Chorley Borough Local Development Framework

Chorley into 2016: Sustainable Resources

Draft Supplementary Planning Document

December 2008

Chorley Council

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આ માહિતીનો અનુવાદ આપની પોતાની ભાષામાં કરી શકાય છે. આ સેવા સરળતાથી મેળવવા માટે કૃપા કરી, આ નંબર પર ફોન કરો: 01257 515822

ان معلومات کا ترجمہ آپ کی اپنی زبان میں بھی کیا جا سکتا ہے۔ یہ خدمت استعمال کرنے کیلئے براہ مہربانی اس نمبر پر ٹیلیفون کیجئے: 01257 515823

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Sustainable Resources
Supplementary Planning Document

Contents

1. Introduction

Spatial vision

1.1

> The spatial vision for Chorley for the use of sustainable resources is:
>
> *"That by 2016, the principles of sustainable development and, in particular, a positive attitude to reducing carbon emissions, will run through all development activity, with Chorley Borough Council acknowledged as a leading authority enabling residents and businesses to reap economic, social and environmental benefits."*
>
> A positive attitude towards reducing carbon emissions should include the consideration of 'zero carbon' or 'carbon neutral' development, where the contribution to greenhouse gas emissions is neutralised or reduced to zero.

Sustainable Resources DPD/SPD Objectives

1.2 In order to promote sustainable development, and in particular the sustainable use of natural resources in Chorley, the Council has adopted a Sustainable Resources Development Plan Document (DPD). The objectives of the Sustainable Resources DPD and this Supplementary Planning Document (SPD) are to:

- Promote the reduction of energy requirements in new developments;
- Minimise waste production and encourage the recycling of waste products in new developments;
- Promote the prudent use of resources;
- Manage water in a sustainable manner, reducing consumption and making greater use of recycled water in new developments;
- Impose clearly signalled year on year targets for the energy requirements of buildings to be met on-site by low carbon energy capture;
- Increase year on year installed low carbon energy capacity in the Borough.

Purpose of the SPD

1.3 The purpose of this document is to expand upon and supplement the policies in the DPD through the provision of practical advice and guidance to developers on how to incorporate the sustainable use of resources into new development. Both the Sustainable Resources Documents form part of the new Local Development Framework for Chorley.

1.4 This SPD sets out advice, sources of good practice and further detail on the criteria of the policies in order to implement the principles set out in the DPD for both producing low carbon developments and promoting commercial low carbon energy generation. It provides guidance regarding what is expected in terms of minimising energy use, maximising energy efficiency and adapting to climate change. It also provides advice on how to define a baseline figure for carbon emissions.

1.5 The Code for Sustainable Homes published in December 2006 sets out a standard rating for homes. By 2010 it will become mandatory for all new dwellings to reach level 3 of the Code, level 4 by 2013 and level 6 by 2016.

1.6 Other national standards for the design of new homes include Building for Life and Lifetime Homes. Building for Life sets out 20 criteria for ensuring homes are well designed. Lifetime Homes includes 16 design features that create a flexible blueprint for accessible and adaptable housing. All public sector funded housing in England will be built to the Lifetime Homes standard from 2011, with a target of 2013 for all private sector dwellings.

2. Meeting the Requirements of Policies SR1 and SR2

2.1 This section provides further detail on the criteria set out in Policies SR1 and SR2 of the Sustainable Resources DPD that will be applied when assessing planning applications. It expands upon the information set out in the DPD and provides applicants with a guide of what will be required to satisfy each criterion.

Policy SR1 – Incorporating Sustainable Resources into New Development

2.2 All planning applications for new built development of 5 or more dwellings or non-residential units of 500 sq metres or more must be accompanied by an Energy Efficiency/Resource Conservation Statement. The Statement will not be required for outline planning applications apart from those for major schemes. However, where details of the layout of the site are submitted as part of an outline planning application, the applicant will be expected to demonstrate how the principles of passive solar design have been considered when designing the layout (see criteria (a) below). The Energy Efficiency/Resource Conservation Statement must demonstrate how the following requirements for each criterion have been met.

Criteria (a) – Evidence to demonstrate that the design and layout minimises energy use, maximises energy efficiency and is flexible enough to withstand climate change

- Minimising energy use, maximising energy efficiency and withstanding the predicted changes to the climate can be achieved by addressing the main principles of Passive Solar Design, providing increased insulation and using energy efficient heating and lighting as set out in section 4A of this SPD. Evidence of how all these principles have been incorporated into the design and layout of a development must be clearly demonstrated. Evidence must also be provided to show how the climate change scenarios set out in Para 3.2 have been addressed.
- Reducing the energy requirements of developments through design and layout will result in a lower predicted energy consumption, which in turn will result in a lower carbon reduction to be achieved through the installation of low carbon technologies.

Criteria (b) – Reducing carbon emissions through the installation of low carbon energy sources

Applicants are strongly advised to seek specialist advice to calculate and demonstrate this requirement. Appendix 4 sets out a template for demonstrating the reduction in carbon emissions. This should be submitted as part of the Energy Efficiency/Resource Conservation Statement.

Step 1: Calculate predicted energy consumption of development

- Applicants are required to set out the overall predicted annual energy consumption of the development in kilowatt-hours, broken down into power source i.e. gas and electricity.
- If developers do not have access to a reasonable approximation of the future energy requirements of the development then they can use the benchmark figures set out in Appendix 3.

Step 2: Convert predicted energy consumption into carbon emissions

- The annual energy consumption calculated above needs to be converted into carbon emissions using the following calculations:
  1 KWh of gas = 0.053 kg of carbon
  1 KWh of electricity = 0.113 kg of carbon

Step 3: Calculate the required annual carbon reduction

- The requirement of the policy is that the above carbon emissions need to be reduced by at least 10% (increasing to at least 15% for applications from 2010 and at least 20% from 2015 onwards).
- The appropriate % of the total predicted carbon emissions of the development needs to be calculated.
- This will give the minimum annual carbon reduction required.

Step 4: Decide which low carbon energy technologies will be installed

- In order to achieve the above reduction in carbon emissions, appropriate low carbon energy sources must be installed in new developments.
- Section 4B of this SPD identifies a range of low carbon energy sources. The applicant must choose which of these will be installed to meet the carbon emissions target.

Step 5: Calculate the total annual carbon reduction achieved by installing low carbon energy sources

- The installation of low carbon energy sources will lead to a reduction in the predicted carbon emissions of the development.
- The amount of carbon saved needs to be identified for each proposed low carbon energy source. Appendix 5 provides examples of carbon savings from a number of low carbon technologies.
- This must be no less than the required annual carbon reduction for the development identified in Step 3.

Criteria (c) – Minimising the use of non-grey water/managing surface water

- Applicants must provide evidence of what measures have been incorporated into the development in order to minimise non-grey water use. Section 4C of this SPD provides information on the different measures that should be incorporated by developers in order to reduce water consumption.
- Sustainable Drainage Systems should be incorporated where appropriate in order to manage surface water and reduce flooding. Section 4C provides information on SuDS and the types of development that they would be particularly suited to.

Criteria (d) – Storage provision for recyclable waste and composting

- Applicants are required to produce a 'waste management strategy' that will best facilitate the storage of waste and maximise the amount that can be sent for recycling. This should be submitted as part of the Energy Efficiency/Resource Conservation Statement. The Council has produced 'Waste Storage and Collection Guidance for New Developments' which provides guidance on how to produce a 'waste management strategy.'
- Storage space for composting should be provided in new developments unless it can be demonstrated that it is not appropriate to do so. The proposed development may result in little compostable waste however consideration should be given to future uses of the site, which may generate more compostable waste.
- More information on waste recycling and composting is included in section 4D of this SPD.

Criteria (e) – Developments in nationally designated areas

- Development in a Conservation Area or affecting a Listed Building will still be expected to satisfy criteria (a) to (d) as set out above through sensitive design. Section 4B of this SPD provides information on the impacts of different types of low carbon technologies and ways of mitigating any adverse effects. Further information on how to incorporate low carbon energy features into new development in nationally designated areas is available at www.helm.org.uk and www.english-heritage.org.uk/climatechange
- Where it can be demonstrated that the implementation of the above criteria would compromise the special circumstances of the national designation then implementing all of the above criteria would not be insisted upon. The applicant must provide strong evidence as to why they cannot meet the requirements of a particular criterion.

2.3 All developments must meet the above requirements. The only circumstance in which the Council will approve a proposal that does not accord with Policy SR1 is if the applicant can demonstrate, through open book accounting, that an individual site's circumstances are such that development would not be feasible or viable if the policy were implemented.

Policy SR2 – Renewable Energy Schemes

2.4 Applications for stand-alone renewable energy schemes will be considered positively provided they are sensitively located and designed. Such applications will be assessed against the criteria of Policy SR2 and applicants will be required to demonstrate how they have met each criterion. The criteria are explained in more detail below:

Criteria (a) – Impact on landscape character and visual appearance of local area

- The landscape and visual effects of renewable energy schemes will vary depending on the type of development proposed, the location and the landscape setting of the area. Section 4B of this SPD identifies possible landscape and visual impacts of the different types of renewable energy technologies and provides advice on ways of mitigating any adverse effects.
- Appendix 7 contains a number of maps illustrating physical characteristics that would influence the location of various renewable energy technologies in the Borough. They provide a useful indication of where specific renewable energy schemes could be located. This does not mean that applications in these areas will be approved and those outside refused, all applications will be assessed on a site-specific basis using all the criteria of Policy SR2 and national guidance contained in Planning Policy Statement 22: Renewable Energy.
- Appendix 7 also contains a landscape sensitivity to wind energy development in Lancashire map, which provides an indication of the most suitable locations for wind energy developments.

Criteria (b) – Sites with statutory protection

- Sites with statutory protection include Sites of Special Scientific Interest (SSSI's), Listed Buildings, Conservation Areas and Ancient Monuments. Each of these sites has been designated as they have special visual, historic or natural/ecological characteristics.
- Applications for renewable energy schemes in such locations will only be permitted where the applicant can demonstrate that the objectives of the designation of the site and its special characteristics will not be compromised by the development.
- Section 4B of this SPD identifies possible landscape, visual, ecological and cultural heritage impacts of the different types of renewable energy technologies and provides advice on ways of mitigating any adverse effects.
- Applicants should liaise with relevant statutory bodies and amenity groups/organisations to ensure negative impacts on sites with statutory protection are avoided or mitigated. Environmental Impact Assessments may be required for some proposals.

Criteria (c) – Avoiding unacceptable detriment to local amenity

- Some renewable energy technologies may generate small increases in noise levels. Such developments must be located and designed in such a way to minimise these increases in ambient noise levels. In some cases noise impact assessments will be required.
- Anaerobic digestion proposals can have impacts on odour. Applications for such schemes must set out proposals for the control of odour and should not be located in close proximity to existing residential areas.
- Biomass generation plants can lead to increases in traffic. These effects should be minimised by locating such plants close to sources of fuel.
- Section 4B of this SPD provides further information on possible local amenity impacts such as noise, odour and traffic and provides advice on possible ways of mitigating these impacts.

Criteria (d) – Harm to local nature, ecology and biodiversity

- Some renewable energy technologies can have ecological impacts particularly wind energy developments. Developers should consult with Natural England and other relevant national, regional and local organisations regarding the presence and importance of species and habitats in an around the proposed development site.
- Applicants must assess any potential impacts the development may cause and identify mitigation measures.

Criteria (e) – Wider environmental, social and economic benefits

- Any significant adverse affects identified in criteria (a) to (d) will normally result in the refusal of an application unless the applicant can demonstrate that these affects are outweighed by wider environmental, social and economic benefits.
- Wider environmental benefits include the development leading to a significant reduction in CO^2 emissions in the Borough and would therefore make a valuable contribution to tackling climate change.
- Economic benefits include providing a secure energy supply in an area.
- Social benefits include ensuring all homes, including those in rural areas, have access to adequate and affordable energy supplies.

3. Practical Advice & Guidance

A. Reducing Energy Use

This section provides information relating to criteria (a) of Policy SR1 of the Sustainable Resources DPD.

3.1 Buildings account for most of the UK's carbon dioxide emissions. In 2005 591 kilo tonnes of CO^2 were emitted in the Borough[1]. The majority of these emissions came from domestic gas consumption (24%), domestic electricity consumption (18%) and industrial/commercial electricity consumption (20%). Reducing domestic and industrial/commercial energy use is therefore vitally important in reducing carbon dioxide emissions and tackling climate change. The design and construction of a building can make a significant contribution to its energy use.

3.2 In accordance with the objectives of the Sustainable Resources DPD, new development will be expected to minimise energy use and maximise energy efficiency, particularly through design and layout. Developments must also be designed to withstand the predicted changes to the climate. 'UK 21st Century Climate Change Scenarios (2008)' provides detailed information on the expected changes to the climate in the UK and the impacts they will have. This information is available at 25x25km grid squares and can be viewed at www.ukcip08.org.uk. Some of the main predicted changes to the climate in the UK are:

- The average annual temperature is to rise by between 0.5 and 1°C by 2040 and between 1 and 5°C by 2100.
- Average summer temperatures are expected to rise by between 0.5 and 2°C by 2040 and between 1 and 6°C by 2100. The numbers of day's buildings require cooling is expected to increase as a result.
- Expected to be 50% less precipitation in summer months, which could lead to droughts.
- Average winter temperatures are expected to rise by between 0.5 and 1°C by 2040 and between 1 and 4°C by 2100. The number of day's buildings require heating is expected to decrease as a result.
- Expected to be 30% more precipitation in the winter months increasing the risk of flash flooding.
- Global sea levels are expected to continue to rise and by 2100 could have risen by as much as 80cm around the UK coast.

3.3 This section sets out some methods and techniques for incorporating energy efficiency measures at the design stage of new development. Part L of the Building Regulations sets out the minimum legal requirements for the conservation of fuel and power in buildings. Developments that are energy efficient will have lower energy demands, reducing the predicted energy consumption of the development and making it easier to achieve the carbon emissions reduction target (criteria (b)). Developers are therefore encouraged to exceed the minimum standards set out in the Building Regulations.

Passive Solar Design

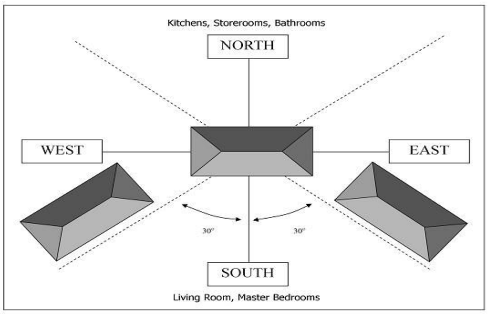
3.4 Passive solar design is an approach to building design that utilises solar energy to provide some of the heating and lighting required in buildings and to assist natural ventilation. Applying simple layout and building design principles can save up to 25% of heating and lighting energy costs in modern housing. In order to maximise the benefits of passive solar design it must be considered early in the design stage of new development as this represents the best opportunity to save energy during the lifetime of a building. It is also important to consider the purpose of the building as the heating and lighting requirements of some commercial buildings may be different to housing.

[1] Figure taken from Local Government Performance Framework - National Indicator 186: Per capita CO^2 emissions in LA areas

3.5 Not all aspects of Passive Solar Design can be controlled by the planning system, for example internal orientation and the use of natural ventilation, however all aspects can lead to significant reductions in carbon use.

3.6 The main principles of Passive Solar Design that should be addressed include:

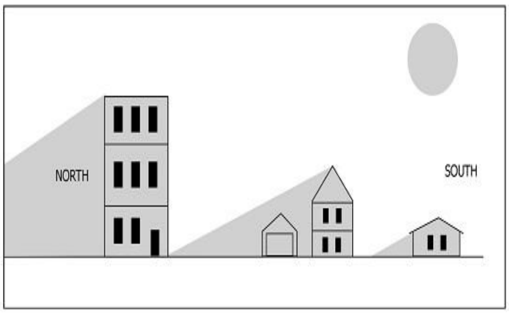
__Orientation__: Careful orientation of buildings is vital for passive solar energy gains. Buildings should generally be orientated with the longest face within 30 degrees of south to maximise solar gain in the winter and limit summer overheating because of the high angle of the midday sun. Southeasterly orientation is generally preferable to south westerly as this maximises early morning gains and reduces the likelihood of overheating in the afternoon.



__Road layout__: In order to enable the optimum orientation for buildings for passive solar gain, roads in new development should be aligned east west where possible. On north-south roads, detached units provide greater flexibility for maximising solar gain, while plots should be set at an angle to diagonal roads. Safety and security issues also need to be taken into account when designing the orientation and layout of a development by ensuring that streets are well overlooked.

__Internal layout:__ Rooms used most often for living and working should be positioned in the south facing part of the building with rooms that benefit less from sunlight (such as storerooms, bathrooms and toilets) on the north side. Kitchens are also better positioned on the north side to avoid excessive heat gain.

__Avoidance of overshadowing__: Buildings should be carefully spaced on site to avoid the overshadowing of southern elevations, particularly during winter when the sun is low. Taller building should be located to the north of the site, or to the south of road junctions or open space. Car parking and garages in particular can be suitably located in over-shadowed areas, particularly to the north of housing.

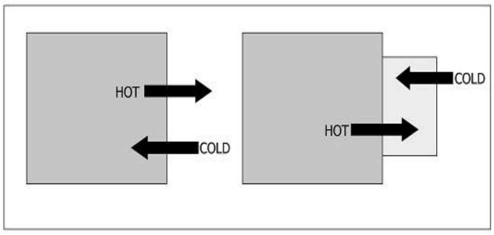


__Window sizing and position__: Well-orientated buildings with optimum internal layouts will not require especially large south-facing windows. If windows are too large, over heating may occur in the summer while heat loss may outweigh solar gain, especially in the winter. Also, if the windows on the other elevations are too small to achieve reasonable internal light, occupants will resort to daytime use of artificial lighting, eroding the energy savings from passive solar energy.

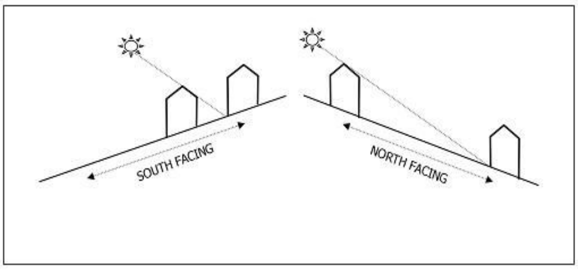
__Natural ventilation:__ Overheating and the intensity of the summer sun can be a problem. Ventilation should therefore be considered as an integral part of a building's design. Often the design can be altered to maximise natural airflows and improve cooling or shade by designing deep roof overhangs and external shading blinds. The simplest technique is to plant deciduous trees, which lose their leaves in the winter and allow the winter sun to penetrate. Mechanical ventilation and air conditioning in commercial buildings consume large amounts of energy consequently design techniques such as passive stack ventilation, shallow building plans and utilising external shading devices on south facades should be considered.

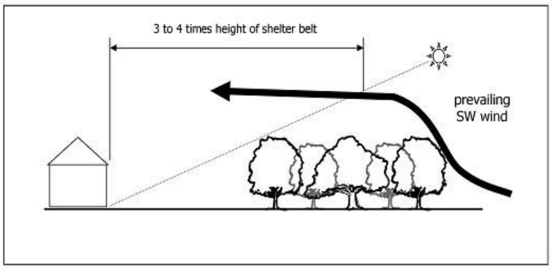
__Building type__: Terraces, apartment/office blocks and, to a lesser extent semi-detached buildings can reduce heat loss as there are fewer exposed 'external' walls. Such house types can also be built at greater densities, representing a more efficient use of land.

Thermal buffers: Using unheated spaces such as conservatories, garages and porches alongside heated rooms to act as thermal buffers can reduce heat loss.



Landscape and topography: Positive use of the local landform and landscape features, particularly trees can allow best use of natural daylight, solar energy and wind sheltering. Slopes will influence the spacing of buildings for solar access, with southerly slopes allowing greater solar access at smaller separations than a level site. Deciduous trees can be carefully placed to provide shade in the summer while allowing sunlight to pass through at a low angle in winter. Small-scale tree and shrub planting can also provide privacy for ground floor south-facing living rooms.





Increased Insulation

3.7 Insulation is a key element in improving the energy efficiency of buildings. Heat is lost in buildings through the roof, walls, floors and windows and can also be lost from hot water storage tanks and pipes. Well-insulated homes, offices and industrial units use less energy, as they keep warm in the winter and cool in the summer. Part of L of the Buildings Regulations sets out the minimum levels of insulation required in new developments. Developers are encouraged to exceed these levels in order to increase the energy efficiency further and decrease the predicted energy use of the development.

Energy Efficient Heating and Lighting

3.8 Under Part L of the Building Regulations, residential developers are required to install condensing boilers whenever a new gas boiler is to be installed in a development. The efficiency of these boilers, and other forms of heating, can be further increased by installing heat controls that allow the temperature to be controlled in different parts of the building. Types of heating controls include electronic boiler controls for the boiler, room thermostats and thermostatic valves on all radiators.

3.9 Energy efficient light fittings can lead to a significant reduction in the amount of electricity used for lighting as they will only take low energy light bulbs. These use a ballast or transformer fitted into the base of the light fitting. It controls the supply of electricity to the bulb, allowing for a small surge of power for a millisecond to light the bulb and then reducing the electricity flow to a very low level.

Green Roofs

3.10 Increased pressures on land and increased density levels are likely to have adverse impacts on drainage, water abstraction, accessible green space, biodiversity, and local climate conditions. A green roof system can play a positive role in mitigating these impacts and contributing towards an increase in the quality of the urban environment. Green roofs can provide a wide range of benefits to buildings, their owners and users, and the immediate environment.

B. Low Carbon Energy

This section provides information relating to criteria (b) of Policy SR1 and Policy SR2 of the Sustainable Resources DPD.

3.11 Key criteria relevant to all low carbon energy schemes are set out in the Sustainable Resources DPD and will be used to assess planning applications. While encouragement is given to low carbon technology schemes, these criteria seek to ensure any negative impacts are satisfactorily addressed. In addition to these criteria, each technology has different characteristics, location and technical requirements that raise specific issues that should be addressed in any planning application.

3.12 A series of maps produced as part of the Renewable Energy Study give broad locations where different technologies may be most suitable based on the criteria in policies SR1 and SR2 of the Sustainable Resources DPD. These are attached as Appendix 6. While they provide a useful indication of where low carbon energy schemes could be located in the Borough, any forthcoming schemes would be assessed on a site-specific basis using the criteria set out in the DPD and this SPD. This section is intended to provide more information on the various technologies, their requirements and impacts, including how these impacts will be assessed.

3.13 Many of the technologies outlined below are applicable at a micro scale for integration into new and refurbished buildings or ‘retro-fitted’ to existing structures. Take up of these technologies will be necessary in Chorley to comply with the targets set out in the Sustainable Resources DPD, and will be welcomed where they meet the criteria set out in the DPD and below.

Wind energy

3.14 Wind power is a technically proven energy technology for which there is great potential in the UK, yet it currently only accounts for around 0.5% of the electricity generated in this country. Given this potential, a significant proportion of national and regional targets for increased electricity generation from low carbon energy sources is likely to be met by onshore wind developments.

3.15 Wind energy involves harnessing of power contained in moving air by wind turbines. Wind turbines use aerodynamic forces (‘lift’ and ‘drag’) to produce mechanical power that can be converted into energy. Wind developments vary considerably in size, up to large grid connected turbines with rotors over 100m in diameter as well as turbines grouped in wind farms. In general terms, the larger the turbine (in terms of both height and rotor size) and the higher the average wind speed the greater the electricity generated. This is known as ‘rated capacity’ which is a measure of the maximum output of the electricity generator - generally achieved in wind speeds above 12-15 metres per second (m/s) at the hub (centre point) of the rotor. The largest wind turbines generate up to 3 megawatts (MW). Based on average UK household consumption figures over the course of a year a turbine of this size would be expected to provide enough electricity to serve around 1680 homes. More commonly, wind developments have consisted of a number of smaller turbines such as at Coal Clough, near Burnley, which is the nearest wind farm to Chorley and was one of the first to be built in the UK in 1992. At Coal Clough twenty-four 400 kW turbines supply approximately 5400 homes but more recent developments have utilised turbines generating between 1–3 MW as technology has advanced. Wind turbines are particularly suitable in industrial areas.

3.16 Building-mounted micro turbines are an emerging technology and are likely to become more common in both rural and urban areas. They are available with either horizontal or vertical axes, the former having a diameter of less than less than 1.75 m.

3.17 Criteria for assessing low carbon energy projects are set out in the Development Plan Document. The following aspects will be specifically relevant to wind power applications and should be addressed in all submissions.

ISSUES TO BE ADDRESSED IN WIND POWER APPLICATIONS	
Landscape and Visual Impacts	Modern wind turbines are large structures, up to and over 100 metres tall. Along with associated infrastructure, including tracks, foundations, hard-standings and substations they will inevitably have an impact on the landscape and the visual environment. Even small building mounted turbines will have a visual impact in both urban and rural areas. All turbines should be carefully sited, where possible using the existing landform to limit impacts on sensitive views. Each scheme will be assessed on a site-specific basis. Smaller scale developments (defined as single commercial-scale turbines, community and domestic turbines) will be permitted provided there is no significant environmental detriment to the area concerned. Building-mounted turbines should, so far as practicable, be sited so as to minimise their effect on the external appearance of the building and streetscene, for example upon non-public frontages and below the highest part of the roof or chimney, but at the same time making sure that they are in a good position to work. Evidence of viability for domestic wind turbines will be required to ensure that cumulatively there is not a detrimental impact on the character of the area.
Ecological Impacts	Developers should consult with Natural England and other relevant national, regional and local organisations regarding the presence and importance of species and habitats in and around proposed development sites and assess any potential impacts and mitigation measures. Ornithological concerns are of particular relevance and the design and layout of wind developments should take account of the risk of 'bird strike', loss of habitat and changes to the landscape.
Noise	Noise levels from modern turbines are generally low and, under most operating conditions, are unlikely to exceed background noise. Any increases in ambient noise levels should be kept to acceptable levels in relation to existing background noise. In accordance with Planning Policy Statement 22 (PPS22), the framework described by 'The Assessment and Rating of Noise from Wind Farms' (report by ETSU for the Department of Trade and Industry, 1997) should be used to assess the noise from wind energy developments. In summary, noise should be limited to 5 dB(A) above background noise and an absolute level within the range of 35 to 40 dB(A) in low noise environments during the day.
Shadow Flicker	Under specific circumstances, the sun passing behind the rotors of a wind turbine will create a shadow. When the blades rotate, the shadow flicks on and off, an effect known as 'shadow flicker'. Problems caused by shadow flicker are rare as in the UK it only occurs inside buildings within 130 degrees of north relative to the turbine and where the flicker appears through a narrow window opening. The occurrence and duration of shadow flicker is also dependant on a number of other factors including the time of the year (relating to the height of the sun), time of day, the distance and height of the turbine and the prevailing conditions - shadow flicker mainly occurs in bright sunshine and cloudless skies. In practice, therefore, a single window in a building will only be affected, if at all, for a few minutes at certain times of the day during short periods of the year. Shadow flicker can be mitigated by siting wind turbines at sufficient distance from the residences likely to be affected. It has been demonstrated that flicker effects occur only within ten rotor diameters of a turbine. Applicants should provide an analysis to quantify the effect of shadow flicker upon any buildings within this distance of proposed wind turbines.
Wind speed	The energy produced by a wind turbine depends largely on the strength of the wind at the site of the turbine. Intermittency and variations in wind speed are also important. Map 1 (Appendix 7) shows there is an average wind speed of above 4 m/s across the whole of Chorley, with areas to the west, east and south averaging higher wind speeds. Micro turbines currently start generating electricity at 4 m/s thus there is the potential for them to be installed across the Borough. Larger turbines require higher average wind speeds of around 6.5 m/s (at 40 metres above ground level). It may be necessary to erect a temporary anemometer for a period of around 12 months in order to assess whether a particular site will be suitable in terms of wind speed. In such instances these same criteria will apply in determining any planning application.

Site Access	Amendments to existing road networks required to gain access to sites proposed for wind turbine developments, both during the initial construction and for subsequent maintenance, should be detailed in the planning application along with any on-site tracks and assessed in terms of their impact on the landscape, local traffic and in terms of potentially providing easier access to the area. Where possible, land converted to access roads and tracks should be reinstated or the infrastructure scaled down.
Electromagnetic Interference	Wind turbines may interfere with electromagnetic signals affecting communication systems that use electromagnetic waves as the transmission medium, including television, radio and emergency services networks. OFCOM are able to provide details of all the microwave links that may be affected by a development and the applicant should come to an agreement with all relevant link operators prior to submitting a planning application.
Cultural Heritage	Wind turbines and ancillary infrastructure can have a significant impact on the setting of sites, buildings, monuments and historic landscapes and upon archaeological interests in both rural and urban areas (Map 3 in Appendix 7 identifies such sites in the Borough). Building mounted and small freestanding turbines have a strong contemporary design that is likely to contrast greatly with traditional buildings and streetscapes. Where they are to be incorporated into traditional forms and layouts great care will be needed to ensure that their siting does not cause detriment to the historic form. Design solutions should be sought that minimise the views of the turbine and avoid siting in prominent locations. The incorporation of micro-turbines into any new development presents unique opportunities to the developer. Care should be taken to ensure they do not become the dominant form within the streetscape but instead add to the spatial and architectural interest of the development. Contact the Council's Conservation Officer for further advice.
Cumulative Impacts	The level at which significant cumulative impacts occur is dependent on the scale and proximity of wind energy developments, the character and sensitivity of the landscape, the location and detailed design of the development. Each application will be assessed on it's own merits in light of baseline conditions at the time of the application. The potential for additional wind turbines cannot be taken into consideration when determining a planning application.

<u>Hydropower</u>

3.18 Water flowing from a higher to a lower level can be channelled through a turbine to produce electricity. The amount of power produced is dependant on the volume of water and rate at which it flows. Canals, rivers and reservoirs in Chorley may all be suitable for small or micro scale hydroelectric schemes, generating up to 1MW for connection to the electricity grid or to supply power to single point users. Any planning application for such a scheme would also require Environment Agency land drainage consent under the Water Resources Act. An impoundment license may also be required under the same act.

ISSUES TO BE ADDRESSED IN HYDROPOWER APPLICATIONS	
Landscape and Visual Impacts	Small-scale hydropower schemes consist of a number of built elements, including a small dam, barrage or weir, a turbine house containing the turbine, generator and ancillary equipment and a tailrace returning the water to the watercourse. Changes to the water regime, such as changes in water levels and flow and the creation of small reservoirs can also have potential visual impacts. All built development should be sensitively sited and designed so as to integrate into the landscape by careful use of landform, materials, vegetation and tree cover and, where appropriate, new planting. In addition to new schemes, there are a number of old water mills in the Borough that could be adapted to generate electricity. Restoration should be sympathetic to the historic design and materials.
Ecological Impacts	The risk of hydropower schemes to fisheries should be addressed and, where necessary, dams and weirs should include structures such as fish passes to protect fish, particularly migratory species, and other freshwater animals from the turbines. Risks of damage to aquatic life can also be mitigated by careful design and adjustment of the seasonal operating schedule of the plant. Developers should liase with the Environment Agency and Natural England to establish the required environmental information and the potential impacts that are to be considered.

Noise	The noise emitted from a hydroelectric turbine is likely to be contained by the turbine house and not heard more than a few metres away. Where residential properties are located in close proximity to a proposed scheme, noise limits may be imposed as a condition of granting planning permission.
Cultural Heritage	Hydropower is an important element of Chorley's industrial history, having been used to power factories and mills. Where waterpower features remain, their reinstatement and adaptation to provide modern small-scale hydropower can bring positive regeneration benefits. Where these opportunities exist, restoration schemes will be supported provided they are carried out in a sympathetic manner, which respects the historic value of existing features. Where new facilities are proposed, an archaeological assessment and evaluation of the site may be likely at an early stage.

Landfill Gas

3.19 The natural processes of decay in biodegradable waste in landfill sites produces gas, in particular methane, which has historically been 'flared' (converted to CO^2). At larger landfill sites however, sufficient quantities of gas are produced to make electricity production a viable alternative. There are three existing operation schemes in the Borough at Ulnes Walton and Rigby Houghton, Adlington, which have a generating capacity of 3MW and at Withnell with a generating capacity of 2MW.

3.20 Landfill gas generation plants are unlikely to create any additional impacts further to those created by the landfill site itself however, the following factors may be relevant where sites are located close to residential areas:

ISSUES TO BE ADDRESSED IN LANDFILL GAS APPLICATIONS	
Landscape and Visual Impacts	Mitigation measures should be proposed where landfill gas plants would cause visual intrusion, particularly where extraction and landfill works have ended and the site is undergoing restoration.
Local Amenity	Applicants should demonstrate that the proposed development would not cause undue harm to local residents in terms of noise, odour and pollution.

Biomass

3.21 Biomass is a collective term for all plant and animal material. A number of different forms of biomass can be burned or digested (see anaerobic digestion below) to produce heat (for space and water heating) and electricity. An increasing range of fuels, known as 'biofuels' are now being utilised with the most common being wood-based. Providing the wood burned as fuel comes from sustainable sources, the carbon dioxide released during combustion is balanced by that absorbed by trees planted in its place. As biomass is produced from organic matter over a much shorter period of time than fossil fuels, which take millions of years to create, it can be a carbon neutral process.

3.22 Wood is usually used as logs, wood chip or wood pellets - a compact form of wood, which has low moisture content and high energy density. At a domestic scale there are two main applications of biomass, stand-alone stoves and central heating boilers. Wood burning stoves are fuelled by logs or wood pellets and have become increasingly popular in households due to their aesthetic qualities. They also have significant benefits in providing space heating for rooms where they are located and provide an output of between 6-12 kW, achieving efficiencies of over 80%. There are also many domestic scale log, wood chip and wood pellet burning central heating boilers available. As with conventional boilers, these wood-fired systems provide hot water and central heating via radiators. Log boilers require manual loading but are less expensive than wood pellet, wood chip or dual-fire (pellets and chips) systems. In these more sophisticated systems the fuel can be automatically fed, making it easier to supply heat when it is required. Higher output wood burning stoves can also be fitted with an integral back boiler for the purpose of providing both hot water and central heating.

3.23 The cost of wood-fired stoves and boilers depends on the type and size of system but as a guide, stand alone room heaters cost £1,500-£3,000 installed and a typical 20 kW wood pellet boiler, the average size needed for a three bed semi-detached house, costs around £5,000. This means wood heating has amongst the lowest capital costs of all the low carbon technologies, being almost as cheap as mains gas. However, unlike other forms of low carbon energy, biomass systems still require the purchase of fuel. In addition to homes, they can be used in many other sectors such as schools, offices and industrial premises.

3.24 On a larger scale wood and other biomass products can also be used for the production of electricity. The main method of producing electricity from wood is a combustion plant (where the material is burned to produce steam) although there are two other possibilities, namely, gasification (where the material is heated in such a way that gases are given off) and pyrolysis (where the wood is heated in the absence of oxygen to produce a bio-oil liquid with some charcoal and gas).

3.25 Internal small-scale wood burning appliances do not require planning permission, however, in a Listed Building or Conservation the Council's Conservation Officer should be contacted for advice before any work is undertaken. The installation of wood fuel appliances must also comply with all safety and building regulations.

Anaerobic Digestion

3.26 In addition to the combustion of biomass material, organic wastes can be digested under anaerobic (oxygen-free) conditions by bacteria to produce a flammable gas consisting mainly of methane and carbon dioxide. This biogas can be used to generate electricity and/or hot water. Projects can be developed on a small-scale to suit individual facilities and wastes (for example, in farm or dairy situations) or on a much larger scale to take a variety of wastes as part of a Centralised Anaerobic Digestion (CAD) facility.

3.27 Applications for larger-scale biomass plants requiring planning permission will be assessed against the criteria set out in the Sustainable Resources Development Plan Document. The following specific issues should be considered:

ISSUES TO BE ADDRESSED IN BIOMASS APPLICATIONS	
Landscape and Visual Impacts	Where biomass plants cannot be housed in existing buildings, new or adapted units should, where possible, be located close to existing buildings (excluding residential dwellings) and designed to fit into their surroundings. Due to their appearance and impacts on amenity discussed below, larger plants should be located within existing industrial areas.
Noise	Engines, condensers and chippers may all create noise within biomass plants. This noise should not cause an unacceptable degree of disturbance to surrounding amenities and, where relevant, facilities should adhere to the British Standards for controlling noise pollution.
Odour	The impacts of odour from a proposed biomass plant and methods for controlling it must be detailed in the planning application in order that it does not unduly harm residential amenity.
Pollution	Developers must satisfy the relevant pollution control authority that potential emissions can be adequately regulated under the pollution control framework. Cumulative effects of existing sources of pollution in and around the site and the proposed development must be addressed.
Cultural heritage	Listed Buildings may require Listed Building Consent for installation of biomass boilers. Contact the Council's Conservation Officer for further advice.

Transport	The environmental impact of transporting biofuels long distances to biomass generation plants can outweigh the positive benefits of such facilities, therefore plants should be located in close proximity to a fuel source. Costs of delivery also significantly increase with distance. It is suggested that a 4 MW facility should be located within 40 km of a wood fuel resource that is a minimum of 4,000 ha and/or 20,000 tonnes of forestry waste. In addition, biomass plants have the potential to be traffic intensive with delivery of fuel occurring regularly. Surrounding roads should have adequate existing capacity to serve the plant. The impact of traffic upon surrounding amenities should be assessed.

3.28 The growing of fuel for biomass plants, for example short rotation coppice, does not fall under the control of the planning system.

Solar power

3.29 Light and heat from the sun can be utilised to generate energy in two ways. Photovoltaic (PV) systems convert solar radiation into electricity using semi-conductors within photovoltaic cells while Solar Water Heating (SWH) systems are designed to capture the heat of the sun and use it to directly heat water. Both systems are well suited to the urban environment as they are entirely silent and release no emissions.

Photovoltaics

3.30 Individual PV cells are most commonly interconnected to form solar modules or panels, mounted upon pitched roofs, however, modules can also be mounted on the side of buildings and on free standing support structures on the ground. PV can also be integrated into the roof or façade of buildings through, for example, the use of PV tiles, cladding and other solar building solutions, which are often indistinguishable from conventional building materials.

3.31 Solar panels are typically 0.5 – 1m² in size with a peak output of 70 to 160 watts. Typical domestic installations comprise of an 'array' of connected panels covering 10-15m². A system this size will produce up to 2 kW peak output, which in the UK would be expected to produce 1500 kWh - enough to provide approximately one third of the average family's annual supply. Where PV systems are grid-connected, surplus electricity not consumed within the building can be exported to the local distribution network with many suppliers buying the 'exported' electricity. A typical 2 MW peak capacity PV scheme would cost between £12,000 and £15,000.

Solar Water Heating

3.32 Employing similar technology to PV systems, radiation from the sun is collected by 'absorbers' within either flat plate or evacuated tube collectors and transferred as heat to a fluid, most obviously cold water. The climate in the North West is suitable for Solar Water Heating systems as year-round sun is not required. Modern systems will make a significant contribution to water heating requirements, providing 50 - 60% of annual domestic hot water requirements and can also be used to provide space heating.

3.33 The following issues should be considered where solar panels are proposed and will be relevant in addition to the criteria set out in the Sustainable Resources Development Plan Document:

ISSUES TO BE CONSIDERED IN SOLAR POWER APPLICATIONS	
Siting Issues	Solar panels are best positioned facing due south at an angle of between 20-40 degrees; however, PV and SWH systems can function at an inclination of between 10 and 60 degrees and within 90 degrees of due south. Shadows from buildings, trees and other structures should be avoided as these can significantly reduce the performance of solar panels.
Cultural Heritage	Permission for solar panels in Conservation Areas, on a Listed Building or another building or structure within the curtilage of a Listed Building will only be granted where the character, appearance and special architectural or historical interest of the area or building are preserved.

Ground Source Heat Pumps (GSHP or GHP)

3.34 Ground Source Heat Pumps transfer the heat from the ground into a building to provide space heating. They can also be used to pre-heat domestic water. Heat is drawn from the ground using 'ground loop' – a closed circuit of piping buried in the ground in either a borehole or horizontal trench and heat pump. The technology is relatively well established as heat pumps are already used in fridges and air conditioning units. For every unit of electricity used to pump the heat, 3-4 units of heat are produced. They can be designed to meet 100% of space heating requirements but they will usually only pre-heat domestic hot water so top up heating (e.g. an immersion heater) will be required.

3.35 There are fewer planning issues associated with ground source heat pumps as they are unlikely to be visually intrusive and often the main components are located under ground or within buildings. Planning applications will be assessed using the criteria set out in the Development Plan Document. Where excavations for horizontal trenches for ground loops involve sizable areas of land the following issues need to be addressed:

ISSUES TO BE ADDRESSED IN GSHP APPLICATIONS	
Ecological Impacts	Disruption of sensitive habitats such as species-rich grasslands should be avoided and all sites sensitively restored. Drilling through contaminated ground or soil poses significant risk of pollution to groundwater. Before any work begins the site must be assessed in order to establish whether there is any contamination. Boreholes will need to be designed so that groundwater is not polluted. Approval from the Environment Agency may be required before proceeding.
Cultural Heritage	Consideration should be given to possible archaeological interests in the land. Before any work takes place it needs to be established whether there are any archaeological remains on the site and if this has implications for the work involved. Lancashire County Archaeological Service can provide information and advice to applicants. The interior of Listed Building are protected therefore ground source heat pumps in Listed Buildings may require planning permission.

Combined Heat and Power (CHP)

3.36 Conventional forms of power generation not only produce harmful greenhouse gases, they are also highly inefficient. The efficiency of power stations supplying energy distributed through the national grid can be as little as 22% at the point of use. Combined Heat and Power (CHP) is a much more fuel-efficient energy technology that recovers the heat that is a by-product of electricity generation and distributes it alongside electricity in the form of hot water for space heating. The energy generated is up to 90% efficient and CHP will typically reduce carbon emissions by 60%. CHP systems are located at the point of consumption meaning there is very little loss of energy through transmission and distribution and greater resilience to supply disruption as power is produced locally and independently of the grid. In many instances, any excess electricity generated by a CHP unit can be exported and sold to the grid thus shortening the capital cost payback period. CHP is possible at a variety of scales, including micro to serve individual buildings.

3.37 CHP plants can be adaptable to different fuels. Conventionally, natural gas is used but fuels such as biogas, biomass and hydrogen can also be used and offer a more sustainable alternative. Further efficiency savings can be made with the addition of an absorption chiller, which allows the CHP system to provide cooling, potentially for air conditioning and refrigeration. The main markets for CHP tend to be those with high heat requirements, for example flats, high density housing, leisure centres, hospitals and industrial sites with process heating requirements, especially the chemical, brewing and paper industries. Sewage treatment works sometimes use CHP fuelled by biogas, emissions released during the decomposition of sewage.

3.38 The emerging market for domestic or micro CHP systems has significant potential to improve energy efficiency and reduce energy bills in homes, offices and other buildings where fitted in place of standard domestic boilers.

3.39 There are few planning considerations in relation to CHP, however if it were to be used to supply the needs of a number of buildings the unit would be large and additional space would be needed. The interior of Listed Buildings are protected, therefore planning permission may be required for the installation of CHP.

C. Water

This section provides information relating to criteria (c) of Policy SR1 of the Sustainable Resources DPD.

3.40 Human disruption to the earth's natural water cycle, including the impact of climate change, has resulted in intensified periods of both drought and flooding in Britain as well as elsewhere. The treatment, purification and transport of water for domestic, commercial and industrial applications is also a major use of energy. The sustainable use of water is vital in contributing to the reduction of the impact and occurrence of both droughts and flooding and reducing energy use. A wide variety of measures can be included in new development to reduce water consumption and improve the efficiency with which water is used. Applicants will be expected to provide evidence of how the following measures have been incorporated into new development, where appropriate:

Rainwater Harvesting

3.41 Average annual rainfall in Chorley is 877 mm. Rather than allowing this rainwater to soak into the ground, evaporate or to enter the drainage system it can be captured from roofs and other impermeable surfaces and put to a variety of uses. Simple systems involve the use of a water butt to collect water for irrigating gardens. Rainwater can be better for plants than tap water because it is very rich in natural minerals that are removed by treatment processes. In more sophisticated systems, tanks have filters that remove all debris and particles from the water making it clean and suitable for most uses not requiring drinking water standard, including washing the car, flushing the toilet and running a washing machine. Toilet flushing accounts for about a third of water use in a typical UK household and the water used is unnecessarily treated to drinking water standard. Overall, the amount of water saved, cost and payback period for Rainwater Harvesting Systems is dependant on the size and type of system installed, amount of rainfall and cost of mains water but a typical domestic installation will provide nearly all household water requirements not requiring drinking water standard. This will save around 50% on mains water consumption and will have a payback period of between 10-15 years, although this can be as low as 2-5 years for larger commercial systems.

Greywater Recycling

3.42 Greywater is wastewater from showers, baths, washbasins, washing machines and kitchen sinks. Like rainwater this can be used for a number of uses not requiring drinking water standard, in particular watering the garden and toilet flushing. Greywater requires filtration and chemical or biological treatment prior to reuse. Systems are most suited to multi-occupancy buildings as these are likely to have greater water circulation ensuring the greywater used is fresh rather than having had a long storage residence time in the system.

Water saving devices

3.43 In addition to the use of rainwater and greywater, there are a number of devices that aid water conservation in the home or workplace. These devices should be incorporated into the design of new developments but can also be integrated into existing buildings:

Low-flush and dual-flush toilets: The volume of water used to flush the toilet represents a significant proportion of a buildings water use. Newer toilets have smaller cisterns and thus use less water. The capacity of cisterns can be further reduced with the use of cistern dams or water savers such as a 'hippo' or 'hog'. Dual flush toilets have two different flush volumes, for example a standard 6-litre flush and a reduced flush of 4 litres, or 4 and 2 litres in the more efficient toilets.

Waterless toilets and urinals: Standard urinals use around 6-10 litres of water to flush. Waterless urinals, which use none, can thus offer substantial savings, particularly in buildings with high levels of occupancy, such as offices, schools and hotels. Waterless toilets have also been successfully installed in new and retrofit situations in a number of dwellings in the UK, albeit mainly those in rural areas not connected to a mains sewer. There are two basic types: a composting toilet and an incinerating toilet.

Low water use appliances: Low water use domestic white goods e.g. washing machines and dishwashers should be specified as these can use significantly less water and energy, especially in comparison to older appliances.

Spray taps: Low flow spray taps can save up to 80% of the water and energy used in comparison to standard pillar taps and are cost-effective and easy to fit. Sensor-operated taps further ensure minimal consumption of water per use. Showers (excluding power showers) generally use less than half the water needed to take a bath and aerated spay showerheads can also reduce water consumption.

Controlled intermittent supplies: Using 'petrol-pump' types of supply can cut the amount of main water used for certain applications, particularly industrial processes such as cooling, cleaning or washing finished articles, workspaces or vehicles where normally a tap or hose would have been left running all the time.

Landscaping: Consideration should be given to gardens and landscaping schemes which require little or no irrigation. Preference should be given to existing native and/or drought-resistant plant types and water-retaining mulches. If watering is necessary, rainwater or recycled greywater should be used to water gardens rather the mains supply.

<u>Sustainable Drainage Systems (SuDS)</u>

3.44 Sustainable Drainage Systems seek to control surface water run-off – rainfall that is not absorbed by the ground or by trees and plants or evaporated. A variety of methods are used to decrease the amount of surface runoff, decrease the velocity of surface runoff or divert it for other purposes, thereby reducing the contribution it makes to sewer discharge and flooding. There are a number of elements that can combine to form a Sustainable Drainage System including soakaways; permeable and porous surfaces, e.g. paving; ponds, basins or swales for temporary storage during heavy rainfall (detention basins) or longer term storage (retention basins); channels to divert water from undesirable locations and structures that increase the lag between a rainfall event and discharge of water to the drainage system by increasing infiltration.

3.45 The SuDS approach is particularly suited to urban areas where high-density development and extensive impermeable surfaces mean surface runoff can easily cause flooding, either directly or indirectly through sewers becoming overloaded. They can also provide landscape, amenity and biodiversity benefits. An interim Code of Practice for SuDS has been developed by the National SuDs Working Group and can be accessed at www.ciria.org/suds/icop.htm

D. Waste Recycling

This section provides information relating to criteria (d) of Policy SR1 of the Sustainable Resources DPD.

3.46 Around 64% of all municipal waste is sent to landfill. This is becoming increasingly unsustainable as sites are rapidly reaching their capacity. There are three 'live' landfill sites in the Borough that accept waste but they cannot continue to do so forever and there are limited opportunities for identifying land suitable for new landfill sites. Transporting waste to other sites is expensive and has its own environmental implications. Landfill sites are also a major source of methane, which along with carbon dioxide is a major contributor to climate change.

3.47 In 2010 a new Waste Technology Park in Leyland is due to open. All non-recyclable waste collected in Chorley Borough will be sent there for treatment, reducing the amount of waste sent to landfill. The Park will also have facilities to compost food and garden waste and accept recycling.

3.48 In April 2005 the Borough Council enhanced its kerbside recycling and household refuse collection service, introducing an 'alternate weekly' collection system to increase the percentage of waste recycled in the Borough. Newspapers and magazines, plastic bottles, glass bottles and jars, cans and foil, cardboard, textiles and garden waste is all collected on a fortnightly cycle. To aid this service, households have been supplied with various different receptacles to segregate waste.

3.49 In addition to this kerbside collection service there are a number of 'bring' recycling sites across the borough where recyclable waste can be deposited. The Lower Burgh Household Waste Recycling Centre in Chorley, offers comprehensive facilities for recycling green waste, wood, oil, batteries, plastics, rubble, soil, paints and cardboard. In addition, householders can dispose of asbestos sheeting, fridges and freezers, electrical goods, gas bottles and some chemicals. There are similar sites just outside the Borough at Station Road, Rufford and Flensburg Way, Farrington.

3.50 Home composting is another means of recycling and minimising household waste. Green waste from the garden including grass cuttings, twigs, leaves, hedge cuttings, plants, weeds and flowers and organic kitchen waste such as vegetable scraps – and even teabags! – can be turned into compost for use in the garden. This helps the environment by reducing the amount of rubbish thrown away and the number of car journeys to tips, reducing the need for chemical fertilisers and eliminating the need to use peat (peat bogs are home to some of our rarest plants and animals). If you regularly buy products to improve your garden, composting can also, therefore, save you money. Home composting requires little technology – all you need is a suitable space and a compost bin or heap. A limited number of free compost bins are available to households in Chorley through Lancashire's Home Composting scheme, a partnership of Lancashire County Council, WRAP and local district and unitary authorities (see Appendix 2 for more details).

3.51 In order to promote and support recycling in the Borough, provision should be made in new developments for sufficient facilities and enough space for composting organic waste, and for the storage of materials that can be recycled. In addition, new development should be located where there is adequate accessibility to bring recycling sites or provide space for such sites.

4. Other Useful Information

This section provides further information on ways to use resources sustainably. The following **ARE NOT** required by the Sustainable Resources DPD but are encouraged, in order to further reduce the energy use and increase the energy efficiency of buildings

Energy efficiency during construction

4.1 As stated in Policy SR1 of the Sustainable Resources DPD all new dwellings will be required to meet level 3 of the Code for Sustainable Homes by 2010, which contains requirements relating to the sustainable use of materials. Although not specifically covered in the criteria of Policy SR1, the sustainable use of materials must still be addressed in all residential planning applications in order to meet level 3 of the Code and be granted planning permission from 2010 onwards. The information provided below provides useful information on the sustainable use of materials during construction. The materials used in construction and redevelopment have a significant impact on the energy efficiency of buildings. 10% of the total energy consumed in England and Wales annually is from the manufacture and transport of building materials.

4.2 In addition to this, as of 6 April 2008 all construction projects of over £300,000 are required to include a Site Waste Management Plan as part of the Site Waste Management Plans Regulations 2007. Construction and demolition waste represents a significant proportion of total waste generation. Reclaiming, reusing and recycling materials can reduce much of the 36 million tonnes of construction industry waste deposited at landfill annually in the UK and significantly reduce energy use. This applies to all development, from small household extensions to large housing developments, industrial units and offices etc. Advice on energy efficient construction is set out below.

Reuse of buildings

4.3 The retention of existing building materials can, where the building is sound, be extended to the reuse of a whole building, in preference to a rebuild. In such cases consideration should be given to the need to improve the energy efficiency of the building. Listed Building Consent may be required to improve the energy efficiency of Listed Buildings, all proposed works to a Listed Building should be discussed with the Council's Conservation Officer.

Use of salvaged building materials

4.4 Consideration should be given to the use of recycled building materials, either from demolished buildings that once occupied the site, or from places nearby such as those acquired from second-hand building materials suppliers. The re-use of brick, stone, slate and timber will reduce the amount of waste produced by a development and the cost of new materials. The selection of materials should also be influenced by consideration of the possibility of future recycling, at the end of the useful life of the building. For this reason materials should be capable of separation for re-use. Lime mortars for example never set as hard as cement and one of the big advantages is that the mortar can be cleaned from the brick making it possible to be reused. In contrast cement mortars cannot be easily removed making bricks good for nothing more than hardcore. Locally sourced and reused materials can also reflect the local character and minimise the energy used in transportation.

Low impact building materials

4.5 Where new building materials are required they should be selected on the basis of a sustainable supply and on the basis of the least possible energy consumption being involved in their manufacture. 'Embodied energy' is the energy used in obtaining the raw materials and manufacturing a product. Materials with very high-embodied energy such as aluminium and plastic, particularly uPVC, require a high energy input in their manufacture and thus, where practicable, should be avoided. Brick production is an energy intensive industry and therefore it is often better to reuse old bricks wherever possible. Cement production is also an energy intensive process and as such cement should be used sparingly. Lime mortars are a viable alternative to using cement.

4.6 Low impact materials include earth, straw, cork and hemp. Timber is also a relatively low impact product providing it is sourced from certified sustainable sources, such as those accredited with the Forrest Stewardship Council (FSC) trademark.

Energy efficiency in the home

4.7 Alongside reducing the amount of energy we use it is equally important to ensure what energy we do use is used efficiently and as little as possible is wasted. There are many cheap and simple techniques for improving energy efficiency in the home. Some of these are set out below. More detailed information is available at www.energysavingtrust.org.uk

Insulation

4.8 In a typical house half the heat is lost through the walls and loft. Ensuring that a house is fully insulated can significantly reduce energy bills. For more information on insulation and grants that are available visit www.energysavingtrust.org.uk

4.9 Sustainable insulation materials are also available such as recycled newspapers and sheep's wool.

Draught proofing

4.10 There are many simple draft-proofing measures that can help insulate a house. These include:

- Using shutters for windows and/or thicker curtains that do not drape over radiators.
- Placing aluminium foil behind radiators to reflect heat into the room.
- Attaching brush seals to doors and letterboxes.
- Placing self-adhesive sealant strips round doorframes and windows to eliminate any draughts.

Lighting

4.11 In most homes lighting accounts for 10-15% of the electricity use. This can be reduced by turning off lights when leaving a room, using energy saving light bulbs and by adjusting curtains and blinds to let in more natural light. Energy efficient light fittings are now also available.

Appliances

4.12 Appliances such as washing machines, fridges and dishwashers now come with a European Union energy label which classifies their energy rating from A (most efficient) to G (most inefficient). This assists consumers to choose energy efficient products. The more efficient models can be more expensive but the savings to electricity bills will outweigh the extra cost over the lifetime of the appliance. Ensuring washing machines and dishwashers are full before use and turning electrical equipment off rather than on standby when not being used can also further reduce electricity use.

Heating

4.13 The following can significantly reduce the amount of energy required to heat buildings and consequently reduce heating bills:

- Installing a condensing boiler will save around a third on heating bills.

- Fit a 75mm thick insulating jacket around the hot water tank if it is not already insulated. They only cost around £12 and can save around £40 a year on heating bills.
- Set the thermostat at the lowest comfortable temperature, which is typically around 18-21°C. Lowering the thermostat by just 1°C can save around £65 a year on heating bills.
- Setting the hot water cylinder thermostat to 60°C will save money on heating bills. Any higher is a waste of energy.
- Bleeding radiators from time to time will keep radiators working at their maximum output.
- Closing curtains at dusk will reduce the amount of heat escaping through windows.

Extensions

4.14 Proposed extensions should also incorporate energy efficiency measures. Conservatories should be built on south facing walls to take advantage of the principles of passive solar design as set out in section 3A and act as a thermal buffer to reduce heat loss from a house. Porches can also act as thermal buffers as they reduce heat loss from external doors.

4.15 The ‘Energy efficiency during construction’ section above provides useful information on the sustainable use of building materials.

APPENDIX 1: GLOSSARY

AMR – Annual Monitoring Report (*assesses the progress of the Local Development Scheme and the extent to which Local Development Plan policies area being implemented).*

BREEAM – Building Research Establishment Environmental Assessment Method (*Industry standard used to measure sustainability of buildings).*

CS – Core Strategy (*set out the long- term spatial vision for the local planning authority and spatial objectives and strategic policies to deliver that vision).*

DPD – Development Plan Document *(Spatial planning documents that are subject to independent examination, together with the Regional Spatial Strategy make up the Development Plan).*

GONW – Government Office for the North West (*local office of Central government in Manchester).*

Issues and Options - (*produced during the early production stage of the preparation of Development Plan Documents and may be issued for consultation to meet the requirements of Regulation 25).*

JLSP – Joint Lancashire Structure Plan (*development plan document that is part of the LDD).*

LDD – Local Development Document (*collective name for Development Plan Documents, Supplementary Planning Documents and Statement of Community Involvement).*

LDF – Local Development Framework *(portfolio of Local Development Documents. It includes Development Plan Documents, Supplementary Planning Documents, Statement of Community Involvement, the Local Development Scheme and Annual Monitoring Reports).*

LDS – Local Development Scheme (*sets out the programme for preparing Local Development Documents).*

Nationally designated areas - Scheduled Ancient Monuments; Parks and Gardens of Special Historic Interest and Sites of Special Scientific Interest.

Non-grey water - treated water direct from the mains.

PINS – Planning Inspectorate (*Independent Inspectorate appointed by the Secretary of State to judge on documents and representations made. Write reports on whether the proposed policies are acceptable following on from the Examination in Public, which the Local Authority must accept).*

PPS – Planning Policy Statement (*Central Government planning policy document that is required to be followed when determining planning applications and producing policies).*

Preferred Options - (*produced as part of the preparation of Development Plan Documents, and issued for formal public consultation as required by Regulation 26).*

Public Examination – (*hearing in which the development plan is tested for soundness. Non-adversarial way of testing soundness of plan. Led by Planning Inspector who will make report that the Council will have to accept).*

RSS - Regional Spatial Strategy (*sets out the region's policies in relation to the development and use of land. Makes up part of the development plan).*

SA – Sustainability Appraisal (*required for all local development documents to ensure that their social, economic and environmental impacts are tested).*

SCI – Statement of Community Involvement (*sets out the standards which authorities will achieve when including communities in the preparation of local development documents and development control decisions).*

SEA – Strategic Environmental Assessment *(environmental assessment of plans, policies and programmes).*

Soundness - (*nine tests that a plan should satisfy – it includes the following categories, "procedural" "conformity", "coherence, consistency and effectiveness").*

Submission Stage - *(Local Development Plan document which is submitted to the Secretary of state prior to the Examination, at the same time there will be public consultation for six weeks).*

SPD – Supplementary Planning Document (*Provides supplementary information in respect of policies in Development Plan Documents).*

SUDS - Sustainable Urban Drainage System.

APPENDIX 2: FURTHER INFORMATION

Section 4A – Energy Use

- The Code for Sustainable Homes is an independent assessment and rating system for the design and construction of new homes. It rates buildings on a 6 level rating scale. The Building Research Establishment's Environmental Assessment Method sets out minimum energy efficiency standards for all other new buildings. More information is available at: www.breeam.org/

- Building for Life is the national standard for well-designed homes and neighbourhoods. It is led by the Commission for Architecture and the Built Environment (CABE) and the Home Builders Federation and backed by the Housing Corporation, English Partnerships and Design for Homes. The Building for Life standard is made up of 20 criteria that embody the government's vision of what housing developments should be. More information is available at www.buildingforlife.org/

- Lifetime Homes is a national standard, which sets out criteria relating to interior and exterior features of the home. Lifetime Homes provide accessible adaptable accommodation for everyone, from young families to older people and individuals with a temporary or permanent physical impairment. What makes a Lifetime Home is the incorporation of 16 design features that together create a flexible blueprint for accessible and adaptable housing in any setting. The Lifetime Homes concept increases choice, independence and longevity of tenure, vital to individual and community well being. More information is available at www.lifetimehomes.org.uk/

- The Energy Saving Trust seeks to achieve the sustainable use of energy and cut carbon dioxide levels through its work with households, business and the public sector. Homeowners can find out more information, including details of available grants, on the Energy Saving Trust's website: www.energysavingtrust.org.uk or their Helpline on 0800 512 012.

- Local advice is available from the Lancashire Energy Efficiency Advice Centre (LEEAC), which provides impartial advice on simple, practical steps householders can take to improve the energy efficiency of their homes: Telephone 0800 512 012, e-mail info@leeac.org.uk or visit www.leeac.org.uk

- Businesses in the Borough can contact the Carbon Trust for advice on how to reduce energy use, saving money and helping combat climate change by cutting carbon emissions. To find out about the range of services offered by the Carbon Trust contact 0800 085 2005 or visit www.carbontrust.co.uk

Section 4B – Low Carbon Energy

- Chorley Councils website provides information on climate change and grants that are available for low carbon energy technologies. More information is available at www.chorley.gov.uk/climatechange

- Not-for-profit community organisations can receive up to £50,000 for a range of renewable energy installations. More information can be found at www.communitysustainable.org.uk or by calling 0845 3 671 671.

- In addition to energy conservation, the Energy Saving Trust also promotes the use of small-scale renewable energy sources, such as solar and wind. See www.energysavingtrust.org.uk or call 0800 512 012.

- The English Heritage Historic Environment Local Management (HELM) website www.helm.org.uk sets out all English Heritage policy position statements, guidance and examples of good practice for microgeneration installation.

- English Heritage provides advice on microgeneration in the Historic Environment. More information is available at www.english-heritage.org.uk/climatechange

- www.climatechangeandyourhome.org.uk is an interactive web portal designed to help those who own or manage houses built of traditional construction understand more about the potential impacts of climate change and ways to save energy.

- There are also a number of trade organisations representing the various renewable energy technologies that can provide further information about technologies and suppliers:

  - British Wind Energy Association – www.bwea.com
  - British Hydrogen Association – http://www.british-hydro.org
  - Heat Pump Association - http://www.heatpumps.org.uk
  - UK Heat Pump Network - http://www.heatpumpnet.org.uk/
  - Renewable Energy Association – www.r-e-a.net
  - National Energy Foundation – www.nef.org.uk/actonCO2/renewableenergy.htm

Section 4C – Water

- For tips on how you can save water in the home there is an online interactive game at http://www.thewaterfamily.co.uk. Envirowise (see above) can help businesses to identify ways to minimise water use.

- An introduction to rainwater harvesting is available from the UK Rainwater Harvesting Association: www.ukrha.org. Details of suppliers of rainwater harvesting systems are also available, many of which also specialise in greywater recycling.

- The Construction Industry Research and Information Association (CIRIA) run an initiative to disseminate and promote good practice in the implementation of sustainable drainage in the built environment. More information about Sustainable Drainage Systems can be found upon their website: www.ciria.org.uk/suds. The Environment Agency has produced a guide for developers on Sustainable Drainage Systems, available at: http://publications.environment-agency.gov.uk/pdf/GEHO0308BNST-e-e.pdf

Section 4D – Waste Recycling

- More details about household waste collection and recycling in Chorley can be found by telephoning the Recycling helpline on 01257 515355 or e-mailing contact@chorley.gov.uk

- Free home composters (limited number available) can be ordered by telephoning 0845 077 0757 or visiting www.recyclenow.com There is also a home composting advice line: 0845 0500110.

- A real nappy laundry service operates in the Chorley area, phone 01257 515355 for details.

- Businesses in the Borough can contact Envirowise, which delivers a government-funded programme of independent, practical and confidential advice to any UK business, free of charge. Guidance aimed at reducing environmental impact, including waste management and minimisation, is available through a free helpline: 0800 585794. A wide range of information, case studies and best practice guides can also be found on their website: www.envirowise.gov.uk.

Section 5 – Other Useful Information

- Find out more about the current issues and key background information on achieving more sustainable construction at the Department for Business, Enterprise & Regulatory Reform's sustainable construction pages: www.berr.gov.uk/sectors/construction/sustainability/page13691.html

- The Recycled Materials for Construction website (www.ecoconstruction.org) contains guidance on issues ranging from planning, choosing and specifying materials, to case studies of recycled & reclaimed material use. There is also a searchable database of available products with details of manufacturing processes of products, their composition, suppliers, etc.

- The Forest Stewardship Council (FSC) is an international, non-government organisation dedicated to promoting responsible management of the world's forests. It operates a system of forest certification and product labelling that allows consumers to identify wood and wood-based construction materials from sustainable sources. For more details of the system and to find certified products and suppliers see www.fsc.org.

APPENDIX 3: BENCHMARKS FOR CALCULATING CARBON EMISSIONS

Housing Development

Dwelling Type		Top floor flat	Mid-terraced	End-terraced	Semi-detached	Detached
Total floor area (m^2)		**60.9**	**78.8**	**78.8**	**88.8**	**104.0**
Energy Requirements (kWh/yr)	Space	2,270	2,232	2,893	3,423	4,451
	Water	2,813	3,228	3,228	3,412	3,762
	L&A	2,201	2,719	2,719	3,057	3,635
	Cooking	1,173	1,264	1,264	1,314	1,386
	Total	**8,456**	**9,443**	**10,103**	**11,205**	**13,233**
Carbon Emissions (kgC/yr)	Space	120	118	118	181	235
	Water	149	171	171	181	199
	L&A	249	307	307	345	411
	Cooking	62	67	67	70	73
	Total	**580**	**663**	**663**	**777**	**918**
Total kgC/yr per m^2		**9.52**	**8.41**	**8.41**	**8.75**	**8.83**

Notes:

- Standard total floor areas (TFA) have been assumed per dwelling type.
- The figures provided are calculated for dwellings build to the Approved Document L1A 2006 regulatory standards.
- The carbon emissions assume that the heating, hot water and cooking fuel is mains gas for all dwelling types.
- It is assumed that no secondary heating is provided and that the entire space heating and hot water requirement is met by the main heating system (86 per cent efficient).
- The carbon emissions incorporate production, delivery and appliance conversion losses.

Source: Based on 'Meeting the 10 per cent target for renewable energy in housing – a guide for developers and planners' (Energy Saving Trust 2006)

Non Housing Development

Building Types (corresponding to planning use classes)	Building sub-types/Examples	Gas Good benchmark kWh/m^2/year	Electricity Good benchmark kWh/m^2/year	Gas kgC/yr per m^2	Electricity kgC/yr per m^2	Total kgC/yr per m^2
Care homes, sheltered housing	Nursing/residential care home	375	42	19.43	4.75	24.18
Cinemas, theatres, bingo, pool & bowling halls, etc.	Theatres	420	180	21.76	20.34	42.1
Cinemas, theatres, bingo, pool & bowling halls, etc.	Cinemas	515	135	26.68	15.26	41.94
Cinemas, theatres, bingo, pool & bowling halls, etc.	Social clubs	140	60	7.25	6.78	14.03
Cinemas, theatres, bingo, pool & bowling halls, etc.	Bingo clubs	440	190	22.79	21.47	44.26
Financial & professional services buildings	Post offices	140	45	7.25	5.09	12.34
Financial & professional services buildings	Agencies	150	55	7.77	6.22	13.99
Financial & professional services buildings	Post offices (all-electric)	0	80	0.00	9.04	9.04
Financial & professional services buildings	Agencies (all-electric)	0	90	0.00	10.17	10.17
Financial & professional services buildings	Banks & building societies	63	71	3.26	8.02	11.28
Financial & professional services buildings	Banks & building societies (all-electric)	0	122	0.00	13.79	13.79
Hospitals	Small acute hospital (<25,000m3)	406	45	21.03	5.09	26.12
Hospitals	Small acute hospital (>25,000m3)	466	60	24.14	6.78	30.92
Hospitals	Long stay hospital	414	41	21.45	4.63	26.08
Hotels & hostels	Smaller hotel	240	80	12.43	9.04	21.47
Hotels & hostels	Business or holiday hotel	260	80	13.47	9.04	22.51
Hotels & hostels	Luxury hotel	300	90	15.54	10.17	25.71
Industrial buildings	General manufacturing	225	65	11.66	7.35	19.01
Industrial buildings	Factory – office	150	72	7.77	8.14	15.91
Industrial buildings	Light manufacturing	175	43	9.07	4.86	13.93
Prestige offices	Type 4	114	234	5.91	26.44	32.35
Primary & secondary schools	Primary or middle school	137	20	7.10	2.26	9.36
Primary & secondary schools	Secondary school without swimming pool	151	22	7.82	2.49	10.31
Primary & secondary schools	Secondary school with swimming pool	172	26	8.91	2.94	11.85
Primary & secondary schools	Primary schools	126	20	6.53	2.26	8.79
Primary & secondary schools	Secondary schools	136	24	7.04	2.71	9.75
Restaurants, pubs, bars, etc.	Restaurant with bar	1,100	650	56.98	73.45	130.43
Restaurants, pubs, bars, etc.	Fast-food restaurant	480	820	24.86	92.66	117.52
Retail buildings	Department stores	194	237	10.05	26.78	36.83
Retail buildings	Department stores (all-electric)	0	209	0.00	23.62	23.62
Retail buildings	DIY stores	149	127	7.72	14.35	22.07
Retail units	Book stores (all-electric)	0	210	0.00	23.73	23.73
Retail units	Catalogue stores	37	83	1.92	9.38	11.30
Retail units	Catalogue stores (all-electric)	0	100	0.00	11.30	11.30
Retail units	Butchers (all-electric)	0	475	0.00	53.68	53.68
Retail units	Clothes shops	65	234	3.37	26.44	29.81
Retail units	Clothes shops (all-electric)	0	270	0.00	30.51	30.51
Retail units	Electrical goods rental (all-electric)	0	281	0.00	31.75	31.75
Retail units	Electrical goods retail (all-electric)	0	172	0.00	19.44	19.44
Retail units	Frozen food centres (all-electric)	0	858	0.00	96.95	96.95
Retail units	Off-licences (all-electric)	0	475	0.00	53.68	53.68
Retail units	Shoe shops (all-electric)	0	197	0.00	22.26	22.26
Sports centres & health clubs	Sports facility without a pool	215	75	11.14	8.48	19.62
Sports centres & health clubs	Sports facility with a pool	360	150	18.65	16.95	35.60

Building Types (corresponding to planning use classes)	**Building sub-types/Examples**	**Gas Good benchmark kWh/m^2/year**	**Electricity Good benchmark kWh/m^2/year**	**Gas kgC/yr per m^2**	**Electricity kgC/yr per m^2**	**Total kgC/yr per m^2**
Sports centres & health clubs	Swimming pools only	775	165	40.15	18.65	58.80
Standard offices	Type 3	97	128	5.02	14.46	19.48
Standard offices	Type 2	79	54	4.09	6.10	10.19
Standard offices	Type 1	79	33	4.09	3.73	7.82
Storage & distribution warehouses	Storage & distribution warehouses	135	29	6.99	3.28	10.27
Storage & distribution warehouses	Distribution warehouses	103	53	5.34	5.99	11.33
Storage & distribution warehouses	Distribution warehouses (all-electric)	0	55	0.00	6.22	6.22
Superstores	Supermarkets	200	915	10.36	103.40	113.76
Superstores	Supermarkets (all-electric)	0	1,034	0.00	116.84	116.84

Source: Based on 'Integrating renewable energy into new developments: Toolkit for planners, developers and consultant' (London Renewables 2004)

APPENDIX 4: TEMPLATE FOR DEMONSTRATING REDUCTION IN CARBON EMISSIONS

BASELINE CARBON EMISSIONS					
Units	Gas		Electricity		TOTAL CARBON EMISSIONS (kgC/yr)
	Predicted energy consumption (kWh/yr)	Carbon emissions (kgC/yr)[2]	Predicted energy consumption (kWh/yr)	Carbon emissions (kgC/yr)[3]	
Building type 1					
Building type 2					
Building type 3					
Building type 4					
Building type 5					
…add more as needed					
Infrastructure e.g. street lighting					
…add more as needed					
DEVELOPMENT TOTAL					
MINIMUM REDUCTION OF CARBON EMISSIONS REQUIRED[4]					

REDUCTION IN CARBON EMISSIONS					
Low carbon energy technologies to be installed	System size	Predicted energy consumption met by low carbon technology (kWh/yr)	Carbon emissions from equivalent kWh/yr of gas/electricity (kgC/yr)	Carbon emissions from low carbon energy contribution (kgC/yr)	Carbon saving (kgC/yr)
TOTAL CARBON SAVINGS					
% CARBON SAVING					

[2] 1 kWh of gas = 0.053 kg of Carbon
[3] 1 kWh of electricity = 0.113 kg of Carbon
[4] 10% of total carbon emissions of development, 15% from 2010 and 20% from 2015 onwards.

APPENDIX 5: EXAMPLES OF CARBON SAVINGS

The following are examples of carbon savings from a range of low carbon technologies. Different types of the technologies are available with varying costs and performance characteristics. Site-specific costs will depend on system selection.

Low carbon energy technology	System size (kW/m^2)	Annual carbon savings (kgC/m^2)	Cost (£/m^2)
Wind turbine (roof mounted)	0.0031	0.90	£6.24
Biomass heating	0.145	4.49	£28.95
Solar water heating	0.035 (m^2/m^2 GIFA)	1.08	£14.02
Photovoltaics (rooftop)	0.080 (m^2/m^2 GIFA)	0.90	£67.96
Ground source heat pump	0.033	1.32	£32.81

Notes:

1. Data based on a medium density suburban housing development with a mix of individual houses; low rise multi residential housing and terraced/row housing.
2. Both low carbon energy system data and development costs are based on gross internal floor area (GIFA).
3. Biomass heating: cost of district heating network not included.

Source: Based on 'Integrating renewable energy into new developments: Toolkit for planners, developers and consultant' (London Renewables 2004)

APPENDIX 6: EXAMPLES OF SUITABLE LOW CARBON TECHNOLOGIES FOR DIFFERENT BUILDING TYPES

The following information identifies examples of what low carbon technologies could be suitable for a number of different building types. It is taken from 'Integrating energy into new developments; Toolkit for planners, developers and consultants' published by London Renewables. The information should only be used as an illustrative guide. More detailed investigations will be needed to deicide which low carbon energy technologies are best for a particular development.

Central retail block
Ground sourced heating is likely to be able to provide the highest low carbon contribution at least cost, with ground cooling also possible.

Small retail unit
Due to location issues, ground sourced heating may be the only possibility.

Prestige office
Ground sourced heating and cooling, possibly in combination, are likely to provide the least cost low carbon contribution, unless PV cladding could be used to replace an expensive facade.

Standard office
Biomass heating, if a suitable fuel supply and storage area is available, could be the cheapest option, with ground sourced heating also low cost. A wind turbine could provide a low cost low carbon source, if there is space and an adequate wind regime available.

Standard infill naturally ventilated office
Biomass heating, if a suitable fuel supply and storage area are available, or ground sourced heating are the cheapest options.

Industry
A wind turbine, if there is space and an adequate wind regime available, can be the cheapest option, alternatively biomass heating, if a suitable fuel supply and storage area are available, and ground sourced heating can be low cost. Solar water heating could be viable if the particular building use has high hot water demand e.g. for washing.

Warehouse and distribution
A wind turbine, if there is space and an adequate wind regime available, can be the cheapest option; alternatively ground sourced heating could be used at reasonable cost.

Hotel
Ground sourced heating is likely to be the cheapest low carbon energy source, with a combination of solar hot water and ground cooling also reasonable. PV cladding, if used to replace an expensive facade, could also provide a contribution.

Care homes and sheltered housing
Biomass heating, if a suitable fuel supply and storage area is available, could be the cheapest option, with ground sourced heating also low cost.

Medium density housing, suburbs
Solar hot water systems on individual houses are likely to be the easiest. However, a stand-alone wind turbine could provide the lowest overall cost low carbon source, if there is space away from the houses and an adequate wind regime available.

Medium density housing, infill
Solar hot water systems are likely to be the cheapest option, as long as adequate roof space is available. Individual ground sourced heating systems are also a reasonable option. If communal heating is to be installed, biomass heating becomes viable, as long as a suitable fuel supply and storage area are available.

Block of flats
If communal heating is to be installed, biomass heating is cheapest, as long as a suitable fuel supply and storage area are available. Communal solar hot water is a further reasonable cost option.

Primary or secondary school
A stand-alone wind turbine could provide the lowest overall cost low carbon source, if there is space and an adequate wind regime available. Biomass heating is also a viable option if there is a suitable fuel supply and storage area available, as is ground sourced heating.

Sports centre/ health club with pool
A stand-alone wind turbine could provide the lowest overall cost low carbon source, if there is space and an adequate wind regime available. A solar hot water system can also provide the necessary contribution at low cost. Biomass heating is a viable option if there is a suitable fuel supply and storage area available.

APPENDIX 7: MAPS

Chorley Low Carbon Energy Maps

The following maps were developed during the Renewable Energy Study at the beginning of 2005. For the various low carbon energy technologies covered, each map shows applicable physical characteristics that would influence location within Chorley Borough. While they provide a useful indication of where low carbon energy schemes could be located in the Borough, any forthcoming schemes would be assessed on a site-specific basis using the criteria set out in the Development Plan Document and this Supplementary Planning Document.

Map 1 – Wind: micro/building mounted turbines
Map 2 – Single turbines and clusters (under 50 MW)
Map 3 – Clusters of large turbines (over 50 MW)
Map 4 – Small-scale hydro
Map 5 – Landfill
Map 6 – Woody biomass
Map 7 – Solar Water Heating & PV
Map 8 – Anaerobic digestion

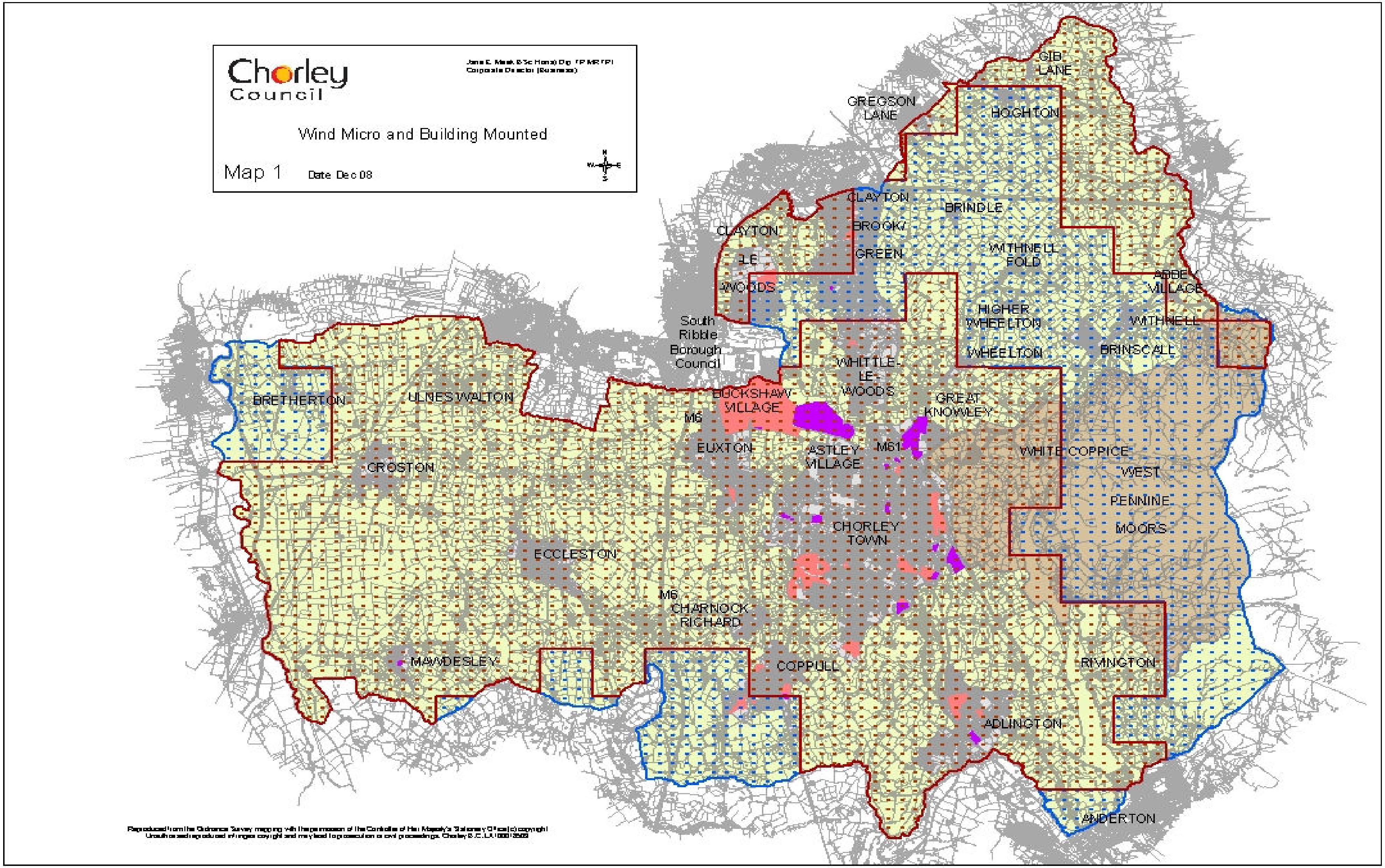
Landscape Sensitivity to Wind Energy Development in Lancashire Map

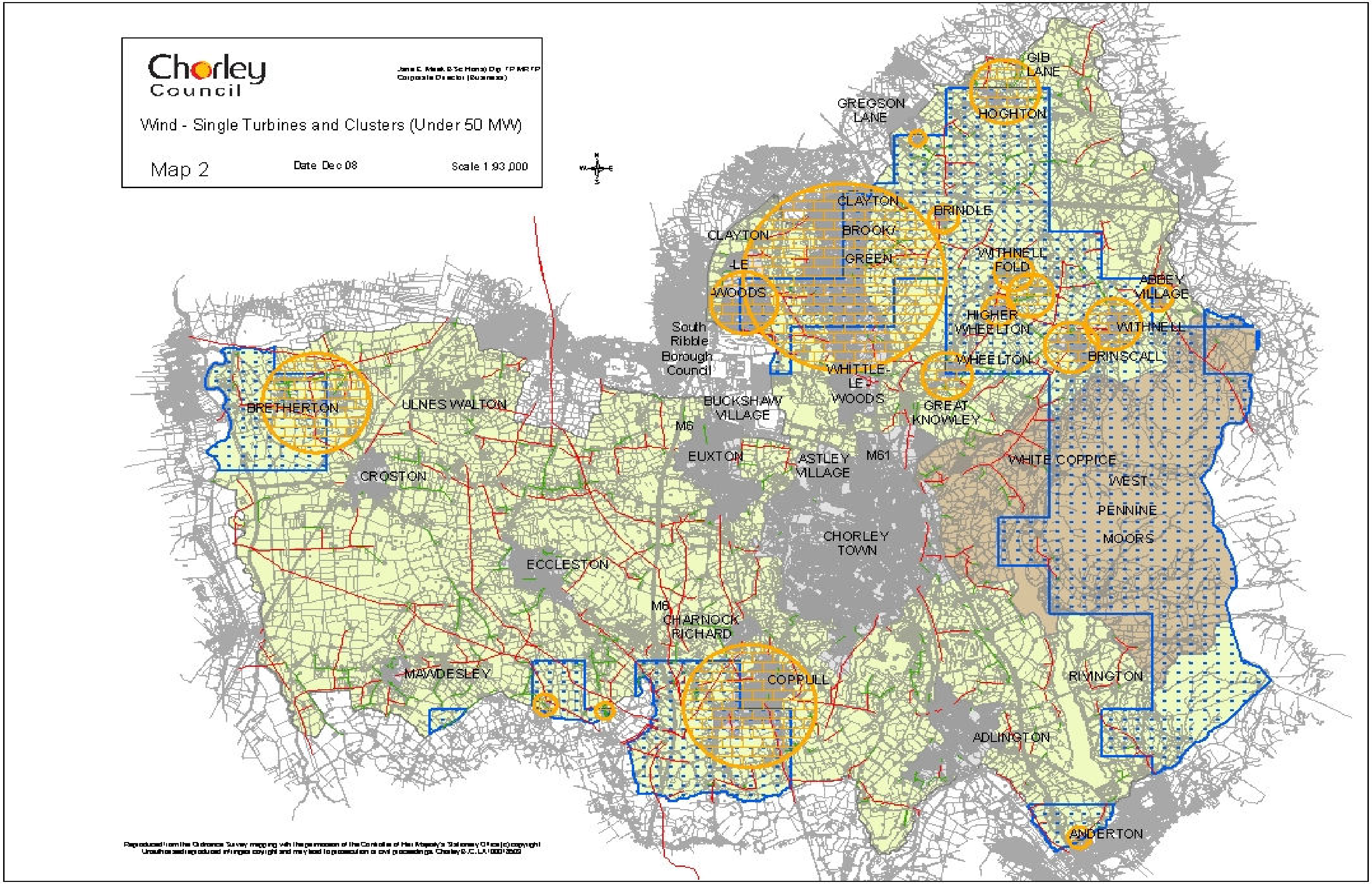
This map is taken from a study undertaken by Lovejoy consultancy. It identifies different landscapes in the Borough and their sensitivity to wind development.

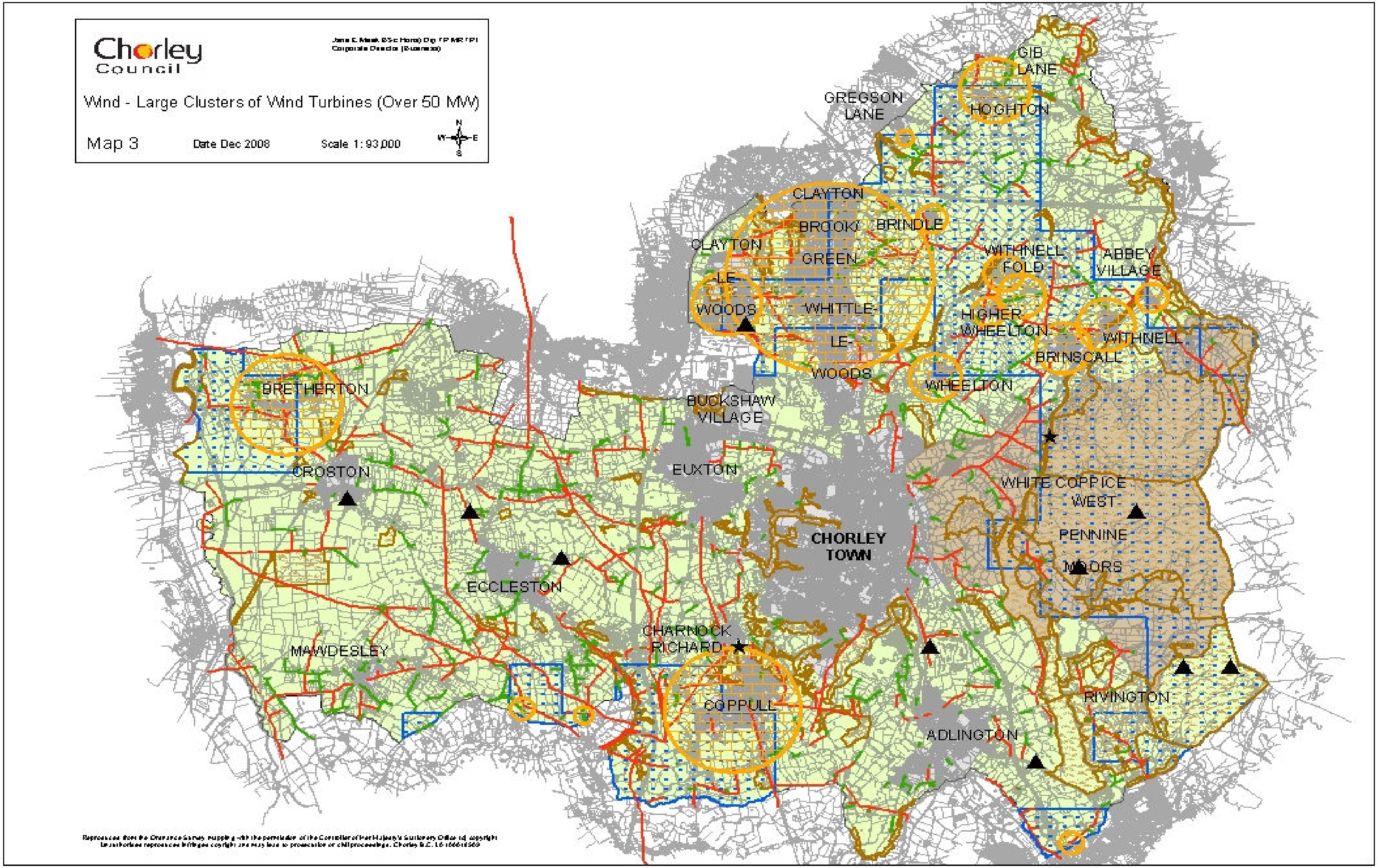
Chorley Council

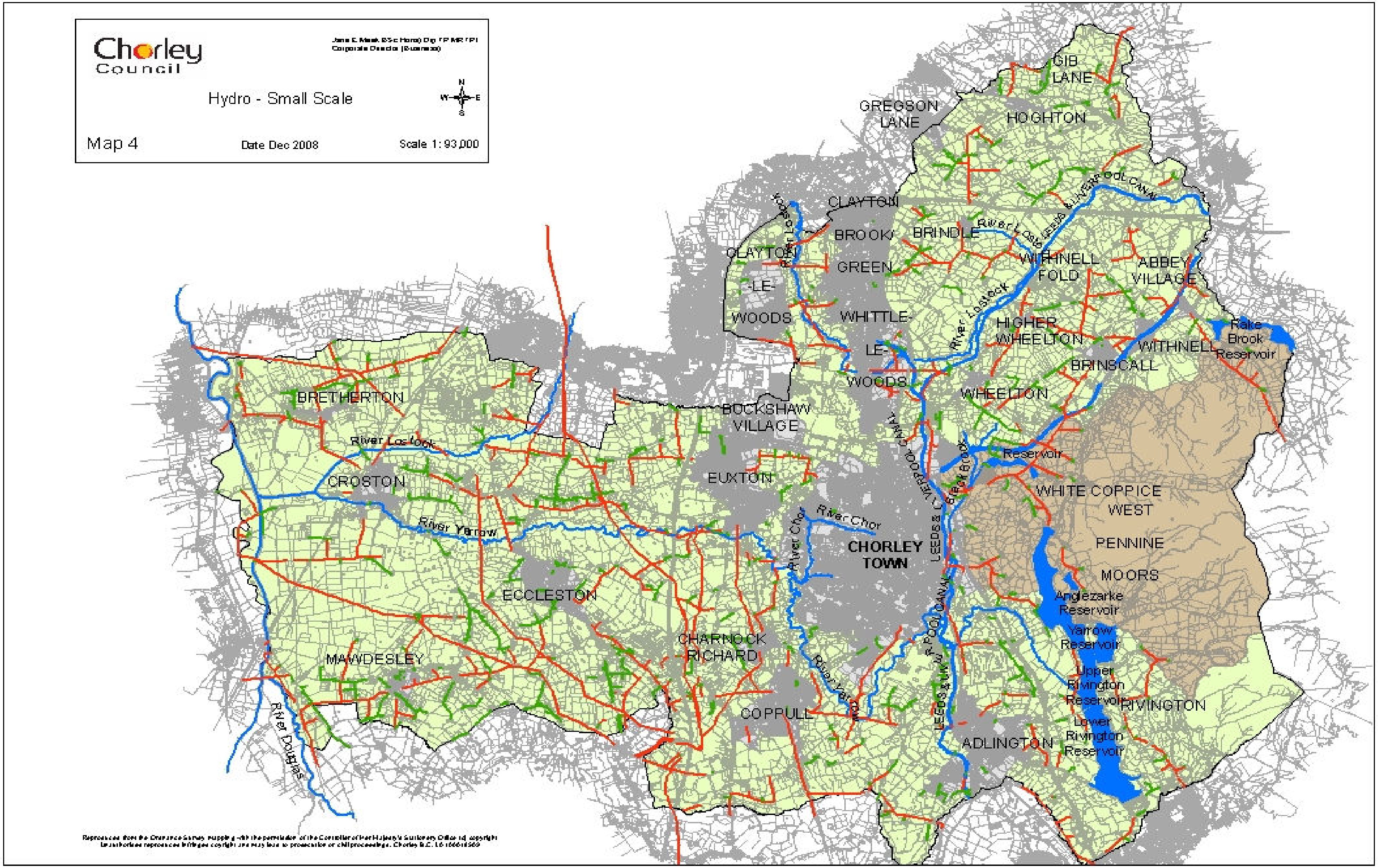
Renewable Energy Key:-

- Green Belt
- Settlements
- Open Countryside
- Scheduled Ancient Monuments
- Site of Special Scientific Interest
- Biological Heritage Sites / Local Nature Reserve
- Main Rivers / Canal
- Woodland
- Major Employment Sites
- New Housing & ROF
- Regional Investment Site /New Employment Sites
- Landfill Sites
- Electricity Grid (11Kv)
- Electricity Grid (33Kv)
- 500m From Significant Groups of Housing
- Wind Speed Greater Than 4m/s
- Wind Speed Greater Than 5m/s


Chorley Council
Wind Micro and Building Mounted
Map 1
Date Dec 08
GIB LANE
GREGSON LANE
HOGHTON
CLAYTON
BRINDLE
BROOK/
GREEN
WITHNELL FOLD
CLAYTON
LE
WOODS
ABBEY VILLAGE
HIGHER WHEELTON
WITHNELL
South Ribble Borough Council
WHEELTON
BRINSCALL
WHITTLE-LE-WOODS
BUCKSHAW VILLAGE
GREAT KNOWLEY
BRETHERTON
ULNES WALTON
M6
EUXTON
ASTLEY VILLAGE
M61
WHITE COPPICE
CROSTON
WEST
PENNINE
MOORS
CHORLEY TOWN
ECCLESTON
M6
CHARNOCK RICHARD
MAWDESLEY
COPPULL
RIVINGTON
ADLINGTON
ANDERTON


Chorley
Council
Wind - Single Turbines and Clusters (Under 50 MW)
Map 2
Date Dec 08
Scale 1:93,000
GIB
LANE
GREGSON
LANE
HOGHTON
CLAYTON
BRINDLE
BROOK/
GREEN
CLAYTON
-LE
WOODS
WITHNELL
FOLD
ABBEY
VILLAGE
HIGHER
WHEELTON
WITHNELL
WHEELTON
BRINSCALL
South
Ribble
Borough
Council
WHITTLE-
LE-
WOODS
BUCKSHAW
VILLAGE
GREAT
KNOWLEY
BRETHERTON
ULNES WALTON
M6
EUXTON
ASTLEY
VILLAGE
M61
WHITE COPPICE
WEST
PENNINE
MOORS
CROSTON
CHORLEY
TOWN
ECCLESTON
M6
CHARNOCK
RICHARD
MAWDESLEY
COPPULL
RIVINGTON
ADLINGTON
ANDERTON


Chorley Council
Wind - Large Clusters of Wind Turbines (Over 50 MW)
Map 3
Date Dec 2008
Scale 1:93,000
GIB LANE
HOGHTON
GREGSON LANE
CLAYTON BROOK
BRINDLE
CLAYTON GREEN
CLAYTON-LE-WOODS
WHITTLE-LE-WOODS
WITHNELL FOLD
ABBEY VILLAGE
HIGHER WHEELTON
WITHNELL
BRINSCALL
WHEELTON
BRETHERTON
BUCKSHAW VILLAGE
EUXTON
CROSTON
WHITE COPPICE
WEST PENNINE MOORS
CHORLEY TOWN
ECCLESTON
CHARNOCK RICHARD
MAWDESLEY
COPPULL
RIVINGTON
ADLINGTON


Chorley Council
Hydro - Small Scale
Map 4
Date Dec 2008
Scale 1:93,000
N
W
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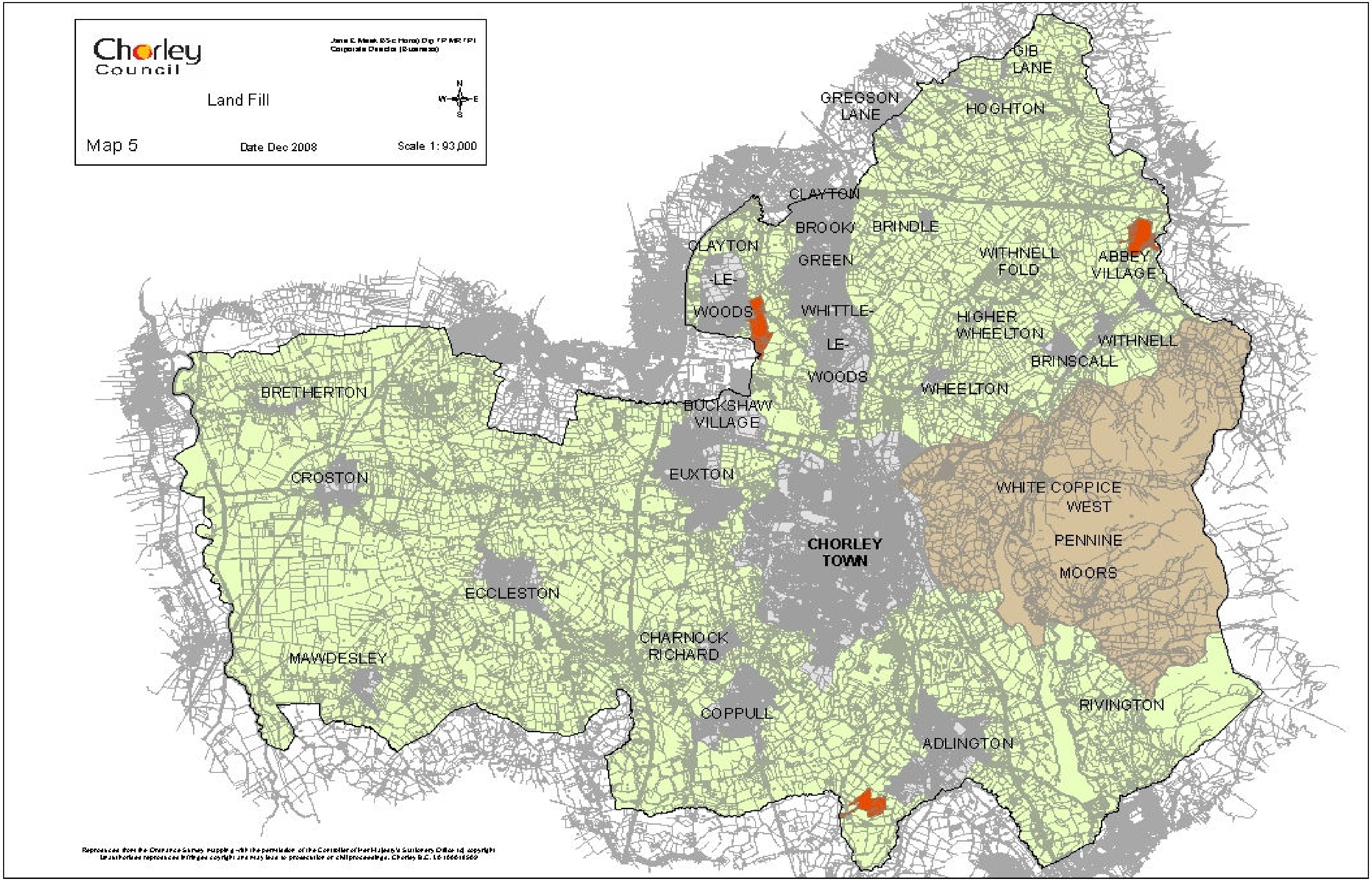
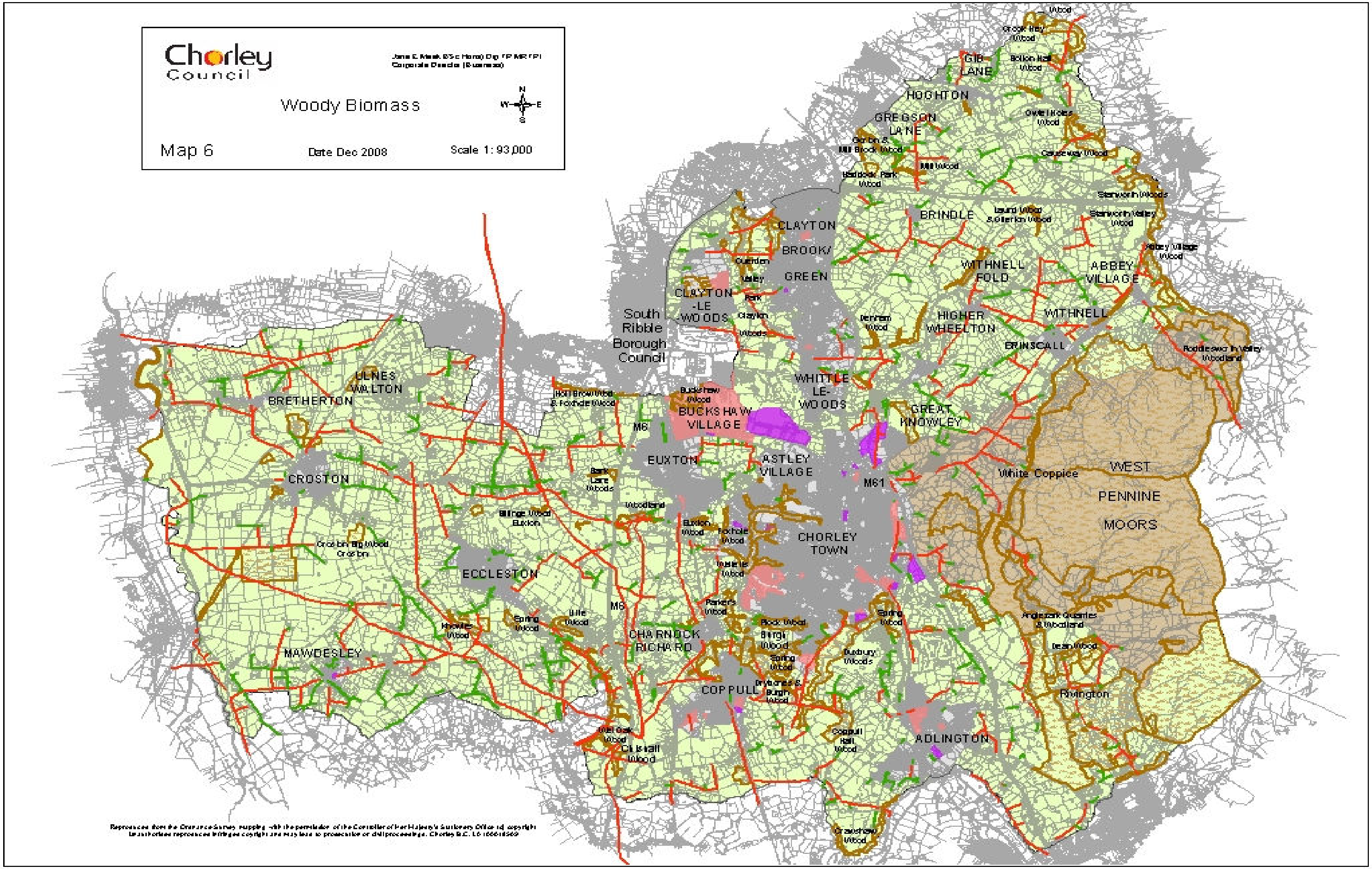
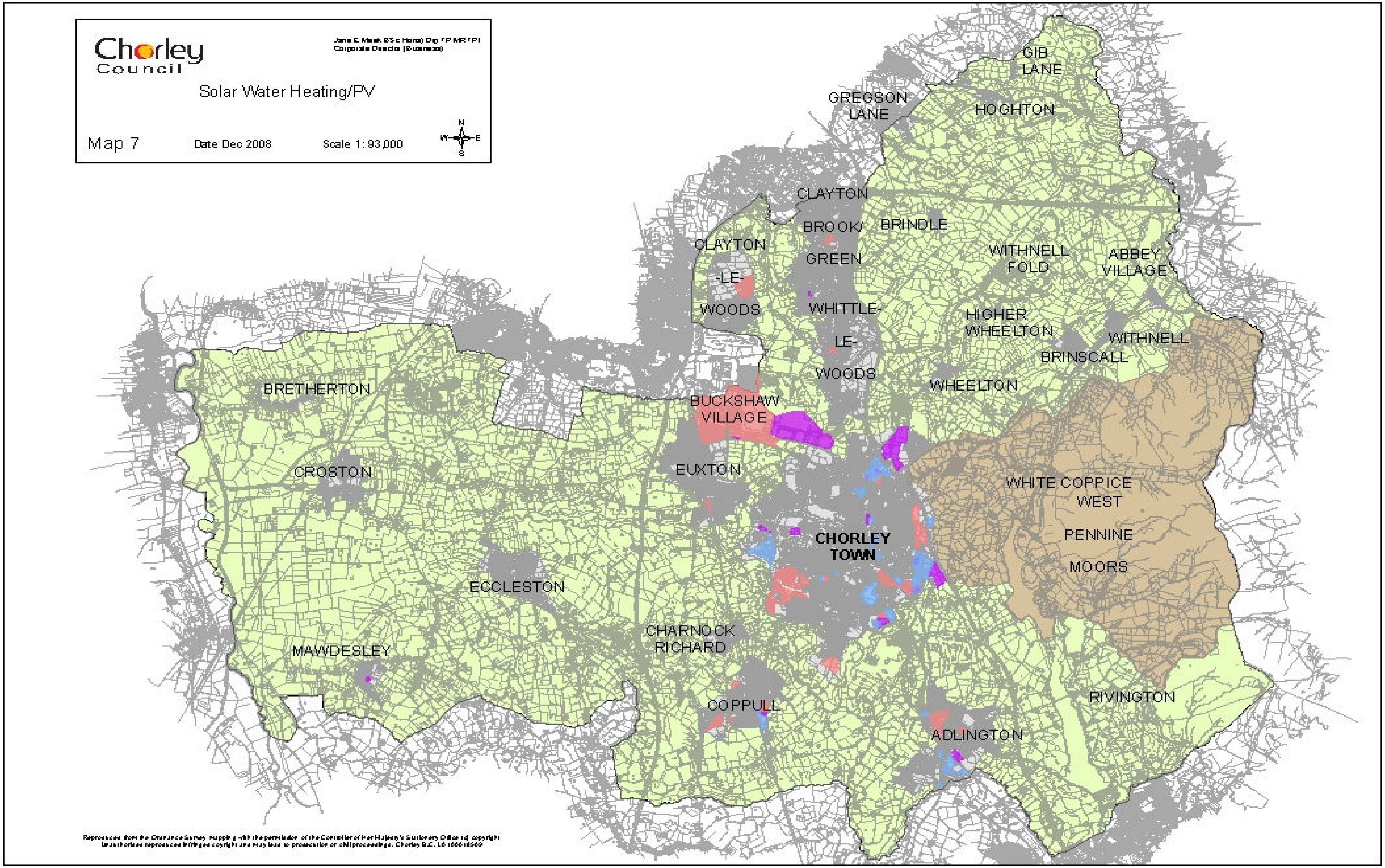
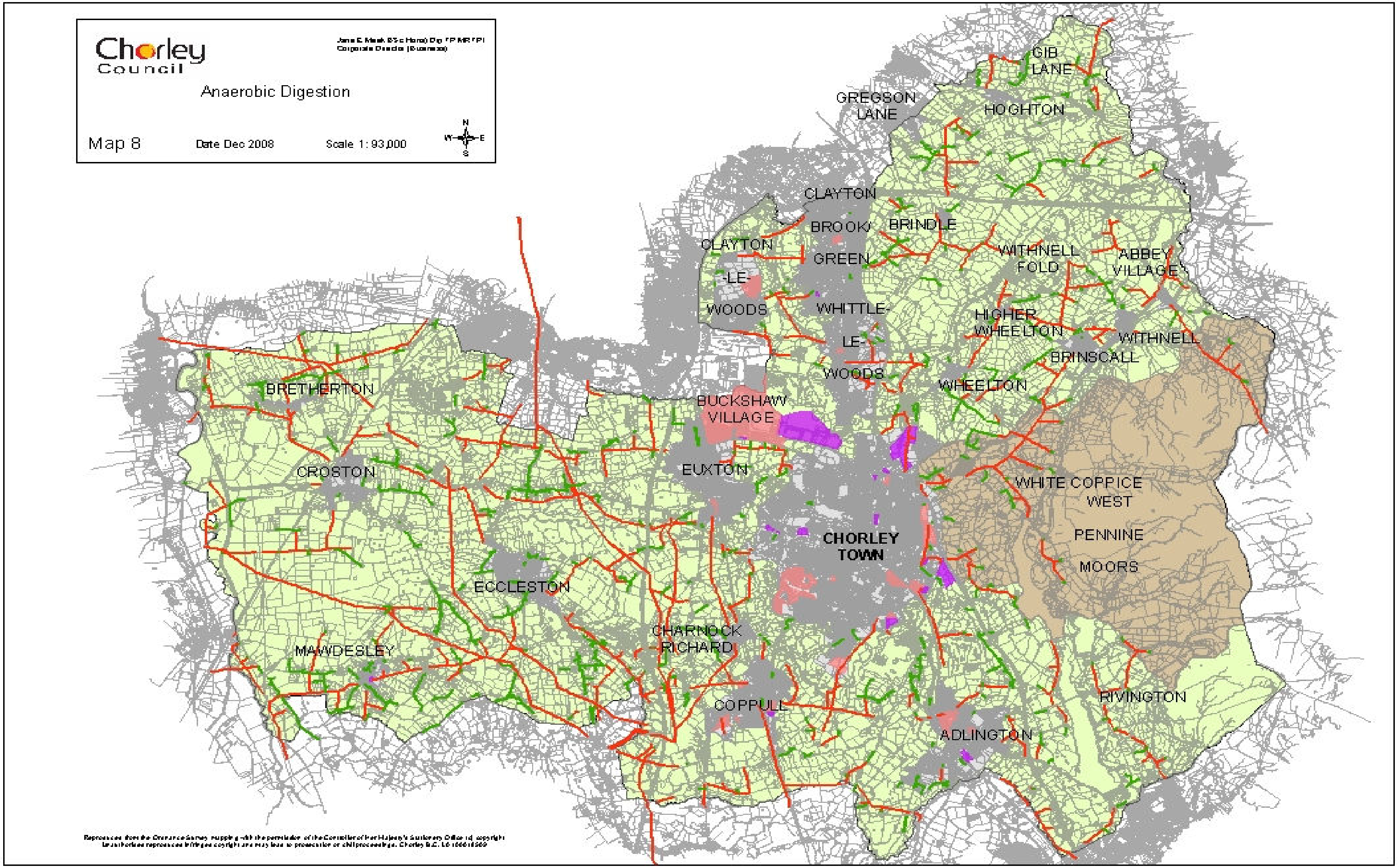
S
GIB LANE
HOGHTON
GREGSON LANE
CLAYTON
BROOK/
GREEN
BRINDLE
CLAYTON
-LE-
WOODS
WHITTLE-
LE-
WOODS
WITHNELL FOLD
ABBEY VILLAGE
HIGHER WHEELTON
WITHNELL
Rake Brook Reservoir
BRINSCALL
WHEELTON
BRETHERTON
BOCKSHAW VILLAGE
River Lostock
Reservoir
CROSTON
EUXTON
WHITE COPPICE
WEST
PENNINE
MOORS
River Yarrow
River Chor
CHORLEY TOWN
Anglezarke Reservoir
Yarrow Reservoir
Upper Rivington Reservoir
Lower Rivington Reservoir
RIVINGTON
ECCLESTON
CHARNOCK RICHARD
MAWDESLEY
COPPULL
ADLINGTON
River Douglas
River Yarrow
Black Brook
LEEDS & LIVERPOOL CANAL


Chorley Council
Land Fill
Map 5
Date Dec 2008
Scale 1:93,000
N
W
E
S
GIB LANE
GREGSON LANE
HOGHTON
CLAYTON
BROOK
BRINDLE
CLAYTON -LE- WOODS
GREEN
WITHNELL FOLD
ABBEY VILLAGE
WHITTLE- LE- WOODS
HIGHER WHEELTON
WITHNELL
BRINSCALL
WHEELTON
BRETHERTON
BUCKSHAW VILLAGE
EUXTON
CROSTON
WHITE COPPICE WEST
PENNINE MOORS
CHORLEY TOWN
ECCLESTON
CHARNOCK RICHARD
MAWDESLEY
COPPULL
RIVINGTON
ADLINGTON


Chorley Council
Woody Biomass
Map 6
Date Dec 2008
Scale 1: 93,000
HOGHTON
GIB LANE
GREGSON LANE
BRINDLE
CLAYTON BROOK/ GREEN
CLAYTON -LE -WOODS
South Ribble Borough Council
WITHNELL FOLD
ABBEY VILLAGE
WITHNELL
HIGHER WHEELTON
BRINSCALL
WHITTLE LE-WOODS
GREAT KNOWLEY
BUCKSHAW VILLAGE
ASTLEY VILLAGE
EUXTON
M6
M61
CHORLEY TOWN
WEST PENNINE MOORS
White Coppice
ULNES WALTON
BRETHERTON
CROSTON
ECCLESTON
MAWDESLEY
CHARNOCK RICHARD
COPPULL
ADLINGTON
Rivington


Chorley
Council
Solar Water Heating/PV
Map 7
Date Dec 2008
Scale 1: 93,000
N
W
E
S
GIB LANE
GREGSON LANE
HOGHTON
CLAYTON
BROOK/
BRINDLE
GREEN
CLAYTON
-LE-
WOODS
WITHNELL FOLD
ABBEY VILLAGE
WHITTLE-
LE-
WOODS
HIGHER WHEELTON
WITHNELL
BRINSCALL
WHEELTON
BRETHERTON
BUCKSHAW VILLAGE
EUXTON
CROSTON
WHITE COPPICE
WEST
PENNINE
MOORS
CHORLEY TOWN
ECCLESTON
CHARNOCK RICHARD
MAWDESLEY
COPPULL
RIVINGTON
ADLINGTON


Chorley Council
Anaerobic Digestion
Map 8
Date Dec 2008
Scale 1: 93,000
N
W
E
S
GIB LANE
GREGSON LANE
HOGHTON
CLAYTON
BROOK
BRINDLE
CLAYTON
-LE-
WOODS
GREEN
WITHNELL FOLD
ABBEY VILLAGE
WHITTLE-
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HIGHER WHEELTON
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BRINSCALL
WHEELTON
BRETHERTON
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ECCLESTON
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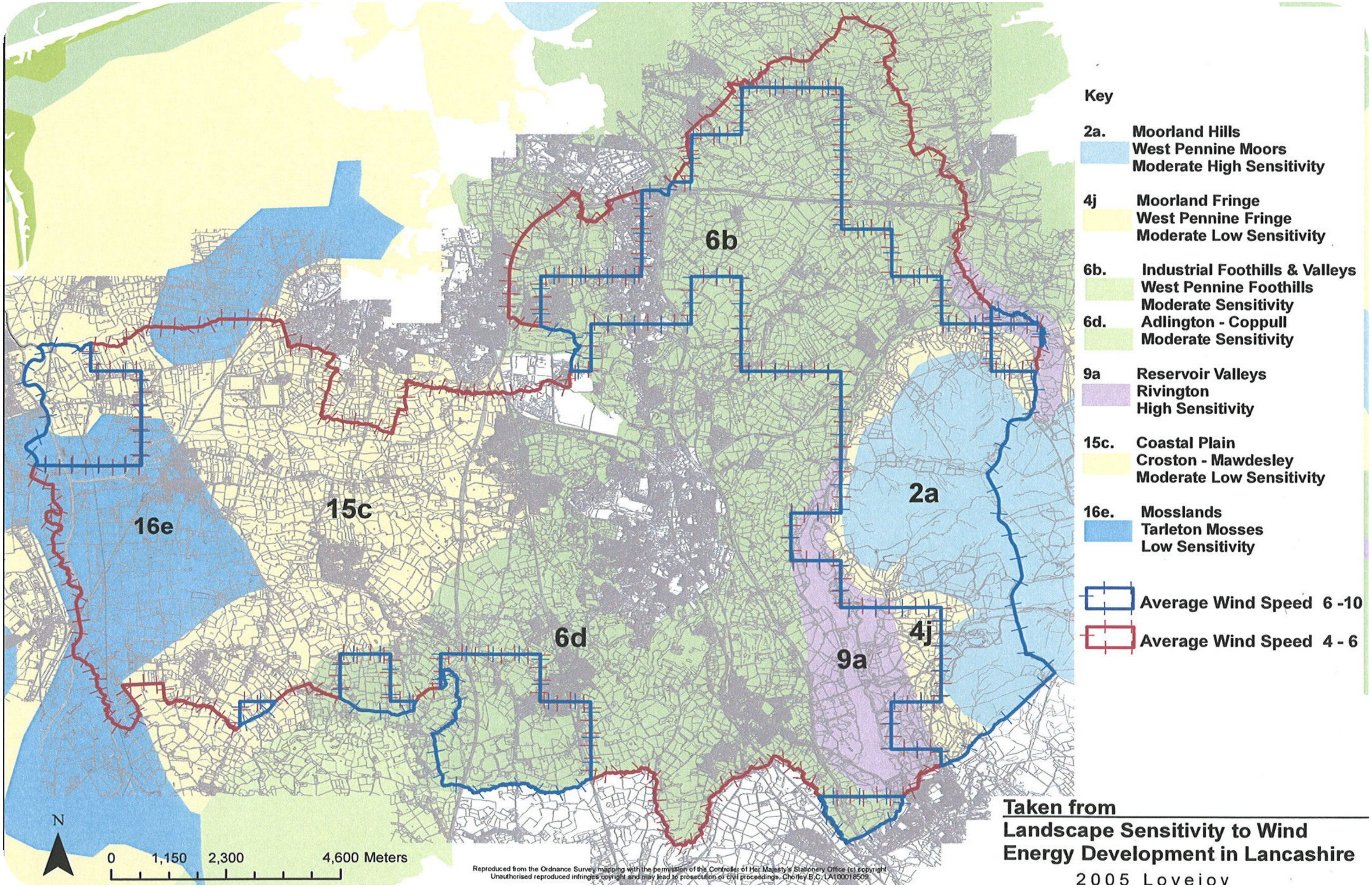
Key
2a. Moorland Hills
West Pennine Moors
Moderate High Sensitivity
4j Moorland Fringe
West Pennine Fringe
Moderate Low Sensitivity
6b. Industrial Foothills & Valleys
West Pennine Foothills
Moderate Sensitivity
6d. Adlington - Coppull
Moderate Sensitivity
9a Reservoir Valleys
Rivington
High Sensitivity
15c. Coastal Plain
Croston - Mawdesley
Moderate Low Sensitivity
16e. Mosslands
Tarleton Mosses
Low Sensitivity
Average Wind Speed 6 -10
Average Wind Speed 4 - 6
6b
2a
4j
9a
6d
15c
16e
N
0 1,150 2,300 4,600 Meters
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Taken from
Landscape Sensitivity to Wind
Energy Development in Lancashire
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