

Appendix 2 A

Adaptation Risk Register - List of potential risks to LCC services from future climate change

The Impact and Probability are scored between 1 and 3 (1 low risk 3 high risk). These are multiplied together to give a score between 1 - 9. This is then multiplied by the influence the council has over this risk (scored between 1 - 3, 3 highest influence, 1 little or no influence) to give the final overall risk rating.

Type	Risk? (Effect)	Who/ What's affected?	Result	Impact	Probability	Score	Influence 3, 2 or 1	Overall Risk
Flash Flooding Pluvial (Rain)	Lack of capacity in the storm/sewer and highway drainage system due to lack of maintenance and cleaning or inadequate size	R&C - Regeneration, Highways & Transportation - Highway Management, Transport Strategy, Transport Development (Drainage) Planning and Policy, Environmental Services - Parks and Green Space, Ecology & Riverside Team, Urban Design	System unable to cope with increased rainfall and speed of runoff leading to localised flooding	The impacts of this type of flooding will be severe but localised	There is an increasing probability of such events occurring as the frequency and intensity of extreme rainfall events increases and the sewer system reaches capacity and maintenance is reduced to a reactive basis by the water service companies	4	2 LCC has some responsibility working with the water service company (Severn Trent ST to maintain the sewerage system)	8
	Road network flooding due to flash storm events	R&C - Regeneration, Highways & Transportation - Highway Management, Transport Strategy, Transport Development (Drainage) Planning and Policy, Environmental services - Parks and Green Space, Urban Design	1. Residents of Leicester unable to use road network 2. LCC employees unable to get to work 3. LCC employees unable to deliver key services due to disruption to transport network 4. Disruption to public transport 5. Emergency vehicles unable to reach victims of flooding	The impacts of the road network flooding will have more significant implications than that of flooding of the sewer network	The probability of the road network flooding will increase as the duration and intensity of localised rainfall events increases	6	3 LCC has total responsibility for maintenance and operation of the road network with exception of major trunk routes	18
	Damaged to road surface on major routes from flash flooding	R&C - Regeneration, Highways & Transportation - Highway Management, Transport Strategy, Transport Development (Drainage) Planning and Policy, Environmental services - Parks and Green Space, Urban Design	Roads need to be repaired after flash flooding causing major disruption to the road network and having significant financial implications	The impact of damage to road surfaces will be localised but with significant financial implications with much traffic disruption and road closures	The probability of such damage occurring will rise as the frequency and severity of rainfall events increase	4	3 LCC has total responsibility for maintenance and operation of the road network with exception of major trunk routes	12
	Damaged to road surface on minor routes from flash flooding	R&C - Regeneration, Highways & Transportation - Highway Management, Transport Strategy, Transport Development (Drainage) Planning and Policy, Environmental services - Parks and Green Space, Urban Design	Roads need to be repaired after flash flooding but with much less disruption	The impact of damage to road surfaces will be localised but with significant financial implications and road closures	The probability of such damage occurring will rise as the frequency and severity of rainfall events increase	2	3 LCC has total responsibility for maintenance and operation of the road network with exception of major trunk routes	6
	Risk of infection Residents/employees who's homes/workplaces have been flooded	R&C - Environmental Services, Licensing and pollution control (EHO's), Planning and Policy, Planning, Policy and Design, Adults and Housing - Community Care Services, Older People Service, Resources - Corporate Water Hygiene (James Seaton), Property Children and Young People's Services,	Workplace/homes unsuitable for occupancy until thorough clean up has taken place	The impacts will be very localised but with significant health implications for those affected	As flood risk increases so does the risk of infection from polluted floodwater	2	2 LCC has a responsibility to ensure that it's buildings are fit for purpose	4
	Floodwaters polluting clean drinking water	R&C - Environmental Services, Licensing and pollution control (EHO's), Planning and Policy, Planning, Policy and Design, Adults and Housing - Community Care Services, Older People Service, Resources - Corporate Water Hygiene (James Seaton), Property Children and Young People's Services,	No access to clean drinking water	The impacts will be localised but significant for those affected	As flood risk increases so does the risk of contamination in drinking water from polluted floodwater	2	2 LCC has some responsibility to work with the water service company (ST) to ensure that residents have access to clean water	4
	Psychological effect of flooding (stress, anxiety, depression and displacement)	R&C - Environmental Services, Licensing and pollution control (EHO's), Planning and Policy, Planning, Policy and Design, Adults and Housing - Community Care Services, Older People Service, Resources - Corporate Water Hygiene (James Seaton), Property Children and Young People's Services,	Residents and LCC employees unable to return to work due to mental or emotional stress	The impacts will be very localised but significant for those individuals affected	The numbers of people affected by flooding will increase and therefore those experiencing psychological effects is likely to rise	2	1 LCC has little control over the mental health of Residents.	2

Type	Risk? (Effect)	Who/ What's affected?	Result	Impact	Probability	Score	Influence 3, 2 or 1	Overall Risk
Fluvial Flooding (Main watercourses)	Rising river floodwater damaging property and infrastructure	Resources - Property Management, R&C - Regeneration, Highways and Transportation, Highway Management, Transport Strategy, Transport Development, Planning and Policy - Planning Policy and Design, Ecology & Riverside team, Urban design,	Damage to property and infrastructure, huge cost of clear up, health risk etc	Very significant or catastrophic impact to those residents within the floodplain of the river and main waterways	Very probable that flood risk will increase due to climate change	6	2 LCC working with the Environment Agency (EA) and water service company (ST) has some responsibility to safeguard residents from the threat of flooding	12
Increased storminess and higher wind speeds	Higher wind speeds and storminess causing damage to the built environment and urban infrastructure (particular issue for tall buildings with an increase in gust velocity)	Resources - Property management R&C - Planning and Policy, Planning Policy and Design.	Remedial repairs needed and potential to cause injury and/or death (Death and injury rates dependent on time of day storm occurs morning and evening commuting time highest no. of injuries and deaths)	The impacts will be very localised but significant or catastrophic for those affected	Predictions of increased wind speeds as a result of climatic change suggest that the probability is low but will increase	3	3 LCC has responsibility for maintenance and operation of the LCC building stock including public buildings, schools and some residential houses	9
	Higher and more frequent winds may cause damage to vegetation and trees and subsequent potential injury and death	Resources - Property Management and Emergency Management and Planning. R&C - Environmental Services, Parks and green Spaces, Trees and Woodland, Urban Design, Regeneration, Highways and transportation - Highway Management.	Mature trees liable to be blown down during storms with potential to cause damage or injury. Higher soil moisture likely to exacerbate, this issue. Road traffic accidents road closures and damages to highways and infrastructure	Very localised but significant or even catastrophic for those in the immediate vicinity	The probability is low but with increasing wind speeds and threat to tree health from climate change may increase the risk	3	3 LCC is responsible for the maintenance and inspection of trees in public and open space	9
	Street lights and signs being brought down	Resources - Emergency Management and Planning. R&C - Regeneration, Highways and Transportation, Highway Management.	Loss of street lighting, potential to expose live electricity cables and injury from falling debris	Localised but significant or even catastrophic for those in the immediate vicinity of falling infrastructure	Low but may increase as wind speeds rise	3	3 LCC is responsible for the maintenance and inspection of street lighting and signs	9
	Power lines, phone masts etc damaged during storms		Loss of power and communication, disruption to the transport network and risk of injury or death from falling infrastructure, electrocution or loss of power in cold weather		Low but may increase as wind speeds rise	3	1 LCC has little influence over the power and communications infrastructure	3
	Council buildings uninsurable if deemed too high a risk from climate change driven extreme weather events (flooding)	Resources - Portfolio Management, Asset Strategy, Property Management. Financial services	Assets may decrease in value or become redundant	Likely to effect a very limited no. of assets if any	Low but may increase as climate changes	1	3 LCC responsible for management of it's entire property portfolio	3

Type	Risk? (Effect)	Who/ What's affected?	Result	Impact	Probability	Score	Influence 3, 2 or 1	Overall Risk
Heat Wave/ Hotter summer temps	Damaged to highways and transport infrastructure by prolonged high temperatures (melting surfaces and bridge expansion)	Resources - Emergency Management and Planning, R&C - Regeneration, Highways and Transportation, Highway Management, Transport Development, Transport Strategy	1. Transport disruption and road closures as road surfaces need to be repaired after melting	Damage to highway infrastructure likely to be significant	It is very probable that this will become an increasing problem over time	4	3 LCC has total responsibility for maintenance and operation of the road network with exception of major trunk routes	12
	2. Residents and LA employees unable to travel to work or deliver essential services							
	Overheating on public transport		People less inclined to travel on public transport	The impact will be low but may increase pressure on other transport modes	It is very probable that this problem will increase over time	2	1 LCC has little influence over public transport companies	2
	Overheating in LCC vehicles	Need to ensure that the LCC fleet	The impact is low	It is very probable that this problem will increase over time	2	3 LCC is responsible for the safety and comfort of those using it's vehicles	6	
	Urban Heat Island Effect. Urban area increasing in temperature due to added solar absorption	Resources - Property Management R&C - Planning and Policy - Planning Policy and Design, Urban Design Environmental Services Parks and Green Spaces Trees and Woodland, Building Control, Highway Management Adults and Housing - Older People Services, Community Care Services, Housing Renewals, options and Development, Housing Improvement and Repair Service, CYPS -	Residents and workers in urban areas exposed to prolonged periods of increased summer temperatures than those in rural areas. This exacerbates heat related illnesses and death rate. (Particular issue with night time temperatures). Particularly pertinent to the elderly, the very young, those with existing respiratory and health problems and those in overcrowded, poor quality housing who cannot afford to buy or run air conditioning and those who work outdoors	The impact of increased urban temperatures will be significant and may even prove catastrophic if sustained over a long period of time	The probability of the UHI affecting large cities will increase as the climate warms and development of urban areas increase	6	3 LCC have significant influence over methods to reduce the UHI effect through planning, best practice and greening the city streets to provide shade and reduce solar absorption	18
	Increase in length of growing season, plants flowering earlier and migration patterns changing	R&C - Environmental Services, Parks and Green Space, Trees and Woodland, Planning Policy and Design, Urban Design, Ecology & Riverside Team, Highway Management	1. Increased maintenance costs of machinery and less time for maintenance as machinery in use for longer periods	Will have significant financial and resource implications	There is already anecdotal evidence of the lengthening growing season here in Leicester and this is likely to continue	4	3 LCC is responsible for the maintenance of the public parks and open space	12
	2. Increase in volume of grass cuttings and tree waste							
	3. Health effects of longer allergy season for those suffering from pollen allergies							
	Changes in the make up and diversity of species in Leicester							
	Warmer weather encourages a more outdoor lifestyle	Pressure on existing green/open space	This will have a low impact on Leicester	The probability of this affecting Leicester is low	1	1 LCC have little control over the lifestyle choices of the residents of Leicester	1	
Increase in the number of non native pest species as temperature increase	R&C - Environmental Services, Parks and Green Space, Trees and Woodland, Planning Policy and Design, Urban Design, Ecology & Riverside Team	Threat to native wildlife	The impact is currently low but may rise to significant in the future	It very probable that invasive non native species will increase as the climate warms	2	1 There is little that LCC can do to avoid this influx of non native species	2	
Productivity falls and mortality increases								
Lower water levels in rivers and waterways	R&C - Environmental Services, Parks and Green Space, Trees and Woodland, Planning Policy and Design, Urban Design, Ecology & Riverside Team	Poorer river water quality due to toxins produced by the Algal bloom affecting aquatic life and human health if in contact with the contaminated water/algae	The impact of low flow in the waterways is low	It is very probable that a reduction of summer rainfall will result in lower flow rates in the main waterways	2	1 LCC have very little control on the levels and flow rates of the main waterways	2	
Algal blooms resulting from warmer temperatures and low river flows		The impact will be low but may increase if there is an increase in the no. of people use the waterways and standing water bodies	The probability of algal blooms occurring on low flowing rivers and waterways are slight	1	1 LCC are unable to prevent the grow of algal blooms during warmer weather.	1		

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Heat Wave/ Hotter summer temps	Higher building occupancy rates, increases in IT equipment and inadequate cooling systems resulting in higher internal temps	Resources - Property Management Adults and Housing - Housing Improvement and Repair Services R&C - Environmental Services, Building Control, Planning and Policy, Planning, Policy and Design, Regeneration, Highways and Transportation, Highway Management CYPS -	Internal temperatures make buildings unsuitable for human comfort	The effects of increasing temperature on building performance and suitability will be significant	The probability will increase as climate change progresses	4	3 LCC are responsible for the performance of many of the public buildings and employee welfare within the city	12
	Future development of the built environment designed to meet future climate predictions ('climate proofed') rather than historical trends in weather.		Building life shortened due to unsuitability for future changing climate	Significant economic impact to replace unsuitable building	It is very probable that some of the existing property portfolio will be unsuitable for the future climate.	6	3 LCC are responsible for the design maintenance and operation of our property portfolio	18
	Internal temperatures in classrooms		Increased temperatures resulting in buildings being unsuitable for human comfort	The effects of increasing temperature on building performance and suitability will be significant	The probability will increase as climate change progresses	4	2 LCC working with the individual schools will have responsibility for the performance of all the public buildings within the city	8
	Increase and vector and water borne diseases	Resources - Property Management, R&C - Environmental Services, Building Control, Planning and Policy, Planning, Policy and Design, Licensing and Pollution control, CYPS -	Cases of illness are increasing resulting in the loss of working time through sickness. (up to 10,000 extra cases of FP, Campylobacter) Popular holiday spots outside the UK currently Malaria free may not be so in the future	This impact will be significant on the health of Leicester residents	The probability is reasonably low	3	2 LCC will have a degree of control over the spread of disease working with local partners	6
	Increase in occurrences of food poisoning due to warmer weather (more BBQ's picnic's etc)		This impact will be significant, but very localised	The probability is low	1	2 LCC have responsibility to inspect food outlets	2	
	Rubbish decaying more rapidly in the warmer weather encouraging pest species		Risk to health, more pest species and smells (likely increase in no. of rats (Leptospirosis-Weil's disease)	The impact will be low but will increase if summer temperatures rise	It is very probable that this risk will increase as climate change develops	3	2 LCC working with partners are responsible for waste collection and street cleaning	6
	Increase in heat stress		Increase in illness caused by heat - (Vulnerable, elderly and those with heart and respiratory problems, asthma, and diabetes)	There will be a significant or even catastrophic impact of heat related illness	It is very probable that there will be an increase in heat related illness and death as the climate warms	6	2 LCC working with partners are responsible for the welfare of vulnerable members of the community and employees welfare	12
	Warmer summer weather leading to increase in time spent outdoors (Higher UV exposure)		Predicted increase in Skin cancers/ melanomas, sun burn and eye damage (cataracts)	This impact will be significant on the health of Leicester residents and those employees working outdoors	It is very probable that there will be an increase in the risk from UV radiation as the climate changes	4	2 LCC are responsible for the welfare of their employees whilst at work	8
	Increase in dust particles and pollutants in air due to hotter summer temperatures (NOX, Ozone and Photochemical smog)		Risk to those who suffer from respiratory diseases from an increase in summer ozone episodes	This impact will be significant on the health of the residents of Leicester	It is very probable that there will be an increase in the concentration of atmospheric pollution as the climate changes	4	2 LCC has some control over the concentration of atmospheric pollution through traffic schemes etc	8
	Homeless at risk from extreme weather events (heat stroke, flooding etc)		Adults and Housing, Older Peoples Services, Community Care Services, Housing accommodation and Tenancy Support, R&C Environmental Services	As temperatures increase the no. of cases of people having to be taken into care and the mortality rate of may homeless may increase	There will be a significant consequences to those involved however the limited no.s of people will mean that there is very low impact	The probability is also low but may increase as the average summer temperatures increase	1	2 LCC has some responsibility working with partners to provide shelter for those in need

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Power Disruption	Extreme weather disrupting electricity/ telecommunication infrastructure, street lighting and traffic signals	Resources - Emergency Management and Planning, Property Management, Asset Strategy, Adults and Housing - Housing Renewal, Options and Development, Energy Team, Housing Improvement and Repair Service R&C - Planning and Policy, Planning, Policy and Design, Highway Management,	1. homes, businesses and public buildings without power	There will be a significant impact should the power and telecommunication infrastructure be damaged by extreme weather	The probability will rise as the frequency of extreme weather events increases	2	2 LCC has little or no control over the power and telecommunication network in Leicester	2
			2. Risks to medical and care facilities electrical equipment and their reliance upon air conditioning (cooking Cleaning washing cooling etc)					
	3. Potential to cause accidents and cause transport infrastructure disruption		Disruption to the transport infrastructure will have significant impacts	The probability will rise as the frequency of extreme weather events increases	3	3 LCC has responsibility for Street lighting and traffic signalling	9	
	Extreme summer temps increasing electrical demand for cooling (particularly in urban areas due to UHI effect)		Potential summer blackouts in urban areas as demand for electricity increases	There will be a significant impact should there be power blackouts	The probability of this occurring is relatively low but could increase if we experience a prolonged period of increased summer temperatures	2	2 LCC can reduce the electricity demand of it's property portfolio but has little control over the rest of Leicester's electricity demand	4
Reduction in summer water availability	Lower summer rainfall leading to water shortages (Water balance deficits during summer months)	Resources - Property Management, Emergency Management and Planning, Corporate Water hygiene R&C - Planning and Policy, Planning, Policy and Design Environmental Services, Building Control Adults and Housing - Housing Renewal, Options and Development, Energy Team	1. Essential services under threat from lack of water	Serious and significant impact to Leicester and it's residents	The likelihood is currently low but will increase as demand for water rises as more of the city is developed and rainfall patterns change due to climate change	6	2 LCC, working with the water service company, can control the amount of water used within it's property portfolio and water conservation measures and education about water use could reduce the risk	12
			2. Buildings closure due to lack of water?					
			3. Health risks. Residents unable to access drinking water in their own homes (particular issue for vulnerable people who are cared for or live at home) (over 2000)					
	Sites unsuitable for development due to lack of water	Resources - Property Management R&C - Planning and Policy - Planning, Policy and Design, Planning Management and Delivery Environmental Services - Building Control	Sites within the city unsuitable for development	Would have a significant impact if it affects development and regeneration within the city	The probability of this occurring is unlikely for the foreseeable future	2	1 LCC can have little influence over the demand for water within the city	2
	Reduction of summer rainfall and lowering of summer water table	R&C - Environmental Services, Parks and Green Space, Trees and Woodland, Planning Policy and Design, Urban Design, Ecology & Riverside Team, Highway Management	1. Native flora and fauna may be less productive. Trees, vegetation and grass in parks and open space dying during prolonged periods without rainfall. This reduces shade and cooling potential	The impact of a reduction in Rainfall will be significant for our parks and open spaces	The probability of this affecting Leicester is currently low but is likely to increase as the effects of Climate change become more pronounced	4	2 LCC can have a degree of control over the reduction in summer rainfall and the effects on vegetation in parks and open space	8
			2. Reduced water availability weakens the root system of trees putting them at risk from future strong winds	The impact could be severe or catastrophic if a tree was to fall and injury or kill somebody	The probability is low but with increasing wind speeds and threat to tree health from climate change may increase the risk	3	3 LCC is responsible for the maintenance of trees in public parks, some open space and along roadsides	9
	Lower summer rainfall lowering the water table and reducing soil moisture to ground subsidence causing damage to structural integrity of buildings and highway infrastructure	Resources - Property Management Adults and Housing - Housing Improvement and Repair Services Strategy, Commissioning, Performance and Business Support R&C - Environmental Services, Building Control, Planning and Policy, Planning, Policy and Design, Regeneration, Highways and Transportation, Highway Management CYPs -	Expensive remedial repairs needed to existing buildings, underground services and/or highway infrastructure likely to result in major disruption to the transport network (worse case scenario roads having to be closed or buildings needing to be demolished)	The impact of subsidence of LCC property and highway infrastructure would be very significant with severe financial implications	The probability of this happening will increase as climate change progresses	6	3 LCC are responsible for the maintenance of our property portfolio	18
Damaged to private property through subsidence caused or exacerbated by LCC owned trees	Resources - Risk Management, Property R&C - Trees and Woodland, Highway Management, Adults and Housing - Housing Improvement and Repairs Services, Strategy, Commissioning, Performance and Business Support	Considerable financial implications to pay for damage to private property	The impact of damage to private property caused through subsidence linked to LCC trees would have severe financial implications	Evidence suggests that the probability is increasing as the climate changes	6	3 LCC has total responsibility for the management of it's tree population	18	

Type	Risk? (Effect)	Who/ What's affected?	Result	Impact	Probability	Score	Influence 3, 2 or 1	Overall Risk
Damp/ waterlogged soils	Damp, wetter winters affecting those with health problems	Adults and Housing - Community Care Services, Housing Renewal, Options and Development, Older People's Services, CYPS	Greater risk to vulnerable groups and those with pulmonary diseases	Small but significant or possibly catastrophic effect on a small percentage of the population	The probability will increase as rainfall patterns change due to ongoing climate change	2	2 LCC, working with partners can improve the accommodation and living conditions of those at risk	4
	Damp and increased rainfall intensity affecting the facade of the building	Resources - Property Management Adults and Housing - Housing Improvement and Repair Service R&C - Environmental Services, Building Control Planning and Policy, Planning, Policy and Design.	More rain penetration into buildings around openings shortening building life	Small but significant financial impact to repair or replace buildings	The probability will increase as rainfall patterns change due to ongoing climate change	2	3 LCC are responsible for the performance and maintenance of a large number of public buildings	6
	Soil heave from increase in soil moisture		Damage to building fabric and service infrastructure	Small but significant financial impact to repair or replace buildings	The probability will increase as rainfall patterns change due to ongoing climate change	2	3 LCC are responsible for the performance and maintenance of a large number of public buildings	6
	Higher winter water table	R&C - Highway Management Parks and Green Space, Urban Design, Trees and Woodland, Ecology and Riverside Team.	Disruption to work programmes and operational issues caused by waterlogged ground conditions	The will be serious disruption to winter work and maintenance programmes	The probability will increase as rainfall patterns change due to ongoing climate change	3	2 LCC has little control over the ground conditions	6
	Waterlogged soils affecting tree roots and tree stability	R&C - Environmental Services, Parks and Green Space, Planning and Policy, Planning, Policy and Design, Urban Design, Trees and Woodland, Ecology and Riverside Team.	Trees likely to die or be more prone to fall over during storms	There is likely be a significant impact should tree health suffer on a large scale	The probability will increase as rainfall patterns change due to ongoing climate change	2	3 LCC is responsible for the maintenance and inspection of trees in public and open space	6
	Wetter soils during winter preventing access for maintenance		Unable to carry out routine operations without causing damage to open space	There is a low impact of maintenance routines being affected	The probability will increase as rainfall patterns change due to ongoing climate change	1	3 LCC is responsible for the maintenance parks and open space	3
Climate enforced immigration	Mass immigration from countries worse affected by Climate change (large parts of Africa and Asia will be much worsely affected by the impacts of climate change)	Adults and Housing - Community Care Services, Housing Accommodation and Tenancy Support, older people's services. CYPS	Need to provide home and care for large numbers of potential climate change refugees	There would be a significant impact upon the housing and social services of LCC should there be a large influx of climate change refugees	The probability of large scale migration caused by climate change will increase as the affects of climate change develop across the world	6	2 LCC working with partners would have a responsibility to find homes and care for these individuals	12
Social Disorder	Increase in crime rates as warmer weather results in windows and doors being left open	Resources - Risk Management, Emergency Management and Planning, Property Management Adults and Housing - Housing Improvement and Repair Service	Risk to LCC and public buildings	The threat of crime will increase the need to secure buildings	Risk of opportunist crime increases as temperatures increase	1	2 LCC are responsible for the maintenance and security of their property portfolio	2
	Civil disturbance	Resources - Emergency management and Planning	Increase in urban temperatures linked to episodes of civil disturbance (Riots and demonstrations, Paris Summer 2007)	The impact of major civil disturbance on the city would be significant	The probability of a breakdown in social order is very low	2	1 LCC can have little or no influence on public order within the city	2
			Increase in risk of looting from abandoned homes and offices during flooding events	The impact of major civil disturbance on the city would be significant	The probability of a breakdown in social order is low but have been reported in other areas which have suffered such an event	2	1 LCC can have little or no influence on public order within the city	2
		R&C - Environmental services, H.O Licensing and pollution control and Street scene enforcement	Increase in noise nuisance as people adopt a more outdoor lifestyle and leave windows open at night for cooling (more noise complaints received during the summer)	Impact of noise nuisance is low	The probability of greater noise nuisance occurring will increase as the climate changes	2	2 LCC can have a degree of control on noise nuisance through enforcement within the city	4