TRAFFORD COUNCIL

LOCAL DEVELOPMENT FRAMEWORK

Draft SPD1: Planning Obligations Technical Note 4:

Climate Change – Mitigation and Adaptation

February 2011

Introduction

This document is a supporting Technical Note for the Planning Obligations SPD - Climate Change – Mitigation and Adaptation. This note contains definitions of Trafford's Low Carbon Growth Areas, guidance on renewable energy technologies which can be used to mitigate carbon emissions along with indicative costs, a suggested Carbon Budget Statement to be prepared by the developer and a summary of climate change adaptation measures and flood risk issues.

A. Section A: Evidence Base List

A.1. The below is the evidence base documents which have been used to inform the planning obligations required for climate change - mitigation and adaptation.

A.2. **PPS1: Delivering Sustainable Development** identifies that planning authorities should provide a framework that promotes and encourages renewable and low carbon energy generation nor should policies restrict renewable and low carbon energy and supporting infrastructure. The Supplement to PPS1 (2007) expects DPDs to set out policies on the provision of low carbon and renewable sources of energy. It details that "Local Authorities should set out a target percentage of energy to be used in new development to come from decentralised and renewable or low carbon energy sources where it is viable. The target should avoid prescription on technologies and be flexible in how carbon savings from local energy supplies are to be secured. Where there are particular and demonstrable opportunities for greater use of decentralised and renewable or low-carbon energy than the target percentage, bring forward development area or site specific targets to secure potential".

A.3. Planning Policy Statement 25: Development and Flood Risk sets out how local planning authorities should take account of flood risk from all sources in preparing plans and determining planning applications. It also highlights the current evidence that climate change is likely to lead to increased and new risks of flooding within the lifetime of planned new developments. The importance of incorporating effective surface water management measures and flood resilient construction techniques in new buildings is stressed.

A.4. **Trafford Core Strategy Policy L5 Climate Change** sets out minimum carbon emission reduction targets for new developments across the Borough, to help Trafford contribute to the national target of a 34% reduction in carbon emissions by 2020. The carbon emissions reduction targets are based on a two-tier approach, one carbon emission target for the whole of the Borough and one for distinct Low Carbon Growth Areas (LCGAs).

A.5. The **AGMA Decentralised and Zero Carbon Energy Planning Study** assesses the potential to deliver zero carbon buildings and decentralised energy across Greater Manchester. The study sets minimum targets for low or zero carbon energy to be set within Core Strategies for developments located within classified character areas (target areas) based on the distinct forms of development modelled within the study i.e. micro-generation areas, electricity focus areas and network expansion/district heating areas.

A.6. The **Trafford Low Carbon Energy Study** Phase 1 has identified that Trafford's future high growth areas (as detailed in Core Strategy Policy L1) have the potential to deliver higher minimum carbon emission reduction targets than the rest of the borough, as there is a greater potential to deliver viable low/zero carbon energy networks in these areas. A series of case studies based on the growth areas have been developed and tested to demonstrate the viability of a range of technologies to reduce emissions.

A.7. The Phase 2 study identifies low carbon infrastructure opportunities in non-growth areas, where existing properties and neighbourhoods could be retrofitted with microgeneration technologies or district energy networks. As new development will always add to Trafford's carbon footprint, however much the additional emissions are mitigated with on-site low carbon energy infrastructure, it will be necessary to reduce emissions from the existing development in the borough if Trafford is to achieve an overall absolute cut in carbon emissions.

A.8. The **Greater Manchester Strategic Flood Risk Assessment (August 2008)** provides a broad overview of flood risk across the sub-region, and includes a SUDS map and User Guide to indicate the types of drainage system that would be appropriate in different areas given their specific hydro-geological characteristics. A detailed assessment of flood risk from all sources within the Borough is provided in the joint Manchester, Salford and Trafford Level 2/Hybrid SFRA (March 2010). This detailed SFRA is accompanied by a User Guide (May 2010) which offers practical advice to those involved in formulating and assessing development proposals.

B. Section B: Climate Change Adaptation Principles

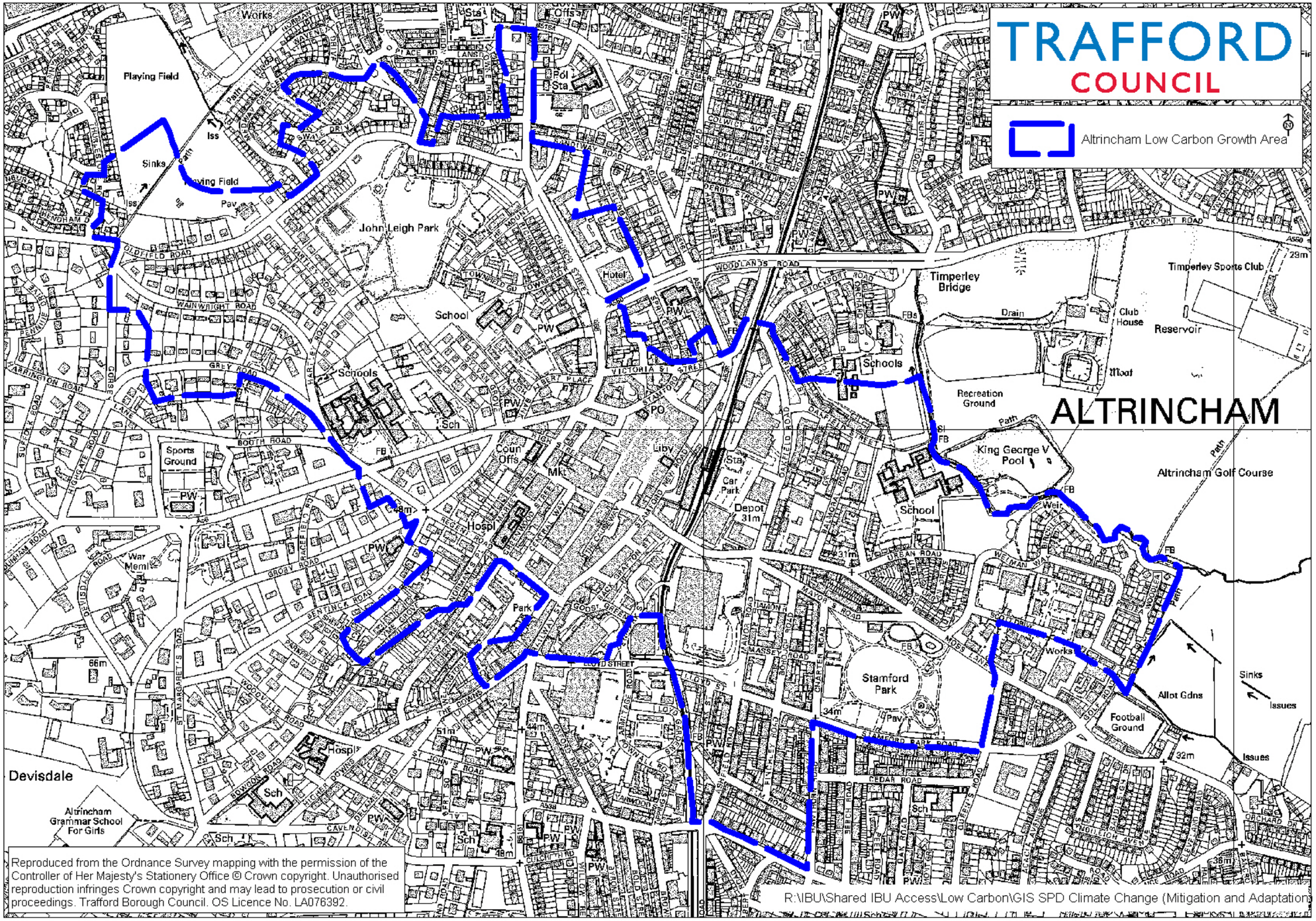
B.1. All new development in Trafford will be required to take account of the need to adapt to the local climatic changes which are taking place as a result of global climate change, if they are to be sustainable.

B.2. A number of measures and design principles exist to help developers ensure that their development is resilient to these changes in local climate. A summary of these measures and design principles can be found in Section 8.

B.3. The Manchester, Salford and Trafford Level 2/Hybrid Strategic Flood Risk Assessment User Guide (May 2010) provides technical advice on assessing and managing flood risk within the Borough. This includes specific guidance on reducing run-off from new development within Critical Drainage Areas and other areas where there are known surface water issues (extract reproduced in Section 9). Developers should have regard to the technical advice contained within the User Guide when formulating proposals for development.

C. Section C: Low Carbon Growth Areas maps

Altrincham


TRAFFORD
COUNCIL
Altrincham Low Carbon Growth Area
ALTRINCHAM
John Leigh Park
Playing Field
School
Schools
Hotel
Timperley Bridge
Timperley Sports Club
Club House
Reservoir
Drain
Moat
Recreation Ground
King George V Pool
Altrincham Golf Course
Stamford Park
Football Ground
Allot Gdns
Sports Ground
Devisdale
Altrincham Grammar School For Girls
Hospl
Sch
Coun Offs
Mkt
Liby
Sta
Car Park
Depot
Works
Sinks
Issues
Path
Weir
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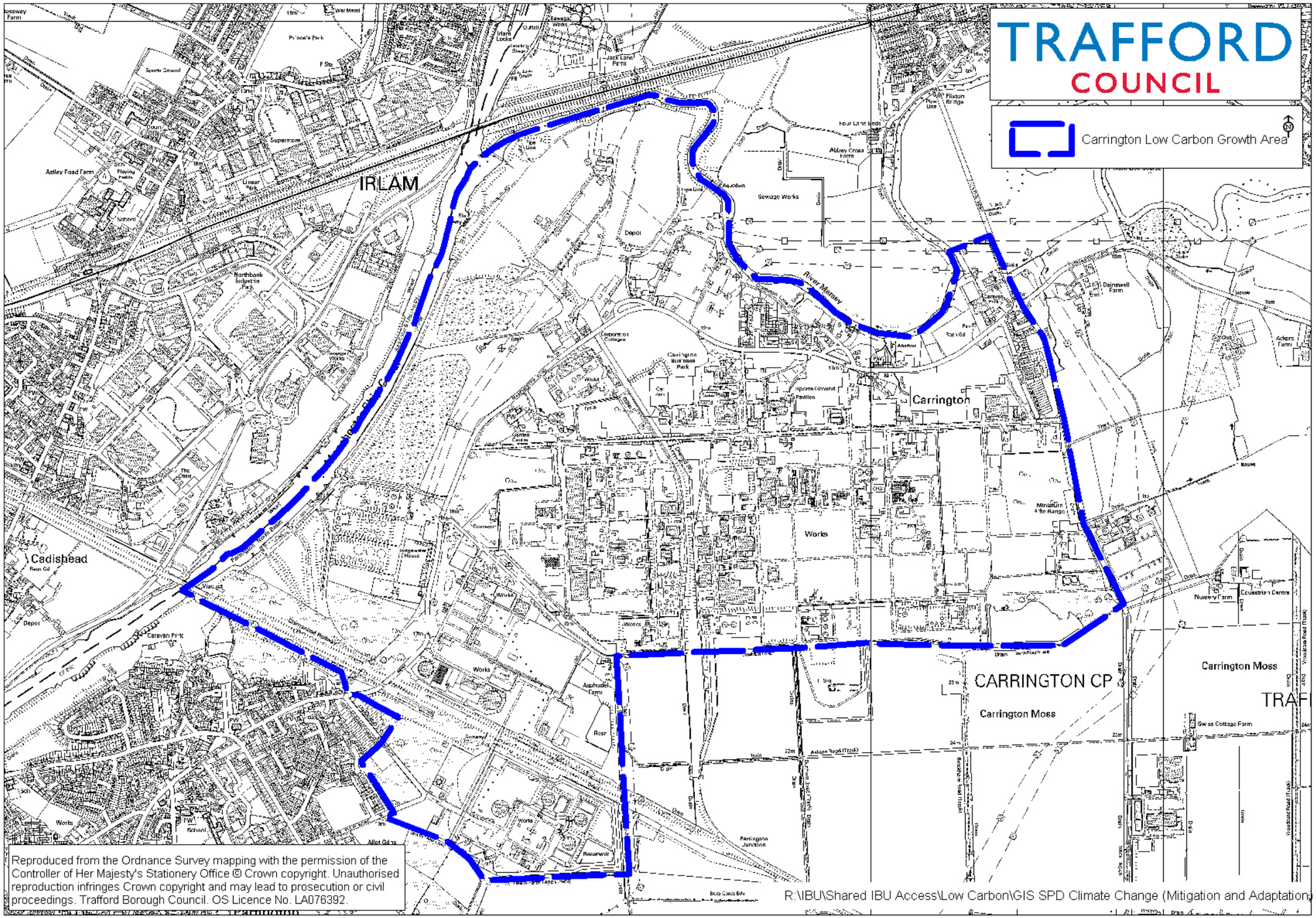
Carrington


TRAFFORD
COUNCIL
Carrington Low Carbon Growth Area
IRLAM
Cadishead
Carrington
CARRINGTON CP
Carrington Moss
River Mersey
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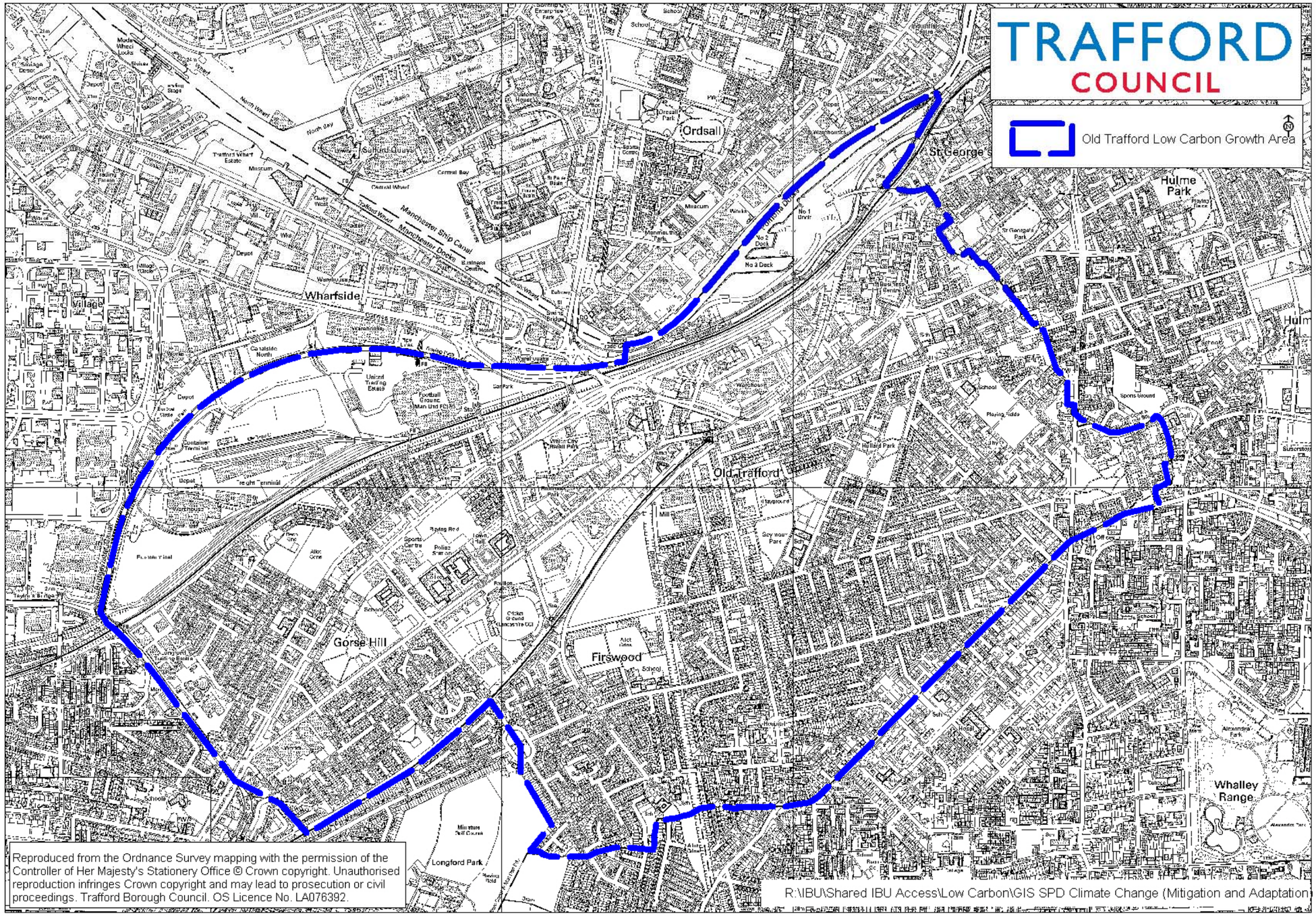
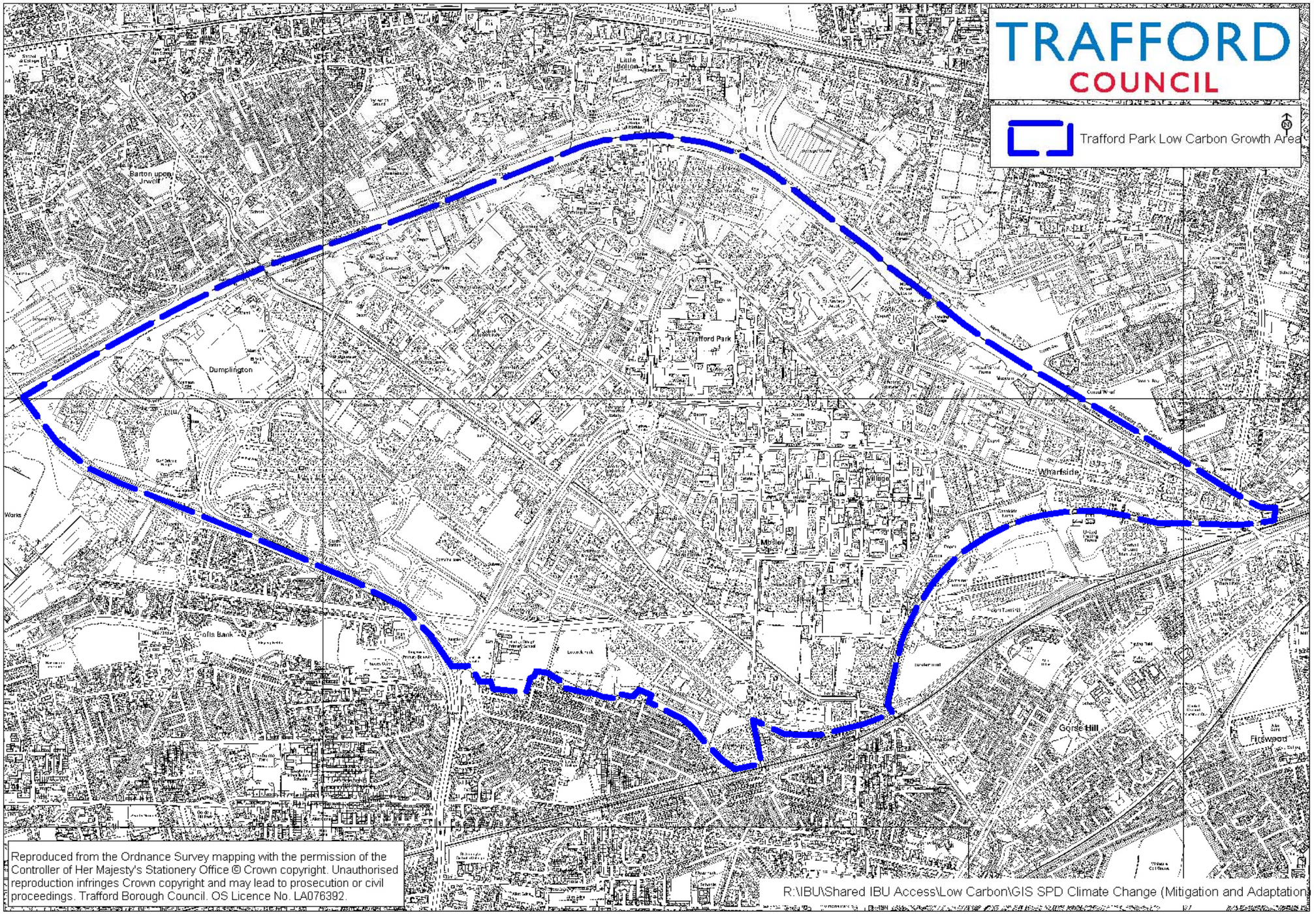
Old Trafford



Trafford Park



D. Section D: Renewable Energy Measures

Type of Renewable Energy Generator	Description	Location best Suited	Type of Development	Trafford Specific Area / Locality	Threshold on size of Development to be applied
Solar Photovoltaics	Typically takes the form of roof-mounted silicon panels or roof slates which generate electricity from daylight.	South-facing roof not overshadowed by trees or buildings.	Suitable for either residential or commercial. Typical generating capacity is around 1kW per $10m^2$	Solar PV is suitable in any location across Trafford.	None.
Solar Thermal (water heating)	A roof-mounted flat plate panel or evacuated glass tube installation which collects heat from daylight and uses it to heat water	South-facing roof not overshadowed by trees or buildings.	Suitable for either residential or commercial. Not suitable for schools as maximum generation is in the summer when the building is unoccupied.	Solar Thermal water heating is suitable in any location across Trafford, but is of particular benefit to swimming pools.	None.
Ground Source Heat Pump	A heat pump which concentrates ambient heat from below the ground and uses it to heat water. Extensive underground coils laid flat or vertically in a borehole are used to collect the heat. Can double	Buildings with large areas of garden or car parking under which the heat coil can be laid. Vertical boreholes are another option but more costly. Water source heat pumps can lay the	Suitable for either residential or commercial. The ground loop requires an area of land approximately twice as large as the total floor area of the building to be heated. If a large area of land is not available, bore holes will need to be drilled.	GSHP are much more cost-effective in new build when the heat coil can be laid before gardens, car parks etc are built. Requires an electricity supply to operate.	None.

Type of Renewable Energy Generator	Description	Location best Suited	Type of Development	Trafford Specific Area / Locality	Threshold on size of Development to be applied
	as a cooling unit in summer.	coil underneath lakes, ponds, canals etc.			
Air Source Heat Pump	A heat pump which concentrates ambient heat from the air & uses it to heat either air or water. Can double as a cooling unit in summer.	ASHP can be fitted in any location, but are particularly effective where no gas supply is present, or to replace electric heating.	Suitable for either residential or commercial. Looks similar to an air conditioning unit.	ASHP are suitable for any location across Trafford. Requires an electricity supply to operate.	None.
Micro Hydro-electric Turbine	A water-powered electricity generator sited on minor waterways.	On a waterway. The greater 'head' of water and rate of flow, the more power produced.	Suitable for either residential or commercial. Power generated can range from a few hundred watts using a 'head' of 1.5m or more, to 50kW using a 'head' of between 5-35 metres.	The river Mersey may offer some micro-hydro opportunities.	10 homes.
Biomass Boiler (<200 kW)	A boiler which typically uses wood pellet fuel, but may also use wood chips or logs.	Road access should be good for delivery of biomass fuel; for smaller biomass boilers residential neighbourhoods with detached homes may be suitable, as well as more rural	Suitable for either residential or commercial. A large fuel storage area will be required, however the exact size will depend on the type of fuel used and the size of the boiler.	Most properties except smaller terraced properties are suitable for biomass boilers. Biomass boilers should comply with the Clean Air Act in Trafford.	None.

Type of Renewable Energy Generator	Description	Location best Suited	Type of Development	Trafford Specific Area / Locality	Threshold on size of Development to be applied
		neighbourhoods.			
Biomass Boiler / CHP (>200 kW)	A boiler which typically uses wood chip fuel, which is either burned directly or gasified before combustion. CHP (Combined Heat and Power) is a unit which not only produces heat as a standard boiler, but also uses this heat to produce electricity, distributing both on a private distribution network.	Large biomass boilers require large storage facilities for the wood chip fuel, and also good access for lorries delivering the fuel. Therefore residential neighbourhoods are not good locations for larger biomass heating installations.	Suitable for commercial developments. A large fuel storage area will be required, however the exact size will depend on the type of fuel used and the size of the boiler.	More rural locations or areas of the borough of industrial activity are best suited to large-scale biomass heating and power systems. As all of Trafford is a smoke control area, biomass boilers should comply with the Clean Air Act for particulate emissions.	10 homes.
Wood Burning Stove	A mechanical cast iron or steel furnace typically used to heat domestic dwellings. May have a back boiler for heating radiators or a water cylinder.	Domestic homes, particularly retrofit for terraced houses with chimneys.	Suitable for residential developments only due to small size. A storage area will be required for logs.	As all of Trafford is a smoke control area, models must be used which have been exempted by DEFRA from the Clean Air Act for use in smokeless zones.	None.

Type of Renewable Energy Generator	Description	Location best Suited	Type of Development	Trafford Specific Area / Locality	Threshold on size of Development to be applied
Micro Wind Turbine (< 10kW)	A wind-powered electricity generator, either building-mounted or free standing.	Rural, flat and open areas; locations with a wind speed >5m/s. Not recommended for built-up areas due to inefficiency from turbulence.	Suitable for residential and small commercial. Whilst building-mounted turbines are available, most are free standing and will require an area of land for their installation.	Not generally suitable for any of the urban and built-up areas of Trafford. May be suitable for more rural or open locations.	None.
Wind Turbine (> 10kW)	A free-standing wind-powered electricity generator.	Rural, flat and open areas; locations with a wind speed >5m/s. Not recommended for built-up areas due to inefficiency from turbulence.	Suitable for residential (groups of houses) and commercial developments. Large wind turbines produce electricity more efficiently than groups of small turbines.	Not generally suitable for any of the urban and built-up areas of Trafford. May be suitable for more rural locations.	10 homes.

D.1.1.

E. Section E: Carbon Budget Statements (for planning applications of Major & Minor scale & a worked example of a Minor scale)

The key steps to be followed in preparing a CBS are outlined below for a major and minor planning application.

E.1. Carbon Budget Statement Major Planning Applications (CBS):

Steps

Step 1: Calculate the predicted annual energy demand of the development using the latest benchmarks as detailed in CIBSE Guide F. For guidance the table below details some the energy consumption of generic development types (residential is based on CfSH Level 4) (source Trafford Low Carbon Study – Phase 1).

Generic Development Types	Gross Floor Area m^2	Total kWh/yr
Individual dwelling Detached/semi-detached	160	20,445
Individual dwelling Terrace	105	13,417
Individual dwelling Flat conversion	65	8,305
Development of dwellings 10-50 flats	930	118,839
Housing/Mixed use site >50-200 units	5,065	952,286
Housing/Mixed use site >200-500 units	16,355	2,106,251
Housing/Mixed use site >500 units (excluding CHP)	100,300	15,726,137

Step 2: Calculate the baseline carbon dioxide for the entire development phased by the year that each phase of the building project is completed using the National Calculation Methodology and the latest carbon emissions factors. For guidance the table below details carbon dioxide emissions for generic development types (residential is based on CfSH Level 4) (source Trafford Low Carbon Study – Phase 1).

Generic Development Types	Total tCO_2/yr
Individual dwelling Detached/semi-detached	6.28
Individual dwelling Terrace	4.12
Individual dwelling Flat conversion	2.55
Development of dwellings 10-50 flats	36.49
Housing/Mixed use site >50-200 units	254.84
Housing/Mixed use site >200-500 units	641.64
Housing/Mixed use site >500 units (excluding CHP)	4,987.76

Step 3: Draw up a shortlist of low carbon technologies for consideration that are appropriate to the development. Applicants are advised to consult Section 8 of this Technical Note and to help identify and determine the relevant, preferred and applicable low carbon technologies to meet the carbon reduction and energy demand targets. Any special energy efficiency measures can also be included in this step.

Step 4: Calculate the contribution of each proposed low carbon energy technology for each phase of the development.

Step 5: Calculate the costs of the technically feasible low carbon technologies including establishment, connection and finance costs. The table below provides indicatives average costs as at 2010. The cost per tonne of displaced carbon dioxide is used to inform the baseline economic cost of the proposal.

Technology	Average (£/kW)
Solar PV	6500
Wind Power	2000
Small Scale Hydro	5500
Solar Thermal	1445
Biomass Boiler	600
GSHP[1]	1000
ASHP	850
Micro CHP	1500
Biomass CHP	5500

Step 6: Calculate the revenue to be received through Renewable Obligations Certificates (ROCs), Feed-In Tariffs (FITs), Renewable Heat Incentives (RHI) and other relevant Government incentives alongside the support available from targeted initiatives to reduce fuel poverty. Any other assumptions must be stated here.

Step 7: Demonstrate that consideration has been given to the business case and Power Purchase Agreement with an Electrical Supplier; this Carbon Budget Statement requires that:

- Low carbon power is used safely and effectively, which may mean exporting to and importing from the national power grid and should demonstrate that the required agreements with the stakeholders (such as Meter Owner and Operator, the Distribution Network Operator and a properly Licensed Electricity Supplier) are in place;
- Low carbon heat is used safely and effectively, which may mean the use and sale of heat into a heat network on one or many properties or commercial sites or into the local Heat Main; and
- The source of the feedstock fuel to be identified and purchase options in place including hedging the feedstock fuel, power and heat prices.

[1] Note: GSHP cost per kW excludes the costs of the heat collector system (slinky or borehole) as this can vary greatly from site to site.

Step 8: Assess the benefits of technically feasible low carbon technologies including end-user benefits considering whole life costs, a high level business case to demonstrate the long-term commercial viability of the proposed technologies over the project period demonstrating total indicative revenues and other benefits derived from the agreements.
Step 9: Calculate the reduction of baseline carbon dioxide emissions for the development or the project.
Step 10: Calculate the annual amount of electricity (kWhe) and/or heating kWhth which will be met by on-site and near-site low carbon energy technologies taking into account the amount of delivered energy, end-use demand, energy efficiency, Co-efficient of Performance ("COP"): individual technologies provide either electric or thermal (heat) energy, with the exception of Combined Heat and Power ("CHP") plants which provide a combination of both heat and electricity.
Step 11: Within the development appraisal show the effect of the costs of low carbon energy generation options with other planning obligations including affordable housing, the relevant Code for Sustainable Homes and cost of compliance with Building Regulations.
Step 12: Identify the approach to be taken for the operation and long term maintenance of the installation including demonstrating the long term safe, secure and viable operation.
Step 13: Provide justification for the preferred approach to meet the requirements of the current Core Strategy policy.

E.2. Carbon Budget Statement Minor Planning Applications (CBS):

Steps

Step 1: Calculate the predicted annual energy demand of the development using the latest benchmarks as detailed in CIBSE Guide F. For guidance the table below details some the energy consumption of generic development types (residential is based on CfSH Level 4) (source Trafford Low Carbon Study – Phase 1).

Generic Development Types	Gross Floor Area m^2	Total kWh/yr
Individual dwelling Detached/semi-detached	160	20,445
Individual dwelling Terrace	105	13,417
Individual dwelling Flat conversion	65	8,305

Step 2: Calculate the baseline carbon dioxide for the entire development using the National Calculation Methodology and the latest carbon emissions factors. For guidance the table below details carbon dioxide emissions for generic development types (residential is based on CfSH Level 4) (source Trafford Low Carbon Study – Phase 1).

Generic Development Types	Total tCO_2/yr
Individual dwelling Detached/semi-detached	6.28
Individual dwelling Terrace	4.12
Individual dwelling Flat conversion	2.55

Step 3: Draw up a shortlist of low carbon technologies for consideration that are appropriate to the development. Applicants are advised to consult Section 8 of this Technical Note and to help identify and determine the relevant, preferred and applicable low carbon technologies to meet the carbon reduction and energy demand targets. Any special energy efficiency measures can also be included in this step.

Step 4: Calculate the contribution of each proposed low carbon energy technology for the development.

Step 5: Calculate the costs of the technically feasible low carbon technologies including establishment, connection and finance costs. The table below provides indicatives average costs as at 2010. The cost per tonne of displaced carbon dioxide is used to inform the baseline economic cost of the proposal.

Technology	Average (£/kW)
Solar PV	6500
Wind Power	2000
Small Scale Hydro	5500
Solar Thermal	1445
Biomass Boiler	600
GSHP[2]	1000
ASHP	850
Micro CHP	1500
Biomass CHP	5500

Step 6: Calculate the reduction of baseline carbon dioxide emissions for the development or the project.

[2] Note: GSHP cost per kW excludes the costs of the heat collector system (slinky or borehole) as this can vary greatly from site to site.

Worked example of a Minor Planning Application Carbon Budget Statement

The development is a single detached house in Old Trafford, to be built in 2013 (once CfSH Level 4 is enforced).
CARBON REDUCTION TARGET: Because the development is below the threshold of 10 residential units, we go to Figure 3 & Table L5.1 of the Core Strategy Policy L5. Using the flow chart in Figure 3 from Policy L5, it advises us that the single residential unit should be connected to a district heat main if there is one present. At this present moment there is not one present, the minimum target carbon emissions reduction for this development will be 15% (the minimum for Target Area 3, 'microgeneration area'). As Old Trafford is a 'cold' market area and the scale of this development will not perform differently in viability terms, there is no justification for raising this 15% target.

Steps

Step 1: The predicted annual energy demand of the development is:

Development Type	Gross Floor Area m^2	Total kWh/yr
Single Detached Residential Unit	160	20,445

Step 2: The baseline carbon dioxide for the entire development is:

Development Type	Total tCO_2/yr
Single Detached Residential Unit	6.28
Carbon reduction target for development 15%	0.942

Step 3: Shortlist of low carbon technologies that are appropriate to the development, following consideration of Section 8 of this Technical Note. Special energy efficiency measures can also be included in this step.

Solar PV, solar hot water, air source heat pump.

Step 4: The contribution of each proposed low carbon energy technology for the development.

Air source heat pump – 1.94 tonnes CO_2/yr (from Section 8)

Steps

Step 5: The costs of the technically feasible low carbon technologies including establishment, connection and finance costs.

Technology	Cost (£)
ASHP	£3,600

Step 6: Calculate the reduction of baseline carbon dioxide emissions for the development or the project.

Baseline emissions = 6.28 tonnes/yr
ASHP contribution = 1.94 tonnes/yr

Reduction of baseline CO2 emissions = (1.94 / 6.28) x 100 = **30.9%**

F. Section F: Renewable technologies - costs and carbon emissions savings tonnes per annum.

Please note: Figures are indicative and for comparison purposes only.

Indicative Carbon Contributions

10% Contributions from Renewables

Use Class	Generic Typologies		Development example(M^2)	Total kWh/yr	RE Contribution (kWh)	10% Power PV	10% Power Wind[1]	10% Power SHP[2]	10% Heat SHW[3]	10% Heat BB	10% Heat GSHP*	10% Heat ASHP	10% CHP CHP	10% CHP BCHP
C3	Individual dwelling detached/semi-detached	Energy Contribution	160	22,788	2,279	£24,307	£3,902		£3,751			£3,600		
C3	Individual dwelling detached/semi-detached	CO_2 savings tonnes per annum				1.25	1.22		0.44			1.94		
C3	Individual dwelling terrace	Energy Contribution	105	14,955	1,495	£15,952			£2,462			£3,600		
C3	Individual dwelling terrace	CO_2 savings tonnes per annum				0.81			0.25			1.94		
C3	Individual dwelling flat	Energy Contribution	65	9,258	926							£3,600		
C3	Individual dwelling flat	CO_2 savings tonnes per annum										0.88		
	Indicative Potential by Dwelling													
C3	Development of Dwellings 10 - 50 Flats	Energy Contribution	930	132,456	13,246	£114,795	£15,120	£15,120	£17,261	£13,699	£11,214	£17,467		
C3	Development of Dwellings 10 - 50 Flats	CO_2 savings tonnes per annum				7.17	7.11	7.11	2.46	11.1	7.27	12.56		
C3	Housing /Mixed use site >50 - 200 units	Energy Contribution	5,065	1,145,969	114,597	£993,173	£130,818	£130,818	£149,339	£88,932	£97,020	£151,117	£42,974	
C3	Housing /Mixed use site >50 - 200 units	CO_2 savings tonnes per annum				62.10	61.54	61.54	21.18	96.04	62.89	115.25	34.85	
C3	Housing /Mixed use site >200 - 500 units	Energy Contribution	16,355	2,345,721	234,572	£1,563.814	£133,888	£146,060	£225,243	£121,304	£158,876	£181,956	£70,372	£250,210
C3	Housing /Mixed use site >200 - 500 units	CO_2 savings tonnes per annum				127.17	125.97	125.97	43.41	196.59	128.74	220.83	70.92	70.92
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	Energy Contribution	100,300	16,945,816	1,694,816	£11,297,211	£967,227	£1,055,157	£1,627,189	£876,319	£1,147,739	£1,314,478		
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	CO_2 savings tonnes per annum				918.70	910.02	910.02	313.54	1,420.16	930.01	1661.66		

20% Contributions from Renewables

Use Class	Generic Typologies		Development example(M^2)	Total kWh/yr	RE Contribution (kWh)	10% Power PV	10% Power Wind[1]	10% Power SHP[2]	10% Heat SHW[3]	10% Heat BB	10% Heat GSHP*	10% Heat ASHP	10% CHP CHP	10% CHP BCHP
C3	Individual dwelling detached/semi-detached	Energy Contribution	160	22,788	4,558	£48,615	£7,804		£7,502			£8,485		
C3	Individual dwelling detached/semi-detached	CO_2 savings tonnes per annum				2.45	2.45		0.88			2.16		
C3	Individual dwelling terrace	Energy Contribution	105	14,955	2,991	£31,903			£4,923			£5,568		
C3	Individual dwelling terrace	CO_2 savings tonnes per annum				1.59			0.53			1.42		
C3	Individual dwelling flat	Energy Contribution	65	9,258	1,852	£19,750			£3,048			£3,447		
C3	Individual dwelling flat	CO_2 savings tonnes per annum				1.02			0.35			0.88		
	Indicative Potential by Dwelling													
C3	Development of Dwellings 10 - 50 Flats	Energy Contribution	930	132,456	26,491	£229,590	£30,241	£30,241	£34,522	£27,399	£22,428	£34,933		
C3	Development of Dwellings 10 - 50 Flats	CO_2 savings tonnes per annum				14.34	14.23	14.23	4.92	12.56	12.56	12.56		
C3	Housing /Mixed use site >50 - 200 units	Energy Contribution	5,065	1,145,969	229,194	£1,986,346	£261,637	£261,637	£298,678	£237,046	£194,041	£302,233	£85,948	
C3	Housing /Mixed use site >50 - 200 units	CO_2 savings tonnes per annum				124.27	123.08	123.08	42.44	146.94	125.79	149.94	69.29	
C3	Housing /Mixed use site >200 - 500 units	Energy Contribution	16,355	2,345,721	469,144	£3,127,628	£267,776	£292,120	£450,487	£242,609	£317,751	£363,913	£140,743	£500,421
C3	Housing /Mixed use site >200 - 500 units	CO_2 savings tonnes per annum				254.34	251.94	251.94	86.82	220.83	220.83	220.83	141.84	141.84
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	Energy Contribution	100,300	16,945,816	3,389,163	£22,594,421	£1,934,454	£2,110,313	£3,254,378	£1,752,638	£2,295,478	£2,628,957		
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	CO_2 savings tonnes per annum				1,837.40	1,820.05	1,820.05	626.99	1,661.66	1,661.66	1,661.66		

30% Contributions from Renewables

						10%								
						Power			Heat				CHP	
Use Class	Generic Typologies		Development example(M^2)	Total kWh/yr	RE Contribution (kWh)	PV	Wind[1]	SHP[2]	SHW[3]	BB	GSHP*	ASHP	CHP	BCHP
C3	Individual dwelling detached/semi-detached	Energy Contribution	160	22,788	6,836	£72,922	£11,706		£11,253	£8,000		£12,727		
C3	Individual dwelling detached/semi-detached	CO_2 savings tonnes per annum				3.70	3.67		1.23	2.16		2.16		
C3	Individual dwelling terrace	Energy Contribution	105	14,955	4,486	£47,855			£7,385			£8,352		
C3	Individual dwelling terrace	CO_2 savings tonnes per annum				2.45			0.79			1.42		
C3	Individual dwelling flat	Energy Contribution	65	9,258	2,777	£29,624						£5,170		
C3	Individual dwelling flat	CO_2 savings tonnes per annum				1.48						0.88		
	Indicative Potential by Dwelling													
C3	Development of Dwellings 10 - 50 Flats	Energy Contribution	930	132,456	39,737	£344,384	£45,361	£45,361	£51,784	£41,098	£33,842	£52,400		
C3	Development of Dwellings 10 - 50 Flats	CO_2 savings tonnes per annum				21.52	21.34	21.34	7.38	12.56	12.56	12.56		
C3	Housing /Mixed use site >50 - 200 units	Energy Contribution	5,065	1,145,969	343,791	£2,979,519	£392,455	£392,455	£448,018	£266,677	£291,061	£453,350	£128,921	
C3	Housing /Mixed use site >50 - 200 units	CO_2 savings tonnes per annum				186.37	184.62	184.62	63.62	146.94	146.94	146.94	103.94	
C3	Housing /Mixed use site >200 - 500 units	Energy Contribution	16,355	2,345,721	703,716	£4,691,443	£401,665	£438,180	£675,730	£363,913	£476,627	£545,869	£211,115	£750,631
C3	Housing /Mixed use site >200 - 500 units	CO_2 savings tonnes per annum				381.51	377.91	377.91	130.23	130.19	130.19	130.19	212.76	212.76
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	Energy Contribution	100,300	16,945,816	5,083,745	£33,891,632	£2,901,681	£3,165,470	£4,881,567	£2,628,957	£3,443,217	£3,943,435		
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	CO_2 savings tonnes per annum				2,756.10	2,730.07	2,730.07	940.53	1,661.66	1,661.66	1,661.66		

40% Contributions from Renewables

						10%								
						Power			Heat				CHP	
Use Class	Generic Typologies		Development example(M^2)	Total kWh/yr	RE Contribution (kWh)	PV	Wind[1]	SHP[2]	SHW[3]	BB	GSHP*	ASHP	CHP	BCHP
C3	Individual dwelling detached/semi-detached	Energy Contribution	160	22,788	9,115	£97,229	£15,608		£15,005	£9,428		£16,970		
C3	Individual dwelling detached/semi-detached	CO_2 savings tonnes per annum				4.95	4.90		1.67	2.16		2.16		
C3	Individual dwelling terrace	Energy Contribution	105	14,955	5,982	£63,807			£9,847			£11,136		
C3	Individual dwelling terrace	CO_2 savings tonnes per annum				3.24			1.14			1.42		
C3	Individual dwelling flat	Energy Contribution	65	9,258	3,703							£6,894		
C3	Individual dwelling flat	CO_2 savings tonnes per annum										0.88		
	Indicative Potential by Dwelling													
C3	Development of Dwellings 10 - 50 Flats	Energy Contribution	930	132,456	52,982	£459,179	£60,482	£60,482	£69,045	£54,797	£44,856	£69,867		
C3	Development of Dwellings 10 - 50 Flats	CO_2 savings tonnes per annum				28.75	28.45	28.45	9.84	12.56	12.56	12.56		
C3	Housing /Mixed use site >50 - 200 units	Energy Contribution	5,065	1,145,969	458,387	£3,972,691	£523,273	£523,273	£597,357	£474,092	£388,082	£604,467	£171,895	
C3	Housing /Mixed use site >50 - 200 units	CO_2 savings tonnes per annum				248.53	246.16	246.16	84.80	146.94	146.94	146.94	138.59	
C3	Housing /Mixed use site >200 - 500 units	Energy Contribution	16,355	2,345,721	938,289	£6,255,257	£535,553	£584,239	£900,973	£485,217	£635,502	£727,826	£281,487	£1,000,841
C3	Housing /Mixed use site >200 - 500 units	CO_2 savings tonnes per annum				508.67	503.88	503.88	173.55	173.58	173.58	173.58	283.68	263.68
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	Energy Contribution	100,300	16,945,816	6,778,326	£45,188,843	£3,868,908	£4,220,627	£6,508,756	£3,505,275	£4,590,956	£5,257,913		
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	CO_2 savings tonnes per annum				3,674.74	3,640.10	3,640.10	1,253.98	1,661.66	1,661.66	1,661.66		

50% Contributions from Renewables

Use Class	Generic Typologies		Development example(M^2)	Total kWh/yr	RE Contribution (kWh)	10% Power PV	Power Wind[1]	Power SHP[2]	Heat SHW[3]	Heat BB	Heat GSHP*	Heat ASHP	CHP CHP	CHP BCHP
C3	Individual dwelling detached/semi-detached	Energy Contribution	160	22,788	11,394	£121,536	£19,510		£18,756	£11,784	£11,576	£21,212		
C3	Individual dwelling detached/semi-detached	CO_2 savings tonnes per annum				6.20	6.12		2.11	2.16	2.16	2.16		
C3	Individual dwelling terrace	Energy Contribution	105	14,955	7,477	£79,758			£12,309		£7,597	£13,920		
C3	Individual dwelling terrace	CO_2 savings tonnes per annum				4.04			1.41		1.42	1.42		
C3	Individual dwelling flat	Energy Contribution	65	9,258	4,629							£8,617		
C3	Individual dwelling flat	CO_2 savings tonnes per annum										0.88		
	Indicative Potential by Dwelling													
C3	Development of Dwellings 10 - 50 Flats	Energy Contribution	930	132,456	66,228	£573,974	£75,602	£75,602	£86,306	£66,497	£56,070	£87,333		
C3	Development of Dwellings 10 - 50 Flats	CO_2 savings tonnes per annum				35.92	35.57	35.57	12.21	12.56	12.56	12.56		
C3	Housing /Mixed use site >50 - 200 units	Energy Contribution	5,065	1,145,969	572,984	£4,965,864	£654,092	£654,092	£746,696	£444,461	£485,102	£755,584	£214,869	
C3	Housing /Mixed use site >50 - 200 units	CO_2 savings tonnes per annum				310.63	307.70	307.70	105.98	146.94	146.94	146.94	173.24	
C3	Housing /Mixed use site >200 - 500 units	Energy Contribution	16,355	2,345,721	1,172,861	£7,819,071	£669,441	£730,299	£11,126,217	£606,521	£794,378	£909,782	£361,858	£1,251,051
C3	Housing /Mixed use site >200 - 500 units	CO_2 savings tonnes per annum				635.84	629.85	629.85	216.96	216.98	216.98	216.98	354.60	354.60
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	Energy Contribution	100,300	16,945,816	8,472,908	£56,486,053	£4,836,135	£5,275,783	£8,135,945	£4,381,594	£5,738,695	£6,572,391		
C3 & Mixed	Housing /Mixed use site > 500 units (excluding CHP)	CO_2 savings tonnes per annum				4,593.43	4,550.12	4,550.12	1,567.51	1,661.66	1,661.66	1,661.66		

G. Section G: Climate Change Adaptation Measures

Type of Climate Change Adaptation Measure	Description	Location best Suited	Type of Development	Trafford Specific Area / Locality	Threshold on size of Development to be applied
SUDS (Sustainable Drainage Systems)	A range of systems which use existing landscape features, low energy designs such as ditches (swales) and holding ponds, and infiltration-based methods (where appropriate) to minimise the quantity of surface water which enters the drainage system.	Particularly important for built-up & heavily paved areas such as industrial sites & residential neighbourhoods, as well as town centres. Parks and other green spaces may be used as part of wider, strategic SUDS to prevent localised flooding of neighbourhoods. The choice of attenuation-based, infiltration-based or combined systems should have regard to the hydro-geology of the various parts of the Borough, as identified in the	Suitable for all types of development, particularly residential (groups of houses) and commercial developments.	Any of the town centres and residential neighbourhoods in Trafford, especially in the North of the borough. SUDS will have a particularly important role within Critical Drainage Areas, as identified in the Manchester, Salford and Trafford Level 2/Hybrid SFRA.	Appropriate types of SUDS may be applied at any level from the individual dwelling or industrial/commercial unit up to estate developments.

Type of Climate Change Adaptation Measure	Description	Location best Suited	Type of Development	Trafford Specific Area / Locality	Threshold on size of Development to be applied
		Greater Manchester SFRA SUDS Map and User Guide.			
Green Roofs	Typically purpose-specific species such as sedums grown in a shallow gravel substrate above a waterproof membrane on the roof of a building.	Can be incorporated into new build or retrofitted to existing buildings. Can reduce energy costs & mitigate localised flooding risks. Ideal for areas affected by the urban heat island effect & localised flooding; built up areas with hard paving.	Suitable for either residential or commercial.	Any of the town centres and residential neighbourhoods in Trafford, especially in the North of the borough.	None.
Tree Cover	Increasing tree cover can help to reduce localised flooding, the urban heat island effect & atmospheric pollution such as airborne particulates, as well as increasing biodiversity	Care must be taken with choice of tree planting locations; fallen leaves can cause problems with blocked drains which may negate the positive effect on flooding reduction. However, increasing tree	Suitable for residential (groups of houses) and commercial developments.	Any of the town centres and residential neighbourhoods in Trafford, especially in the North of the borough.	None.

Type of Climate Change Adaptation Measure	Description	Location best Suited	Type of Development	Trafford Specific Area / Locality	Threshold on size of Development to be applied
	opportunities.	cover in industrialised, heavily paved and built-up areas can bring multiple benefits.			

H. Section H: Extract from Manchester, Salford and Trafford Level 2/Hybrid Strategic Flood Risk Assessment User Guide (May 2010)

3.4.1 Critical Drainage Areas

H.1. Certain locations are particularly sensitive to an increase in the rate of surface water runoff and/or volume from new development. This can be for a number of reasons, including known local flooding problems associated with these areas. These areas have been defined as Critical Drainage Areas (CDAs) in the SFRA. Specific drainage approaches are recommended in these areas to help reduce local flood risk. The SFRA has designated CDAs as high flood risk areas.

H.2. The CDAs provided in the SFRA should be refined over time as more detailed information on flood risk and local flood management assets, including sewered catchments, becomes available.

H.3. In these areas, a detailed FRA is advised for all developments over 0.5 hectares, regardless of which Flood Zone the site falls within. This should demonstrate that new development is not at risk from flooding from existing drainage systems or potential overland flow routes. It should also demonstrate that the development will not adversely affect existing flooding conditions by the use of appropriate mitigation measures. The FRA should define and address the constraints that will govern the design of the drainage system and layout of the development site.

H.4. The Environment Agency Standing Advice allows developers to screen online for the level of flood risk assessment that is appropriate for a development with regard to the PPS25 Flood Zones. This highlights the need for a FRA in Flood Zones 2 and 3 and in Flood Zone 1 where there are critical drainage problems. The Standing Advice notes that for developments in Flood Zone 1 FRA Guidance Note 1[13] should be followed *'In areas where the Local Planning Authority has identified drainage problems through a Strategic Flood Risk Assessment or Surface Water Management Plan and they have indicated that a formal flood risk assessment is required'. FRA Guidance Note 1 requires FRAs to provide 'Proposals for surface water management that aims to not increase, and where practicable reduce the rate of runoff from the site as a result of the development (in accordance with sustainable drainage principles, and the Local Planning Authority's published SFRA).'* It is recommended that proposals for development in Critical Drainage Areas, as defined by this SFRA, follow the guidance set out below.

[13] Environment Agency. Flood Risk Assessment (FRA) Guidance Note 1, Development Greater Than 1 Hectare (ha) in Flood Zone 1 (and Critical Drainage areas less than 1ha) Can be accessed online at http://www.environment-agency.gov.uk/static/documents/Research/FRAGuidanceNote1.pdf

Recommended allowable discharge rates for CDAs and other areas

H.5. All development should seek to reduce existing local flooding problems and not add to them. The AGMA authorities are currently developing drainage standards for developments within Critical Drainage Areas and for all other areas. Over time, it is envisaged that local authorities will commission drainage strategies (see below) to determine in more detail, and establish the evidence base for, set reductions in surface water runoff from development sites. These will be used to inform the incorporation of targets and standards in Development Plan Documents, supported by Supplementary Planning Documents, as appropriate.

H.6. With regard to this, the developer should liaise closely with the Environment Agency, United Utilities and the LPA as soon as possible to determine an appropriate reduction in runoff rate and volume with reference to discharge limits as laid down by any completed SWMP, drainage strategy or local development document for that area. Minimising surface water run off rates within catchments should be the starting point for negotiations with Developers.

H.7. In the interim, and based on the technical work undertaken for the SFRA, the following guidance is provided:

- Development should aim to deliver Greenfield runoff on Greenfield sites up to a 1 in 100 year storm event, considering climate change
- Development should aim for a minimum reduction in surface water runoff rates of 50% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, considering climate change
- Development should be designed so that there is no flooding to the development in a 1 in 30 year event and so that there is no property flooding in a 1 in 100 year plus climate change event

H.8. Wherever possible, this should be achieved through the implementation of SUDS. Source control should be considered first. There may be opportunities to deliver SUDS though integrated solutions for collections of strategic sites. The future ownership and maintenance of SUDS systems should be discussed at the planning application stage with the relevant sections of the LPA (including Highways and Drainage), United Utilities and the Environment Agency. This approach should be taken unless the developer can demonstrate that this is not feasible and that there will be no adverse impact caused by the development elsewhere.

H.9. This is supported by Category 4 of the Code for Sustainable Homes, which requires developers to ensure that peak run-off rates and run-off volumes will be no greater than the pre-development conditions as a minimum. However, the code recommends that attenuation of the additional flows caused by

development should be related to the degree of flood risk in an area. In 'high flooding risk areas', 100% of the additional volume should be attenuated[14]. Planning Policy Statement 1[15] allows local planning authorities to stipulate high levels of the code where there are local circumstances that allow and warrant it. **The SFRA has designated CDAs as high flood risk areas.**

H.10. The effectiveness of a flow management scheme within a single site is heavily limited by site constraints including (but not limited to) topography, geology (soil permeability), development density, existing drainage networks within the site and surrounding area, adoption issues and available area. The design, construction and ongoing maintenance regime of such a scheme must be carefully defined at an early stage and a clear and comprehensive understanding of the catchment hydrological processes (i.e. nature and capacity of the existing drainage system) is essential.

[14] CLG (2006) Code for Sustainable Homes

[15] CLG (2007) Planning Policy Statement: Planning and Climate Change - Supplement to Planning Policy Statement 1

I. Section I: Indicative Developer Contributions by Building Type

I.1. The following tables provide the source data for indicative developer contributions in Section A, Table 1 of the Technical Note 1.

I.2. The assumptions for domestic dwellings are sourced from benchmarked data in Stratford-on-Avon's Sustainable Low Carbon Buildings SPD, Table 1, Page 12:-

https://www.stratford.gov.uk/files/seealsodocs/7866/Sustainable%20Low-Carbon%20Buildings%20SPD%20-%20Oct%202007.pdf

I.3. The assumptions for non-domestic development are taken from the London Renewables Toolkit benchmark emissions data (Tables 4.12.2 to 4.12.13).

Property Type	**Annual CO2 emissions (tonnes) 2005**	**Adjusted for Building Regs 2010**	**Trafford 40% higher target reduction**	**Developer contribution per dwelling @ £75/ tonne CO2 x 25 years (lifetime)**
Ground Floor 2 bed flat	1.34	1.005	0.402	£753.75
Middle Floor 2 bed flat	1.16	0.87	0.348	£652.50
Top floor 2 bed flat	1.31	0.982	0.393	£737
Mid terraced 3 bed house	1.46	1.095	0.438	£821.25
End terraced 3 bed house	1.64	1.23	0.492	£922.50
Semi-detached 3 bed house	1.85	1.388	0.555	£1,040.50
Small detached 3 bed house	2.43	1.822	0.729	£1367
Large 4 bed detached house	3.35	2.512	1.005	£1,844.50

Type of development	**Kg CO2 per m2 per annum**	**Tonnes CO2 per 100m2**	**Trafford 40% higher target reduction**	**Developer contribution per 100m2**
Retail units	79	7.9	3.16	£5925
Standard offices	73	7.3	2.92	£5475

Industrial units	62	6.2	2.48	£4650
School	35	3.5	1.4	£2625
Sports centre / health centre	135	13.5	5.4	£10,125