Thurrock Council

Local Climate Impacts Profile (NI 188)

Planning for Thurrock's Adaptation to Impacts of Climate Change

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Purpose

A Local Climate Impacts Profile (LCLIP) aims to assess an area's vulnerability to climate change. It highlights the impacts of severe weather events and enables local authorities, businesses and communities to adapt to climate change.

This report is intended to assist Thurrock Council and its partners to develop services that are resilient to the impacts of climate change, a priority for Shaping Thurrock as articulated in Thurrock's Local Area Agreement (LAA). This report highlights the significant risks; the services and partners who are likely to be involved in dealing with these risks, and highlights interventions that services may need to undertake in order to respond to the long term impacts of climate change.

Background

Climate Change policy at a local level typically addresses two distinctly different elements, firstly measures to prevent climate change and secondly measures to adapt to the impact of climate change. Although both of these issues are important for local partners, it is the second of these policy issues (NI 188 – Adaptation to Climate Change) that Thurrock has prioritised within its LAA.

This report, a Local Climate Impacts Profile (LCIP), will assist Thurrock Council and its partners in the development of a comprehensive risk-based, site and service specific action plan, to ensure that Thurrock's infrastructure, services and communities are resilient to the impacts of a changing climate.

In September 2008, Thurrock Council compiled a Climate Change Evidence Base. This document highlights that Thurrock's vulnerability to weather is as follows:

a. Rising sea levels, stronger winds and more frequent heavy downpours of rain will result in more regular widespread flooding, as well as coastal and soil erosion.
b. Warmer and drier summers will result in more regular drought and heat-waves
c. Milder and wetter winters will result in more extreme winter precipitation.

The following partners will be required to be involved in Thurrock's climate change risk assessments:

a. Environment Agency
b. East of England Ambulance Service
c. Essex Fire and Rescue Service
d. Essex Police
e. Health Protection Agency
f. Essex County Council
g. Thurrock Council
h. Southend Council
i. Maritime & Coastguard Agency

j. South West Essex NHS (Primary Care Trust)
k. Basildon and Thurrock NHS Foundation Trust
l. Thurrock Business Association
m. Citizen's Advice Bureau
n. Thurrock CVS

The following strategic documents will be subjected to a climate change risk assessment.

a. Major emergency response plan (Thurrock)
b. Major emergency response plan (Essex Resilience Forum)
c. Essex Flood Plan
d. Essex Severe Weather Plan (including snow)
e. Business Continuity Plans for each service (all partners)
f. Local Development Framework
g. Local Transport Plan
h. Economic Development Strategy
i. Biodiversity Action Plans
j. Greengrid strategy
k. Waste Management Strategy
l. Housing Strategy
m. Cultural Strategy
n. Health and Wellbeing Plan
o. Crime, Antisocial Behaviour, drugs and alcohol misuse prevention strategy

The risk assessment will be quite detailed and site specific. For example, the risk assessment of the Housing Strategy may contain recommendations that prioritise an Estate in a flood risk area for a number of emergency planning interventions, and Estates in other locations to improve housing ventilation and insulation.

It is expected that each strategic document will be amended in line with the recommendations arising from the risk assessment. Some recommendations will contain low cost modifications to policies/ procedures/processes. However, it is anticipated that some recommendations will result in more significant cost implications. The latter will need to be carefully considered by Thurrock's partners for the short, medium term and long-term risks and benefits.

The recommendations arising from the risk-assessment process will form the action plan that Shaping Thurrock will monitor on an annual basis. This document will sit alongside Thurrock's Emergency Planning and Business Continuity documents.

This report also contains a summary of impacts and possible interventions arising from expected changes in weather patterns in Thurrock.

General Findings from the Essex County LCLIP

The Essex LCLIP was commissioned by the local authorities within the County of Essex and produced over a three month period in the summer 2010. The aim of Essex LCLIP was to assess the impact of recent weather events on local authority services, businesses and communities. This search was performed over a five year period, from January 2004 to December 2009. During this period, Essex recorded over 160 weather related incidents caused by severe weather events such as flooding, heavy rain, strong winds, extreme winter conditions, and extreme summer temperatures.[1]

UK Climate Projections (UKCP09)

According to the projections produced by the UK Climate Projections in 2009 (UKCP09) the following climatic changes in Essex are likely to occur by 2080:

- Winter temperatures will increase by 2.6-3.7°C
- Summer temperatures will increase by 2.9-4.7°C
- Winter precipitation will increase by 12.9-21.3%
- Summer precipitation will decrease by 14.9-27.9%[2].

These changes are likely to result in the following threats to Essex:

- "*Decrease in water resources exacerbated by a potential increase in demand,*
- *Increase in risk to people, property and the environment from flooding,*
- *Hotter and sunnier summers putting public health and safety at greater risk,*
- *Hotter summers causing greater "heat stress" to buildings, utilities and the transport system,*
- *Decrease in soil moisture (particularly during summer and autumn) affecting agriculture, the natural environment and landscape.*" [3]

Moreover, the UKCP09 has projected changes in sea levels likely to impact communities, businesses and local authority services situated in coastal areas. Indeed, scientists have claimed that by 2080 "average sea levels will rise by 26-86cm [and] extreme sea levels will rise by 80-140cm (including regional isostatic subsidence as well as climate change)"[4]. Considering the coastline in Essex extends over 300 miles, an increase in sea levels will undoubtedly impact local authority services, businesses, communities and the surrounding wildlife in coastal areas.

Thurrock's Vulnerability to Climate Change

An LCLIP is created as a catalyst to understanding the scale of the impacts of climate change and eventually encourage effective adaptation.[5]

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[1] Essex LCLIP, 2010
[2] © UK Climate Projections, 2009
[3] As identified by *Climate Change in Essex – The Evidence base and priorities for a county-wide action plan Part 1 – Project Report*
[4] *Climate Change in Essex – The Evidence base and priorities for a county-wide action plan Part 1 – Project Report*
[5] UKCIP website

The weather events identified as posing the greatest risk to Thurrock Council's services, its partners and the local community are:

- Heat wave and drought;
- Flooding (including flash, fluvial and tidal flooding); and
- Extreme weather events, including snow and ice and stronger winds.

The expected impacts and possible interventions to prepare for the impacts and adapt to conditions arising from such weather events are described below.

Heat Wave and Drought

East of England is the driest region in England, and one of the fastest growing. Water resource availability is limited and there are already supply-demand issues in parts of the region. In some catchments, winter abstraction is not reliable during dry winters, and under predicted scenarios for climate change, more frequent drought conditions are expected.[6]

According to the Environment Agency, there are no further ground water resources available for any further development in Thurrock and no licences will be issued for further ground water extraction.[7]

Analysis of data from 1959 to 2007 (using Greenwich and Cambridge Met Office Stations) indicates that maximum temperature rates have remained constant; however, minimum temperature rates have risen by 1%.[8] Increases in annual average minimum temperatures may threaten health and infrastructure and may also have economic impacts.[9]

Expected impacts are:

- Greater hospital admissions of older residents, infants and other vulnerable residents (NHS bodies)
- Deterioration in air quality arising from prolonged periods of still, dry days, resulting in increased hospital admissions for asthma and other respiratory conditions (NHS bodies)
- Potential increase in anti-social behaviour and crime associated with long hot summers in urban environments (Essex Police, Local Authority)
- Increase in incidence of domestic, outdoor and industrial fires (Fire service)
- Increased electricity usage resulting from increased use of air-conditioning units (National Grid)
- Increased demand on water resources (particularly through watering of gardens) (Essex and Suffolk Water; Thames Water)
- Road surfaces may become significantly degraded, impacting local transport networks and businesses (Local Authority; Highways Agency)

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[6] Environment Agency Water Resources Strategy consultation 2007
[7] Environment Agency; Small Fish Consultants, *Thurrock Climate Change Evidence Base*, September 2008
[8] Greenwich and Cambridge Met Office Stations
[9] Small Fish Consultants, *Thurrock Climate Change Evidence Base*, September 2008

- Capacity of rail network may be reduced to cope with hot track conditions (C2C; Eurostar; Port of Tilbury; other businesses using rail)
- Increased demand for swimming instruction and outdoor recreational facilities (Local Authority)
- Possible weakening of foundations of buildings and homes arising from changed conditions in soil (Local Authority, English Heritage)
- Decrease in local biodiversity as species may be unable to adapt to sustained periods of drought (Local Authority; Environment Agency)
- Loss of production in agricultural land
- Increase in footfall in air-conditioned premises, such as Lakeside Shopping Centre

Possible interventions required:

- Waste collection may be need to be modified to prevent spread of disease and mitigate rodent population growth (Local Authority)
- Public and private sector homes may need improved insulation and ventilation to reduce hospital admissions (Local Authority)
- Policies within Local Development Framework will need to enforce standards for building design and construction materials for new dwellings and business space (Local Authority; Development Corporation)
- Replacement of road surfaces to withstand higher temperatures (Highways Agency, Local Authority)
- New fire safety measures may need to be introduced, such as safe disposal of cigarette butts, introduction of fire bans (Fire Service, Local Authority)
- Amendments of grass cutting / street maintenance policies and procedures to prevent accidental fires (Local Authority)
- Water restrictions may need to be introduced and enforced (Essex and Suffolk Water; Thames Water, Local Authority)
- Investment in local wildlife sites to introduce measures that encourage protected species to adapt to new environmental conditions (Local Authority)
- Install shade protection in public urban spaces or investment in tree planting (Local Authority)
- Regular surveys of historic sites such as Coalhouse Fort, Tilbury Fort other identified vulnerable sites to ensure structural soundness (English Heritage, Local Authority)
- Enhance outdoor recreational facilities / open spaces (Local Authority)
- Introduction of free safe swimming programmes for young people and adults (Local Authority; NHS bodies)
- Enforcement of alcohol free zones to prevent increase in anti-social behaviour and crime (Essex Police, Local Authority)

Flood (Flash Flooding; Fluvial Flooding; Tidal Flooding)

There are currently approximately 11,000 properties at risk of tidal flooding in Thurrock with several hundred properties at risk of fluvial flooding. The frequency of major flood risk for these properties is likely to increase as incidence of heavy rainfall continues to rise. Locations at risk are Tilbury, East Tilbury, Fobbing, London Gateway, Purfleet, West Thurrock, and Bulphan. No planning permissions were granted in 06/07 contrary to Environment Agency advice on flood risk grounds, compared with 13 in the region and 110 nationally. [10]

Tidal flooding can result from a storm surge, high spring tides or both events taking place over undefended land. The 2006 Strategic Flood Risk Assessment for Thurrock concluded that much of Tilbury, Purfleet and West Thurrock are at or below mean high tide level. These areas are protected by the defence system along the Thames and a series of drainage channels that pump water into tidal outfalls.

The drainage channels can also flood for a variety of reasons including if rainfall is greater than the capacity of the channels or pump capacity, the channels are blocked (even partially) or there is pump failure downstream. In general, properties closest to the Thames are most vulnerable to breaches of flood defences.

The Mar dyke is a fluvial river that can also be subject to tidal flooding in extreme events. Flooding in the Mar dyke could occur from heavy rainfall in upper reaches of the catchment being too great for the capacity of the channel. There are flood defences along the Mar dyke, however, flooding can still occur if the flow of water is greater than the levels of protection for which the barrier design was intended.[11]

Analysis of data from 1959 to 2007 (using Greenwich and Cambridge Met Office Stations) indicates that annual rainfall has increased by 2% and air frost days have increased by 10%. It is expected that small but steady annual increases in rainfall are likely to present additional challenges in Thurrock in relation to drainage and flood risk. [12]

Expected impacts are:

- Significant flooding may require residents to evacuate their homes, businesses to evaluate their premises (all partners)
- Increase in demand for temporary housing and housing advice (Local Authority, Emergency Services)
- Potential increase of disease arising from potential degradation to sewage disposal and water collection systems (NHS partners)
- Increase demand (and cost) for emergency and first aid health services (Police, Fire, Ambulance, Coast Guard)
- Flood resilience measures will need greater maintenance and improvements (Environment Agency)

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[10] Small Fish Strategy Consultants, *Thurrock Climate Change Evidence Base*, September 2008
[11] Scott Wilson, *Thames Gateway South Essex Appendix F Thurrock Borough Council Strategic Flood Risk Assessment*, November 2006
[12] Greenwich and Cambridge Met Office Stations

- Increase in traffic incidents due to degradation of travel conditions (Highways Agency, Fire, Police, Ambulance)
- Possible cancellations of public transport networks, disrupting commuters and residents' access to essential services (C2C; Eurostar; Port of Tilbury; other businesses using rail)
- Increased pressure on localised food and fuel supplies in isolated areas of flooding
- Cancellation of schools (Local authority, education partners)
- Increased soil and coastal erosion (Environment Authority)
- Weakening of foundations of buildings and homes arising from flooding (Local Authority, Emergency Services)

Possible interventions required:

- Enhancements to procedures within Essex Flood Plan (Local Authority, Environment Agency)
- Enhancements to Essex Emergency Plan (Local Authority, Emergency Services)
- Modifications to flood defence (Environment Agency)
- Modifications to wildlife preservation areas to protect wildlife from impact of flood (Environment Agency, Local Authority)
- Improvements to drainage systems on strategic road network to prevent accidents arising from flash flooding (Highways Agency, Local Authority)
- Engagement activity with residents and businesses to develop their own mini emergency plans (Local Authority, Emergency Services)

Extreme Weather (Snow and Ice, Stronger Winds)

The annual frequency of strong winds has increased over the last 10 years. The increased frequency and intensity of winds has caused greater damage, such as building damage, transport disruption, power cuts and fallen trees.[13]

Like windstorms, snow can impact the whole county causing wide-scale rather than localised disruptions to transport networks.

Essex public sector services, like most of the UK, have been severely affected by the winter 2009/10. Roads remained inaccessible as grit supplies were running low, businesses were disrupted as workers were unable to travel to work, trade suffered as shoppers remained at home and school closures meant a loss of education hours for children and forced leave for working parents.

Extreme winter conditions primarily disrupt our transport systems as the local media search revealed that approximately 60% of all incidents during extreme winter conditions affect roads and rail services. Difficult driving conditions cause short term disruptions to our roads,

[13] Essex LCLIP, 2010

such as congestion and traffic accidents.[14]

Extreme winter conditions also create health and safety concerns and add further stress on emergency services for the following reasons:

- Cold temperatures increase the risk of cold related illnesses,
- Slippery pavements increase the number of injuries and consequently the number of admissions in hospitals, and
- Emergency services experience a surge in calls, and find it increasingly difficult to reach victims as transport systems are disrupted by icy conditions.

Expected impacts are:

- Greater requirement for salt stocks to cope with prolonged winter snow levels (Highways Agency, Local Authority)
- Increased demand for emergency services to clear fallen trees, housing repairs and repair essential physical infrastructure (Emergency Services)
- Increase in hospital admissions arising from falls from icy pathways and traffic accidents (NHS partners)
- More regular closure of Queen Elizabeth II bridge (Highways Agency)
- Public transport networks cancelled – disrupting commuter journeys, some residents unable to access essential services (Transport providers).
- Increased pressure on food supplies
- Cancellation of schools (Local Authority and education partners)
- Power cuts resulting from fallen power lines (Energy Suppliers)
- Intruder alarms set-off (false alarms) in houses affected by storms (Police)
- Increased demand on energy supplies as a result of greater usage of indoor heating (Energy Suppliers)
- Increased soil erosion (Environment Agency)
- Potential impact on safety of ships at Port of Tilbury and London Gateway and Thurrock's other Docks (Port of Tilbury)

Possible Interventions:

- Enhancements to Essex Emergency Plan (Emergency Services)
- Ensure Winter Maintenance Plan is in place (Highways Agency, Local Authority):
  - identify lead officer rota to ensure decision making cover
  - review of previous seasons and advance planning of next season
  - securing adequate supplies of salt
  - instigating emergency (reduced) salting network to keep key areas moving
  - undertake public education & awareness campaigns, e.g. winter driving
- Communication plan to provide timely travel advice on local road and bridge closures

[14] Essex LCLIP, 2010

to allow for re-routing of journeys

- Engagement activity with residents and businesses to develop their own mini emergency plans (Local Authority)
- Business Continuity Plans – call-down communication system/ flexible working/ working from home (Local Authority)
- Public and private sector homes may need improved insulation to reduce demand on energy supply for indoor heating (Local Authority)
- Policies within Local Development Framework will need to enforce standards for building design and construction materials for new dwellings and business space to reduce demands on energy supply for indoor heating (Local Authority; Development Corporation)
- Campaigns to encourage communities to grow their own food (Local Authority)

Conclusions

Weather events have always caused some degree of disruption, however an increase in extreme weather events will result in further long term and intensive damage and disruption to local authority services, businesses and communities.

Climate change projections for Essex from the UKCP09 indicate an alteration of usual weather patterns, which could result in an increase of extreme weather events.

The Essex LCLIP has shown that from January 2004 to December 2009, extreme weather events have in some way affected the majority of the communities, businesses and services provided by local authorities in Essex. Whilst some areas only experienced minor disturbance, others such as Essex's transport system were frequently affected by multiple and various extreme weather events such as flooding, heavy rain, strong winds, drought and icy conditions.

Similarly, the Thurrock LCLIP identifies a number of significant risks for Thurrock, including rising sea levels; stronger winds and more frequent heavy downpours of rain, resulting in more regular widespread flooding, as well as coastal and soil erosion; warmer and drier summers, resulting in more regular drought and heat-waves; and milder and wetter winters, resulting in more extreme winter precipitation.

The Thurrock LCLIP will act as a catalyst to understanding the scale of the local impacts of climate change for the Council's services, partners and the Thurrock community, and encourage effective adaptation to address the identified impacts.