitigate the loss of food supply.

3.2 Lakes and Ponds

Research done by the University of Liverpool suggests that lakes and ponds containing fish and other creatures are at risk from the increasing temperatures which come with climate change.

Depending on the level of nutrients in the water, algal blooms can flourish and remove so much oxygen from the water than it ceases to be able to support fish, which will die. There is therefore a risk that many of our bodies of standing water could become large green pools devoid of most life except algae.

The critical deciding factor for any particular lake or pond is the level of nutrients in the water feeding the algae, and many of these nutrients can reach the water in the form of chemical fertilisers leaching from nearby farmland. This would suggest that organic forms of farming may play a crucial role in safeguarding the water quality and fish stocks in standing bodies of water, as well as buffer zones between farmland and watercourses. An additional factor is extra nutrients which are delivered to the pond or lake by surface run-off from flood waters.

The risk to lakes and ponds is further amplified by the lower summer water levels which will result from increased evaporation due to higher summer temperatures, and lower inflow from reduced rainfall. This in turn may concentrate the nutrients in the remaining water and further reduce the oxygen available to fish and other creatures.

As well as the threat from eutrophication, fish breeding programmes can be adversely affected by extremely low water levels and increased water temperatures in lakes and ponds.

The risks from temperature rises and eutrophication may be mitigated by a programme of planting of lakes and ponds with underwater oxygenating plants, or even mechanical oxygenating systems run with electricity generated from solar photovoltaic systems. The systems would pump most oxygen when the sun is strong – exactly when it is needed to counteract algal growth. However, great care must be taken with oxygenating measures, as an excess of oxygen in the water can raise the pH of the water to a point which is lethal to all water life.

3.3 Rivers and Streams

Climate change will cause a significant global temperature increase in the future. This will alter weather patterns around the world. In the UK there is expected to be more rain in winter, falling in shorter spells, and less precipitation in the summer.

These changes may lead to extreme low flow conditions during summer and autumn months in groundwater fed rivers. They may also lead to more incidences of flooding in the winter months and during extreme weather events.

It will be essential to identify all facilities and property which may be at risk on existing flood plains in order to instigate protective measures. New procedures to deal with flooding emergencies in extreme weather events should also be put in place (see **2.3**).

4. Heat Risk and the Urban Heat Island Effect

Temperatures within built-up areas are typically higher than those of the surrounding rural areas due to the release of heat from local power consumption and the way that the urban environment alters the transfer of heat and moisture between the ground and atmosphere.

How this 'urban heat island effect' will change in the future is uncertain and will depend on development and adaptation of existing buildings in Trafford. Without adaptation, future extremes of temperature are expected to increase human mortality, especially when they are sustained for an extended period. By adapting infrastructures and behaviour to better cope with higher temperatures it should be possible to reduce these potential casualties.

In the summer heatwave of 2003, an estimate 2000 people in the UK died from heat-related causes who would not have died in a traditionally 'normal' UK summer. The figure in Europe was even higher – around an extra 35,000 'excess summer deaths'.

An increase in low-level ozone and airborne particulates is also predicted with increasing summer temperatures, bringing more implications for health. There may also be an increase in ultraviolet radiation, bringing an increased risk of ailments such as skin cancer, and making increased shading a priority.

Ironically, the increased use of air conditioning systems in urban areas to provide space cooling in buildings can actually serve only to exacerbate the urban heat island effect, as the heat from inside buildings is expelled to the urban environment. The operation of mechanical air conditioning equipment itself generates heat, and of course the 'greenhouse gas' emissions generated by the production of electricity to power mechanical air conditioning systems will result in more extreme temperatures as climate change progresses.

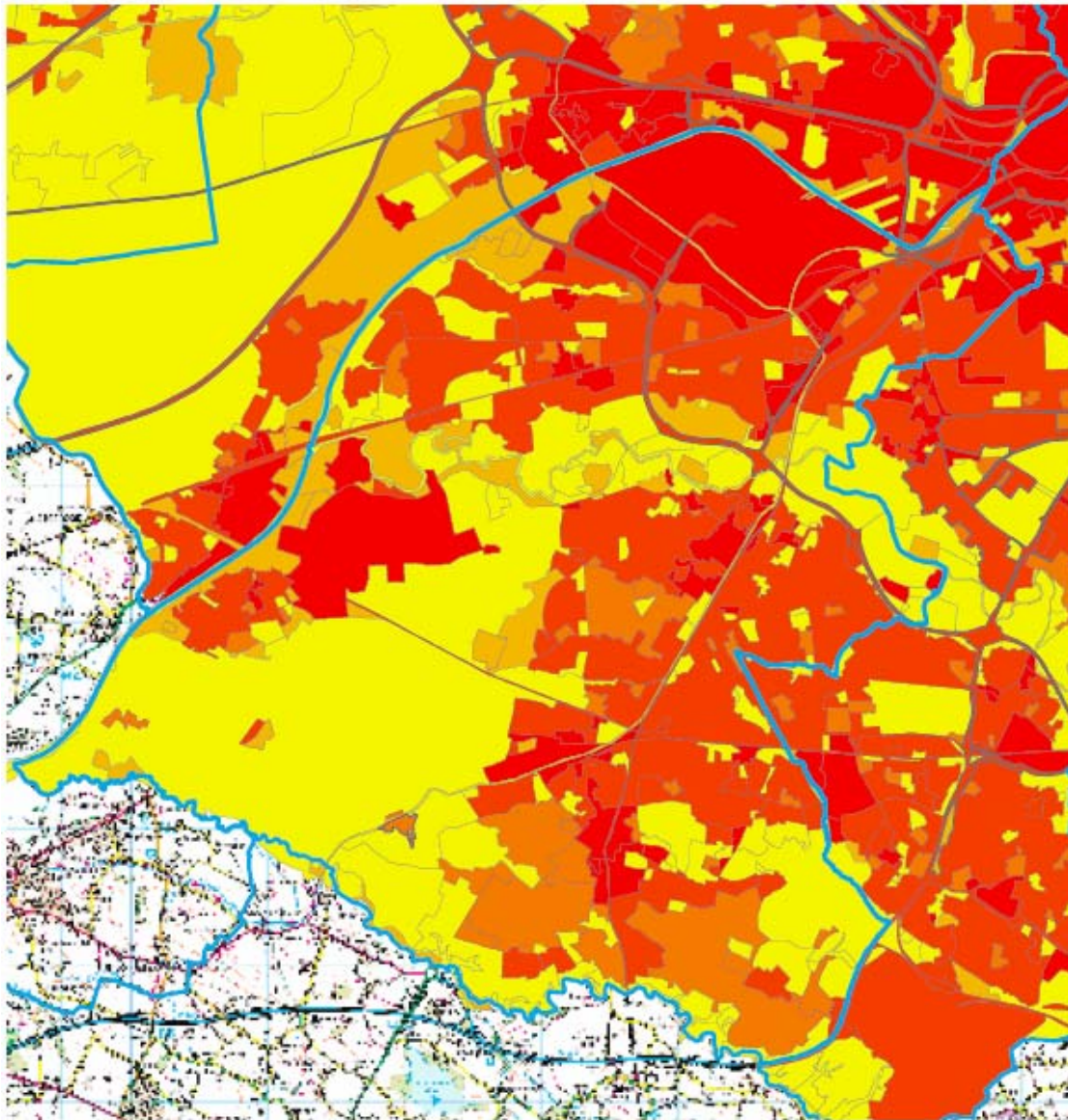
One approach to tackling the urban heat island effect would be to increase the numbers of trees in urban areas (choosing species appropriate to the situation i.e. trees which do not grow too large for the location, and appropriate to the expected climatic conditions), especially along roads and around other sources of pollution, which would help to provide cooling in the summer months, as well as removing particulates and other pollutants from the air (see **6.3**). Deciduous trees also provide shade in the summer whilst allowing sunlight to enter buildings in the winter, providing passive heating.

Other measures might include strains of ivy which do not damage walls, or even 'green wall' technology which is now becoming available.

The map below shows vulnerable areas of Trafford where mitigation measures will be targeted. Some parts of Trafford, such as Partington and Bowdon, are more rural, and so are less susceptible to the urban heat island effect. However, other areas such as Davyhulme, Urmston and Stretford are more at risk (mitigated somewhat by cooling from the River Mersey). Traffords Core Strategy sets out broad areas for the location of future development in Trafford. A high proportion of development is planned in the north of the borough in particular Old Trafford and Trafford Park. Mitigation will need to be put in place to address the heat Island effect, especially in areas such as Trafford Park, which is almost entirely covered with concrete and black tar, and will need to be a particular focus of urban heat island mitigation measures.

The ASCCUE project (from which the map is taken) also showed significant variations between different parts of an urban area. These differences will be exacerbated as the climate changes. For example, modelling in Great Manchester showed higher density development to be over 12°C warmer than the surrounding countryside, while lower density areas were only 6°C warmer under a 2080s High Scenario. Modelling also showed that use of trees and green cover could significantly reduce these differences so long as it is kept irrigated. Good design and integrated risk management and planning strategies, therefore, will play an important role in preventing over-heating.

Map: Areas of Trafford most at risk from Urban Heat Island effect



Key: Deep Red=High Risk Area. Yellow=Low Risk Area

Source: UK Climate Change Impacts Programme (UKCIP), Adaptation Strategies for Climate Change in the Urban Environment (ASCCUE) study: *“Adapting Cities for Climate Change”*

5. The Built Environment

5.1 Planning and New Developments

National Planning Policy Statement 1 Supplement now contains significant climate change adaptation elements, putting climate risk and vulnerability at the heart of the planning system.

The Regional Spatial Strategy sets out policy for adaptation to climate change. Seeking that all applicants and local planning authorities ensure all developments meet minimum standards set out in the North West Sustainability Checklist for Development.

Planning permission is now required (as of October 2008) to replace green space such as gardens in residential properties with paved or concreted areas such as driveways. Hard paved areas are a major contributor to the lack of natural drainage in built-up parts of Trafford, and their contribution to an increased risk of flooding has been recognised. Therefore the replacement of gardens with paved driveways is discouraged.

New developments are required to incorporate a Sustainable Drainage System (SUDS), which provides natural soakaway for rainfall, permeable hard surfaces wherever possible and other natural drainage features such as swales and ponds. A good example of such a system is the one at the Stamford Brook development in Broadheath, where a SUDS is in place featuring permeable pavements and a natural flood plain, which has been restored along with Sinderland Brook to its original course across the site.

Planning requirements do not yet exist for issues such as the installation of efficient toilets in new developments and water butts in the gardens of new properties, and measures such as these, although small in scale, when applied to all new developments can have a significant impact on reducing storm water run-off into sewers and watercourses and reducing the requirement for water from the mains water system, with its attendant reduction in the requirement for energy use in water treatment plants.

New developments will soon be required to demonstrate a commitment to on-site renewable energy generation and high standards of energy efficiency. Aspects of this low-energy design could include natural heating, cooling and ventilation features such as wind cowls, summer shading, and a design which gives maximum solar gain in the winter months. Other low-energy building techniques which are useful include 'green' sedum roofs and even rainwater harvesting/evaporative cooling arrangements.

Ideally, to reduce carbon emissions associated with food production and transport, new housing developments should also have facilities for home food production – either in the form of large gardens (which have been suggested to support a wide range of biodiversity), or nearby, easily-accessible allotments.

Trafford will be seeking adaptation to climate change through policies developed as part of the Local Development Framework in its Core Strategy and subsequent Development Plan Documents and Supplementary Planning Documents. The Core Strategy sets out the Council's vision for development over the next 15 years. It will be the key document for implementing sustainable development in Trafford. The location and amount of development set out in the Core Strategy will take into account the constraints and opportunities resulting from climate change. The Core Strategy policies will be developed against a clear evidence base of the borough's present position as regards infrastructure, flood risk, Greenspace, pollution in order to set the targets and standards new development will need to meet to successfully adapt to climate change.

The full integration of building and site planning into the landscape planning process will be essential, in which Landscape Architecture will provide the over-arching guidance for sustainable design. Any design brief should take account of topography, vegetation and microclimate to produce a plan to maximise the shelter from intense wind and sun whilst incorporating maximum solar and wind energy benefits. The guidance of landscape architects will ensure a balance between the social, environmental and economic aspects of adapting to climate change.

Landscaping could be more multifunctional in its use than it has been in the past, with better design fulfilling the more traditional Greenspace, recreational use and attractive image to a site as well as more innovative uses such as a Sustainable drainage system, habitat for declining bird species or flood water soak away. The council's developing Greenspace Strategy will also form an essential pillar of climate change adaptation policy in the borough, as green spaces and green infrastructure are instrumental in tackling issues such as the urban heat island effect and flooding from overland runoff.

Multi functionality of green space will be addressed through the concept of Green Infrastructure. Policies to promote the importance and development of Green Infrastructure will be included in Trafford's Core Strategy.

5.2 Highways

Trafford's road network is the council's single largest asset. Key impacts/adaptation strategies which have been identified are:

- **Increased risks of flooding from rivers and canals.** It is predicted that both the frequency and magnitude of flooding will increase. There are several different elements to adaptation:
 - Assessing the relative importance of the road. Are there alternative routes?
 - Improved flood protection.
 - Carrying out a risk assessment for any new road (in accordance with National Planning Policy Statement 25 on Development and Flood Risk), bearing in mind that road embankments on flood plains can make floods worse.
 - Contingency planning - what route will the emergency services use?
 - Ensuring bridge openings and culverts are sufficient to deal with predicted levels of flooding. However, the floodwater still needs to be delivered into an effective drainage system, and inter-council coordination across the Manchester city region may be necessary to implement this effectively.
- **Increased flooding from inadequate drainage.** Drainage is an important source of flooding, particularly where drains are badly maintained, and in urban areas. Drainage requirements will change not just as a result of increased storms but also as a result of increased weathering of drains and roads from heat and additional vegetation.
- **Deterioration of highway infrastructure (earthworks, bridges, pavements etc).** Many of the structural features of our roads have a life-span of over 100 years, and long term climate change planning is therefore of relevance here. A reduction in days of frost will reduce the damage to structures and to the carriageways' surfaces. However, many of the changes predicted will increase weathering. In particular:
 - Embankments are at risk of subsidence, heave and slippage, as a result of wetter winters, drier summers and changing vegetation.
 - Bridges, signs, overhead cables and other tall structures are at risk from increased wind speeds.
 - Concrete deterioration may increase from higher summer temperatures and driving rain.
 - Increased water run-off and a rising water table will affect the sub-base of the carriageway, which in turn will result in premature failure of the roadbase, binder course and surface course.
 - Run-off can soften the verges and cause deterioration at the edge of the carriageway.

- Standing water in the channels can cause edge deterioration.
- Increased summer temperatures can cause softening of the bituminous surface course and wheel track rutting then occurs.
- The softening of the binders can cause a reduction in the skid resistance, on both surface courses and surface dressing.
- On composite surfaces (concrete/bitumen material) the different expansion rates can cause damage at joints and the interface between the concrete and bitumen layers.

It is estimated that these impacts could reduce the lifetime of highways by as much as 8%, and have many implications for design and maintenance issues.

- **Changes in road safety** Increasingly extreme weather has an obvious impact on driving conditions, whether because of flooding, driving rain, high winds, or summer heat. There are also a number of less obvious issues such as winter glare, dusty roads which then become slippery when it rains, increased vegetation obscuring signs, road rutting and road-stone polishing from the heat.
- **Changes to the management of landscape and biodiversity.** This is a surprisingly large issue as the council owns large areas of soft roadside estate. Climate change is likely to change the plant species that will thrive, and increase overall growth rate. There is likely also to be some soil erosion.

Main concerns are:- the need to ensure that embankments and other structures are stable if there is subsidence or heave; the need to build 'weather-proofing' into maintenance schedules and the need to improve drainage.

Regional climate change studies have also identified a number of impacts on roads. These include:

- Higher rainfall could increase the incidences of pollution from foul sewers siphoning back as culverts fail. It could also wash away old country lanes which have limited foundations and generally poor or non-existent drainage.
- Drier conditions, such as those experienced in the drought of 1976, led to the collapse of dry stone roadside walls.

Contingency plans for other climate change issues, such as water shortages can lead to massive overuse of local roads. For example, during the summer of 1995, 2500 water-tankers fed standpipes in Yorkshire every day for six weeks. This led to damage of £1m to the roads.

5.3 The Council's Estate

The council's Energy and Water Management Plan aims to reduce water use in council buildings through the installation of more efficient appliances and management systems.

Efficient and waterless systems such as waterless urinals should be specified where appropriate for new council buildings. Other measures such as rainwater harvesting for use in toilet flushing and irrigation of lawns and plant beds should also be incorporated in new council developments. These measures feature in buildings which conform to the BREEAM “Excellent” standard, to which the Energy and Water Management Plan recommends all new council buildings conform.

The Energy & Water Management Plan aims to retrofit existing buildings wherever possible to reduce the requirement for water use.

Other design features such as ‘green’ sedum roofs should be incorporated wherever possible into new council buildings, as well as being retrofitted wherever appropriate.

Other aspects to climate change adaptation also need to be explored. In existing buildings, air conditioning systems can provide a solution to cool office areas, although the use of these systems requires energy and results in carbon emissions. Although there may currently be no alternatives to using traditional powered air conditioning systems in existing council buildings, for any new council developments there are opportunities to use other methods of cooling, ranging from good design practice such as shading and the planting of deciduous trees on South-facing aspects, through to passive ventilation systems using large wind cowls or even evaporative cooling coupled with rainwater harvesting.

5.4 Homes and Businesses

Water butts which can easily be plumbed into drain pipes on homes in the borough are cheaply available and simple to install. These provide a method of harvesting rainwater which is available to almost everyone, and when installed in large numbers on properties across the borough can make a significant contribution to reducing storm water run-off, capturing thousands of gallons before they enter the sewerage system. The council is currently promoting water butts via a subsidy scheme.

Water butts of course also provide vital water supplies to gardens, supporting home food production as well as preventing damage to plants, trees and shrubs and preserving the permeability of garden soil. The use of captured rainwater for the irrigation of gardens instead of mains water also avoids the emissions of carbon dioxide which are associated with energy use in water treatment plants, and which are amongst the main causes of man-made climate change.

Homes and business premises can also benefit from more sophisticated rainwater harvesting systems, which can use captured rainfall for toilet flushing, car and clothes washing facilities etc which do not require the use of potable mains water. Waste water from sinks, baths and showers can also be stored and used for toilet flushing. Simple water use reduction technology can

also be employed such as aerating spray nozzles on taps and shower heads, and low-flush toilets.

The council will run more educational and awareness-raising campaigns for businesses and householders to encourage better management of water resources as part of the strategy to prepare Trafford for the effects of climate change.

Waste systems operated by the council in partnership with Greater Manchester Waste Disposal Authority have been adapted, and may need to be adapted further in future to cope with changing weather patterns for homes.

For example, the volume of green waste for collection may change considerably dependent on the weather and could require changes to collection methodology or frequency of collections. Also, high heat levels in the future may mean different methods of waste collection to reduce odours etc. from waste being stored for long periods of time.

The current collection systems are fit for purpose and have been adapted over the last few years to allow people to recycle more and have improved containment of waste, but this does not mean that they will not need to be adapted in the future to meet the needs of the day.

6. Greenspace

6.1 Parks and Greenspace

Trafford's parks and open spaces will be significantly affected by the projected changes to the climate in the North West of England.

Hotter, drier summers will mean an increased risk of droughts which could damage trees, shrubs and open areas of grass and meadows.

Prolonged dry spells also dehydrate topsoil, which means that rain is less easily absorbed when it comes, and this can increase the risk of flooding in extreme weather events which are forecast to increase in frequency. At present, parks and open spaces can absorb heavy rainfall and allow it to soak away without running off onto highways or into residential areas, but this ability will be reduced by the hotter, drier summers which are forecast to occur in the future.

Steps can be taken to reduce the risk to plants by using species which are drought-resistant, and new planting regimes should be designed and implemented in parks as demonstrations of low-maintenance gardening for a hotter climate, but most of the vegetation in Trafford's parks will comprise plants which are already present and which will remain for many years to come, including all the usual tree species which are indigenous to the UK.

This vulnerability of plants and trees, coupled with the increased risk of impermeability to torrential rain, requires an improved maintenance schedule including the incorporation of new species into planting regimes, and also a possible requirement for extra infrastructure such as rainwater harvest and storage facilities to reduce flooding risk coupled with new irrigation systems to tackle drought and heat damage to plants and open spaces.

Additionally, the use of bedding plants in parks and on road islands should be reviewed with a view to deciding whether it is an effective use of resources. Bedding plants normally need a plentiful supply of water, which may not be possible in future climatic conditions.

There may also be an additional threat from new, exotic and invasive species of flora and fauna. Japanese Knotweed for example forms monoculture blocks which all die back in winter, exposing ground to erosion, and also reduce the species range available to support various food chains. There may also be implications for health from new insect species such as the Asian Hornet or new diseases such as malaria, for which there is evidence of Northern migration.

There is also evidence of increasing damage from nematode activity in lawns and grassed sports pitches. Nematodes which destroy grass root systems have been flourishing in the warmer soil temperatures which come with climate change, making the increased use of pesticides necessary with the extra expense that implies.

6.2 Woodlands

The Forestry Commission has conducted research into the possible effects of climate change on woodland and forests, and has produced a report entitled, "Climate Change – Impacts on UK Forests". Some of the key findings of the report are as follows:-

- An increased incidence of summer drought would make trees more vulnerable to attack by weak pathogens.
- Increased winter rainfall may raise water tables enough to kill roots, thereby reducing effective rooting depth and making trees more vulnerable to summer droughts.
- Good forest management can help to promote soil carbon retention by selecting species best suited to the changed climate and by adopting practices that increase forest productivity and reduce carbon losses.
- Opportunities for the restoration of floodplain woodland are likely to increase, with possible attendant benefits of flood control.
- Exotic pests such as the southern pine beetle could establish populations in Europe, and that climatic warming could make UK forests susceptible to damage; other bark beetles such as *ips typographus*, which is present in some parts of Europe, but not the UK, could become a serious problem.
- Given that CO₂ levels and temperatures are set to rise above current levels in the coming decades, it may be expected that forest growth rates in Britain will continue to rise, except perhaps in areas prone to summer droughts or nutritional limitations.
- More extreme atmospheric pressure ranges will bring with them stronger winds, which could pose a threat to trees and areas of forest and woodland. The current regime whereby developers are paid by the number of trees they plant encourages very close planting, which generally produces trees with relatively weak root structures. This makes areas of woodland far more vulnerable to strong winds, which can flatten large areas at once.

The Forestry Commission document also contains a chapter on responses to these changing conditions. Trafford's Greenspace teams will obviously need to be aware of these changes and how best to deal with them.

6.3 Street Trees and Other Green Infrastructure

It is recognised that urban trees and other green infrastructure such as shrubs and parks plays a vital role not only in removing pollution from the air, but also in providing a reduction in noise pollution and a significant cooling effect in areas which exhibit the 'urban heat island effect'.

Such green infrastructure can also help to reduce flood risk, but in the hotter, drier summers which are forecast may require improved maintenance regimes.

Trafford's budget for the replacement of trees which are removed in the course of annual maintenance has recently declined, and so the borough is seeing an overall drop in the numbers of urban trees. This will inevitably result in reduced environmental benefits from these trees, as well as a reduced supply of wood which can be harvested from these trees and used either as fuel or for other purposes such as building or manufacturing.

There may be an increased risk from falling trees and branches in extreme weather events such as strong winds, but with the right maintenance regimes trees which pose a risk can be identified and either removed or pruned to minimise this risk, in most cases. However, the risk can never be completely removed, as an otherwise perfect tree which is subjected to short-term water stress can respond by dropping branches.

When planting trees in the urban environment, species selection is important. Some of the larger tree species are unsuitable as street trees.

7. Frontline Services

- **Social Services**

The recent study, “Growing Old in a Changing Climate” identifies a number of issues relevant to climate change adaptation in social care:-

- The risk and harm resulting from climate change will not be evenly distributed; certain groups in society will be affected more than others. By 2031 over 50s are expected to represent approximately 41 per cent of the UK population (27 million).
- People in old age may be physically, financially and emotionally less resilient to dealing with the effects of a changing climate than the rest of the population. The insecurity and heightened exposure to certain threats caused by a changing climate are compounded in old age by reduced capacities for coping independently. The Government agenda around personalizing care and support (Putting People First) will improve the capacity of services to deliver services tailored to the individual needs of people. As the environment changes, the risks to people can be incorporated into the individual assessments and care plans that will central to the provision of support to those most at risk. Alongside this the development of preventative services and the further development of the Healthier Trafford Partnership should take into account issues relating to the impact of climate change on individuals.
- The homes of older people should be climate-change proofed to the highest standard, with insulation and microgeneration measures to reduce fuel bills and increase comfort. This factor is already addressed for privately owned dwellings in Trafford’s Sustainability Strategy, but should be extended to all residences.
- An improved community transport infrastructure which can be used by older people goes hand-in-hand with reduction of carbon emissions from transport, and enables older people to travel with ease and comfort in adverse weather conditions. There should also be an emphasis on improving access to public transport for older people and disabled people.
- **Strategic Housing**
 - Homes funded through the Homes and Communities Agency (The newly created body resulting from the merger of English Partnerships and the Housing Corporation) have to comply with the Code for Sustainable Homes-level 3. This means that the properties constructed will have a high insulation value with reduced energy consumption.
 - There is still much debate about the benefits and costs of micro generation as it relates to residential property. There is still a lot of

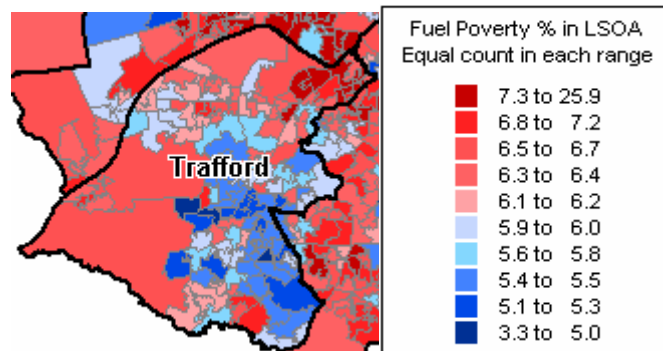
development work required to produce reliable technology that is cost effective. Solar Hot water is probably one of the most effective ways of reducing heating costs and therefore reducing carbon emissions in domestic property. Insulation is also a relatively cheap and effective ways of reducing fuel bills, increasing thermal comfort and reducing carbon emissions. Any technology should be simple to use and preferably need no input from the householder.

- There is still a considerable amount of property in Trafford that is pre-1940 and we have to be realistic about our ability to bring it up to the thermal efficiency standards of modern homes. The Decent Homes Standard is going some way to ensuring that rented homes have efficient heating systems and insulation. It is likely that there are a substantial number of older people who live in their own homes but have limited means to carry out improvements.
- Fuel poverty is becoming an issue for an increasing number of people as the cost of fuel continues to rise. Much of this is caused by the UK reliance on imported gas, the price of which is linked to oil prices. Clearly there is a need to look at becoming more self sufficient in this area and develop cost effective sources of renewable energy to meet at least some of our needs.
- How we deal with very hot weather is another matter. Homes in the UK are simply not designed to cope with heat waves as they are in parts of Southern Europe. The solution is perhaps not really property based but more about the capacity of our care and health services to cope.
- **Welfare Benefits**
- In our work we see a lot of older people who are, or perceive themselves to be, on the poverty line. There are those who are reluctant to claim benefits especially those that are means tested, this has been long acknowledged and the central Manchester district of the Pensions Service will be part of a pilot for marketing benefit take up in the New Year. Take up is usually very productive but labour intensive and requires joint working with all agencies involved.
- We also see many older people who sit in the cold and are frightened of the thought of their fuel bills and this may not be proportionate to their actual ability to pay. However, many fuel companies will overestimate use when they work out payment plans and it does not occur to older customers to challenge them and if they do it is quite often difficult to communicate meaningfully with fuel companies in order to negotiate lower payments.
- With regards to the energy efficiency schemes such as "Warm Front" there is a history of poor quality work that is not policed, local agencies such as care and repair or Age Concern could be involved in recommending contractors or even having their own schemes that are

locally managed and quality checked. Also Housing Association tenants are not covered by the Warm Front scheme.

The Department of Health issues annual Heat Wave Plans to increase community resilience in the face of increasing risks from climate change. The plan is cascaded to local health authorities, and together with strategies to tackle fuel poverty, is essential in limiting 'excess seasonal deaths'.

Trafford Council will need to work closely with the local Health Authority during both the summer and winter months to minimise the risk from climate change to vulnerable members of the community in Trafford. Improving thermal insulation is a key way to reduce both cold-associated winter deaths and heat-associated summer deaths. It therefore follows that identifying households which are suffering from 'fuel poverty' is a key way to mitigate the effects of a changing climate in vulnerable communities.



(Data modelled by University of Bristol and CSE from 2001 census and 2003 English House Condition Survey)

Data from Trafford's Housing Stock Condition Survey shows that the wards in Trafford with the highest percentages of homes suffering from fuel poverty are as follows:-

<u>WARD</u>	<u>%age in Fuel Poverty</u>
Clifford	12%
Bucklow	9%
St. Martin's	9%
Talbot	9%
Urmston	9%
Altrincham	7%
Longford	7%
Park	7%
Priory	7%
Sale Moor	7%
Stretford	7%

These are likely to also be the areas which are most at risk from excess summer deaths due to heatwaves when they occur. Tackling the energy efficiency of properties in these areas will also improve the cooling effect from thermal insulation during the summer months.

8. NI188 – Definitions, Funding Issues and Action Plan

From 2008, the new National Indicator set for Local Authorities will include an indicator dealing with climate change adaptation. The Audit Commission describes the new indicator as follows:-

Rationale: To ensure local authority preparedness to manage risks to individuals, communities and businesses from a changing climate, and to make the most of new opportunities.

The indicator measures progress on assessing and managing climate risks and opportunities, and incorporating appropriate action into local authority strategic planning. The risks and opportunities might include: flooding; heat waves; changing patterns of disease; impact on local ecosystems; changing demand for, and scope to grow, new crops; reduction in heating bills and increased tourism.

Definition: *Authorities should report the level they have reached as follows:*

Level 0

The authority has not assessed and managed climate risks and opportunities, or incorporated appropriate action into local authority strategic planning.

Level 1

The authority has undertaken a comprehensive, local risk-based assessment of current vulnerabilities to weather and climate, both now and in the future. It has developed possible adaptation responses explicitly related to other relevant council strategies, plans, partnerships and operations (such as planning, flood management, economic development, social care, services for children, transport etc).

Level 2

The authority has identified the most effective adaptation responses to address the risks and opportunities, explicitly related to other council strategies, plans and operations. This will yield a set of locally specific, preferred options.

Level 3

The authority has developed an adaptation action plan to deliver necessary steps to achieve the existing objectives set out in council strategies, plans, investment decisions and partnership arrangements in light of projected climate change.

Level 4

The authority has implemented an adaptation action plan, and a process for monitoring and review to ensure progress with each measure.

Level 1 – Risks and Vulnerabilities

1. Environmental Operations

- Service areas – Tree Strategy / Highways Strategy

Tree Unit Climate Change Issues

- In order to address all of the dead, dying & dangerous trees in Parks that need immediate attention the tree unit have calculated that it will cost a minimum of £131,000 annually.
- Parks have an annual tree budget of £51,000. This figure has to cover the inspection & maintenance of all parks & open space trees and the replacement of any trees removed. Currently very few of the trees removed from parks are replaced.
- In the current budget, there are insufficient funds to address CURRENT climate change issues.

The Tree Unit always expects in a given year, 1 or 2 major storms which cause damage to trees throughout the Borough. However, in 2008 we had 4 major storms resulting in over 250 emergency incidents being logged on the Council's SAP system.

- March 3rd 2008 - 19 enquiries
- March 11th 2008 - 28 enquiries
- May 27th 2008 - 160 enquiries
- June 22nd 2008 - 44 enquiries

If this trend continues as detailed by various government bodies who inform us that due to climate change it will, the whole budget for managing the Council's trees will be spent on dealing with storm damage on a regular basis.

The following photographs show challenges currently faced by the tree unit in respect of Storm Damage which unfortunately is becoming an annual event:

Photo 1 - Failed Oak tree branch – rear of Drayton Close



Photo 2 - Fallen Beech tree – rear of 33 Medway Crescent



Urban Trees

The Highways Strategy will result in around £20 million of works on urban roads in Trafford over the next 3 years. This will mean the loss of many urban trees during the works, and replacement trees should be paid for from the £20 million highways budget. Alternatively, working methods should be used which do not require tree removal.

Drainage Climate Change Issues

- Drainage work is becoming capital in nature.
- Severe flooding means excavating up to 8 metres in depth on defective highway connections.
- Surface water often has to be mechanically pumped constantly to ensure the highway network remains open.
- Specialist drainage contractors needed to carry out repairs.
- Day work rates applicable due to unquantifiable nature of work.
- Work is outside the realms of a reactive drainage revenue budget.

PCA Budget Report 2

Trafford M.B.C. Profit Centre Report Budget Report 2

Date: 09.06.2008

Controlling Area: TMBC
Profit Centre Group: 41
Cost Element Group: TMBC
Fiscal Year: 2007
Period from: 1
Period to: 13
Plan Version: V1
User: 73918

General Ledger Code	Actual	Plan	Variance	Var %
Total	313,096.72	173,771.00	139,325.72	80

Drainage Budget Pressure

- Over spend of £139,000 in 2007/8
- 2007/8 ledger includes drainage work that is predominantly capital in nature:

Capital Drainage Works 2007/8

• Order	Capital Value	Details
• 1029747	10,048.77	Breakdown on two gullies JCT Bedford Rd
• 1029599	8,532.51	Floods from 14/6/07
• 1027150	15,000.00	Stockport Road
• 103081	9,985.65	Barton Road
• 1029945	9,392.12	Baemar Ave
• Total	52,959.05	

Drainage Pressures

The following photographs show challenges currently faced by Highways in respect of flooding which unfortunately is becoming an annual event:

Photo 1 – Driving & stabilising the trench piles



Photo 2 - result - tree root blocking highway connection to the sewer, approximately 8 metres in depth



The Need for Consultation

When designing and undertaking work schemes for highways, Highways and Structures (Environmental Strategy) should in future always consult with Environmental Operations on the practical implications of the schemes. This is because features which may appeal on a strategic level may have long-term maintenance or other operational implications which may not be obvious at first.

Summary

- Climate Change is affecting environmental operations budgets currently and is not only a pressure for the future.
- Drainage and tree budgets are already under pressure from storms and flooding.
- Sufficient revenue and capital funding is essential to ensure the current pressures do not multiply.

2. GIS Survey of Ponds and Lakes

To identify bodies of water in Trafford which may be at risk from eutrophication, water temperature rise and low water levels and produce a schedule of possible remedial works with costs.

- Service area – Greenspace Strategy.

3. Heat Vulnerability Survey

To determine areas of the borough which are particularly vulnerable to high temperatures due to the urban heat island effect. Already completed (see map in section 4)

- Service area – Core Planning Strategy / Tree Strategy

4. Green Roofs Potential Survey

To determine existing buildings across Trafford that may be suitable for retrofit of 'green roofs' to help with flooding mitigation and the urban heat island effect.

An initial aerial survey of Trafford Park by the Greater Manchester Ecology Unit estimates that there could be as much as ten hectares of buildings' roofs on Trafford Park which may be suitable to be retrofitted with green roofs.

Trafford is participating in an AGMA survey of the potential for green roofs across the city region.

5. Fuel Poverty Survey

Study already completed – refer to the map and 'league table' in section 7 of this strategy.

Level 2 – Assessing Adaptation Response Options

Identifying Risks and Risk Owners

RISK	RISK OWNER	ECONOMIC RISK	SOCIAL RISK	ENVIRONMENTAL RISK
Deterioration of existing drainage systems	Trafford MBC, GMPTE, UU	High (already over £200K per annum with trees)	Medium – disruption to homes and businesses	Medium – further damage to infrastructure such as roads
Deterioration of tree stocks and woodlands	Trafford MBC	High (already over £200K per annum with drainage)	High – disruption to homes, businesses and risk of fatalities	High – deterioration of flood prevention, co2 sinks, air quality and wood resource
Design standards for new developments	Trafford MBC, developers, insurance companies, UU	High – developments lose their value due to flood vulnerability etc	Medium – disruption to homes and businesses	Medium – increased risk of flooding from impermeable surfaces, increased health risk from urban heat island
Lack of buy-in from members / senior management	Trafford MBC	High – homes and businesses remain unprepared	High – residents psychologically unprepared	High – damage could be amplified by lack of preparedness
Whole-life costings not taken into account	Trafford MBC, developers, insurance companies	High – false economies can be made resulting in long term liabilities	Medium	Medium
Heat risk to vulnerable residents	Trafford MBC Social Care, residents, schools and nurseries	Low	High – may result in fatalities	Low
Flooding – SFRA, Trafford has a ‘high risk’ of fluvial flooding.	Trafford MBC, GMPTE, developers, insurance companies, UU	High – developments lose their value due to flood vulnerability	Medium – 4,000 – 6,000 homes in Timperley are at risk	Medium – further damage to infrastructure such as roads
Public health risk due to increased incidence of disease	Trafford MBC, PCT, Health Authority, Social Care, schools	Medium – economic cost of work days lost due to illness	High – may result in fatalities	Low
Biodiversity risk	Trafford MBC, Environment Agency, GM Ecology Unit	Low	Low	High – risk to bees and other pollinators, and many other species
Risk to effectiveness of emergency services	Trafford MBC, Police, Fire, PCT, Health Authority	Medium – increased risk of damage from fire and flooding	High – potential for social disorder	Low
Risk to critical infrastructure	UU, power distribution companies	High – interruption to businesses	High – potential for social disorder	Medium – risk of pollution of watercourses

Actions and Priorities

When assessing actions and priorities, three factors are taken into account:-

- The financial cost of the action or initiative, including the cost of not taking action where invest-to-save applies;
- The timescale for implementation;
- The impact on all three target areas: economic, social and environmental.

There are many areas of action which were considered by the workshop and by this strategy which on the surface would appear to be logical and essential measures for climate change adaptation. However, upon further scrutiny, it became apparent that many of these areas could in fact result in false economies.

An example of this possible false economy scenario would be the use of porous pavements and surfaces generally for roads and car parks. Whilst this would at first seem to be the way to go for water runoff attenuation, on closer inspection a few factors become apparent which would tend to suggest otherwise:-

- Permeable surfaces are generally less hard-wearing and more expensive than their standard equivalents.
- Maintenance costs for such specialist surfaces tend to come out around double the cost of 'standard' surfaces over the same life period. This is due to reduced resilience against frost, clogging and general wear and tear.
- These factors could mean that employing such permeable surfaces is simply shifting the maintenance cost from drainage and sewerage to roads, pavements and car parks – not the desired outcome.
- Low-cost, short-term solutions can be better – lateral thinking is necessary. For example, non-permeable car parks can actually serve to contain flooding in times of extreme precipitation, and hold water in the short term to prevent it from reaching drainage systems, which of course is the aim. Measures to redirect run-off into such non-permeable 'holding areas' are far cheaper to install than permeable surfaces. These low-cost solutions should be engineered in to all construction and development schemes from the start, by way of a checklist for climate change adaptation requirements. A prime example would be the £21 million highways improvement project the council is currently undertaking.
- A surface water management plan could provide evidence to support these low-cost, short-term solutions, as well as recommend adequate tree planting space, green roofs and other adaptation measures. Documents could be written to assist developers in incorporating climate change adaptation techniques, technologies and measures into new development.

Another example might be where ponds and swales associated with Sustainable Drainage Systems present a drowning risk or an increasing risk from disease-carrying insects such as mosquitoes as climate change takes effect. Care must be taken in the design and siting of such measures and systems, and the education of nearby residents must be a priority when instigating such measures.

Many other factors also come into play when looking for climate change adaptation solutions, and projects requiring significant funding and co-ordination are not always the answer. Effective enforcement and policing of existing legislation and processes, coupled with educational programmes to bring awareness of these to the relevant stakeholders, are often all that is required:-

- Part H of the building regulations regarding drainage – soakaways should always be considered and chosen as a first resort as it is far cheaper to prevent water from reaching drains and sewers in the first instance, although care should be taken not to place soakaways too close to houses. Policing of the building regulations and enforcement of same is a resource issue though, and Trafford has only three enforcement officers. Patios and landscape gardens a problem, but this can be overcome by educating residents and builders.
- United Utilities generally refuses to provide foul sewerage services for Sustainable Drainage Systems, and this could be an issue until legislation requires them to do so. United Utilities also holds responsibility for upgrading sewerage and drainage systems and should have adequate asset management plans for this. The possibility exists of enforcement action by the council against United Utilities to recover costs incurred as a result of neglect by UU, where the council's environmental operations service has to deal with flooding problems for example. If it can be shown that UU (or other owners of drainage systems) have not discharged their duty in keeping infrastructure in an adequate state of repair, the council should be fully prepared to recover its costs via court action under the general principle of enforcement of environmental standards.

Key Stakeholders

- Other Local Authorities
- Red Rose Forest and Mersey Forest
- Groundwork and the Local Strategic Partnership
- United Utilities
- Peel Holdings and other large developers
- Trafford Park
- PFI Partnerships e.g. Sale Waterside, Proposed New Town Hall
- Schools and Colleges – can be covered by AfSL partnership
- PCT & Health Authority
- Fire & Rescue services, emergency planning
- Architects & Designers
- Councillors
- Planning Committee
- AGMA
- Government Office North West
- NWDA
- Network Rail
- Metrolink
- Supermarkets
- Highways Agency
- GMWDA
- National Trust
- Landowners (green credentials)
- House Builders
- Church Commissioners
- National Farmers' Union
- Mersey Basin Campaign
- Environment Agency
- Brixton Estates
- Bruntwood
- GM Police
- HE
- Shell (one of the largest landowners in the borough)
- Registered Social Landlords

Level 3 – Adaptation Action Plan

‘Quick Wins’

‘Quick Wins’ are low-cost, high-impact actions which can be implemented within a short timescale. It is proposed that the following actions form the first part of Trafford’s Climate Change Adaptation Action Plan, and be implemented between April 2009 and April 2010.

- Educate householders
 - What the council is spending on climate change adaptation & maintenance
 - How the council is leading by example in adaptation measures
 - Planning rules on impermeable driveways, landscape gardens
 - Practical examples, for example the difference it would make if everyone had water butts, water meters and cistern ‘bricks’.
 - Action for Sustainable Living to distribute information leaflets to households
 - **Funding source: Sustainability Team budget**
- An information leaflet to be sent out with every planning application and to educate architects and the developers who the council regularly works with. The same leaflet can be sent out to building companies. To be done in partnership with the Environment Agency, along the lines of the document prepared by the Welsh Assembly.
 - **Funding source: Sustainability Team budget / Environment Agency**
- Make sure the Environment Commission has adaptation as a priority with a cross-GM approach, and works with the Health Commission, taking into account the Strategic Flood Risk Assessment.
 - **Funding source: Trafford MBC officer time**
- A Sustainable Construction Supplementary Planning Document, to be included within the Local Development Scheme. This would contain information on climate change adaptation requirements as well as carbon reduction requirements.
 - **Funding source: Trafford MBC officer time**
- Increase tree cover wherever/whenever possible, with permeable surfaces around tree roots, and green roofs where appropriate.
 - **Funding source: Trafford MBC officer time / Highways budget / Council Property Budgets / Section 106**
- A climate change adaptation masterclass for the private sector, delivered with Groundwork. Schools, Planners and the Environment Agency will also be invited to attend. Potential costs to businesses of climate change, and the costs of adaptation to be covered, along with the Planning framework, green roofs etc.
 - **Funding source: Trafford MBC officer time / Groundwork**
- Highways, bridges and structures team, and Landscape Architects, to be included in planning decisions. Review of Structural Issues – for council and associated buildings. Are current design and engineering standards adequate in the light of climate change?
 - **Funding source: Trafford MBC officer time**
- A Sustainability ‘sign-off’ for council decisions, especially Planning.
- When the Environment Agency is renewing permits for industrial users, drainage to be given priority consideration.
- Climate Change adaptation session for the council’s Planning Committee.

- **Funding source: Trafford MBC officer time**
- 'Mini Stern Review' presentation for councillors – the Economic Impact of Climate Change. Also the Economic impact of Green Infrastructure report.
- **Funding source: Manchester Enterprises / Ecology Unit**
- DEFRA is running a programme of grants to upgrade properties in flood risk areas – however, this project will not fund homes already subject to flooding, despite the opportunity to work with insurance companies repairing damage. Insurance could be cheaper for properties prepared for CC. £300million is available under the scheme, which homes at risk from flooding in Timperley could qualify for.
- **Funding source: DEFRA**
- 'Gardens of the Future' – example plant beds in parks according to future climate change scenarios. The project to be fronted by a community group such as Action for Sustainable Living, and will be located in a major town in the borough as a well-known public attraction.
- **Funding source: Trafford MBC / AfSL**
- Bedding Plants – replace annual bedding plants at appropriate sites with low-maintenance perennials which do not need watering. This will save significant financial and physical resources (compost, water etc).
- **Funding source: Greenspace Operations**
- Logging of Incidents and Agreed Budgets – climate change related incidents and expenditure to be logged under a special revenue budget code in order to effectively track and monitor the status of the action plan. Agreed budgets to cover costs associated with climate change. A separate record of individual climate change related incidents and events e.g. storms, floods etc to be kept to help determine trends.
- **Funding source: IBU**
- AWARM – The Greater Manchester Health Commission recommends that all GM authorities put in place a referral mechanism to help tackle fuel poverty. AWARM (The Affordable Warmth Access Referral Mechanism) has already been piloted in four Local Authorities in North Manchester and has shown to be effective not only in reducing carbon emissions from fuel poor homes, but in increasing the income levels of vulnerable households via 'benefits health checks', to make sure that vulnerable people are claiming all the state benefits to which they are entitled. Thermal insulation also plays a vital role in reducing the threat of excess temperatures to vulnerable members of society and so the implementation of AWARM would be a powerful step in climate change adaptation for Trafford. AWARM will cost around £10,000 per annum for each local authority area, but has the potential to bring in substantial external funding from the health authority and other sources. Under AWARM, all front-line services which visit people in their homes would receive training in the identification of fuel poverty and how to refer households to the AWARM scheme, which would identify the full range of benefits available.
- **Funding source: Housing Strategy, Adult Social Care, Trafford Primary Care Trust**

Actions with higher cost or timescale implications are listed below.

ACTION	COST /TIMESCALE	ECONOMIC IMPACT	SOCIAL IMPACT	ENVIRONMENTAL IMPACT
New tree planting schedule based on urban heat island and flooding models	Cost neutral	Low	Medium – improved urban greenspace and psychological health	High – improvement in biodiversity, air quality, flood control and heat mitigation
Environmental Management System for the council	£75K over 3 years, or £30K per annum for permanent officer	Low	Medium – improved urban environment and ‘street scene’	High – improvement in overall environmental quality
Comprehensive treatment of dangerous trees (URGENT)	£1 million	Medium – removes risk of damage to property	High – removes risk of injury and death	Medium – improves average quality and health of tree resource
Trees for the future – S106 funded, identify sites, grass into woodland etc (forest plan)	Cost neutral / S106 funded Street Tree Debate remains	Low	Medium – improved recreational greenspace	High – improvement in woodland resource and biodiversity
Changes in woodland management arrangements	Cost neutral	Low	Medium – improved recreational greenspace	High – improvement in woodland resource, productivity and biodiversity
Survey of potential for floodwater storage in parks and car parks & implementation	TBC Should include identification of key infrastructure & cleanup costs	High – removes risk of damage to property	Medium – removes threat of disruption to homes and businesses	Medium – improves biodiversity and irrigation of greenspace
Trafford Park masterplan (pilot Green Infrastructure plan)	Cost neutral	High – removes risk of damage to property, improved working environment reduces sickness	Medium – improved urban greenspace and psychological health	High – improvement in biodiversity, air quality, flood control, heat mitigation and overall environmental quality
Study of opportunities for upstream water attenuation (other LAs)	Cost neutral (will use data from SFRA / Waterproof)	Medium – removes risk of damage to property	Medium – removes threat of disruption to homes and businesses	Medium – reduces flooding risk
Study of vulnerable residents at risk from heat with PCT / Health Authority	Cost neutral; may result in re-targeting of resources around AWARM	Medium – re-housing and investment in insulation, natural ventilation may reduce treatment costs	High – removes or reduces risk of illness and death in vulnerable residents	Low

Level 4 – Implementation and Monitoring



Above: the roof of Carrington Depot which was ripped off by a storm in 2007.