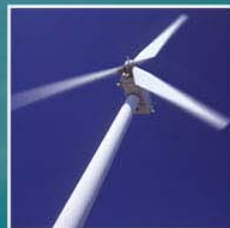
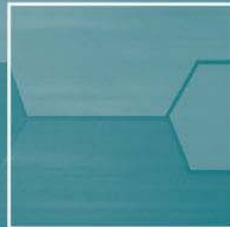
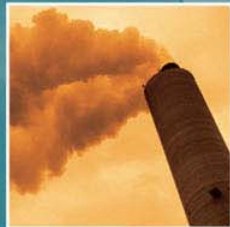


Northern Ireland Planning Service

Review of Permitted Development Rights for Non-domestic Small Scale Renewable Energy Development

Policy Consideration

September 2009



Entec

Creating the environment for business

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CW038iR	Minor Corrections	11/09/2009



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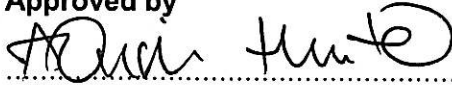
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Northern Ireland Planning Service

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September 2009

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Summary of Recommendations for Microgeneration Permitted Development

Generic permitted development recommendations for all microgeneration permitted development	
Energy production	<ul style="list-style-type: none"> Microgeneration equipment installed under permitted development must be primarily for the purpose of providing heat or electricity within the agricultural unit or building curtilage in which it is erected or, in the case of solar or wind microgeneration only, to provide commensurate energy for a development undertaken by statutory undertakers or others carrying out development permitted under Part 13 of the GDO or carried out by Road Service Northern Ireland
Disused equipment	<ul style="list-style-type: none"> Microgeneration equipment installed under permitted development that will no longer be used for the purpose for which it was installed should be removed as soon as reasonably practicable, and, where appropriate, the land restored to its condition before the development took place

Solar panel permitted development recommendations	
Roof mounted solar panels	<ul style="list-style-type: none"> For pitched roofs panels must not exceed the highest part of the roof and, where facing onto and visible from a road, must not protrude more than 20cm from the roof plane Maximum height of 2m for panels mounted on flat roofs Minimum of 2m from edge of roof for panels mounted on flat roofs Panels must not exceed the boundary of the existing roof No permitted development for panels erected in a Conservation Area, AONB, National Park or World Heritage Site where panels face onto and are visible from the road Not permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted



Solar panel permitted development recommendations

Wall mounted solar panels	<ul style="list-style-type: none">• Panels must not exceed the boundary of the existing wall• Where any part of a solar panel fitted to a wall within 3m of the boundary of the curtilage extends above 4m in height, panel should not extend more than 20cm beyond the plane of the wall• No permitted development for panels mounted on walls that face onto and are visible from a road in a Conservation Area, AONB, National Park or World Heritage Site• No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted
Free standing solar panels	<ul style="list-style-type: none">• Maximum height of 2m• Maximum surface area of 20m² for free standing solar panels erected under permitted development within the curtilage of a building or in an agricultural unit• Minimum of 5m from boundary of building curtilage or agricultural unit• No permitted development for panels erected in an AONB, National Park, World Heritage Site or Conservation Area where panels face onto and are visible from the road• No permitted development in an Area of Special Scientific Interest or Site of Archaeological Interest• No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted



Wind turbine permitted development recommendations

Building mounted wind turbines

No permitted development for any building mounted wind turbine until issues on noise, vibration, health and aircraft safety and other critical communications systems are resolved. If these can be agreed satisfactorily we recommend the following restrictions on permitted development:

- Maximum height to blade tip of 3m above the highest part of the roof
- Maximum blade diameter of 2.5m for horizontal axis wind turbines and maximum swept area of 5m² for vertical axis wind turbines
- Maximum of one turbine with permitted development on a single building
- No permitted development for turbines which extend over a road or publicly accessible open space
- No permitted development in an AONB, National Park, World Heritage Site or Conservation Area where mounted on a principal or side elevation that faces a road
- No permitted development in an Area of Special Scientific Interest
- No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted

Free standing wind turbines

No permitted development for any free standing wind turbine until issues on noise, vibration, health and aircraft safety and other critical communications systems are resolved. If these can be agreed satisfactorily we recommend the following restrictions on permitted development:

- Maximum height to blade tip of 15m
- Maximum blade diameter of 6m for horizontal axis wind turbines and maximum swept area of 28m² for vertical axis wind turbines
- Minimum of 17m from the boundary of building curtilage or agricultural unit and from any road
- Bottom of blade must be a minimum of 5m above ground level
- No permitted development within an AONB or National Park unless the wind turbine is located within 50m of the building or group of buildings which will utilise the electricity being produced by the turbine
- No permitted development in a Conservation Area, World Heritage Site, Area of Special Scientific Interest or Site of Archaeological Interest
- No permitted development within the curtilage of a Listed Building
- Maximum of one turbine with permitted development within the curtilage of a building or in an agricultural unit



Hydro permitted development recommendations

In stream works	<ul style="list-style-type: none"> No permitted development for in-stream works
Turbine house	<ul style="list-style-type: none"> Maximum of 3m in height Maximum floor area of 10m² Development must be located at least 5m from the building curtilage and not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road No permitted development in a Site of Archaeological Interest, Area of Special Scientific Interest, Conservation Area or World Heritage Site. No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted

Biomass, CHP and Anaerobic Digestion permitted development recommendations

Biomass and CHP boiler room	<ul style="list-style-type: none"> Maximum floor area of 10m² for buildings with a floorspace of up to 1000m² Maximum floor area of 75m² for large non-domestic buildings with a floorspace of 1000m² or more Must not exceed 3m in height Development must be located at least 5m from the boundary of the property and not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road Flue must be not exceed 1m in height above the highest part of the roof of the boiler room Maximum of one extension or new building to contain a biomass or CHP boiler within a building curtilage or agricultural unit to be permitted development Fuel should not include products derived from animals or animal wastes other than those biomass and CHP boilers in agricultural holdings, or wood containing dangerous substances No permitted development in a Site of Archaeological Interest or Area of Special Scientific Interest No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted
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Biomass, CHP and Anaerobic Digestion permitted development recommendations

- Biomass and CHP fuel store**
- Maximum floor area of 10m² for buildings with a floorspace of up to 1000m²
 - Maximum floor area of 75m² for large non-domestic buildings with floorspace of 1000m² or more
 - Must not exceed 3m in height
 - Development must be located at least 5m from the boundary of the property and not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road
 - Maximum of one extension or new building to contain a biomass or CHP fuel store within a building curtilage or agricultural unit to be permitted development
 - No permitted development in a Site of Archaeological Interest or Area of Special Scientific Interest
 - No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted

- Anaerobic digestion plant**
- Maximum area 300m²
 - Must be located on agricultural land
 - Must be located within 75m of the nearest part of a group of principal farm buildings
 - Must be located a minimum of 75m from any dwellinghouse (other than the dwellinghouse of any person engaged in agricultural operations on the said unit)
 - Maximum height of 3m for a digester within 3km of the perimeter of an aerodrome, or 12m in any other case
 - No part of the development may be within 24m of the nearest part of any special road, or within 24m of the middle of a trunk or a first or second-class road or 9m from the middle of other classes of road
 - Only material generated from agricultural activities on the unit should be used to feed the digester
 - No permitted development in an Area of Special Scientific Interest or Site of Archaeological Interest
 - No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has been granted



Heat pump permitted development recommendations

Ground source heat pumps

- Maximum excavation area of 0.5ha
- Excavated land should be made good after the heat pump has been installed
- Above ground elements must be a minimum of 5m from the boundary of the building curtilage or any road and should not be nearer to any road which bounds the curtilage than the part of the existing building nearest that road
- Above ground elements must not exceed a maximum floor area of 10m² for buildings with a floorspace of up to 1000m²
- Above ground elements must not exceed a maximum floor area of 75m² for large non-domestic buildings with a floorspace of 1000m² or more
- Above ground elements must not exceed 3m in height
- No permitted development in an Area of Special Scientific Interest or Site of Archaeological Interest
- No permitted development for above ground elements within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted

Water source heat pumps

- Area of pipework must not exceed 0.5ha
- Above ground elements must be a minimum of 5m from the boundary of the building curtilage or any road and should not be nearer to any road which bounds the curtilage than the part of the existing building nearest that road
- Above ground elements must not exceed a maximum floor area of 10m² for buildings with a floorspace of up to 1000m²
- Above ground elements must not exceed a maximum floor area of 75m² for large non-domestic buildings with a floorspace of 1000m² or more
- Above ground elements must not exceed 3m in height
- No permitted development in an Area of Special Scientific Interest or a Site of Archaeological Interest
- No permitted development within the curtilage of a Listed Building for above ground elements unless Listed Building Consent for the development has previously been granted



Heat pump permitted development recommendations

Air source heat pumps

No permitted development for any air source heat pump until issues regarding noise can be resolved. If these can be agreed satisfactorily we recommend the following restrictions on permitted development:

- Maximum combined volume of all air source heat pumps of 30m³ for buildings with a floorspace of up to 1000m² or 75m³ for large non-domestic buildings with a floorspace of 1000m² or more
- Must not exceed the height of the existing building
- Must be a minimum of 5m from the boundary of the building curtilage or any road and should not be nearer to any road which bounds the curtilage than the part of the existing building nearest that road
- No permitted development in a Conservation Area or World Heritage Site where the pump is visible from a road and erected on a wall that faces onto that road
- No permitted development in an Area of Special Scientific Interest or Site of Archaeological Interest
- No permitted development within the curtilage of a Listed Building for any external element of the heat pump unless Listed Building Consent for the development has previously been granted



Summary of Other Recommendations for Microgeneration

In addition to the recommendations Entec have made regarding whether permitted development rights should be allowed for microgeneration equipment in non-domestic situations that are summarised in the previous pages, Entec also have a number of more general recommendations with regard permitted development in Northern Ireland which could be considered for action by the Department of the Environment. These are outlined in the following table.

Other recommendations	
All techs	<ul style="list-style-type: none"> • Ensure manufacturers and installers of microgeneration equipment are consulted on recommendations • Review effects of amendments to permitted development on the number of small scale renewables installations in Northern Ireland • Publish guidance regarding best practice in terms of installation and the potential impacts associated with small scale renewable technologies along with any amendments to permitted development rights
Solar	<ul style="list-style-type: none"> • Conduct an early review of the 20m² recommended surface area limit to free standing solar panels
Wind	<ul style="list-style-type: none"> • Engage with other CLG, WAG and Scottish Government to agree common UK standards regarding wind turbines and noise, vibration, frequency, aircraft safety and communications interference • Conduct an early review of the 15m height and 6m blade diameter limits recommended for free standing wind turbines
Biomass	<ul style="list-style-type: none"> • Conduct further research and consultation regarding the burning of products derived from animal waste (e.g. chicken litter)
Air source heat pumps	<ul style="list-style-type: none"> • Engage with other CLG, WAG and Scottish Government to agree common UK standards regarding air source heat pumps and noise



Recommendations for Inclusion in Guidance

We have included within the report a number of recommendations of the type of information that should be included in guidance that accompanies any amendments to permitted development rights for small scale renewables devices in non-domestic land uses. A summary of these recommendations is included in the following table. Note that these recommendations are not comprehensive but set out some specific recommendations that we believe could be usefully included in guidance.

Recommendations for inclusion in guidance for developers
<ul style="list-style-type: none">• Potential for impacts on ecology, e.g. wind turbines and bats, removal of hedges during bird breeding season, potential damage to tree roots when excavating ground
<ul style="list-style-type: none">• Requirements and procedures regarding development near Listed Buildings
<ul style="list-style-type: none">• Developers must check the local planning regime before commencing work, e.g. to ensure no Article 4 directions or LDOs are in place
<ul style="list-style-type: none">• All development erected under permitted development must be contained completely within the agricultural unit or curtilage of the building
<ul style="list-style-type: none">• Advice on siting devices for maximum effect while minimising adverse impacts
<ul style="list-style-type: none">• Guidance on how the maximum height of a roof is measured
<ul style="list-style-type: none">• Details regarding legal and planning requirements to satisfy aircraft safety concerns, particularly with regard to wind turbines. Include guidance on what bodies should be contacted prior to installation
<ul style="list-style-type: none">• Details of other permissions, licences and other legal requirements that may be needed before development can commence, e.g. abstraction licences, advertising permission, the electrical safety of devices, telecommunications systems, etc
<ul style="list-style-type: none">• Details of statutory requirements regarding emissions from biomass and CHP boilers



Abbreviations used in the Report

Abbreviations	
AONB	Area of Outstanding Natural Beauty
ASHP	air source heat pump
ASSI	Area of Special Scientific Interest
BERR	Department for Business Enterprise and Regulatory Reform (NB the energy functions of BERR are now the responsibility of the Department for Energy and Climate Change)
BWEA	British Wind Energy Association
CHP	combined heat and power
CLG	Department for Communities and Local Government
cm	centimetre
dB	decibel
Defra	Department for Environment, Food and Rural Affairs
DETI	Department of Enterprise, Trade and Investment
the Department	the Department of the Environment
Defra	Department for Food and Rural Affairs
EIA	Environmental Impact Assessment
EU	European Union
GDO	The Planning (General Development) Order (Northern Ireland) 1993
GHG	Greenhouse gases
GPDO	General Permitted Development Order
GSHP	ground source heat pump
IPCC	Intergovernmental Panel on Climate Change
km	kilometre
kW	kilowatt

Abbreviations	
kWh/y	kilowatt hours per year
LNR	Local Nature Reserve
MCS	Microgeneration Certification Scheme
m	metre
MW	Megawatt
MWh	Megawatt hours
NI	Northern Ireland
NNR	National Nature Reserve
PD	permitted development
PPS	Planning Policy Statement
PV	photovoltaic
RDS	Regional Development Strategy
SAC	Special Area of Conservation
SAI	Site of Archaeological Interest
SDS	Sustainable Development Strategy for Northern Ireland
SEF	Strategic Energy Framework for Northern Ireland
SR	Statutory Rule
SME	Small and medium sized enterprises
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
UK	United Kingdom
UKAS	United Kingdom Accreditation Service
VAT	Value added tax
WAG	Welsh Assembly Government
WSHP	water source heat pump



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1. Introduction

1.1 Purpose of the Review

This report has been produced for the purpose of reviewing permitted development rights in Northern Ireland for microgeneration development located in non-domestic land uses with a view to making recommendations to the Northern Ireland Planning Service regarding potential amendments to the *Planning (General Development) Order (Northern Ireland) 1993* such that permitted development can be extended for microgeneration technologies.

Microgeneration is generally regarded as a renewable or low carbon technology with a rated output of between 45-50kW. The energy produced can be in the form of electricity or heat. For this review however we use the term microgeneration for convenience only and have not set a specific upper limit of what can be defined as microgeneration, beyond a general assumption that it refers to equipment that can generate electricity primarily to power the needs of the non-domestic land use on which it is located, i.e. it is not being used for the commercial generation of electricity.

The Planning Service is already undertaking a review of permitted development rights for domestic microgeneration and its recommendations were published for consultation in January 2007¹ with a view to bringing forward new microgeneration permitted development rights for householders. Alongside this work, the Planning Service has commissioned Entec UK Ltd (Entec) to review and identify impact criteria for extending microgeneration permitted development rights to all non-domestic land uses, i.e. for all land uses except residential housing. This report outlines the issues that Entec identified during the review and includes recommendations as to how permitted development rights in Northern Ireland might be revised to facilitate the take-up of these technologies without having a significant impact on people or the environment.

For the purpose of this review, microgeneration technologies are defined for both small scale renewable and low carbon equipment as equipment that can generate electricity to power the needs of the non-domestic land use to which they apply, rather than be used for the commercial generation of electricity. These technologies include solar, wind, biomass and CHP, hydro and heat pumps. Further information on microgeneration is included later in this report.

It should be noted that the recommendations contained in this report relate to what might be considered to be permitted development and does not in any way imply that the installation of small scale renewable and low carbon devices that are outside these limits is not appropriate in many, or perhaps most, cases. Where permitted development rights are not appropriate for a particular development, the developer can apply for planning permission in the normal manner.

¹ Department of the Environment (2007) *Microgeneration permitted development rights: Consultation document*



1.2 Drivers for Increasing the Uptake of Small Scale Renewable and Low Carbon Technologies

1.2.1 Climate Change

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report² states that “warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.” Many would argue that the impacts of climate change are already being felt both environmentally and socio-economically with an intensification of extreme weather events causing drought, flood, habitat loss and crop failure. With regard to Northern Ireland, for example, the Sustainable Development Strategy³ highlights that:

- 9 of the 15 warmest years recorded since 1841 have occurred since 1990;
- in 2005 nine days in December were hotter than in the preceding summer;
- the average sea level is now about 10cms higher than it was in 1900; and
- over 40,000 properties are currently at risk of river flooding.

One way of addressing the impact of climate change is to maximise the use of energy from renewable energy sources that are continuously replenished by nature (e.g. the wind, the sun, moving water, heat extracted from the air, ground and water (geothermal energy), and biomass (wood, biodegradable waste and energy crops)).

1.2.2 Energy Supply

The UK is increasingly becoming a net importer of energy and is particularly dependant on imports of natural gas as our own North Sea reserves decline. Consequently, the UK is in a vulnerable position given the unpredictability of a European gas market dominated by only two countries, Norway and Russia. The fragility of the UK’s position was exposed during the 2005/6 winter with the political dispute between Russia and the Ukraine which had the effect of disrupting gas supplies in Europe. The recent tensions have not eased concerns with Malcolm Wicks, the

² IPCC (2007) *Climate Change 2007 – synthesis report: An assessment of the IPCC*

³ Office of the First Minister and Deputy First Minister (2006) *A sustainable development strategy for Northern Ireland: First steps towards sustainability*



UK Energy Minister⁴ stating that “*the Ukraine issue sent a shiver down the European energy spine and Georgia is a recent episode which will focus a lot of minds.*”

There is now widespread recognition that we need to secure our energy supplies in a world where energy use is increasing and proven fossil fuel reserves are diminishing. Many fossil fuels are also located in unstable regions of the world and as energy resources become scarce this cost of energy and difficulty in obtaining it may increase as a result.

1.2.3 Cost

As a consequence of a wide range of factors such as supply disruptions, energy consumers in the UK have seen unstable and increasing energy prices in recent years. The threat of increased gas prices has been widely publicised with reports suggesting that household gas bills could rise by up to 70%⁵. Indeed, prices have recently risen by 15% over just two days following a leak in a Norwegian gas pipeline which sparked fears over winter supplies⁶. The rising price of energy is especially pertinent in the case of Northern Ireland which, as a result of its peripheral location and lack of indigenous energy sources, is highly dependent on a finite supply of imported fossil fuels which not only increases the cost but raises questions over the security of supply in the future. In fact, energy costs in Northern Ireland are higher than in the rest of the UK and are an issue of real significance for industry and commerce⁷. As can be seen in Figure 1.1, the price of electricity to Small and Medium Enterprises (SMEs) in Northern Ireland has risen sharply since 2004 and is some 12% above Republic of Ireland (ROI) prices and 30% above the GB level.

⁴ Quoted on BBC News <http://news.bbc.co.uk/1/hi/world/europe/7588746.stm> [accessed 01/09/08]

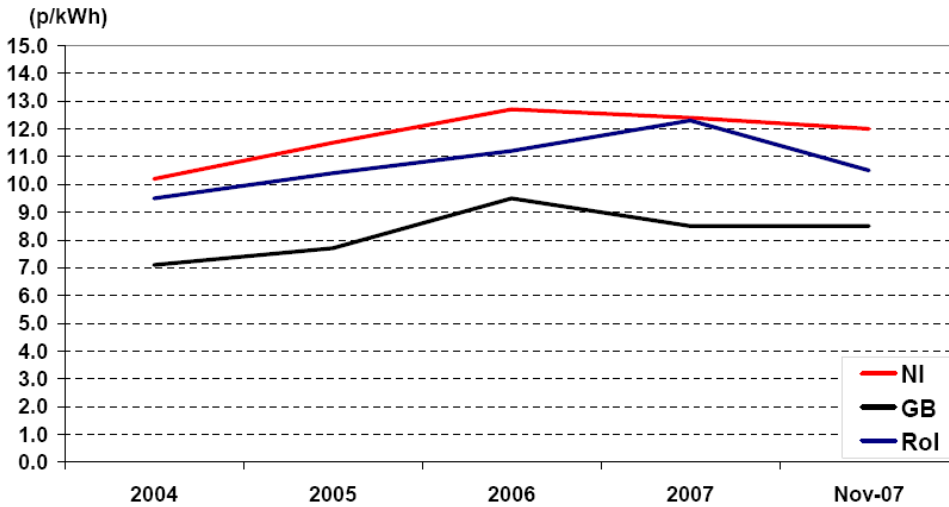
⁵ Reported on Guardian.co.uk <http://www.guardian.co.uk/business/2008/jul/18/gas.pricewarning.centrica> [accessed 28/07/08]

⁶ Reported on BBC News <http://news.bbc.co.uk/1/hi/business/7575197.stm> [accessed 01/09/08]

⁷ Department of Enterprise, Trade and Investment (2004) *Strategic energy framework for Northern Ireland*



Figure 1.1 Prices of SME electricity (excluding VAT)



Source: *Review of the 2004 Strategic Energy Framework for Northern Ireland (2008)* Department of Enterprise, Trade and Investment

Because of these three key drivers - climate change, energy supply and price - most of us in the UK now have some understanding of the costs of using energy, in both economic and environmental terms. One of the ways in which these costs can be reduced is through the use of small scale renewable energy and low carbon technologies in which heat or electricity is produced on site, close to the point of demand. These technologies are seen by many as being able to make a meaningful impact on reducing pollution, reducing our carbon footprint, providing secure and sustainable energy at an acceptable cost and contributing towards Government objectives of making development carbon neutral.

1.3 The General Development Order

Article 3(1) of the *Planning (General Development) (Northern Ireland) Order 1993*⁸ (the GDO) grants planning permission for the classes of development set out in Schedule 1. The classes describe the types of development that can be undertaken in Northern Ireland without requiring a planning application and are popularly known as permitted development rights. Permitted development rights generally relate to minor building operations or land uses where the effects of the development on neighbours or the environment is likely to be small. Permitted development rights therefore serve to reduce the number of planning applications which would otherwise need to be prepared, submitted and processed and thus ease the regulatory burden of the planning system.

⁸ Statutory Rule 1993 No. 278



The permitted development constraints which qualify rights for non-domestic land uses are in many cases based on physical measurement such as the area, volume and height of the structures to be provided, and the distance from other land or buildings. It is likely that many of these thresholds and constraints will be pertinent to microgeneration permitted development. For example Part 6 Class A of Schedule 1 to the GDO (substituted by SR 2005 No. 427 Article 2 and amended by SR 2007/ 432) sets out permitted development rights relating to Agricultural Buildings and Operations and permits, among other things, works for the erection, extension or alteration of a building on agricultural land comprised in an agricultural unit reasonably necessary for the purposes of agriculture within that unit. The building may be up to 12m in height provided that it is not within 3km of the perimeter of an aerodrome, in which case it must not be higher than 3m. No part of any building may be within 24m of a trunk or classified road. The ground area covered by such a building may not exceed 300m².

Part 8 Class A of the GDO describes permitted development for the extension or alteration of an industrial building or warehouse. Several restrictions could be relevant to microgeneration including:

- the height of the building as extended or altered should not exceed the height of the original building;
- the cubic content of the original building must not be exceeded by more than 20%;
- the floorspace of the original building should not be exceeded by more than 750 square metres;
- any part of the development must not be within 5 metres of any boundary of the curtilage of the premises;
- development must not be carried out within any boundary of the curtilage of the premises which adjoins the curtilage of any dwellinghouse or flat;
- development is not permitted in a Conservation Area, an Area of Outstanding Natural Beauty (AONB) or a National Park.

Part 8 Class B describes permitted development carried out on industrial land for the purposes of an industrial process, consisting of, among other things, the installation of additional or replacement plant or machinery or structures or erections of the nature of plant or machinery, and states that development will not be permitted if it exceeds 15m in height.

Permitted development rights are also given for a variety of other classes of land use or development undertaker, including forestry buildings and operations, district councils, for statutory and other undertakers and telecommunications development. These serve to provide some indication of the relative extent of microgeneration development that could be allowed under permitted development rights.

Permitted development rights set out in the GDO are sometimes different in certain types of area that are considered to be particularly sensitive to some forms of development, in particular National Parks, Areas of Outstanding Natural Beauty (AONBs), Conservation Areas and Areas of Special Scientific Interest (ASSI). The



GDO provides that permitted development rights can be restricted by using what is termed as Article 4 Directions to remove some or all permitted development rights from an area where there is a particular need to do so. For example, permitted development rights enabling householders to erect a satellite dish on a dwelling in a Conservation Area could be removed to preserve the character of the area.

Permitted development rights can also be different from that set out in the GDO in specific areas where land is the subject of a Special Development Order. On such land, whether the Special Development Order was made before or after the commencement of the GDO, the GDO applies ‘*only to such extent and subject to such modifications as may be specified in the special development order.*’⁹ The Department also has the power to extend permitted development rights in a locality through Development Orders or by creating a Simplified Planning Zone which grants a specified planning permission in the zone without the need for a formal application or the payment of planning fees.

The existing permitted development rights provided for in the GDO were not however designed to facilitate microgeneration development¹⁰ and as it stands do not explicitly grant permitted development rights for the development of non-domestic small scale renewable and low carbon technologies. However, it is possible to undertake some microgeneration development under the existing GDO and, in the domestic context; the Planning Service has published an information leaflet¹¹ detailing renewable energy development permitted development. The introduction of specific permitted development rights for microgeneration technology development will help to clarify and strengthen the Department’s existing legislative provision thus facilitating the potential for take-up of small scale renewable and low carbon technologies.

1.4 Other Reviews of Permitted Development Rights for Microgeneration in the UK and Republic of Ireland

As noted previously, the Planning Service is currently reviewing permitted development rights for householder microgeneration. A consultation document was published in January 2007 which included permitted development recommendations for solar, biomass, heat pump and wind technologies. Following the receipt of consultation responses, the Planning Service is currently reviewing the recommendations for permitted development for domestic microgeneration set out in its consultation paper. Where known Entec have included within each of the relevant sections in this report information relating to that consultation exercise, however it should be noted that final decisions on appropriate domestic permitted development rights for each technology are still to be made.

⁹ Article 1(2)

¹⁰ Department of the Environment (2007) *Microgeneration permitted development rights: Consultation document*

¹¹ Department of the Environment (2006) *Information leaflet #12: Renewable energy development within the curtilage of a dwelling house – permitted development rights*



Elsewhere in the UK, the Scottish Executive published a consultation on domestic microgeneration in March 2008¹² as part of a wider review of permitted development rights. In England, the Government's Planning White Paper '*Planning for a Sustainable Future*' published in May 2007, set out detailed proposals to reform the planning system in England. These proposals included permitting a range of types of householder microgeneration without the need to apply for planning permission and to review, and where possible extend, permitted development rights of microgeneration to non-residential land uses. Permitted development rights for householders were subsequently amended¹³ in April 2008 to make provision for the installation of solar panels, ground and water source heat pumps and biomass boilers. The Department for Communities and Local Government (CLG), together with the Welsh Assembly Government (WAG) also commissioned a review of permitted development rights for small-scale renewable and low carbon devices in non-domestic land uses which was prepared by Entec¹⁴.

In the Republic of Ireland, the Department of the Environment, Heritage and Local Government have already extended their equivalent of permitted development rights for domestic¹⁵ microgeneration and recently made provisions for the installation of small scale renewable and local carbon technologies on non-domestic land within the *Planning and Development Regulation 2008* (S.I. No. 235 of 2008). These Regulations grant permitted development rights, subject to conditions, for, among other things, wind turbines, meteorological masts, CHP plants, solar panels and biomass units on industrial buildings, business premises and agricultural holdings.

The reviews highlighted above have sought to determine the consequences of allowing the installation of microgeneration technologies such as visual impacts, noise, environmental effects, nuisance, health and safety. In doing so they have considered potential limits to permitted development in order negate such effects. They have also made various recommendations for protecting Designated Areas such as AONBs, National Parks, Conservation Areas and World Heritage Sites.

The status of these reviews in the UK and the Republic of Ireland is summarised in Table 1.1.

¹² Scottish Government (2008) *Permitted development rights for domestic microgeneration equipment: Consultation paper*

¹³ by The Town and Country Planning (General Permitted Development) (Amendment) (England) Order 2008

¹⁴ CLG and WAG (2008) *Small scale renewables and low carbon technology non-domestic permitted development review*

¹⁵ Department of the Environment, Heritage and Local Government (2007) *Planning and Development Regulations 2007* (S.I. No. 83 of 2007)



Table 1.1 Status of permitted development reviews in UK and Republic of Ireland in August 2008

Stage	Domestic			Non-domestic		
	Review complete	Consulted	Permitted development rights amended	Review complete	Consulted	Permitted development rights amended
Northern Ireland	✓	✓		✓		
Republic of Ireland	✓	✓	✓	✓	✓	✓
Scotland	✓	✓				
England	✓	✓	✓	✓		
Wales	✓	✓		✓		

1.5 Structure of this Report

The remainder of report is set out as follows:

- Section 2: Background to the review
- Section 3: Methodology
- Section 4: An introduction to microrenewables
- Section 5: General limits to permitted development
- Section 6: Solar
- Section 7: Wind
- Section 8: Hydro
- Section 9: Biomass (including anaerobic digestion) and combined heat and power
- Section 10 Heat pumps



2. Introduction to Microgeneration

2.1 Background

The following technologies have been included in this review of permitted development rights (an overview of these technologies is provided in the relevant chapters of this report):

- solar;
- wind;
- hydro;
- heat pumps;
- biomass including anaerobic digestion; and
- combined heat and power.

In general these technologies can be split into two main categories: those that generate electricity or heat from a renewable energy resource (such as wind, solar, hydro, heat pumps and biomass) and those that enhance the efficiency of energy generation and can generate close to the consumer (CHP). The technologies can be used to produce one, or both, of the two main forms of energy that we use - heat and electricity.

The range of heat uses in the non-domestic sector is vast. Heat is used, for example, to provide hot water and comfort for people and for farming and industrial processes. In some cases heat provision is very similar to the domestic sector where boilers produce hot water that is then fed to radiators. Certain industrial processes require so much heat (e.g. furnaces) that they have their own dedicated heating plants. Nevertheless, even these factories look very carefully at their heat demands to find the most efficient way to meet them, for example using combined heat and power units.

Electricity is used in the non-domestic sector to provide power and an even wider range of uses including lighting, computers, pumps, air conditioning and motors. Small users, such as care homes, use electricity in much the same way as we do in our homes. At the other extreme some businesses have dedicated power plants, for example aluminium smelting works are very often sited next to hydropower plants. The demand from non-domestic users for electricity greatly depends on the type of user. Businesses are seeking ways to reduce their energy bills, many have climate change commitments requiring them to investigate generating their own renewable power, and many want to use renewable energy to enhance their image.

In numerical terms, the energy demands at the lower end of non-domestic land uses, for example, a small corner shop would have a total energy demand similar to that of the rest of the houses in the street of around



22,000kWh/y¹⁶. At the other end of the scale some industrial processes, such as aluminium smelters are energy intensive, and can require their own power plants to produce the energy required. One such smelter in Fort William, Scotland for example uses its own hydro-electric scheme with a nominal capacity of 85MW¹⁷ and consumes hundreds of millions of kilowatt hours of electricity each year. To give some sense of the scale of this energy requirement a wind turbine erected in 2005 at Antrim Area Hospital produces around 1,200,000kWh/y and is 40m high to its hub¹⁸.

Most non-domestic uses will consume more energy than a domestic household and to make a meaningful contribution to their total energy requirements they will generally wish to install larger more powerful systems. As systems get larger they require more investment to plan and build and, as a result, the proportionate burden of planning permission in terms of cost and time becomes less and the likelihood of the impacts of the structures being small enough to have minimal impacts on neighbours and the environment decreases. In other words, as the systems become larger to provide meaningful amounts of energy to more energy intensive non-domestic land uses the less likely the development is to be suitable for permitted development and the less it matters in economic terms.

2.2 Differences Between Domestic and Non-domestic Renewable Energy Systems

There are many similarities between domestic and non-domestic renewable energy systems and in previous research undertaken by Entec and research undertaken for this review we have found that issues relating to the granting of permitted development are generally alike. However, the weight attributed to the impacts of each issue may differ in non-domestic settings. For example, noise from systems is still an important issue but domestic receptors generally require a much lower noise threshold than many (but not all) non-domestic receptors. There are some significant differences in the range of different non-domestic uses and in the scales of these sites too. Table 2.1 presents an analysis of the issues associated with granting permitted development rights for microgeneration in the domestic sector with those for the non-domestic sector.

¹⁶ BERR UK Energy in Brief 2007 and Census, Labour Force Survey, Office for National Statistics 2003

¹⁷ <http://www.visit-fortwilliam.co.uk/alcan/index.htm> [accessed 02/09/2008]

¹⁸ <http://howtosaveenergy.blogspot.com/2008/03/hospital-wind-turbine-makes-profit.html> [accessed 02/09/2008]



Table 2.1 Main differences between non-domestic and domestic renewable energy systems issues

Issue	Domestic	Non-domestic
Size and scale	Domestic dwellings are of broadly similar sizes and so physical permitted size limits on energy systems are likely to be widely applicable.	The scale of non-domestic applications varies widely from residential care homes to major industrial complexes. The acceptability of different installation scales might vary considerably between non-domestic sites.
Planning permission cost	The cost of planning permission is significant to many people. The small size of domestic systems may also mean that planning permission costs are a more significant proportion of the costs.	Many businesses will be more tolerant of planning permission costs. Where businesses seek larger generation systems they will also be able to more readily absorb the costs of applying for planning permission.
Electricity demand	Domestic energy generation is likely to be installed to meet a significant proportion of the domestic demand. Domestic users consume broadly similar amounts of energy and thus there is a limited range of technology scales appropriate to the meeting domestic requirements.	Non-domestic energy demand varies widely from small (~domestic-scale) to significant (e.g. major industrial demands) which can be thousands of times larger. On-site generation for industrial users will often need to make a significant contribution to meeting business needs and in many cases this will mean significantly higher power systems than for the domestic sector. Small-scale systems might be of less interest unless they are used as a visible token of sustainable credentials.
Noise	A very high proportion of domestic energy generators will be sited close to other dwellings where neighbours may be affected by raised noise levels. This can affect both their amenity and potentially affect their ability to sleep.	Non-domestic sites are often much less sensitive to noise. Many industrial processes are already noisy. Many industrial users will also be sited well away from domestic receptors. Additional low-level noise from small-scale generation may not be perceptible above other industrial noises.
Landscape and visual	Dwellings present a character setting that may be considered more 'sensitive' to 'industrial' looking energy developments.	The character of non-domestic areas might be much more aligned with the character of energy generation equipment and thus larger visual effect may be tolerated.
Technology choice	Different domestic energy users are likely to require a similar mix of electricity and heat demand and thus require a similar mix (or type) of technology.	Non-domestic energy users will have widely varying demands for heat and power. Some process industries will require significant quantities of heat, while others may require only electricity. The mix of technologies will vary widely.
Familiarity with the planning process	The general public is likely to be much less familiar with formal processes such as planning permission. The costs of planning permission are significant to many people.	The private sector is familiar with a variety of contractual arrangements, formal processes, etc. and is thus less likely to be deterred by the need to obtain planning permission. If permitted development rights are to be used to <i>increase</i> take-up in this sector then its main influence may potentially be on simplifying the permitting of the larger developments that are more attractive to businesses.



2.3 UKAS Accredited Microgeneration Certification Scheme

A third party certification scheme for microgeneration products, called the Microgeneration Certification Scheme (MCS)¹⁹ has been developed by industry groups with the support of the Department for Business Enterprise and Regulatory Reform (BERR) to provide a third party certification scheme for microgeneration products and installers in the UK. The scheme, which is currently administered by the Building Research Establishment, is being developed to build consumer confidence by ensuring quality and reliability. It also underpins the BERR grant scheme for the installation of microgeneration technologies, the Low Carbon Buildings Programme²⁰. Only those products and installers certified under MCS will be eligible for grants. Linking certification to the Low Carbon Buildings Programme grant scheme makes it likely that certification will be widely used by manufacturers and installers to ensure customers can obtain grant support to buy their products and services. Although there will be a cost to manufacturer and installers to join the scheme this could be balanced out by an increase in business.

The MCS evaluates products and installers against criteria for microgeneration technologies (including micro wind, heat pumps, solar thermal, PV, biomass, micro hydro, micro combined heat and power and fuel cells) based on type testing and assessment of policies and practices at the manufacturing facilities, installation contractor's office and at installation sites. The standards set out in the scheme can be modified over time to allow the incorporation of new developments and improvements in technology. For example, although it currently only covers devices that are classified as microgeneration devices (i.e. devices up to a rating of 50kW for electricity and 45kW heat) it could be expanded to include larger installations which may be appropriate in some non-domestic situations.

The MCS offers a number of opportunities to allow permitted development for small scale renewable and low carbon technologies if permitted development rights can be framed in such a way that the standards utilised in the certification scheme can be used to evaluate whether a product (or installer) conforms to that standard. For example a wind turbine can be tested to noise and vibration standards such that, providing the device is competently installed and maintained, the noise levels at a particular distance in particular circumstances can be judged. It would then be possible to set a maximum noise limit for a device that would be eligible for permitted development rights, e.g. to minimise noise impacts on residential dwellings. For installers to be eligible for certification it may be possible to require certain standards and procedures to be gone through (and documented) in order for installers to receive and keep their certification. This could usefully cover such topics as checking for potential ecological and archaeological impacts, siting devices to cause minimal disruptions to television signals and ensuring the device was installed in a safe manner.

There are some potential problems with this approach however, including whether the requirement to be certified by a particular scheme is anti-competitive. We therefore recommend that that the phrase 'UKAS²¹ accredited

¹⁹ See www.ukmicrogeneration.org

²⁰ <http://www.lowcarbonbuildings.org.uk/home/>

²¹ The United Kingdom Accreditation Service, see <http://www.ukas.com/> for details



microgeneration²² certification scheme' is used in the GDO, given that the UK Government is to allow other organisations to register as certification bodies alongside appointing a new overall administrator for the scheme²³.

Other potential drawbacks of certification include whether the additional conditions required to allow permitted development rights would make the scheme too complex, that the scheme as it stands may not cover equipment at the more powerful end of the small scale devices that would be eligible for permitted development, the time it may take to incorporate the permitted development rights recommendations within a certification scheme and the time it would take for products and installers to gain certification. We have therefore given recommendations for permitted development rights that, wherever possible, have avoided using the requirement for an installer and product to be certified. This is not because we consider it is undesirable, on the contrary, we believe that a convincing argument could be made to require all products and installers to be certified before being eligible for permitted development rights. However, more small-scale renewable and low carbon devices are needed as soon as possible and therefore we believe that it is necessary to set out recommendations for permitted development rights now. Many of the recommendations we have made for permitted development rights can be incorporated within accredited microgeneration schemes at a later date and we suggest that the Planning Service review our recommendations in light of certification standards both as they exist now and as they are developed in the future. We have also recommended that there is a need for UK-wide agreement on specific issues such as noise and aviation safety in relation to technologies such as wind turbines and ASHPs prior to allowing the installation of such equipment under permitted development rights. Once agreed, such requirements could be incorporated within, and implemented via, a UKAS accredited microgeneration certification scheme. These issues are discussed in more detail within the relevant technology sections of this report.

²² If the certified devices are more than 45kW and 50kW they will no longer strictly be classified as microgeneration, however for convenience and to avoid confusion we have however continued to refer to the schemes as being “microgeneration certification schemes”.

²³ See <http://www.energyefficiencynews.com/power-generation/i/840/> (accessed 10/09/08)



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3. Policy Background

3.1 Context

3.1.1 Europe

European Directive 2001/77/EC promotes an increase in the contribution of renewable energy sources to electricity production in the internal electricity market. Article 6, which relates to administrative procedures, requires Member States to evaluate existing legislative and regulatory frameworks for the production of electricity from renewable energy sources, with a view to:

- reducing the regulatory and non-regulatory barriers to the increase in electricity production from renewable energy sources;
- streamlining and expediting procedures at the appropriate administrative level; and
- ensuring that the rules are objective, transparent and non-discriminatory, and take fully into account the particularities of the various renewable energy source technologies.

The EC Directive is a key driver for this review as extending permitted development rights for microgeneration development is one mechanism to reduce the regulatory burden of the planning system.

In January 2008 the European Commission proposed a draft Directive²⁴ to implement a target of meeting 20% of total energy consumption from renewable sources by the year 2020. In December 2008 the European Parliament voted in favour of a climate and energy package in line with the proposals in the draft Directive and agreed on legally binding targets by 2020 to cut greenhouse gas emissions by 20%, to establish a 20% share for renewable energy, and to improve energy efficiency by 20%.²⁵

3.1.2 Strategic Energy Framework for Northern Ireland

The *Strategic Energy Framework for Northern Ireland* (SEF) was published in June 2004 by the Department of Enterprise, Trade and Investment (DETI) in response to the 2003 UK Energy White Paper '*Our energy future - creating a low carbon economy*'. The SEF sets out four main goals for government policies:

²⁴ Directive 2008/0016 (COD)

²⁵ See http://ec.europa.eu/environment/news/brief/2008_12/newsletter_12_2008.pdf (accessed 7/1/2009)



- to reduce energy costs relative to other UK/EU regions;
- to build competitive energy markets;
- to protect our future by enhancing the sustainability of our energy supply and consumption; and
- to maintain the reliability of energy supplies.

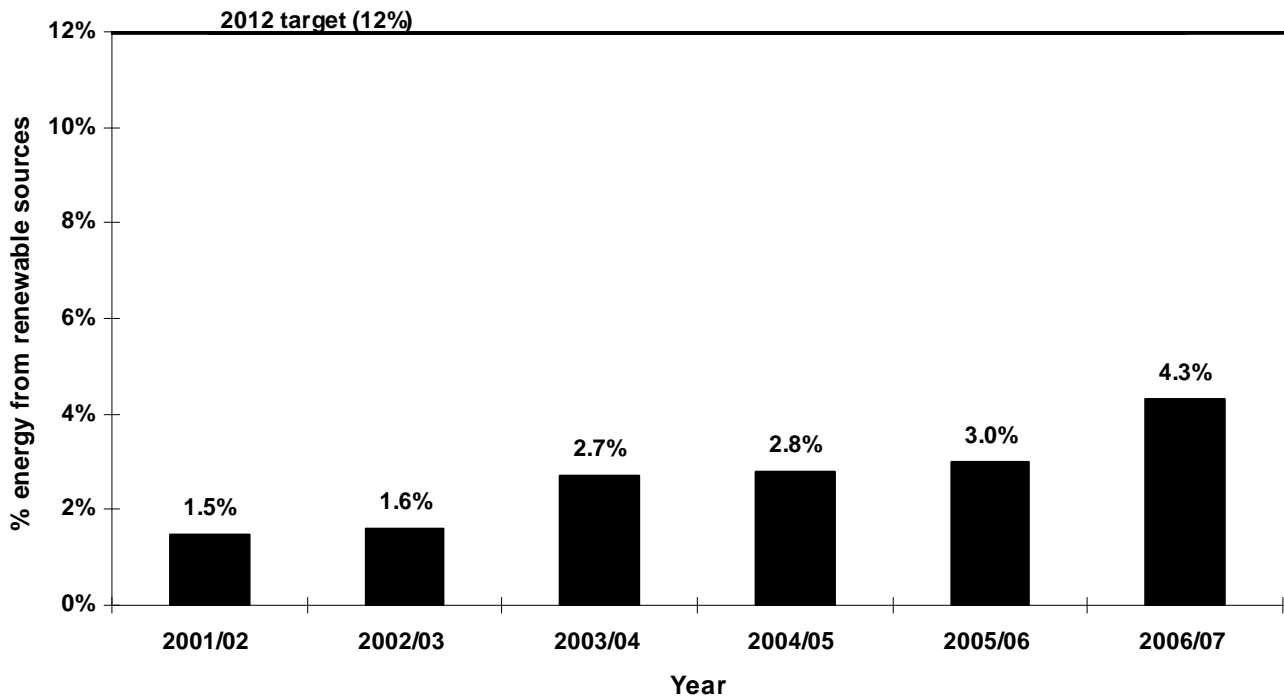
The SEF requires that, by 2012, at least 12% of all electricity consumed in Northern Ireland should be obtained from indigenous renewable energy sources such as wind, solar and biomass (including at least 15% generated from non-wind technologies). In response, and as part of wider reforms to the planning system, the Department of the Environment's (the Department) Planning Service is considering land use planning measures to encourage the uptake of microgeneration technologies including simplifying the planning regime for microgeneration related development through amendments to permitted development rights, which allow certain development to proceed without the need to apply for planning permission.

The recent review of the SEF²⁶ suggests that progress is being made towards meeting this objective with an increase of 2.8% in the proportion of electricity generated from renewable sources between 2001/02 and 2006/07 (see Figure 3.1). However, these figures also suggest that there is still much progress to be made if the target of 12% by 2012 is to be met.

²⁶ DETI (2008) *Review of the 2004 Strategic Energy Framework for Northern Ireland* (available at <http://www.detini.gov.uk/cgi-bin/downutildoc?id=2221> , accessed 10/09/2008)



Figure 3.1 Electricity generated from renewable sources in Northern Ireland



Source: DETI (2008) *Review of the 2004 Strategic Energy Framework for Northern Ireland*

3.1.3 Regional Development Strategy

*Shaping our future: adjustments to the Regional Development Strategy (RDS) - 2025*²⁷ published by the Department for Regional Development in 2008, sets out socio-economic and environmental guidance for Northern Ireland up to 2025 and informs policies contained within development plans. The RDS contains a clear objective to reduce the impact of global warming and to take actions to reduce emissions of greenhouse gases (ENV 5.3), including the ‘*exploitation of renewable resources of energy and alternative energy technology for power generation.*’

²⁷ Available at <http://www.drdni.gov.uk/shapingourfuture/>, accessed 10/09/2008



3.1.4 Sustainable Development Strategy for Northern Ireland

The *Sustainable Development Strategy for Northern Ireland: first steps towards sustainability*²⁸ (SDS) recognises that there is significant potential within Northern Ireland to increase the proportion of Northern Ireland's energy requirement met from indigenous renewable energy sources. It highlights that, whilst Northern Ireland's wind energy resource is regarded as being the strongest regime in Europe, other sources including solar, biomass and geothermal can help meet energy requirements. Two strategic objectives are contained within the SDS namely; to reduce greenhouse gas (GHG) emissions, principally by promoting energy efficiency and the use of renewables; and to establish Northern Ireland as a world class exemplar in the development and use of renewable energy. Under these objectives, the SDS sets out targets to reduce GHG emissions by 25% below 1990 levels by 2025 and to ensure that, beyond 2025, 40% of all electricity consumed in Northern Ireland is obtained from indigenous renewable energy sources.

3.2 Draft Planning Policy Statement 18: Renewable Energy (Draft PPS18)

Draft PPS18²⁹ sets out the Department's planning policy in relation to renewable energy development. It aims to encourage the uptake of renewable energy technologies where appropriate and is underpinned by, among other things, the following objectives:

- to contribute to the regional target of 12% of electricity generation by 2012, and 40% by 2025 from renewable energy sources;
- to assist the diversification of energy supply and a more competitive energy market;
- encourage economic growth and rural diversification associated with the development of an indigenous renewable energy industry;
- to ensure that the environmental, landscape, visual and amenity impacts associated with renewable energy development are adequately addressed;
- to ensure appropriate protection of the Region's built, natural and cultural heritage features;
- to promote knowledge of and greater acceptance by the public of prospective renewable energy developments that are appropriately located;

²⁸ Office of the First Minister and Deputy First Minister (2006), available at <http://www.ofmdfmi.gov.uk/index/economic-policy/economic-policy-sustainable-development.htm> accessed 10/09/2008

²⁹ Department of the Environment (2007) *Draft Planning Policy Statement 18: Renewable energy – consultation paper*



- to foster greater community involvement in renewable energy projects and encourage use of community benefits; and
- promote greater application of the principles of Passive Solar Design in the design, siting and layout of new development.

The policies contained within draft PPS18 outline the main planning considerations to be taken into account in the assessment of proposals for renewable energy development. Policy RE1 states that renewable energy development will be permitted providing that it would not have detrimental effect on:

- public safety, human health or residential amenity;
- visual amenity and landscape character;
- biodiversity, nature conservation or built heritage interests;
- local natural resources, including air and water quality; and
- public access to the countryside.

Policy RE1 Renewable Energy Development is intended as a generic development control tool for all renewable energy technologies. As part of its overall efforts to promote renewable energy and carbon efficiency, the Government wishes to facilitate and encourage greater integration of renewable energy technologies, both in the design of new buildings and through the appropriate retrofitting of such technologies to existing buildings. As such, the second policy, Policy RE2 relates to integrated renewable energy and the 'complementary technology' of passive solar design. For development that will not be exempted through permitted development, the provision of Policy RE2 aims to be promotive of such retrofitting where it will meet the provisions of Policy RE1.

Although this relates to the assessment of planning application proposals submitted for the installation of renewable technologies, these key planning issues provide a useful basis for determining the potential limits that could be placed on non-domestic microgeneration permitted development rights.

Draft Supplementary Planning Guidance (SPG) '*Wind energy development in Northern Ireland's landscapes*' has been produced to accompany draft PPS18. The SPG is based on the publication, '*Landscape Character Assessment 2000*' and sets out how all wind turbine development is to be assessed in the 130 different Landscape Character Areas already defined in this publication, specifically for their sensitivity to wind turbine development.

The draft SPG looks at the landscape sensitivity, landscape value and landscape capacity. These terms are defined in the draft SPG as follows:

- Landscape sensitivity: the extent to which the inherent character and visual amenity of a landscape are vulnerable to change due to wind energy development



- Landscape value: the intrinsic value attached to a landscape, often reflected in designation or recognition
- Landscape capacity: the extent to which a landscape can accommodate wind energy development without significant adverse impacts on its (or on transboundary) landscape character, visual amenity or landscape value

In some instances, the guidance suggests that some landscapes may be too sensitive to change to permit even the smallest of turbine installations.

When adopted by the Department, the draft Supplementary Planning Guidance is aimed at domestic, community and wind energy developers and their planning and landscape consultants. It is intended to assist developers in identifying sites for wind energy development and in defining the types of wind energy development that may be suitable in solely landscape and visual terms. It will also be used by the Department in their determination of planning applications for wind energy development, and is intended to inform judgments on the impacts and acceptability of proposed developments in landscape and visual terms.

3.3 Sensitive Areas³⁰

3.3.1 Introduction

Under the existing GDO in Northern Ireland, permitted development rights can be limited or prohibited in certain areas and sites which may be sensitive to such development. For example, permitted development for microwave antenna in 'Designated Areas' (defined³¹ as Conservation Areas, Areas of Outstanding Natural Beauty (AONBs) and Areas of Special Scientific Interest (ASSIs) and National Parks) is not allowed under Part 1 Class G.1(d) and Part 18 Class A.1(h) and Class B.1(f) of the GDO. The GDO generally limits permitted development in sensitive areas in a targeted manner and there is no consistent limitation on permitted development rights across all types of sensitive area.

The review of householder microgeneration permitted development in Northern Ireland limited permitted development rights for some technologies in all Designated Areas and did not differentiate between the different types of area. Although this does simplify the GDO in relation to domestic microgeneration we believe that, in relation to non-householder microgeneration, an initial examination of each technology against each different type of sensitive area is necessary to ascertain the potential effects on the reasons for designation. For example, there may be inherent differences between the effects of a microgeneration device in large scale protected areas such as

³⁰ Note that reference to sensitive areas in this report is not limited to those types of area defined as sensitive areas in SI 1999 No. 73 The Planning (Environmental Impact Assessment) Regulations (Northern Ireland)

³¹ As defined under Article 2(1) of the GDO and amended by SR 2006 No.348



National Parks and AONBs compared to more localised sites such as Conservation Areas and ASSIs. This is examined within the technology sections of this report.

The remainder of this section outlines the various types of sensitive area found in Northern Ireland which will be examined in this report.

Where permitted development is allowed in any sensitive area we recommend that developers are encouraged to contact the relevant authorities for advice regarding installation of small-scale renewable energy equipment to help ensure that development is carried out sympathetically and to ascertain whether other permission, consents or licences are needed before development can take place.

3.3.2 Conservation Areas

A Conservation Area is an area designated for its special architectural or historic interest in order to preserve or enhance its character and appearance. There are 59 Conservation Areas in Northern Ireland ranging in scale from city and town centres to villages and relatively small residential parks and streets.

3.3.3 Areas of Outstanding Natural Beauty

An AONB is an area which the Department of the Environment (the Department) considers to be of outstanding natural beauty. The designation is designed to protect and enhance the natural beauty, amenities, wildlife and historic assets of the area and to promote and provide for public access and enjoyment. There are 9 AONBs in Northern Ireland, including the Causeway Coast, Ring of Gullion and Antrim Coast and Glens and they tend to cover large areas (at the landscape scale) when compared to other sensitive areas.

The Planning Service has commented that within some AONBs there are special countryside policy areas where specific policies are in place to protect the unique character of the area. In addition a number of AONBs have a design guide which sets out specific design principles and focuses on local styles and layouts. Relaxation of permitted development rights in such areas may compromise the objectives of these policies and documents. In light of this the Planning Service considers that some constraints on permitted development rights for microgeneration in AONBs (and National Parks, see below) are appropriate.

It should be noted that to enable industry to meet the Region's renewable energy targets, draft PPS 18 does not preclude wind turbine development in AONBs. Instead, all wind turbine development is to be assessed against the draft Supplementary Planning Guidance to draft PPS18 referred to in the previous section.

3.3.4 Areas of Special Scientific Interest (ASSI)

An Area of Special Scientific Interest (ASSI) is an area of land protected due to its nature conservation or geological value. ASSIs are the major statutory mechanism for protecting sites of nature conservation importance



and generally provide the underpinning protection measure for the designation of European protected nature conservation sites (see below).

3.3.5 National Parks

There are currently no National Parks designated in Northern Ireland, however the Department has the ability to declare one should it choose to do so in the future. A National Park is an extensive area of countryside where the Department considers it desirable that measures be taken for the purposes of (a) conserving or enhancing the natural beauty or amenities of that area; (b) conserving wildlife, historic objects or natural phenomena therein; (c) promoting the enjoyment by the public of the area; and (d) providing or maintaining public access to the area.

3.3.6 European and International Protected Nature Conservation Sites

Special Areas of Conservation (SAC) and Special Protection Areas (SPA) are sites of European importance for nature conservation. Regulation 55 of the Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 has the effect of proscribing the commencement of development granted by the GDO which is likely to significantly affect a European site or European offshore marine site either alone or in combination with other plans or projects unless the Department has given its approval for such commencement provided that is not directly connected with or necessary to the management of the site. Although the Habitats Regulations apply only to classified SPAs, and SACs, as a matter of policy, the Government wishes development proposals affecting all possible European sites to be considered in the same way, i.e. as if they had already been designated, therefore the proscription to commencing development granted by the GDO also applies to those sites currently being considered for SPA and SAC status. The Government has chosen to apply the same considerations to sites listed under the Ramsar Convention³²). Thus the Regulations (in particular regulations 55 and 56) ensure that any permission granted under the GDO is not in breach of the terms of the Habitats Directive. The Regulations have the effect of preventing any development which is likely to have a significant effect on a European site in Northern Ireland or a European offshore marine site from benefiting from permitted development rights, unless the Department has determined that the development will not adversely affect the integrity of the site³³. Where a development is proposed using permitted development rights in or near a European site or European offshore marine site, the developer is advised to check whether this is likely to have a significant effect on that site. If developers are uncertain about the effect their proposal may have on a European site, they are advised to apply to the Department's Northern Ireland Environment Agency for an assessment. In light of the foregoing the GDO does not

³² The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources (see www.ramsar.org). Ramsar sites are wetlands of international importance designated under the Ramsar Convention.

³³ Department of the Environment (1997) *Planning Policy Statement 2: Planning and nature conservation*



need to withdraw permitted development rights where the Habitats Regulations provide the appropriate level of protection.

3.3.7 Sites of Archaeological Interest

Sites of Archaeological Interest (SAIs) are sites which have been scheduled for protection under the Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995 or a site that is on the Department's Sites and Monuments Record for its archaeological value. We recognise that some development, for example ground source heat pumps or underground biomass development (e.g. a fuel store), could have an adverse impact on SAIs given the excavation of land that they require. We have therefore made recommendations in this review that permitted development rights be removed in SAIs for these technologies.

3.3.8 World Heritage Sites

World Heritage Sites are designated under the World Heritage Convention 1975 (ratified by the UK in 1984) which seeks to protect cultural and natural heritage. The Giant's Causeway and Causeway Coast site is the only World Heritage Site in Northern Ireland and was inscribed as a World Heritage Site by UNESCO in 1986. The site is of outstanding universal value and meets two of the criteria set out in the World Heritage Convention³⁴, namely it:

- is an outstanding example representing major stages of the earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;
- contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.

Although, in general, we feel it unlikely that microgeneration permitted development rights will be utilised such that the special qualities of the existing site will be adversely impacted, the Planning Service are considering constraining permitted development rights in World Heritage Sites generally. As such the need for restricting permitted development rights for non-domestic microgeneration will be considered in this report, although it should be noted that there are currently no case studies in such sites to use as evidence.

3.3.9 Listed Buildings

Listed Buildings are those placed on the statutory lists of buildings of 'special architectural or historic interest' in accordance with the Article 42 of the Planning (Northern Ireland) Order 1991. Listed Building Consent protects Listed Buildings from unauthorised works but it is not always required within the building curtilage and is not

³⁴ From <http://www.ni-environment.gov.uk/landscape/designated-areas-2/whs.htm>, accessed 10/09/2008



required outside the curtilage. There is therefore a risk that uncontrolled permitted development could adversely impact the setting of Listed Buildings.

In some cases the existing GDO limits permitted development rights within the curtilage of a Listed Building. The domestic microgeneration consultation paper included recommendations that the development of some renewable technologies, for example free standing solar panels, should not be permitted within the curtilage of a Listed Building. This approach has also been taken in this review where we feel that Listed Building Consent may not offer enough protection to the Listed Building.

We also believe that it is appropriate for developers to contact relevant authorities for advice regarding installation in or near the curtilage of a Listed Building where a device has permitted development rights to ensure that development is carried out with sensitivity and to ascertain whether other regulations apply or other consents or licenses are needed before works should begin. Guidance should also stress that development near a Listed Building should be conducted in such a way so that it will not adversely affect the setting of the building.

3.3.10 Other Sites and Designations

National Nature Reserves (NNRs) and Local Nature Reserves (LNRs) are reserves protected and managed for nature conservation and people, generally by local authorities or the statutory nature conservation agency (i.e. in Northern Ireland, the Department). As such it is unlikely that microgeneration equipment will be installed unless it is felt that there would be no damage to the reserve. We also note that there are no current restrictions in the GDO regarding NNRs or LNRs. We have therefore not included any recommendations for removing permitted development for microgeneration on these types of site.

As well as the potential for permitted development for microgeneration to impact on statutorily protected nature conservation sites we also recognise the potential for impacts on protected species. For example, some stakeholders have raised the potential for disturbance of bats during the installation of wind turbines or solar panels on a roof. A further issue related to wildlife and nature conservation is that where excavation is required, for example when installing a ground source heat pumps tree roots could be damaged (which could also have health and safety implications) and for wind turbines to achieve their potential it may be necessary to remove or prune trees nearby. All of these issues, although important, are not appropriate within the GDO as all are subject to separate legislation. We would strongly recommend that, where it does not already exist, guidance makes reference to these issues and regulations, stressing that even with permitted development rights it may not be possible (or legal) to carry out a development.

As well as those sensitive areas which are protected for their national importance, local sites of historical, landscape and wildlife importance are identified in Development Plans for protection from inappropriate development. These sites include areas of Areas of Townscape or Village Character, Local Landscape Policy Areas and Sites of Local Nature Conservation Importance. This review does not include proposals to limit or disallow permitted development for these types of locally designated areas. Instead we recommend that guidance should stress the need for installers to check the current local planning regime and, where necessary, contact the



relevant authorities before commencing work. Installers should also employ special sensitivity during installation and operation in these areas to prevent inappropriate development.

Article 4 Directions could be used to remove permitted development rights in local sites where the Planning Service, after consultation with the relevant District Council, feels they would not be appropriate.



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4. Methodology

4.1 Introduction

Entec's brief to carry out this review included a number of requirements, namely:

- the review should identify impact criteria for extending microgeneration permitted development rights to all non-domestic uses;
- the proposals should be in sufficient detail to enable Departmental officials to draft new provisions in the GDO for non-domestic microgeneration;
- the proposed permitted development rights should be available to all users of land and buildings – the review should not therefore be confined to particular users;
- the baseline for permitted development rights proposed for non-domestic microgeneration users is that those proposed for domestic users should be conferred as a basic minimum unless there are exceptional reasons to do otherwise. The proposed permitted development rights should be extended where possible to match the higher energy requirements and greater potential for generating energy of many non-domestic users and the possibly more limited impact of development in this context upon neighbours and the wider community;
- the review should consider how users such as community groups and schools can be given permitted development rights and identify the relevant impact criteria;
- where extensions to permitted development are proposed which would exceed the criteria for the purposes of the definition of “Schedule 2 development” in the Planning (Environmental Impact Assessment) Regulations (NI) 1999 the review should consider whether it might be justified to raise the thresholds; and
- proposals should be subject to stakeholder consultation.

The following sections of this report outline how these requirements were taken into account during this review.

4.2 Methodology

Entec's methodology adopted for this review was based on previous work undertaken for CLG and WAG, and involved the following three key strands to the research:

- data gathering relating to the various technologies;



- highlighting the key issues and opportunities associated with each of the technologies by way of examination of case studies; and
- testing of recommendations through stakeholder consultation.

Consideration was also given to the consultation on permitted development rights for householder microgeneration in Northern Ireland together with other reviews carried out in the UK and the Republic of Ireland, including Entec's previous research in England and Wales³⁵.

The aim of this review was to deliver robust recommendations for permitted development rights in order to encourage the installation of microgeneration equipment that would have little or no significant adverse impacts. A steering group comprising Planning Service officers provided advice and a sounding board to Entec during the review.

4.2.1 Data Gathering

The initial stage of the review primarily involved researching existing case studies in Northern Ireland relating to each technology, concentrating on those areas where we believed there was more likelihood of significant numbers of development proposals being removed from the requirement for planning permission on foot of an application thus relieving pressure on the planning system and removing any unnecessary planning impediment to the delivery of these technologies on the ground. Our focus was therefore mainly on solar and wind technologies but also extended to include hydro, heat pumps, biomass and CHP. Case studies were primarily sourced from planning applications made to the Planning Service, however examples were also identified via contacts such as Action Renewables, District Councils, industry organisations, installers and developers/landowners. Where appropriate, stakeholders were contacted to provide further information regarding the case studies.

A total of 64 case studies from Northern Ireland were examined to provide empirical data as to what types of planning application were being made and the issues associated with them including reasons for refusal and any conditions attached to approvals (Table 4.1 provides an overview of the number of case studies researched by technology type). The case study review gave a good understanding of the range of microgeneration across Northern Ireland and their actual and/or potential impacts on nearby receptors and the wider locality. Where possible, links between the case studies were made such that we could ascertain a limit of what could be thought of as having little or no impact. Where few Northern Ireland case studies could be found we have relied on our experience of carrying out this type of review in other parts of the UK to provide evidence.

³⁵ CLG 2006 *The Householder Development Consents Review* and Entec 2008 unpublished *Small scale renewables and low carbon technology non-domestic permitted development review*



Table 4.1 Overview of Northern Ireland case studies used in review

Solar -roof mounted	Solar - wall mounted	Solar - free standing	Wind - building mounted	Wind - free standing	Hydro	Biomass (including anaerobic digestion)	Heat pump - ground source	Heat pump - air source	Heat pump - water source
20	1	1	2	22	4	12	1	1	0

4.2.2 Stakeholder Engagement

The second phase of the research involved identifying and consulting with stakeholders in order to ascertain the key issues in relation to microgeneration and how, if at all, permitted development rights should be extended to allow for the easier delivery of the technologies on the ground. The primary method of engaging stakeholders was via a workshop which was held in June 2008. A wide variety of stakeholders attended the workshop including representatives from the microgeneration industry, the planning profession and environmental and heritage organisations. The workshops involved facilitated round table discussions regarding each of the technologies together with comment forms distributed to, and completed by, attendees in order to identify key issues and test potential limits to permitted development. Interviews were conducted with other stakeholders such as installers and landowners. Comments received by the Planning Service on the domestic microgeneration consultation document were also reviewed in order to highlight any potential issues and help determine the likely limiting factors to permitted development for each technology in a non-domestic context.

It was also important to understand the views of planning officers', given that they are involved in the processing of planning applications for microgeneration developments. A separate planning officer workshop was held to gather information relating to the range of applications that had been received, identify the issues that arose in their determinations and seek views on Entec's draft recommendations for permitted development. As with the stakeholder engagement, the workshop comprised round table discussions together with comment forms completed by attendees.

It should be noted that comments attributed to organisations within this report may be the views of the individual representative concerned and not that of the organisation as a whole.

4.2.3 Impacts Approach

The information received from the data gathering exercise and stakeholder engagement, coupled with the proposals contained in the domestic consultation document and reviews undertaken elsewhere in the UK were assimilated and recommendations derived in relation to amendments to the GDO in Northern Ireland using an 'impact approach'. The impact approach was first used by Sparks and Jones in their study for the Householder



Development Consents Review³⁶ for development such as extensions and loft conversions. This study identified four levels of impact for householders from Level 1 impacts that affect the household only through to Level 4 impacts that affect a wider area beyond the immediate street scene.

Although this review is for non-domestic land uses, as opposed to households, the definitions are broadly comparable and those used by Sparks and Jones have been adapted for use in this review as shown in Box 1.

Box 1	Impact approach
	<p>Level 1 - Affects only the host property and its occupants.</p> <p>Level 2 - Affects the living or working conditions of people in adjoining properties. In the case of adjacent houses these impacts may take the form of overlooking and loss of privacy, overshadowing and loss of daylight, an overbearing presence causing a loss of aspect or openness, and noise disturbance leading to loss of peace and tranquillity.</p> <p>Level 3 - Affects the immediate street scene, particularly having regard to its character and appearance. Proposals that are visually discordant will have adverse impacts, particularly where the street scene is distinguished by some ordering principles such as the scale, massing, orientation, materials or form of the buildings, or the openness of the layout or means of enclosure of the gardens.</p> <p>Level 4 - These impacts apply over a much wider area and affect interests of importance that extend beyond the immediate street scene. They may compromise the integrity of designated areas such as Conservation Areas, National Parks and Areas of Outstanding Natural Beauty, or impact on sites of ecological or cultural importance. Any proposal that affects the character or appearance of a listed building will have a Level 4 impact since historic buildings are protected for the benefit of the whole community. There may also be Level 4 impacts if there are consequences for road safety affecting the passing public.</p>

This review does not make explicit reference to what level of impact the recommended permitted development rights will have as, in each case, the recommendations have been made such that we believe the impacts will generally be of a low level (i.e. Levels 1-2). Where feasible, permitted development rights have been limited such that impacts will be felt only within the curtilage of the host property, however some impacts (particularly visual impact) are subjective.

4.2.4 Land Uses, including Community Groups and Schools

The terms of this review were to identify impact criteria for extending permitted development rights to all non-domestic land uses and that such proposals be available to all users of land and buildings. Given the wide range of non-domestic land uses, where possible the recommendations outlined in this review have been made such that they can apply to all land uses in a separate additional Part in Schedule 1 to the GDO for microgeneration. This approach avoids over complicating the GDO and should therefore help to maximise the growth of these technologies, although we acknowledge that a development can have different impacts depending on its location and surroundings. For example, retail can apply equally to a corner shop or an out of town shopping centre, yet

³⁶ Householder Development Consents Review: Appendix 1 - Making the System More Proportionate available at <http://www.communities.gov.uk/documents/planningandbuilding/pdf/151750.pdf> , accessed 10/09/2008



clearly there could be differentiations between what impact a permitted development might have in these differing circumstances (e.g. a ten metre high wind turbine in a supermarket car park would have a very different impact to the same turbine being erected in the back garden attached to a corner shop).

The project brief required the review to consider how community groups and schools could be given permitted development rights. After reviewing case studies and consulting with stakeholders we do not believe that it is appropriate for different permitted development rights to exist for community groups and schools to those of other developers. While we can understand the wish to allow community groups as much potential to develop microgeneration projects as possible, in reality we have been constrained by the impact approach that was used during this review. We have endeavoured to extend permitted development rights as far as is possible to allow for the maximum growth in these technologies on the condition that it does not impact significantly on neighbours or the environment. Should we make recommendations for community groups that go beyond those recommendations we have already made there would therefore be a higher level of impact on neighbours or the environment. In addition we firmly believe that the extent to which our recommendations have been made, for example allowing 100% coverage of roofs with solar panels, offers good potential for community groups to exercise permitted development rights.

A further problem we identified when examining permitted development rights for community groups was how they could be defined for the purposes of the GDO. For example, would it be necessary for them to be a properly constituted body or should it be for any grouping of people who say they are a community. Equally, could a house builder anticipate the needs of a local community in terms of energy use and erect devices such that the development would be carbon neutral before any of the houses were lived in by a community?

As stated earlier we believe that the recommendations we have made in this report offer good potential for community groups to exercise permitted development rights for microgeneration and consequently, no specific permitted development rights for community groups are proposed.



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5. General Conditions

5.1 Introduction

During the course of this review, a number of common issues arose relating to the scale of energy generation, disused equipment, aviation safety and the UKAS accredited microgeneration certification scheme. Consequently, in this section we have set out recommendations relating to these issues and suggested, where appropriate, general limits to permitted development rights that could be applied universally to all forms of microgeneration. These general conditions also serve as a useful starting point in developing the more detailed recommendations for the specific technologies.

5.2 Energy Production

The results of the Planning Service's consultation on domestic microgeneration indicate that there is majority support for including a requirement within the GDO that permitted development must be for the purpose of providing heat or energy for use within the curtilage of the dwellinghouse. Similar issues, albeit in a non-domestic context, were raised during the stakeholder workshop with concerns surrounding the potential for equipment to be installed of a scale disproportionate to the building(s) to be served. One stakeholder, for example, commented *'for all technologies, only should be allowed for personal consumption – excess after hours could be sold to grid.'* Although some Planning Service Development Control officers raised concerns surrounding the enforceability of imposing a restriction similar to that being considered by the Planning Service in the domestic context, the majority were in favour.

We therefore recommend that a condition is included within the GDO that microgeneration equipment installed under permitted development rights must be primarily for the purpose of providing heat or electricity within the agricultural unit or building curtilage in which it is erected.

As well as providing power to buildings stand alone solar panels and free standing wind turbines can also be used to provide power for communications and monitoring systems, such as highway signs, and other development in remote areas or where connecting to the grid would be expensive or otherwise problematic. For example, draft PPS18 notes that elsewhere in the UK, *'PV is used to provide energy for lighting of telephone kiosks in rural areas, bus shelter lighting, remote traffic monitoring, and railway trackside signalling is increasing as it is almost always more cost-effective than new connections to the grid.'*

We therefore recommend that an exception is made to the condition that microgeneration equipment installed under permitted development rights must be primarily for the purpose of providing heat or electricity within the agricultural unit or building curtilage in which it is erected where they are erected to provide energy for communications and highway systems under Part 13 of the GDO or carried out by the Road Service of Northern Ireland. Any microgeneration permitted development rights granted to these statutory undertakers or Roads



Service should be limited by the conditions attached under the relevant technology (e.g. area, height) outlined later in this report and should also be limited such that the energy generated by the device should be commensurate with the needs of the development erected by the statutory undertaker or Roads Service.

5.3 Disused Equipment

For some types of development, such as development by or on behalf of a telecommunications code system operator (Part 17 Class A), the existing GDO stipulates that equipment, structures or apparatus no longer required should be removed as soon as is reasonably practicable. Such a requirement could also be applicable to small scale renewable and low carbon technologies, such as wind turbines, solar panels and even housing for biomass and CHP boilers and fuel stores, in order to prevent the future cluttering of landscapes with redundant microgeneration-related development. A condition requiring removal of biomass and solar equipment '*as soon as reasonably practicable*' was included in the illustrative Microgeneration Permitted Development Rights (Annex 2) of the Domestic Microgeneration consultation document. Similar restrictions are currently being considered in Scotland in the domestic context and have been adopted in the amended GPDO for England for domestic solar panels. In addition, as part of Entec's previous research in England and Wales, a recommendation was made that non-domestic solar panels and wind turbines should be removed if they have not been in use for a continuous period of 6 months. Some Planning Service Development Control officers were generally unsure as to whether such a condition was appropriate due to concerns relating to its enforceability. It should be noted however that this is simply a condition of exercising the proposed permitted development right and its purpose is to ensure that the developer is aware that redundant equipment should be removed to prevent any future adverse impacts associated with dereliction, etc.

For consistency between the different types of microgeneration and other consultations we recommend that a general condition should be included for all non-domestic microgeneration permitted development requiring the removal of equipment as soon as reasonably practicable after it is no longer in use and, where appropriate, the land restored to its condition before the development took place.. Whilst we appreciate concerns that this condition may be difficult to enforce, we feel that it serves to afford the Planning Service powers to require the removal of redundant equipment in the future should this be required and desirable. Care would have to be taken to ensure that removal of such equipment is not required where the microgeneration equipment is integral to a buildings structure, e.g. photovoltaic tiles.

5.4 Safety in Relation to Aviation

A number of aviation safety concerns were raised during this review particularly relating to wind turbines but also to other forms of microgeneration such as solar panels. These concerns primarily centred on wind turbines being a physical hazard to planes and their potential to cause radar interference. The existing GDO does restrict the height of certain developments around the perimeter of aerodromes and, where possible, we have borne in mind these restrictions when developing our recommendations for each technology. However, we would recommend that the Planning Service continues to liaise with relevant bodies and government departments throughout the UK on these



issues in the context of a consistent UK wide approach. This is discussed in more detail within the wind turbine section of this review.

5.5 Microgeneration Certification Scheme for Wind and Air Source Heat Pumps

As part of this review we have considered a generic condition requiring all microgeneration equipment installed under permitted development to be certified by an UKAS accredited microgeneration certification scheme and to be installed by certified installers. The potential opportunities of adopting this approach have already been discussed (see Section 2.3) although at this stage we do not recommend that such a condition is taken forward given the complexities surrounding integrating the scheme within the GDO and the need for a UK-wide consensus on issues such as noise and safety. However, where appropriate, recommendations have been made specific to each technology that could be incorporated within the UKAS accredited microgeneration certification scheme.

5.6 Relationship to the Curtilage or Boundary

In certain circumstances a party may wish to erect a microgeneration device at or on the edge of a property, e.g. a wall mounted solar panel or a wind turbine mounted on the wall of a building. In some cases this may lead to the device extending over the edge of the building curtilage such as if the devices were located on the front façade of a shop. We recommend that it is made explicit within guidance to the GDO that such development does not constitute permitted development as it is not contained completely within the curtilage of the building.

5.7 Summary of Recommendations

A summary of our recommended generic conditions that should apply to all non-domestic microgeneration equipment is included in Table 5.1.

Table 5.1 Summary of generic condition recommendations for all non-domestic microgeneration permitted development

Generic conditions for all microgeneration permitted development	
Energy production	<ul style="list-style-type: none"> Microgeneration equipment installed under permitted development must be primarily for the purpose of providing heat or electricity within the agricultural unit or building curtilage in which it is erected or, in the case of solar or wind microgeneration only, to provide commensurate energy for a development undertaken by statutory undertakers or others carrying out development permitted under Part 13 of the GDO or carried out by Road Service Northern Ireland
Disused equipment	<ul style="list-style-type: none"> Microgeneration equipment installed under permitted development that will no longer be used for the purpose for which it was installed shall be removed as soon as reasonably practicable



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6. Solar

6.1 Introduction

6.1.1 Solar PV

There are two types of solar renewable technology that may be used in a non-domestic context: solar photovoltaic and solar thermal. Solar photovoltaic (PV) cells operate by converting energy from the sun into electricity by using semiconductor materials to absorb photons of light and then convert part of the energy contained within the photons to electricity. The electrical output from a single cell is usually in the order of a few watts. To provide useful quantities of electricity, multiple cells are connected together and enclosed in a transparent case to form a module. PV modules can be connected together to form a PV system, any number of modules can then be connected together in a variety of configurations to give the desired electrical output. Solar water heating (solar thermal) employs a solar collector to absorb heat from the sun and concentrate it to provide heating for hot water.

Solar PV cells can be categorised into three groups based on the type of material used as the semiconductor. Solar cells themselves are relatively small with a typical cell having an area of between 10 and 100cm², this allows the cells to be connected in a wide range of configurations to produce devices for installation on domestic buildings. These devices can be panels, tiles, or integrated into glass facades.

Solar PV can be connected to the mains electricity grid by connecting the system through an inverter. This adds benefit by providing a secure supply of electricity when the system is not generating and allows the export of excess electricity back into the grid. Solar PV can also be used for systems that are not connected to the grid; these types of system are known as stand alone systems and are usually connected to a back up energy supply and an energy storage system such as batteries.

Solar panels are the most common method of using PV in buildings. The panels can vary in size depending on the power output required. The panels can be simply bolted onto the existing roof (Figure B.2) or they can be embedded into the roof structure which will minimise the roof profile of the system (Figure B.3). For a typical bolted on PV panel installation the surface of the panel is around 6cm above the roof plane (or proud of the wall).

Where solar panels are incorporated into the roof structure it is important to ensure the integrity of weatherproofing is maintained. It is also important to keep the panels well ventilated as if PV cells are overheated then the performance of the system will be reduced.

In non-domestic applications PV panels can be retrofitted to small areas of roofs as with retrofits to domestic dwellings or to whole façades. They can be used as an architectural feature, or as a replacement for existing architectural cladding.



The power output of Solar PV is directly proportional to the area of the panels. Thus higher energy users will need larger areas of panels to make a meaningful contribution to their energy demand. Currently solar panels are relatively expensive and often only small roof areas are covered but if, as the industry expects, costs reduce then larger installations are more likely.

PV cells can also be built into tiles that fit with existing roof tiles; this allows PV to blend in with the existing building and reduces the visual impact of the system. PV tiles come in a range of standard sizes to enable retrofitting of roofs. As PV is becoming more accepted as a building material, more ways are being developed of incorporating it into buildings, such as louvres and semi transparent façades, and into windows. Developments in thin film PV technologies have led to a wider variety of applications such as flexible cells and semi-transparent PV glass.

The electrical energy produced by a PV device depends fundamentally on the amount of sunlight it receives. To improve the energy production of the panels they can be mounted on a frame that tracks the movement of the sun, therefore maximising the amount of sunlight hitting the device at all times of the day. This can be done with either manual or electronic control. While it is far more common to have a fixed mounting, tracking mechanisms can improve energy generation by up to 30%. The major disadvantage to using a tracking system is the added cost of the system and of its maintenance.

6.1.2 Solar Thermal

The types of solar thermal system range in complexity from simple plastic tubing on a roof for heating swimming pools to advanced evacuated tube collectors which can offer improved performance in cloudy conditions. Solar thermal systems are most often built at the domestic scale, however quite large solar thermal systems are particularly effective at heating swimming pools and greenhouses. The main variations on a typical system will be in the type and size of collector that is used. Sometimes solar water heating panels can be fitted to frames, allowing larger systems to be installed where there is no convenient pitched roof, such as near outdoor swimming pools or on factories with flat roofs.

A typical solar thermal system could provide around 50% of hot water needs over the year for non-domestic buildings with low hot water requirements similar to those of a normal household, e.g. a corner shop. This would usually provide all the hot water needs over the summer months but require back up from conventional heating methods at other times. Solar water heating can provide an effective means to reduce fossil fuel energy consumption, particularly if mains electricity is normally used for water heating. The benefit of solar water heating to non-domestic users will depend greatly on their demand for hot water.

6.2 Draft PPS18

Draft PPS18 is not explicit as to whether there are existing permitted development rights for solar panels erected on non-domestic buildings, however consultation with Planning Service officers found that it was generally held that



solar panels were generally not covered by the GDO in these land uses. With regards dwellinghouses draft PPS18 notes that solar PV and solar thermal panels mounted on dwellinghouses will generally be permitted development provided the panels do not extend more than 15cm beyond the plane of the existing roof slope, although it also states that *‘permitted development rights to clad the walls or alter the existing roofline of a dwelling do not necessarily apply in Areas of Outstanding Natural Beauty, Conservation Areas, Areas of Special Scientific Interest, or the proposed Mournes National Park.’* When considering whether to extend permitted development rights for solar panels in non-domestic land uses it will therefore be important to consider the effects of solar panels on the reason for designation and it may be appropriate to consider stricter limits than in other areas.

Where a planning application for a solar panel is submitted for a building close to a Conservation Area, or close to a Listed Building, its proximity to such an area or buildings may be a material consideration in deciding that application. Draft PPS18 notes that *‘the installation of solar panels on a building listed for its special architectural merit or historic interest - or on another building or structure within its curtilage - is likely to require an application for listed building consent’* and that *‘this will be so, even if specific planning permission is unnecessary.’* It also notes that stand alone solar panels are widely used to provide power for communications systems and monitoring systems in remote areas or where connecting to the grid would be expensive or otherwise problematic and that elsewhere in the UK, *‘PV is used to provide energy for lighting of telephone kiosks in rural areas, bus shelter lighting, remote traffic monitoring, and railway trackside signalling is increasing as it is almost always more cost-effective than new connections to the grid.’* It is important that this review take these uses into account when setting limits to permitted development for solar panels.

6.3 Stakeholder Workshop

At a stakeholder workshop Entec identified the top 2 planning issues with regard to the installation of solar panels as:

- Visual, e.g. cumulative effect of many panels, support structures on flat roofs
- Shading of nearby properties, e.g. of freestanding structures on roofs

Visual impact and shading were generally recognised by the stakeholders as major issues of concern with regard to permitted development for solar panels. Comments included that *‘all forms of renewable[s]...will become standard features of the landscape’*, *‘can be visually unpleasant as with TV dishes’* and *‘visual impact of solar is low’*. A number of comments were made that shading of other buildings should not be permitted development. The potential cumulative visual effect, particularly that associated with ancillary infrastructure, was raised as an issue. There were also concerns with regard to the effect of solar panels on protected and sensitive areas such as Listed Buildings, Conservation Areas and AONBs, and that the view down on buildings should be considered.

Stakeholders were asked whether they thought that installing solar panels over the entire pitched roof of a 2 storey office complex on a business park could be permitted development. Some 70% of respondents agreed that this could be permitted development with only 13% against. This positive response shows that there are at least some



occasions when stakeholders felt there could be permitted development for solar panels in a non-domestic context. Those stakeholders who either didn't know or were against permitted development in the example given were only against it in certain conditions, e.g. in environmentally sensitive locations and that it '*depends on visual impact*'. Other comments included that it was a '*very straightforward installation and should be encouraged*' and that it would have a minimal visual impact as the whole roof would be covered by PV.

A number of general comments were also made regarding permitted development rights for solar panels, including the need to ensure connections to the grid, allowing permitted development rights for associated infrastructure, taking into account predicted climate change and that restrictions could be made in upland areas and coastal zones with or without protected area designations. Although these are all valid comments it is uncertain that permitted development rights would be an appropriate place to address most of these issues. The issue of allowing permitted development rights for infrastructure associated with solar panels, e.g. control units, could be addressed in the GDO, however it is likely that in most cases such ancillary development would either be *de minimis* or could be accommodated within the building on which the panels are mounted (or near to in the case of stand alone panels). Where this is not the case a planning application would be appropriate.

6.4 Evidence: Building Mounted Solar Panels

6.4.1 Roof Mounted

Case Studies

A total of 20 examples of roof mounted solar panels in a non-domestic context were found during the course of the review. Of these, 8 of the case studies were for solar panels mounted on pitched roofs and 12 were mounted on flat roofs. All of the 8 pitched roof case studies were located on schools or community facilities and all were for photovoltaic panels, none for solar thermal. That all the case studies were for a similar type of land use is not altogether surprising as the nature of the economics of these schemes mean that it is frequently necessary for those wishing to install them to have access to grant funding and some of the more well utilised grant schemes have been targeted at community groups and councils. It was however expected that some solar thermal examples would have been found as these are more common than PV installations in a domestic setting.

Only 2 of the pitched roof case studies could be confirmed as having applied for and received planning permission. In one of the case studies where planning permission was not sought, the installer was informed by the Planning Service that an application would not be required as the panels would not protrude more than 15cm from the plane of the roof. The two planning applications were for PV panels of size 6m² on a school and 4.8m² on a community centre. In both cases, the officer and DC Group recommended approval. For the other case studies, where detailed planning applications were not available, interviews with relevant parties revealed that the panels were up to approximately 45m² in surface area and generally covered only a small proportion of the roof, with the exception of solar panels on Ballyearl Arts & Leisure, which appear to cover approximately three-quarters of a roof plane. Details regarding the protrusion of the panels from the roof plane were not generally available, although anecdotal



evidence in one case indicated that the panels were 135mm above the roof plane. So far as could be ascertained, none of the case studies were within a Conservation Area or on a Listed Building and only one case study was located in an AONB. The case study in the AONB received planning permission.

12 case studies for solar panels mounted on flat roofs were examined during the review. As with pitched roofs, the flat roof case studies were all located on schools, council and community buildings with the single exception of 156 solar panels installed on the roof of a Tesco store in Newtownbreda. So far as could be determined, all of the case studies were for photovoltaic panels, not for solar thermal. In only 7 of the case studies was a planning application identified. The main issue that was examined in these cases was the potential for visual impact. All of the planning applications were approved so it seems likely that any visual impact identified in these cases was either not significant or could be mitigated. In the other 5 case studies, reasons given for not making a planning application included that *'the panels would not be visible from a road'* and that that they were *'above the sight line of the building'*.

In those case studies where physical parameters of the panels could be identified, the surface area of flat roof mounted solar panels ranged from 7-40m² and varied in height above the roof plane from 0.3-2.8m. So far as could be ascertained, none of the case studies were on a Listed Building or within a Designated Area.

Other Permitted Development Consultations

Permitted development rights have been introduced for roof mounted panels on dwellinghouses in England and for dwellinghouses and non-domestic land uses in the Republic of Ireland. A comparison of these with recommendations currently being considered for dwellinghouses in Northern Ireland is shown in Table 6.1.

Table 6.1 Limits to permitted development for roof mounted solar panels being considered or introduced in England, Northern Ireland and Republic of Ireland

Limits being considered/introduced	Domestic			Non-domestic
	England	Republic of Ireland	Northern Ireland	Republic of Ireland
Max plane protrusion pitched roof	20cm	15cm	20cm if facing onto and visible from a road, otherwise no limit	Industrial: 1m Light Ind/Business: 50cm (LI) or 15cm (B) Agric: 50cm
Max protrusion flat roof	n/a	50cm	1.5m	Industrial: 2m Light Ind/Business: 2m (LI) or 1m (B) Agric: 2m



	Domestic			Non-domestic
Limits being considered/ introduced	England	Republic of Ireland	Northern Ireland	Republic of Ireland
Location	Not above highest part of roof	50cm from edge of roof	Not above highest part of a ridged roof	Industrial: 50cm from edge of roof Light Ind/Business: 50cm (pitched) or 2m (flat) from edge of roof Agric: 50cm (pitched) or 2m (flat) from edge of roof
Associated equipment	n/a	n/a	n/a	All: in roof space
Max area	n/a	12m ² or 50% of roof area (whichever is less)	Limited to boundaries of existing roof	Industrial: None Light Ind/Business: 50m ² or 50% of roof area (whichever is less) Agric: 50m ² or 50% of roof area (whichever is less)
Sensitive areas	Not permitted in a Conservation Area or World Heritage Site if visible from a highway	n/a	Not permitted in Designated Areas on ridged roofs if roof slope faces onto and is visible from a road. Not permitted in Designated Areas on flat roofs if any part of a panel is visible from a road	n/a
Listed Building	Not permitted if mounted on building within curtilage of a Listed Building	n/a	Not permitted on a roof within the curtilage of a Listed Building	n/a
Other	Minimise effect on external appearance of building Minimise effect on amenity of area Remove if no longer needed	n/a	Primary purpose to provide heat or energy for use within the curtilage of the dwellinghouse. Remove when no longer in use	All: No advertising, signs or non-required objects

Note that these limits and conditions are an abridged version for ease of reference. See original reports or statutory instruments for full details.

Justification of Recommendations

Design and External Finishing

Following consultation on permitted development rights for householder microgeneration, the Planning Service is not considering introducing a requirement that the design and external finishes of solar panels fitted to a roof be in



conformity with those of the original dwellinghouse as this would be a matter of judgement and would pose difficulties of compliance. The same argument applies in a non-domestic context although perhaps in many cases, such as on schools, retail and industrial developments there would be less concern as to whether or not a panel is in conformity with the rest of the building. We therefore do not propose to include a condition for permitted development requiring roof mounted solar panels to be in keeping with a building's appearance in non-domestic land uses. We recommend that methods of minimising visual impact are included in any guidance that is produced to accompany any changes to microgeneration permitted development.

There is some concern that the support structure for solar panels on flat roofs could be used to display advertising materials, such as the manufacturers name or logo. Advertising materials are not specifically allowed under the permitted development rights recommendations contained in this review and the separate control of advertisements regime will apply to any structure or device allowed under the changes. We therefore do not believe an explicit reference banning advertising from any microgeneration devices and structures allowed under permitted development rights is necessary. It is recommended that published guidance regarding permitted development rights for microgeneration equipment includes reference to the Planning (Control of Advertisements) Regulations (Northern Ireland) 1992 that must be complied with if the equipment is to be used for the purposes of displaying adverts.

Height Above Roof Plane

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering allowing permitted development for solar panels on ridged (i.e. pitched) roofs up to 20cm above the plane of the roof which faces onto and is visible from a road. There is little difference between domestic and non-domestic contexts for this parameter with the exception that non-domestic panels may not be close to residential areas and therefore could potentially be more prominent without affecting many people. This is not always the case however as a non-domestic context can include community centres and local shops that are found in residential areas as well as shops and offices in town centres where prominent solar panels could have a visual impact.

At a workshop, stakeholders were asked whether permitted development for pitched roof mounted solar panels should be limited to those with a maximum protrusion of 20cm from the roof plane. No distinction was made as to whether the panels were facing onto and visible from a road or not. There was a high degree of uncertainty amongst stakeholders as to whether a 20cm protrusion above the roof plane could be permitted development with 43% of respondents unsure, although there was also significant support for a 20cm limit with 48% of stakeholders in agreement. Discussions with Development Control officers in the Planning Service also found support for a 20cm limit.

The householder permitted development rights in England allow the installation of solar panels using permitted development provided the panels do not protrude more than 20cm from the roof line. In the Republic of Ireland permitted development rights for solar panels (both PV and solar thermal) are allowed to protrude up to 1m on a pitched roof on industrial buildings, 50cm on a light industrial building or on a structure within an agricultural



holding or 15cm on a business premises³⁷. This differentiation is based on the likelihood that industrial areas are likely to be less visually sensitive than other land uses however we have not discovered any instances where such a protrusion from a pitched roof has been necessary in Northern Ireland, England or Wales. Where it is necessary to have a 50cm or 1m protrusion we believe it would be more appropriate to require a planning application to address the potential visual impacts pertaining to the individual circumstances.

In light of the above arguments and for consistency with the proposed domestic amendments we recommend that solar panels on a pitched roof in non-domestic land uses should generally be permitted development unless the panels face onto a road and protrude from the roof plane by more than 20cm.

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering limiting permitted development for solar panels on pitched roofs such that they do not exceed the highest part of the roof. We are not aware of any case studies where solar panels have been erected such that they extend beyond the highest part of the roof so are unable to fully judge the likely impacts this may have, although we do not believe it would be significant in the majority of non-domestic situations. However, for consistency with the domestic recommendations we recommend that permitted development rights for solar panels in non-domestic situations are also limited such that they do not extend beyond the highest part of the roof. We also recommend that guidance makes clear what constitutes the highest part of a roof and in particular that chimneys are excluded from this measurement.

For solar panels mounted on flat roofs the Planning Service are also considering allowing permitted development on dwellinghouses provided they are no more than 1.5 metres above the plane of the roof. At a stakeholder workshop Entec asked whether in non-domestic situations solar panels on flat roofs up to 2m above the plane of the roof should be permitted development. There was a high degree of uncertainty regarding this with some 48% of respondents unsure that 2m was appropriate. Comments made regarding this included that permitted development rights could be increased for taller buildings or where located further from a road. There were also concerns regarding visual amenity and the effects on health and safety.

In the Republic of Ireland permitted development rights for solar panels (both PV and solar thermal) on flat roofs are allowed up to 2m above the roof plane on industrial buildings, light industrial buildings and in an agricultural holding and 1m in the case of business premises. Permitted development is further restricted on flat roofs such that the solar panels must be a minimum distance from the edge of the roof depending on the land use (50cm for industrial, 2m for light industrial buildings, business premises and agricultural structures/buildings).

³⁷ Note that throughout this report reference to buildings in the Republic of Ireland permitted development rights for non-domestic land uses includes ancillary buildings within the curtilage of the primary building. Reference to an agricultural holding includes agricultural structures and the area within an agricultural holding (see Statutory Instrument 235 of 2008 for full details).



In light of the above we recommend allowing permitted development rights for solar panels on flat roofs in a non-domestic building up to 2m above the plane of the roof. This will allow the installation of larger solar panels which will help to deliver proportionally larger amounts of energy or hot water for non-domestic land uses when compared to dwellinghouses. This will increase proportionally in terms of the roof area available. There is some danger of visual impact should such panels be erected on smaller buildings where they will be highly visible. We therefore recommend that solar panels mounted on flat roofs should be required to be located away from the edge of the roof. The distance that would be required to minimise the visual impact is dependant on the height and location of the building on which the solar panels would be mounted with a 2m high panel on a building that is only 4m high likely to be more visually intrusive than if it was mounted on a 10m high building (depending on the location). To give more surety that the potential visual impact will be minimised we therefore recommend that for solar panels mounted on flat roofs to have permitted development they should be located at least 2m from the edge of the roof. This constraint will also reduce the likelihood of support structures being used for advertising purposes (as they will be less visible) and has the added advantage that it will act as a safety buffer should the panels fall over. We note that this condition on permitted development could restrict the amount of solar panels that can be erected on some smaller non-domestic buildings and recommend that this should be made clear in the consultation document and a question included asking whether this limit is too restrictive. Alternatives to the recommendation could include allowing permitted development within 1m of the edge of the roof or including a condition limiting solar panels to those that are at least their height away from the edge of the roof (e.g. solar panels 0.5m high must be located 0.5m from the edge of the roof).

Area

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering allowing permitted development for solar panels fitted to the roof of a dwellinghouse provided they are limited to the boundaries of the existing roof. No specific numerical limit is being considered as the roof coverage on dwellinghouses is likely to be self-limiting due to cost and the limitation of permitted development rights to panels whose primary purpose is to provide heat or energy for use within the curtilage of the dwellinghouse.

Although both these factors also apply to non-domestic panels fitted on roofs there is some potential for far larger areas to be covered than is the case in most domestic situations. For example, case studies for this review found panels with surface areas of up to 40m² and 45m² compared to the 'typical' household requirement of 3-4m² for solar thermal panels and 10m² for photovoltaic panels. With advances in technology and the expected reductions in the price of solar panels there is no reason to suppose that cost limitations will continue into the future. The Republic of Ireland permitted development rights allow a maximum of 50m² or 50% of the roof area (whichever is less) to be covered with solar panels for light industrial buildings, business premises and agricultural holdings (there is no roof coverage limit for industrial buildings). The Republic of Ireland also limits the total surface area of solar panels within a building curtilage after which permitted development rights no longer apply (50m² for agricultural holdings, 50m² or 50% of the roof area whichever is lesser in light industrial or business premises).

We do not believe that a specific limit to the amount of roof mounted solar panels that can be allowed under permitted development rights is required as the main issue associated with solar panels is related to visual impact



and the building itself is likely to have the main visual impact, not retrofitting solar panels to its roof. We therefore recommend that the area limit of roof mounted solar panels in a non-domestic context is the existing roof area. As outlined in the previous section this is limited for solar panels on flat roofs by the requirement for the panels to be at least 2m from the edge of the roof.

In the Republic of Ireland solar panels on an industrial or light industrial building, a business premises or in an agricultural holding must be a minimum of 50cm from the edge of a pitched roof to be permitted development. This is to prevent the possibility that a solar collector panel may be lifted away from the roof if high winds weaken tiles at the edge of the roof. During our research Entec have not come across any case studies where this has been an issue and it has not been raised as an issue by any stakeholders during this review or during consultation for the domestic review of microgeneration. In many case studies we have found that solar panels are generally fitted some distance from roof edges anyway, presumably as this is easier for installation. We believe that such a limit to permitted development rights for roof mounted solar panels would be difficult to enforce, could cause some confusion as to whether installing PV tiles would be eligible for permitted development and would have little tangible benefit. We therefore do not recommend including such a condition for pitched roof mounted panels in Northern Ireland.

Sensitive Areas

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering excluding permitted development rights for roof mounted solar panels in Designated Areas (i.e. Conservation Areas, AONBs, ASSIs and National Parks) if they are fitted to roof slopes that face onto and are visible from a road or on flat roofs where any part of the solar panel is visible from the road. This is linked to the approach adopted in a recent amendment to the GDO for satellite dishes and other antennae where similar limits to permitted development in Designated Areas have been set. The amendments were made to introduce a consistent approach to satellite and other antenna permitted development within the various Designated Areas. Permitted development rights for the enlargement, improvement or other alteration of a dwellinghouse consisting of an addition or alteration to its roof are excluded in Conservation Areas.

The terms of this review are such that the proposed permitted development rights should be extended beyond those allowed for domestic uses where possible. In the case of roof mounted solar panels we believe that they can be permitted development in certain sensitive areas provided the impact is minimised. For example, it is debatable whether erecting a solar panel on the roof of a building in an AONB would have the same effect as erecting a panel on the roof of a building in a Conservation Area due to the landscape in the former being able to absorb the visual impact of the panels compared to the smaller and generally more urban nature of a Conservation Area. The Planning Service have commented that although an existing building will have visual impact, this will have been determined through the planning process and issues such as design, use of materials and finishes will have been considered.

At a workshop, stakeholders were asked whether permitted development rights in AONBs should be removed where visible from a road. 57% of stakeholders agreed that permitted development rights should be removed in



such a situation with 35% disagreeing. Comments relating to removing permitted development rights for solar panels in an AONB where visible from a road included *'if sufficiently well designed and screened, some sensitive developments permitted'*, *'an AONB is about more than a view from the road'* and *'potentially more harmful in designated sites due to size of non-domestic structures.'* There were also mixed views from Development Control officers with regard removing permitted development rights in AONBs where panels were visible from a road.

Within some AONBs there are special countryside policy areas where specific policies are in place to protect the unique character of the area. In addition a number of AONBs have a design guide which sets out specific design principles and focuses on local styles and layouts. Relaxation of permitted development rights in such areas may compromise the objectives of these policies and documents. In light of this the Planning Service considers that some constraints on permitted development rights in AONBs and National Parks are appropriate.

On balance, we believe that to remove all permitted development rights for roof mounted solar panels in an AONB (or National Park) is unnecessary as the existing buildings already affect the landscape designations of these areas and the installation of solar panels on such buildings is likely to have a minimal additional visual effect. However, we recognise that some protection may be needed in some AONB special countryside policy areas. Although we have considered recommending removing permitted development rights in such areas we believe that this could overcomplicate the GDO. We note that in the domestic microgeneration consultation it was recommended that permitted development rights should not be allowed in AONBs if they are fitted to roof slopes that face onto and are visible from a road. We recommend that a similar restriction for non-domestic solar panels is used for AONBs and National Parks in a non-domestic context and believe that this should be sufficient to protect the special character of all AONBs, including those with special countryside policy areas.

A roof mounted solar panel could impact on the character or appearance of the built environment and we believe that a restriction on permitted development is appropriate in Conservation Areas to limit any potential impact on such sites. As was the case with AONBs, the domestic consultation responses and respondents at the stakeholder workshop were generally supportive of limiting permitted development rights in Conservation Areas where they were visible from a road. In light of this we recommend that permitted development rights for roof mounted solar panels in Conservation Areas are removed where the panels face onto and are visible from a road.

Mounting solar panels on building roofs in World Heritage Sites is likely to have the same type and magnitude of effect as mounting panels in Conservation Areas or AONBs (depending on whether the site was declared for cultural or natural landscape reasons) and a similar restriction to permitted development rights in these sensitive areas should be considered (i.e. no permitted development rights where the roof faces onto and is visible from a road). If new World Heritage Sites are declared in Northern Ireland the GDO should be examined to see whether existing limits to permitted development (e.g. removing permitted development rights in Listed Buildings) are sufficient to protect the special nature of such sites. Where further protection is needed this can be accomplished either through excluding permitted development through Article 4 directions or by amending the GDO as appropriate.



With regard to other types of sensitive areas we do not believe that allowing permitted development rights for roof mounted solar panels on existing buildings within ASSIs or Sites of Archaeological Interest is likely to be a major issue in the majority of sites, although we note that a possible exception to this would be if any buildings are designated as ASSIs for their bat interest. As protected species legislation already protects bats we do not propose to include any additional limits to permitted development for roof mounted solar panels in ASSIs.

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering removing permitted development for solar panels fitted to a dwellinghouse roof within the curtilage of a Listed Building. 48% of stakeholders at a workshop agreed that permitted development rights for solar panels should be removed within the curtilage of a Listed Building and a third of stakeholders disagreed. Those that did not agree with removing permitted development in a Listed Building curtilage gave reasons such as '*ground mounted or not visible from road should be allowed under PD*'. A stakeholder noted that Listed Building Consent will cover the same ground as a planning application and that someone will therefore have to apply for permission twice for the same development. Where Listed Building Consent is required for solar panels it seems unnecessary to also require planning permission and we were therefore inclined not to remove permitted development rights within the curtilage of a Listed Building. The Planning Service however has noted that an object or structure within the curtilage of a Listed Building that forms part of the land and has done so since before 1 October 1973 is treated as part of the Listed Building and a solar panel erected on such a building would require Listed Building Consent. However, an object or structure within the curtilage of the Listed Building on which solar panels are erected and which is not fixed to the Listed Building, would not require such consent. In light of this we therefore recommend that permitted development rights are removed for roof mounted solar panels within the curtilage of a Listed Building unless Listed Building Consent for the development has been granted.

6.4.2 Evidence: Wall Mounted Solar Panels

Case Studies

Only one example of a non-domestic wall mounted solar panel in Northern Ireland was found during the course of this review. This is not altogether surprising as wall mounted panels are generally not at the most efficient angle to generate energy from the sun and solar panels are generally better placed on a roof or free standing. Wall mounted solar panels could also be prone to vandalism if in a public area and at a low level. The case study was found not to have this problem as the panels were located at a high level on a wall above a school's flat roof. The panels had a surface area of 13m² and were not visible from the external boundaries of the school. The planning application was recommended for approval by the case officer and subsequently approved by the DC Group.

Other Permitted Development Consultations

Permitted development rights have been introduced for wall mounted panels on dwellinghouses in England and for dwellinghouses and non-domestic land uses in the Republic of Ireland. A comparison of these with recommendations currently being considered for dwellinghouses in Northern Ireland is shown in Table 6.2.



Table 6.2 Limits to permitted development for wall mounted solar panels being considered or introduced in England, Northern Ireland and Republic of Ireland

Limits being considered/ introduced	Domestic			Non-domestic
	England	Republic of Ireland	Northern Ireland	Republic of Ireland
Max protrusion	20cm	15cm	Where any part of a solar panel fitted to a wall within 3m of the boundary of the curtilage extends above 4m in height, panel should not extend more than 20cm beyond plane of wall.	Industrial: 1m Light Ind/Business: 15cm Agric: 15cm
Max area	n/a	n/a	Limited to the boundaries of the wall	Industrial: 50m ² Light Ind/Business: 25m ² Agric: 25m ²
Location	Not above highest part of roof	50cm from edge of wall	Not above highest part of roof if mounted on chimney wall.	Industrial: 50cm from edge of wall Light Ind/Business: No solar thermal, PV 50cm from edge of roof Agric: 50cm from edge of wall
Sensitive areas	Not permitted in a Conservation Area or World Heritage Site if visible from a highway	n/a	Not permitted in Designated Areas where fitted to a wall which faces onto and is visible from a road	n/a
Listed Building	Not permitted if mounted on building within curtilage of a Listed Building	n/a	Not permitted on the wall of a building within the curtilage of a Listed Building	n/a
Other	Minimise effect on external appearance of building Minimise effect on amenity of area Remove if no longer needed	n/a	Primary purpose to provide heat or energy for use within the curtilage of the dwellinghouse. Remove when no longer in use	All: No advertising, signs or non-required objects

Note that these limits and conditions are an abridged version for ease of reference. See original reports or statutory instruments for full details.

Justification of Recommendations

The parameters relating to wall mounted solar panels are, in the main, the same as for roof mounted solar and similar recommendations are made for permitted development in most cases. Only where there is a difference or a notable reason for doing so are similar parameters referred to in this section. The full list of conditions and limits to permitted development is included in the summary section at the end of this chapter.



Relation to the Curtilage

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering recommending that wall mounted solar panels should generally be permitted development with some physical limits to the protrusion of panels mounted on walls close the boundary of the curtilage where they extend higher than 4m (to prevent overshadowing of neighbouring properties). In a non-domestic context we recognise there are some situations, for example in town centres where shop fronts abut public highways, where wall mounted solar panels could cause visual impact. However in such situations the solar panels would likely be mounted such that they would be outside the building curtilage, e.g. on a shop frontage extending over a pavement, and therefore not eligible for permitted development rights. As noted earlier in this report we recommend that it is made clear in guidance to the GDO that such development would not be allowed under permitted development.

Area

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering allowing permitted development for wall mounted solar panels and limiting the maximum area they may cover to the existing boundaries of the wall. They are also considering allowing wall mounted solar panels to have permitted development provided they do not exceed the highest part of the roof of the existing dwellinghouse. In the Republic of Ireland wall mounted solar can be permitted development if the panels do not exceed 50m² on industrial buildings or 25m² in an agricultural holding. PV solar panels (but not solar thermal) are permitted development for wall mounted panels on business premises or light industrial buildings provided they do not exceed 25m². The Republic of Ireland also limits permitted development rights for solar panels on walls to those panels that are a minimum of 50cm distance from the edge of the wall, however we do not believe that this serves any practical purpose.

Limiting permitted development for wall mounted solar panels to the existing wall area and not including a prescribed maximum area could result in developments that have a significant visual impact. This effect would be more pronounced than roof mounted panels as those that are fitted to a pitched roof can be thought of as being relatively similar to tiled roofs and those on flat roofs should be partially hidden, at least from the ground, due to the angle of viewing. Conversely it could be argued that we are not used to seeing solar panels on walls and that they could seem normal after we had seen as many of these as we have roof mounted panels. Such developments could look similar to existing buildings which are glass covered (e.g. the Gherkin in London). One such example of wall mounted solar panels on a large scale is the CIS tower in Manchester, where existing tiles were replaced with solar panels. Such development is very bespoke and unlikely to be a common occurrence at least in the immediate future and if carried out on such a scale could have significant visual impact. In light of this Entec seriously considered recommending a limit to the maximum area of wall mounted panels at a similar level to free standing solar panels (see section 6.5). Such a limit though would be contrary to the principle that non-domestic permitted development rights should generally be more permissive than those for dwellinghouses. We therefore recommend that no area limit is placed on wall mounted solar panels except that which is recommended for dwellinghouses, i.e. permitted development is limited to panels that are erected on the existing wall area. We also recommend that a question asking whether a limit to the area of wall mounted solar panels should be set at the same size as for free standing solar panels (20m²) in the consultation document.



Protrusion

To minimise overshadowing of neighbouring properties the Planning Service is considering limiting permitted development for wall mounted panels on dwellinghouses such that they should not protrude more than 20cm from the plane of a wall when the panel is fitted to a wall within 3 metres of the boundary of the curtilage and where the panel extends above 4 metres in height. As well as minimising overshadowing this protrusion limit will also help minimise visual impact. In the Republic of Ireland wall mounted solar panels can be permitted development provided the distance between the plane of the wall and the panels does not exceed 1m for industrial buildings and 15cm on an agricultural holding. This 15cm maximum for permitted development also applies to light industrial and business premises, although only for solar PV panels (wall mounted solar thermal panels are not permitted development on these land uses).

We recognise that if the same conditions to permitted development rights for wall mounted solar panels on dwellinghouses are used in the non-domestic context there is some potential for visual impacts beyond a buildings curtilage, e.g. wall mounted panels below 4m in height on a wall 3m from the curtilage boundary could cover the side of a large industrial unit and protrude 3m from a wall (or more if located away from the curtilage boundary). No examples of such a development have been found during research for this report so it seems likely the risk of such a development is low. In light of this and the requirement to where possible extend permitted development rights beyond those that were consulted on for dwellinghouses leads us to recommend utilising the same limits to permitted development rights that the Planning Service are considering introducing for dwellinghouses, namely that where any part of a solar panel fitted to a wall within 3m of the boundary of the curtilage extends above 4m in height, the panel should not extend more than 20cm beyond the plane of the wall.

Sensitive Areas and Listed Buildings

As stated earlier, as a result of the householder microgeneration consultation the Planning Service is considering removing permitted development rights for wall mounted solar panels in Designated Areas where they face onto and are visible from a road.

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering allowing permitted development for wall mounted solar panels on dwellinghouses in Designated Areas except where they face onto and are visible from a road. We believe that wall mounted solar panels in Conservation Areas will generally have a higher likelihood of causing visual impact due to the smaller scale and urban nature of the designation when compared with AONBs or National Parks which are larger and are more commonly associated with landscapes. However, the Planning Service has commented that within some AONBs there are special countryside policy areas where specific policies are in place to protect the unique character of the area and that a number of AONBs have a design guide which sets out specific design principles and focuses on local styles and layouts. Relaxation of permitted development rights in such areas may compromise the objectives of these policies and documents. In light of this the Planning Service considers that some constraints on permitted development rights in AONBs and National Parks are appropriate.



As with the recommended restrictions for roof mounted solar panels, we believe that to remove all permitted development rights for wall mounted solar panels in an AONB or National Park is unnecessary as the installation of solar panels on the walls of existing buildings is likely to have a minimal additional visual effect. However, we recognise that some further restriction to permitted development rights may be needed in some AONB special countryside policy areas. We believe that if a similar restriction for wall mounted solar panels is used for AONBs and National Parks in the non-domestic context this should be sufficient to protect the special character of all AONBs, including those with special countryside policy areas, and of any special areas in National Parks should one be declared in Northern Ireland.

As a wall mounted solar panel could impact on the character or appearance of the built environment we believe that a restriction on permitted development is appropriate in Conservation Areas to limit any potential impact on such sites. As the domestic consultation responses were generally supportive of limiting permitted development rights for wall mounted solar panels in all Designated Areas, including Conservation Areas, where they were visible from a road we recommend that a similar restriction is used in the non-domestic context.

The mounting of solar panels on walls in World Heritage Sites is likely to have similar impacts as was outlined for roof mounted panels and we recommend that the same limits to permitted development are implemented, namely that there should be no permitted development rights where a wall faces onto and is visible from a road. If new World Heritage Sites are declared in Northern Ireland the GDO should be examined to see whether existing limits to permitted development (e.g. removing permitted development rights in Listed Buildings) are sufficient to protect the special nature of such sites. Where further protection is needed this can be accomplished either through excluding permitted development through Article 4 directions or by amending the GDO as appropriate.

With regard to other types of sensitive areas we do not believe that allowing permitted development rights for wall mounted solar panels on existing buildings within ASSIs or Sites of Archaeological Interest is likely to be a major issue in the majority of sites, although we note that a possible exception to this would be if any buildings are designated as ASSIs for their bat interest. As protected species legislation already protects bats we do not propose to include any additional limits to permitted development for roof mounted solar panels in ASSIs.

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering disallowing permitted development for solar panels fitted to dwellinghouse walls within the curtilage of a Listed Building. As outlined for roof mounted solar panels earlier in the report, at a workshop regarding non-domestic microgeneration, 48% of stakeholders agreed that permitted development rights for solar panels should be removed within the curtilage of a Listed Building, although where Listed Building Consent is required for solar panels it seems unnecessary to also require planning permission for the same development. The Planning Service however has noted that an object or structure within the curtilage of a Listed Building that forms part of the land and has done so since before 1 October 1973 is treated as part of the Listed Building and a solar panel erected on such a building would require Listed Building Consent. However, an object or structure within the curtilage of the Listed Building on which solar panels are erected and which is not fixed to the Listed Building, would not require such consent. In light of this we recommend that wall mounted solar panels are permitted development on a wall



within the curtilage of a Listed Building, but only if Listed Building Consent for the development has been received.

6.5 Evidence: Freestanding Solar Panels

6.5.1 Case Studies

Only one case study relating to free standing solar panels in Northern Ireland was identified during this review. An interview with an employee of the organisation stated that she believed there were 64 solar panels and had an estimated surface area of 1,736 cubic feet (approximately 49m³). The panels were located over 100m from residential dwellings and were not in the vicinity of a road or near to Listed Buildings. The scheme was initially intended to be erected on a flat roof but the stand alone option was chosen to maximise efficiency. Plans are currently being explored to install a further 32 free standing panels. Details of the types of panel used for the installation were obtained from the internet, although it should be noted that the website stated that only 32 panels had been installed³⁸.

6.5.2 Other Permitted Development Consultations

Permitted development rights have been introduced for wall mounted panels on dwellinghouses in England and for dwellinghouses and non-domestic land uses in the Republic of Ireland. A comparison of these with recommendations currently being considered for dwellinghouses in Northern Ireland is shown in Table 6.3.

Table 6.3 Limits to permitted development for free standing solar panels being considered or introduced in England, Northern Ireland and Republic of Ireland

	Domestic			Non-domestic
Limits being considered/introduced	England	Republic of Ireland	Northern Ireland	Republic of Ireland
Max height	4m	2m	2m	All: 2m

³⁸ See www.energysavingtrust.org.uk/content/download/1521/10288/version/1/file/cs_servite_trust_cotyrone.pdf (accessed 4 September 2008)



	Domestic			Non-domestic
Limits being considered/ introduced	England	Republic of Ireland	Northern Ireland	Republic of Ireland
Max area	9m ² (max dimension of 3mx3m), no more than one panel	12m ² ³⁹	14m ²	Industrial: 50m ² Light Ind/Business: 25m ² Agric: 25m ²
Location	Min of 5m from boundary of curtilage	Not on or forward of front wall of house	Not permitted where any part of the panel is nearer to any road which bounds the curtilage than the part of the dwellinghouse nearest to that road	Industrial: none Light Ind/Business: Behind front wall of building/premises Agric: none
Sensitive areas	Not permitted in a Conservation Area or World Heritage Site if visible from the highway	n/a	n/a	n/a
Listed Building	Not permitted within curtilage of Listed Building	n/a	Not permitted within the curtilage of a Listed Building	n/a
Other	Minimise effect on amenity of area Remove if no longer needed	The erection of any free standing solar array shall not reduce the area of private open space, reserved exclusively for the use of the occupants of the house, to the rear or to the side of the house to less than 25m ² .	The primary purpose of the stand-alone solar is to provide heat or energy for use within the curtilage of the dwellinghouse Remove when no longer in use	All: No advertising, signs or non-required objects

Note that these limits and conditions are an abridged version for ease of reference. See original reports or statutory instruments for full details.

³⁹ The permitted development limits with regards maximum area for free standing and roof mounted solar panels are included in a single paragraph of the RoI Planning and Development Regulations 2007 and state that, 'The total aperture area of any such panel, taken together with any other such panel previously placed on or within the said curtilage, shall not exceed 12 square metres or 50% of the total roof area, whichever is the lesser.' It has been assumed for this report that the reference to 50% of the total roof area does not apply to free standing panels.



6.5.3 Justification of Recommendations

Visual Impact: Height and Size

As with building mounted solar panels the main issue associated with free standing panels is the potential for visual impact. Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering allowing permitted development within the curtilage of a dwellinghouse if a free standing solar panels has a maximum height of 2m above ground level. In the Republic of Ireland free standing solar panels within the curtilage of on an industrial or light industrial building, on business premises and in an agricultural holding can be permitted development if they are not more than 2m above ground level. In dwellinghouses in the Republic of Ireland the height limit for permitted development for free standing panels is also 2m. In England free standing solar panels of up to 4m in height can have permitted development.

In terms of height limits in non-domestic land uses the existing GDO allows permitted development for buildings structures or works on agricultural land up to a height of 12m (or 3m if within 3km of the perimeter of an aerodrome). On industrial land the installation of additional or replacement plant or machinery up to 15m in height is permitted development for the purposes of industrial processes. Other height limits for permitted development referred to in the GDO include 4m for certain development by district councils; 18m for electricity undertakes where the building is solely for the protection of plant and machinery; 15m for the installation of plant and machinery for gas, road passenger transport, post office water and sewerage undertakers; 15m for certain structures for the Civil Aviation Authority; 4m for structures on an aerodrome; 3m for structures required in connection with mineral exploration (where within 3km of an aerodrome); 5m for structures in amusement parks (if not within 3km of an aerodrome); plant and machinery up to 15m associated with drainage works undertaken by or on behalf of the Department for Agriculture and Rural Development; plant and machinery up to 15m for the Department of Culture, Arts and Leisure; and small ancillary works up to 4m or the installation of additional or replacement plant and machinery up to 15m by the Crown. Although none of these height limits in the GDO are directly relevant to the installation of free standing solar panels and most are constrained by further conditions (e.g. the development must be on operational land or is not permitted in certain Designated Areas), they give an indication of what heights could be appropriate. We do not believe that allowing permitted development toward the higher end of those contained for other development would be appropriate for visual impact or practical reasons. A solar panel can be a substantial structure (although would be dependant on the area limit set out later in this section) and would be visible from a considerable distance if of a size required to produce a useable amount of energy. It would also be impractical and expensive to maintain solar panels if they were up to 15 or 18m above ground level.

Permitted development rights for free standing solar panels in the UK and Ireland seems to be reaching a consensus that the maximum height in the range of 2-4m is appropriate. In a workshop, Entec asked stakeholders whether a height limit of 4m would be appropriate in non-domestic land uses in Northern Ireland. There was a high level of uncertainty regarding a 4m height limit being permitted development, with 'don't know' responses totalling 61% of replies, 22% agreeing and 17% disagreeing with the limit. When asked whether a 2m height limit was an appropriate limit for permitted development, 50% of the Development Control officers consulted were in agreement, with 17% against and 33% unsure.



Only one freestanding solar panel case study exists. We understand this is less than 2m high and could, in theory therefore be eligible for proposed permitted development rights with a 2m height limit if other relevant conditions were complied with. Freestanding and flat roof mounted solar are erected on a similar principle however (i.e. both are mounted on a framework) and for this review, where a height could be determined, the cases studies were 0.3-0.7m off the ground. Even allowing for a gap between the ground and the panels to prevent, for example, grass growing in front of the panels if it was erected on a lawn, none of these installations would be expected to exceed 2m in height. Research of PV panels did not reveal any that were 2m in height or more, although a number were found which were up to 1.6m in height, allowing up to 40cm ground clearance if they were installed as freestanding panels.

In light of the above we recommend a height limit of 2m for permitted development of freestanding solar panels. We also recommend that the lack of examples of freestanding solar panels is highlighted in the consultation document and a supplementary question asking whether a 4m height limit would be more appropriate. Increasing the height limit to 4m would allow an array of 2 or more PV panels to be arranged vertically.

Following consultation the Planning Service is considering allowing freestanding solar panels in dwellinghouses to have permitted development if the array is of area up to 14m². In the Republic of Ireland non-domestic free standing solar panels can be permitted development within the curtilage of on an industrial building if the area of the solar array does not exceed 50m² and in the curtilage of a light industrial building, on business premises or in an agricultural holding if the array does not exceed 25m². Domestic permitted development rights in the Republic of Ireland allow a surface area of up to 12m² and in England up to 9m².

The 14m² surface area limit to permitted development in dwellinghouses in Northern Ireland was arrived at by the Planning Service as this is the approximate area of panels needed for a 'typical household' (estimated at 22MWh/year). The surface area required in a non-domestic context could vary considerably from this depending on energy usage. In England, BERR has defined 'small industry' as using between 20-499MWh/year. A small industrial unit at the bottom end of this energy usage scale could therefore expect most or all of its energy requirements to be provided by a solar panel of surface area 14m². By extrapolation, a small industrial business at the top end of the BERR scale could require a panel surface area in the order of 318m² (e.g. 109m long by 2m wide) of solar panels to provide all its energy requirements. A free standing panel of this size however does not necessarily lend itself to permitted development in every non-domestic situation. At a workshop stakeholders were asked whether they agreed that permitted development should be limited to free standing solar panels with a surface area not exceeding 14m². There was a high level of uncertainty to this question with some 65% of responses being 'don't know'. Stakeholders were also asked whether permitted development rights for free standing solar panels on agricultural land could be extended to permit a maximum surface area of 300m². 35 % of stakeholders disagreed with this limit and 48% were unsure. The negative response to the higher limits on agricultural land was due to concerns such as cumulative effect, effects on visual amenity and potential biodiversity impacts. Development Control officers consulted for this review were also concerned with regard to free standing solar panels with over half unsure or against the 14m² surface area and only 1 of 6 officers was supportive of a 300m² surface area limit for free standing solar panels in agricultural areas.



To minimise the likelihood of visual impacts Entec believe that the majority of solar panels are better mounted on buildings, particularly roofs, than to be free standing. Nevertheless, we recognise that in some situations building mounted panels may not be appropriate and that the Planning Service have indicated that the baseline for permitted development rights proposed for non-domestic microgeneration users is that those proposed for domestic users should be conferred as a basic minimum unless there are exceptional reasons for doing otherwise. We therefore recommend that a precautionary approach is followed initially and that free standing solar panels are limited to a maximum surface area within a building curtilage or agricultural unit of 20m². This is marginally larger than the area permitted for dwellinghouses and will therefore be of benefit to the smaller energy users on non-domestic land uses. Larger energy users will generally be less constrained than small energy users and a planning application fee will therefore have less of an economic impact on the business. We recommend that if this surface area limit is adopted it is reviewed to ascertain whether it has had any effect on the number of free standing solar panels that are erected in Northern Ireland and to establish whether there is scope to increase the surface area of solar arrays that can be permitted development.

We do not believe that the 20m² surface area limit need be confined to a single array panel as this is likely to create difficulties for installers in some situations, particularly when combined with the 2m height maximum for free standing panels. Instead we recommend that the total surface area of solar panels erected under permitted development within a building curtilage should be limited to a total surface area of 20m². This allowance is in addition to any building mounted solar panels allowed under permitted development, although it should be noted that the total energy produced by all renewable technologies erected under permitted development should not exceed the requirements of the building or agricultural unit in which it is erected (see Section 5).

Visual Impact - Location

Following consultation the Planning Service is considering recommending that free standing solar panels should not be permitted where any part of a solar panel is nearer to any road which bounds the curtilage than the part of the dwellinghouse nearest to that road. Permitted development in the Republic of Ireland is limited in business premises and light industrial buildings (but not in industrial buildings or on an agricultural holding) such that panels are permitted development only if they are not located forward of the front wall of the building or premises.

At the stakeholder workshop 52% of respondents agreed that restricting permitted development rights to stand alone solar panels behind the existing building line with 17% against such a limit. However, by including such a limit a situation may arise where a building such as a hotel, school or office park which has a large area of open ground to its front (e.g. a car park or mown grassland) will not be able to erect a free standing solar panel under permitted development rights even if it was to be located some way from the curtilage boundary and would not have any significant visual impact outside it's boundary. As there would be little visual impact in such scenarios permitted development rights should be extended to such types of land use if possible. A similar argument can also be made regarding free standing solar panels on agricultural land where it may be more appropriate for PV panels generating electricity to feed directly into the grid rather than into a building if a connection is available that has a better aspect or if buildings are set back some distance from the boundary.



We therefore recommend that in the non-domestic context rather than limiting permitted development to free standing solar panels behind the existing building line that a limit relating to the distance to the boundary is used instead. Having no limit relating to the boundary would, we believe, not be appropriate as there will undoubtedly be some visual impact from the panels. Due to the lack of case studies from which to gain evidence as to what distance criteria may be appropriate we have examined the existing GDO permitted development rights for similar non-domestic restrictions related to visual amenity. Part 8 Class A (the extension or alteration of an industrial building or a warehouse) development is not permitted with 5m of any boundary of the curtilage. We therefore recommend that the distance limit to boundaries is set at 5m as this will reduce visual impact and also reduce potential safety concerns should the solar panel fall over (see the following section).

Safety

There could potentially be some safety concerns with regard to aircraft safety and the danger of the solar panels toppling over and harming passers-by or damaging property. In relation to aircraft safety we note that agricultural and forestry development within 3km of an aerodrome is limited to buildings or structures that are 3m or less in height. As we have recommended that permitted development for solar panels only be allowed up to 2m in height we therefore do not believe that aircraft safety will be an issue although we recommend that a copy of the consultation document is passed on to all airports and aerodromes for their comment on this point.

As outlined in the previous section we have recommended that free standing solar panels are only allowed permitted development if they are a minimum of 5m from the boundary of a building curtilage or agricultural unit and 5m from any road. As the recommended maximum height of a free standing solar panel allowed under permitted development is 2m we believe the safety implications will be minimal although note that free standing solar panels could be permitted development in parks, open spaces and other publicly accessible spaces and therefore there will be some potential for harm to members of the public. We believe that in these cases the risk assessment is the responsibility of the land owner/tenant and the panel installer and is not for the planning system to address.

Sensitive Areas

Following consultation the Planning Service is not considering imposing any additional restrictions on freestanding solar panels within the curtilage of a dwellinghouse in sensitive areas. The main limitations to permitted development proposed for all free standing solar panels within the curtilage of a dwellinghouses is therefore that the solar panels must be no nearer to any road which bounds the curtilage than the part of the dwellinghouse nearest to that road. This, along with the height limitation of 2 metres and area constraint of 14m² aims to reduce the visual impact of domestic free-standing solar panels not only in Designated Areas but in general. The proposed maximum area for non-domestic uses is however greater at 20m² and it has also been proposed that a distance from the boundary of the building curtilage be imposed rather than a building line constraint. Moreover, as outlined in previous sections consideration is being given to limiting permitted development for dwellinghouses in Designated Areas for pitched roof and wall mounted solar panels such that they must not face onto and be visible from the road and for panels mounted on flat roofs such that they are not visible from the road. In light of these additional



conditions on dwellinghouses we have recommended that constraints on permitted development on roof and wall mounted solar panels in certain types of sensitive area be implemented. In the case of free standing solar panels for non-domestic uses we believe that there is potential for them to have an adverse visual impact in sensitive areas similar to that previously outlined for roof and wall mounted solar panels.

In light of the above we recommend that non-domestic permitted development for free standing solar panels in AONBs, National Parks, Conservation Areas and World Heritage Sites is removed where the panels face onto and are visible from a road.

As the installation of the support structure for free standing solar panels will be likely to require some excavation we recommend the removal of permitted development rights in ASSIs and SAIs to prevent potential impacts on the reason for their designations.

As with roof and wall mounted solar panels, free standing solar panels could have an impact on the setting of Listed Buildings. We therefore recommend a similar approach for free standing panels is applied to Listed Buildings, i.e. permitted development rights for free standing solar panels within the curtilage of a Listed Building are removed unless Listed Building Consent for the development has previously been obtained.

6.6 Summary of Recommendations

In summary, we recommend that solar panels in non-domestic land uses should generally be allowed permitted development, subject to the constraints outlined in Table 6.4.

Table 6.4 Summary of permitted development recommendations for solar panels

Type of panel	Recommendations
Roof mounted solar panels	<ul style="list-style-type: none"> • For pitched roofs panels must not exceed the highest part of the roof and, where facing onto and visible from a road, must not protrude more than 20cm from the roof plane • Maximum height of 2m for panels mounted on flat roofs • Minimum of 2m from edge of roof for panels mounted on flat roofs • Panels must not exceed the boundary of the existing roof • No permitted development for panels erected in a Conservation Area, AONB, National Park or World Heritage Site where panels face onto and are visible from the road • No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted



Type of panel	Recommendations
Wall mounted solar panels	<ul style="list-style-type: none">• Panels must not exceed the boundary of the existing wall• Where any part of a solar panel fitted to a wall within 3m of the boundary of the curtilage extends above 4m in height, panel should not extend more than 20cm beyond the plane of wall• No permitted development for panels erected on walls that face onto and are visible from a road in a Conservation Area, AONB, National Park or World Heritage Site• No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted
Free standing solar panel	<ul style="list-style-type: none">• Maximum height of 2m• Maximum surface area of 20m² for free standing solar panels erected under permitted development within the curtilage of a building or in an agricultural unit• Minimum of 5m from boundary of building curtilage or agricultural unit• No permitted development for panels erected in an AONB, National Park, World Heritage Site or Conservation Area where panels face onto and are visible from the road• No permitted development in an Areas of Special Scientific Interest or Site of Archaeological Interest• No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted



7. Wind

7.1 Introduction

All wind turbines work by placing a rotor into the wind flow. The rotor is turned by the wind and this rotary motion is then connected to a mill, pump or to an electricity generator. Faster winds contain more energy than slower winds. Winds can vary between heights above the ground but, in general, the higher above the ground, the faster the winds. This means that wind turbines are usually placed on tall towers. Wind turbines are generally placed in uninterrupted wind flows, for example on smooth rounded hills, and away from tall trees. Some wind turbines are designed to be sited on buildings and can benefit from the enhanced wind flow caused by wind flowing over or around the roof.

There are three types of wind turbine: axial-flow, cross-flow and impulse. Axial-flow designs tend always to be on horizontal axes. Cross-flow and impulse designs can be on either horizontal or vertical axis (or on any axis perpendicular to the flow direction). Turbines can have any number of blades from one to many tens, although most electricity generating turbines have between two and five blades. Full-scale commercial wind turbines (1MW or more) are usually three bladed axial-flow on a horizontal-axis. There is much more variety in rotor designs and blade number in smaller wind turbines.

Wind turbines can be made to almost any size. The power produced by the turbine depends on the 'swept area' of the rotor, for example a turbine with a rotor diameter of 2m would produce roughly four times the power of a turbine with a 1m diameter rotor.

For small non-domestic users with energy demands similar to that of an average home a turbine with a nominal installed capacity rating of about 1.3-2.7kW would be needed depending on siting and the local wind speed. At the larger non-domestic scale such as a factory or a university campus there could be an average power consumption of a megawatt. To make a significant contribution to meeting total power demands a turbine of 0.5-2MW might be needed. Such a turbine would have a hub height of 60-100m and a total height of 90-150m.

7.2 Draft PPS18

Annex 1 (A) of draft PPS18 (paragraph A36) highlights that planning is often the key consideration in determining the location of wind turbines. It states that *'although in the past most windfarm development tended to be located in upland areas due to higher wind speeds, technological advances, and changes to the renewable electricity markets have resulted in wind speed being less pivotal in the site selection process. Generally, whether there is a reasonable prospect of obtaining planning permission is becoming a much more dominant factor in the initial site selection process.'*



Policy RE 1: Renewable Energy Development includes specific reference to wind energy developments and states that applications for wind turbines must demonstrate the following:

- i. that the development will not have a unacceptable impact on visual amenity or landscape character through: the number, scale, size and siting of turbines; or the need for new transmission lines for connection to the electricity supply grid;
- ii. that the development will not impact significantly on peatland carbon stores if sited in or near a peatland habitat;
- iii. that the development has taken into consideration the cumulative impact of neighbouring wind turbines or wind farm development, existing or approved;
- iv. that no part of the development will give rise to unacceptable electromagnetic interference to communications installations; radar or air traffic control systems; emergency services communications; or other telecommunication systems;
- v. that no part of the development will have an unacceptable impact on roads, rail or aviation safety;
- vi. that the development will not cause significant harm to the safety or amenity of the users of any regularly occupied building arising from noise; shadow flicker; ice throw; and reflected light; and
- vii. that above-ground redundant plant (including turbines), buildings and associated infrastructure shall be removed and the site restored to an agreed standard appropriate to its location.

The requirements above provide a useful indication of what key planning concerns should be addressed in considering limits to permitted development rights for wind turbines. In particular, it is important that this review takes account of issues relating to: nature conservation and built heritage; visual impacts relating to size and scale; local environmental impacts including noise, flicker and electromagnetic interference; and cumulative effects.

7.3 Stakeholder Workshop

For a stakeholder workshop Entec identified the top 3 planning issues with regard to wind as:

- Visual impact
- Annoyance, e.g. noise, vibration
- Safety, e.g. potential affect on radar, topple

There was general agreement that the issues identified above were the most important planning considerations. Concerns relating to the visual impact of wind turbines focused on their potential cumulative effect with one stakeholder stating that *'it is critical that the visual amenity and tourist amenity is not compromised by turbine*



proliferation. Accurate figures regarding how many small scale wind turbines are currently operating in Northern Ireland and forecasts for how many there may be in the future are not currently available. There have been various attempts to quantify the number of small scale wind turbines in the UK including a study commissioned by BERR and others which estimated that in 2007 there were 1,100 grid connected microwind turbines across Scotland, England and Wales and that this could increase to between 7,400 - 112,800 depending on the policy scenario that was taken forward⁴⁰. The Carbon Trust have recently released a report⁴¹ into the potential UK carbon savings from small-scale wind energy and have estimated that 1.5 terawatt-hours of electricity could realistically be generated from small scale wind turbines in the UK. The British Wind Energy Association has estimated that this amount of electricity could mean that 2 million micro and small wind turbines would need to be installed across the UK⁴².

Similarly, the cumulative effect of noise, flicker and shadow, particularly on residential amenity, was also recognised as an important issue. However, for many stakeholders safety was seen as the *'top issue'*. Safety-related concerns focused on the risk of interference with radio and radar equipment, building safety and clearance from overhead lines and cables.

However, in some instances there was disagreement over whether some issues were concerns at all. For example, one stakeholder commented that the visual impact of wind turbines was of *'questionable importance'* whilst another suggested that turbines did not present a risk to safety *'unless on busy flight paths.'*

Other issues identified included ecological impacts, particularly in relation to birds strike and disturbance as well as on protected or priority habitats.

Stakeholders were asked whether they believed that installing a 21m high (14m height to hub) free standing wind turbine in an industrial complex could be permitted development. 32% of stakeholders agreed that this could be permitted development, 36% thought that it shouldn't be permitted development and 32% were unsure. Comments included *'as long as it supplies only the needs of the complex [i.e. building]'*, *'it complements industrial landscape'* and concerns regarding cumulative impacts and safety, particularly in relation to airports.

⁴⁰ BERR (2008) The growth potential for Microgeneration in England, Wales and Scotland, available at <http://www.berr.gov.uk/energy/sources/sustainable/microgeneration/research/page38208.html> (accessed 1 September 2008)

⁴¹ Carbon Trust (2008) Small-scale wind energy: Policy insights and practical guidance, available at <http://www.carbontrust.co.uk/technology/technologyaccelerator/small-wind> (accessed 4 September 2008)

⁴² See http://www.bwea.com/media/news/articles/millions_of_consumers_waiting.html (accessed 4 September 2008)



7.4 Evidence: Building Mounted Wind Turbines

7.4.1 Case Studies

Only 2 building mounted wind turbine case studies, one on a school and one on a health centre, were uncovered during this review both of which were recommended for approval by the case officer and were subsequently approved by the DC Group with no conditions except that development must commence within 5 years. The turbine at Knockbracken Clinic had an installed capacity of 1kW and was directly connected to the mains. It was installed to the front elevation of the building and the case officer believed it would have minimal impact on the character of the area as its location was not visible beyond the boundaries of the Health Care Park. The turbine had a blade diameter of 1.75m and was mounted on a pole which extended 2m above the roof line where it was attached although the blade tip was actually below the highest part of the building. The turbine was located behind the building line.

The second planning application for a building mounted turbine to receive approval was located at Cedar Lodge School in Belfast, which was under construction at the time of the application. The blade diameter was 1.8m and the blade tip extended to 2m above the roof line where it was mounted (although it was lower than the highest point of the roof in another part of the building) to a total height of 8m above the ground. The site was located in a residential area although the closest household was 80m from the turbine. Neither application was within a Designated Area or in the curtilage of a Listed Building.

7.4.2 Other Permitted Development Consultations

In the Northern Ireland consultation on permitted development rights for microgeneration in dwellinghouses, 71% of respondents agreed that wind turbines attached to a dwellinghouse or other buildings within the curtilage of a dwellinghouse should have permitted development rights. However, due to concerns particularly regarding the complexity of limiting the potential for noise impacts the Planning Service is considering not introducing permitted development rights for wind turbines (both free standing and building mounted) at present and proposes to review the way forward upon completion of work on industry standards by BERR and this review of non-domestic microgeneration. Should a way forward be agreed the Planning Service are considering incorporating a number of limits to permitted development for building mounted turbines on dwellinghouses. These limits are summarised in Table 7.1. A similar situation exists regarding permitted development rights for building mounted turbines on dwellinghouses in England which will not be introduced until standards regarding noise and vibration are agreed. The limits to permitted development that CLG are considering incorporating are included in Table 7.1. In the Republic of Ireland it has been decided that permitted development rights for building mounted turbines for either domestic or non-domestic land uses will not be introduced at this time.



Table 7.1 Limits to permitted development in dwellinghouses for building mounted turbines in England and Northern Ireland

Constraint	Limits being considered in England	Limits being considered in Northern Ireland
Maximum total height	Less than 3m above ridge of roof (including blade)	3m above highest part of roof
Maximum blade length	Diameter of blades less than 2m	2.5m diameter for both horizontal and vertical axis turbines
Number of turbines	n/a	1 turbine within the curtilage allowed permitted development rights
Sensitive areas	No permitted development in Conservation Areas or World Heritage Sites	No permitted development for building mounted turbines in Designated Areas where the wall or roof to which they are fitted faces onto and is visible from a road

The Planning Service has also indicated that should permitted development rights be extended to building mounted wind turbines that they would consider providing guidance on siting and location of small wind turbines to minimise the potential detrimental impact on birds, bats, public broadcasting etc.

7.4.3 Justification of Recommendations

Visual Impact

One of the major issues associated with allowing permitted development of building mounted wind turbines is the potential for them to cause visual impact. Potential limits to permitted development that could reduce this impact in a non-domestic context could be based on height, blade diameter and number of turbines. Each of these parameters is explored in turn in this section.

In the Republic of Ireland no permitted development rights for building mounted wind turbines have been introduced for domestic or non-domestic land uses. This is due to concerns⁴³ regarding the performance of building mounted turbines being reduced because of turbulence from buildings, potential noise impacts and the effects of vibration on building structure in the absence of relevant building standards. In England, when issues

⁴³ Department of Environment, Heritage and Local Government (2008) *Proposed Amendments to the Exempted Development Provisions of the Planning and Development Regulations 2001 in Respect of Renewable Technologies for Industrial, Commercial and Agricultural Use Summary Paper on Public Consultation Process held between October 2007-February 2008* (available at <http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownload,18016,en.pdf> , accessed 08/09/2008)



surrounding noise and vibration are resolved, CLG are considering limiting permitted development to those turbines less than 3m above the ridge of the building.

In Northern Ireland, the consultation on limits to domestic building mounted wind turbines has led the Planning Service to consider restricting building mounted turbines to a maximum of 3m above the highest part of the roof. This limit was decided on as a typical 1.5kW rated horizontal axis microturbine would have a rotor diameter of just over 2m and would therefore require 3m to ensure the blades were above the roof (if the turbine was located at the highest point) and to help reduce the turbulence caused by the roof itself. The height above the roof line in the 2 case studies was 2.9m and 2m, although in neither case did the top of the turbine extend beyond the highest point of the roof. Both these cases would therefore have permitted development if the limit was set at 3m above the highest point of the roof.

A report prepared for the Carbon Trust⁴⁴ has found that to increase power output turbines mounted in an urban environment need to be mounted as high as possible above the mean building height and that height above the roof level is a critical parameter. It was estimated that increasing the height limit from 3m to 4m above the roof level can increase power output by 30 to 40%, and that increasing the height limit to 10m can increase power by a factor of 3 to 4 compared with a 3 m height limit, although the report notes that increases are less for optimal sites. The report goes on to note that *'turbines mounted below roof height, as may be the case for pole-mounted turbines in dense urban areas, on average experience very low wind speeds and so generate little power.'* If the object of providing permitted development rights for microgeneration is to reduce carbon emissions then serious consideration must be made to increasing the maximum limit above the roofline to 5m (4m to the hub plus 1m blade radius). Such a height however would suggest that the potential for visual impact would also be greater and therefore may be unsuitable for permitted development. There is also far more likelihood that a turbine at this height could interfere with electromagnetic signals such as for mobile phones and television and for structural damage to buildings in high winds.

At the stakeholder workshop we asked whether permitted development could be allowed for wind turbines (both stand alone and building mounted) up to 4m above the nearest building. There was a general lack of consensus among respondents in relation to this limit with 41% of respondents agreeing with a height limit of 4m, 32% disagreeing and 27% unsure. Comments included *'other factors such as trees, outbuildings etc should also be considered'* and *'height, safety requirements etc should be site specific and their impact on the local environs should be taken into account. If criteria was introduced then it may be possible to decide what is permitted development or not.'*

We do not believe that visual impacts can be successfully minimised by allowing permitted development for wind turbines up to 5m above the roof line and recommend that the maximum total height of 3m above the roofline

⁴⁴ Met Office (2008) *Small-scale Wind Energy – Technical Report Urban Wind Energy Research Project Part 2 - Estimating the Wind Energy Resource*, prepared for Carbon Trust (available at <http://www.carbontrust.co.uk/NR/rdonlyres/6A29EA3A-C9B1-4129-849A-554030DEA081/0/SmallscaleWindEnergyTechnicalReport.pdf> , accessed 08/09/2008)



(excluding the chimney) which has been recommended for domestic consultation is also appropriate for non-domestic land uses, while acknowledging that even at this height there is potential for visual impacts. A maximum of 3m in height is also in line with the current thinking toward limits for domestic mounted turbines in other parts of the UK. We also recommend that guidance is published regarding the best siting of building mounted turbines and includes information that should the turbine be sited in an area of turbulence its capacity for energy generation will be reduced. This limit applies to both vertical and horizontal axis turbines.

The domestic consultation recommended a maximum blade diameter of 2.5m. This is somewhat more than has been recommended in other parts of the UK which set a blade limit of 1-2m diameter. It is however in line with Entec's previous research into non-domestic microgeneration in England and Wales and would enable permitted development rights to be extended to the case studies researched for this review. Increasing this limit could result in an increase in the potential visual impact and we therefore recommend that the limit to blade diameter is set at the same 2.5m maximum diameter as was consulted on for dwellinghouses.

Discussions with industry stakeholders for the England and Wales review revealed that such a diameter limit is only appropriate for horizontal axis axial flow wind turbines most commonly seen mounted on buildings and that to be applicable to vertical axis wind turbines it would need to be converted to a swept area. A 2.5m diameter blade on a horizontal axis wind turbine would have an equivalent swept area of 4.9m^2 (i.e. $\text{Area} = \pi r^2$). We recommend that a maximum of 5m^2 swept area is the limit for permitted development of vertical axis wind turbines.

To reduce visual impact the Planning Service has indicated that in a domestic context only one wind turbine would be allowed permitted development on a dwellinghouse. There are some non-domestic situations where we can envisage that the visual impacts of multiple turbines on the roof of a non-domestic building may not add to the visual impact. In fact, in other parts of the UK rows of microturbines have been used as an architectural feature. Leaving aside the artistic merits of a row of microturbines, if they cannot be seen by members of the public then they will not be likely to have a visual impact except within the curtilage of the dwelling, however the number of cases where this would be applicable is likely to be relatively small, perhaps limited to isolated hotels or farm buildings and we are not convinced adding this layer of complexity to the GDO would accomplish anything in terms of carbon reductions. In these circumstances it is likely that a single free standing wind turbine, provided it is not subject to wind turbulence, could produce more energy than a number of building mounted turbines. Other land uses where there is potential to increase the number of turbines allowed permitted development includes retail parks, industrial sites or on top of high buildings. In England and Wales the merits of increasing the number of microturbines with permitted development to 4 is being considered for buildings of 15m or higher.

The *Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999* (the EIA Regulations) amends the GDO to ensure that it does not grant planning permission for certain types of development which is likely to have significant effects on the environment. Such development has to be the subject of a planning application and the application itself must be accompanied by an environmental statement which sets out the developer's assessment of the project's likely significant effects on the environment and a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment. The EIA Regulations are likely to apply where development consists of installations for the



harnessing of wind power for energy production and either any part of the development is to be carried out in a sensitive area (as defined in the EIA Regulations), the development involves the installation of more than 2 wind turbines, or the hub height of a wind turbine is more than 15m high. If we recommended allowing permitted development for 4 building mounted wind turbines this would trigger the EIA Regulations and thereby remove permitted development rights for such a development. As the purpose of amending the GDO is to remove unnecessary bureaucracy and make it easier for people to install microgeneration equipment we do not believe a recommendation that would, in effect, remove the permitted development right, fulfils this brief.

In light of the above we recommend that permitted development is limited to a single wind turbine mounted on a building but that a supplementary question is included in the consultation document asking for stakeholder opinion on extending permitted development rights for up to 4 wind turbines where the building they are mounted on is 15m or more in height. If the Planning Service decides to take forward the option of allowing permitted development for three or more wind turbines on a building we recommend detailed discussions are held with CLG and the Scottish Government and Welsh Assembly Planning Departments to agree on amendments to Schedule 2 of the EIA Regulations.

Noise and Health

In the domestic consultation the Planning Service suggested that the risk of noise nuisance might be minimised by requiring wind turbines (both building mounted and free standing) to be located a minimum of 10m from the façade of the nearest residential building. 75% of respondent agreed that a distance limit from residential was appropriate although there was less agreement regarding what this minimum distance should be. Some respondents suggested that a 10m separation in an urban environment would disadvantage those with small gardens, others that it would be more prudent to have a larger distance and review the outcomes of this later.

There was also some disagreement between respondents as to whether a distance criteria should be used as a means of limiting permitted development for wind turbines. Most agreed that using a distance limit was a simple method, easy to comply with and enforce and was easily understood. Others, such as the Chief Environmental Health Officers Group argued that to provide sufficient protection to local amenity there needed to be a limit based on noise level at a given wind speed which should not be exceeded at the nearest neighbouring garden or window. Action Renewables were concerned that using a distance criteria for wind turbines would not distinguish between different turbine models with varying noise outputs. As a result of the complexities regarding noise the Planning Service is considering delaying a decision on permitted development rights for wind turbines until work on industry standards by BERR and this review of non-domestic microgeneration has been completed.

The current position in England is quite similar to that in Northern Ireland with CLG awaiting further work before finalising recommendations. In the English domestic consultation a limit based on noise levels at receptors was recommended. Many respondents commented that this approach was far too complex and would lead to extra work for Council Environmental Health Officers and lead to confusion for manufacturers, installers and customers. Conversely those respondents who dealt with noise on a regular basis, such as the Institute of Acoustics, commented that the recommendations were too simplistic.



In Entec's review of non-domestic microgeneration in England and Wales we recommended that permitted development rights for wind turbines should await the development of an UKAS accredited certification scheme for microgeneration and that permitted development rights would only be given to certified installers and products.

As an interim measure we recommended that; (a) a distance criterion be established limiting permitted development to those turbines at least 100m from a residential window, (b) that any wind turbine installed under permitted development rights would be required to have been tested by the manufacturer to standards contained in the British Wind Energy Associations (BWEA) (2007) *Small Wind Turbine Performance and Safety Standards* and (c) that the turbines should be rated as having a maximum BWEA Reference Sound Level of 40dB(A). Using these criteria would place the responsibility for minimising residential noise disturbance on wind turbine manufacturers.

The situation regarding noise limits in England has not yet been resolved and we recommend that the Planning Service liaise closely with CLG to consider whether a similar approach should be taken to what can be a complex issue. We believe there is little point in having differing standards relating to noise in the UK as this would be liable to confuse manufacturers, installers and customers and could lead to less wind turbine products being available in Northern Ireland if manufacturers chose to conform to the English requirements.

The UKAS accredited Microgeneration Certification Scheme currently requires that for a micro or small wind turbine to be certified it must have a rated electrical power output of between 0.3kW and 50kW (measured at a wind speed of 11.0m/s) and that they meet and continue to meet the requirements of the BWEA (2007) *Small Wind Turbine Performance and Safety Standard*. BWEA are currently updating these standards and are in discussion with CLG and Defra to ensure the noise impact can be minimised. Our understanding is that this may lead to a certified product installed by a certified installer to be permitted development provided that certain noise levels are met at the façade of a residential building and at the property boundary.

The scheme is likely to work by providing each certified product with a noise label which will show 40dB(A) and 45dB(A) noise levels. A certified installer will then utilise what is called the NOABL mean wind speed database at 10m to ascertain the mean wind speed in the area where the product will be installed. This figure will then be adjusted to take into account a Rayleigh wind distribution and adjusted by a wind correction factor to ascertain the $V_{90,H}$ wind speed. This can then be used to calculate the distances from the wind turbine where noise levels of 45dB(A) and 50dB(A) will occur. We understand that CLG are currently considering allowing permitted development for wind turbines located such that they are below the 45dB(A) threshold at receptors. This will result in a relatively straightforward process for an accredited installer or wind turbine supplier to ascertain whether a specific certified product will be permitted development.

In light of the above, we recommend that no permitted development rights are extended to building mounted wind turbines until a suitable means of limiting potential noise impacts is resolved between Defra, BERR, industry, the Planning Service and other stakeholders.



Vibration

Vibration can also cause nuisance and may, in the case of building mounted turbines, result in damage to the structure to which they are attached. During the domestic consultation, all respondents agreed that the potential effects of vibration should be addressed by manufacturers and installers of building mounted turbines and that the onus should be on householders to seek to ensure that this issue is addressed in their installation. Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering recommending that vibration should not be controlled with permitted development rights. In Entec's previous research into microgeneration in England and Wales we recommended that turbines should be located a minimum of 100m from residential property windows in order to mitigate against vibration becoming a significant annoyance for householders. However, this was an interim measure and we recommend that annoyance/structural considerations relating to vibration caused by building mounted turbines are dealt with through an UKAS accredited microgeneration certification scheme MCS thus ensuring that permitted development rights are only extended to certified manufacturers and installers. As with the issue of noise, we recommend that the Planning Service liaise with CLG to ensure the application of a consistent standard in relation to vibration.

Safety

Building mounted wind turbines, unlike free standing turbines, will be inaccessible to members of the public. There is some potential however that improperly installed or maintained turbines could become detached from the building and harm people passing below them, although we note that this was not recognised as a factor in the domestic consultation. This safety aspect may not strictly be a planning concern and could potentially be accommodated under building regulations, however, we believe it would be prudent to remove permitted development rights for those building mounted turbines that would extend above public open space, roads and footpaths.

The second safety related issue concerns the potential for wind turbines to affect aircraft safety due to the turbine causing radar interference. The current GDO allows agricultural development up to 12m in height and with no height restriction for forestry buildings, unless the agricultural or forestry development is within 3km of the perimeter of an aerodrome, in which case development must not exceed 3m in height. In the domestic consultation the Planning Service did not make any specific recommendations in respect of this issue although a recommendation was made that guidance should be provided on the siting and location of small wind turbines in order to minimise their potential impact on broadcasting (which could be equally applicable to radar). At the non-domestic stakeholder workshop several comments were made in relation to the importance of the location of turbines close to aerodromes.

Aircraft safety is one of the major issues that must be agreed at a UK level before permitted development rights for wind turbines can be allowed. Our understanding of the current UK situation is that a memorandum of understanding with regard to wind turbines and radar operators (including Defence Estates) has been published that outlines the need to work together to find a way to overcome the potential conflicts between aircraft safety and wind turbines. One outcome of this will be the setting up of a website that will allow installers to ascertain if the



turbine they are erecting could have an effect on aircraft safety. When this website is running it should be relatively simple for a trained installer to input the site and height details of a turbine and ascertain if there are any safety issues to be considered. Details of how the website will work and how safety issues can be enshrined in permitted development regulations have still to be formalised. We believe it would be better to wait until these details have been agreed before the Planning Service allows permitted development rights for wind turbines in Northern Ireland and also recommend that the Planning Service actively engage with CLG to ensure issues relevant to Northern Ireland are considered before a final agreement is reached. We believe that this will include a condition that the turbine must be an UKAS accredited certified product and erected by a certified installer, as was also recommended to overcome noise impacts. It may be difficult to write conditions that will require aircraft safety is adequately dealt with in the GDO and the option of including such requirements within certification schemes should be actively explored with accrediting bodies and government departments in other parts of the UK.

As well as the safety issues of topple and aircraft safety, the potential for wind turbines to induce seizures in those with photosensitive epilepsy has been raised as an issue in other parts of the UK. The domestic consultation document did not set out any recommendations in relation to frequency, however the need to gain more information relating to the performance of wind turbines, including flicker, was raised as an issue by consultees. Flicker was also highlighted as a concern by several stakeholders at the non-domestic workshop. During the CLG's consultation on householder microgeneration, Epilepsy Action requested that all turbines should have a maximum frequency of 3 Hertz. This request was subsequently carried forward as a provisional recommendation in Entec's review of non-domestic microgeneration in England and Wales. Epilepsy Action's position is that it *'does not challenge the theory that wind turbines may create circumstances where photosensitive seizures can be triggered. However from our experience and that of our members and website users it does appear that this risk is minimal.'*⁴⁵ In light of these circumstances we recommend that a frequency limit is not included in the GDO but that the issue is dealt with by manufacturers through an UKAS accredited certification scheme.

Electromagnetic Interference

In the domestic consultation, National Grid Wireless raised concerns in relation to potential interference with public broadcasting and suggested that there could be provision for prior notification procedures to enable consultation with broadcast transmission providers.

Draft PPS18 states that *'provided careful attention is paid to siting, wind turbines should not cause any significant adverse effects on communication systems which use electromagnetic waves as the transmission medium (e.g. television, radio, telecommunication links, and police and emergency service links).'* Although it goes on to note that potential impacts can be mitigated by moving the turbines by up to a few hundred metres away this will generally not be feasible in the case of small scale wind turbines and it may therefore be necessary for consultation with specialist organisations responsible for the operation of electromagnetic links. Draft PPS18 also highlights

⁴⁵ <http://www.epilepsy.org.uk/campaigns/survey/windturbines>, accessed 22/07/2008



that wind turbines could impact on civil radio communications, utility providers, emergency services and operators in the Republic of Ireland.

During this review we have found no evidence regarding the effects of small scale wind turbines on telecommunications signals although there seems to be a general acknowledgement within the wind farm industry that large turbines can have a localised effect on telecommunications signals and that, at least for TV signals, this can be overcome through booster signals for TV reception or simply realigning the TV aerial such that it is pointing in a different direction, although we note that in the Republic of Ireland non-domestic wind turbines must have a *'blade made of material that does not deflect telecommunications signals'* before enjoying permitted development rights.

We are not convinced that requiring a blade to be made of such a material is appropriate in the GDO in Northern Ireland due to the lack of evidence regarding the effects of small scale wind turbines on communications signals, the lack of evidence regarding the efficacy of turbine blades with non-deflecting materials and also the likely difficulties that could be encountered in enforcing this condition,

In response to the concerns of National Grid Wireless raised during the domestic consultation, the Planning Service are considering providing guidance on the siting and location of small wind turbines to minimise the potential detrimental impact on public broadcasting (as well as potential effects on birds and bats). We recommend that this approach is also followed in the non-domestic context and that the Planning Service should seek to formalise this through encouraging this to be part of the required training for certified installers accredited by an UKAS accredited certification scheme for microgeneration. We also recommend that the Planning Service engage with other government planning departments in the rest of the UK and the Republic of Ireland to develop a common approach to researching whether there are any issues regarding communications interference by small scale wind turbines that cannot be resolved by guidance alone.

Ecology

There is concern among many environmental organisations that wind turbines can have ecological impacts, particularly in relation to bird and bat strike. Although currently there is little evidence to suggest that this impact is significant, the Bat Conservation Trust has recorded approximately 10 bat and 1 bird deaths within close proximity to small turbines in the UK⁴⁶ between August 2003 and June 2007. In the domestic consultation there was agreement among consultees that the Department should provide guidance on siting and location of small wind turbines to minimise the potential detrimental impact on birds and bats. Similar concerns were raised at the stakeholder workshop with one respondent stating *'potential for impacts on birds - disturbance, collision risk and displacement. Also on protected or priority habitats through access routes, excavation of peat, etc'* although the same respondent added that they were *'generally not concerned about single turbines'*. In both the building

⁴⁶ http://www.bats.org.uk/publications_download.php/431/07.06.05_microturbine_mort_v3.pdf [accessed 21/07/08]



mounted and free standing case studies examined for this review, there was no requirement placed on installers to undertake a bat survey and no other ecological conditions were imposed.

In light of this apparent uncertainty, we recommend that further investigation into these issues is undertaken by the Department of Environment with a view to producing guidance which:

- provides instructions on how to identify bat roosts on buildings where the turbine is to be mounted and identifies potential threats to birds;
- clearly outlines that it is illegal to harm protected species including bats;
- details measures to mitigate any potential effects of wind turbines; and
- recommends that turbines are not installed where mitigation is not possible and removed where unexpected ecological harm is found to be caused and cannot be mitigated.

It should be noted that the above points are recommended for inclusion in a guidance document and would not be enforceable in planning terms, although in some cases (e.g. causing harm to protected species) may be enforceable by legal authorities. We recommend that it is a requirement of accreditation by an UKAS accredited certification scheme that installers are tested and shown to be competent with regard the potential ecological effects of wind turbines.

Sensitive Areas and Listed Buildings

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering removing permitted development rights for building mounted wind turbines attached to a dwellinghouse or to a building within the curtilage of a dwellinghouse in Designated Areas where they face onto and are visible from a road. In trying to extend permitted development rights for microgeneration in a non-domestic context above those that may be introduced for dwellinghouses it has been necessary to unpick the different types of Designated Areas to examine whether there is scope to extend permitted development in the individual designations.

As outlined in the solar panel chapter of this report some AONBs have special countryside policy areas where specific policies are in place to protect the unique character of the area and some AONBs also have design guides which set out specific design principles focussing on local styles and layouts. The relaxation of permitted development rights in such areas may compromise the objectives of these policies and documents and the Planning Service considers that some constraints on permitted development rights for non-domestic land uses may be appropriate in AONBs and National Parks.

On balance, we believe that to remove all permitted development rights for building mounted wind turbines in an AONB (or National Park if one is declared in Northern Ireland) is unnecessary as the existing buildings already affect the landscape designations of AONBs and National Parks and the installation of turbines on such buildings is



likely to have a minimal additional visual effect. However, as with the recommendations for solar panels we recognise that some additional limitations to permitted development may be necessary to offer additional protection in AONB special countryside policy areas. We believe that removing permitted development rights specifically from AONB special countryside policy areas could overcomplicate the GDO and instead recommend removing permitted development rights for building mounted turbines if they are mounted on roof slopes or walls that face onto a road and the turbine would be visible from that road.

A building mounted wind turbine could also have a visual impact in Conservation Areas and World Heritage Sites and we recommend that permitted development rights in such areas should also be removed where the turbine is to be mounted on a roof slope or wall that faces onto a road and the turbine would be visible from that road. If new World Heritage Sites are declared in Northern Ireland the GDO should be examined to see whether existing limits to permitted development (e.g. removing permitted development rights in Listed Buildings) are sufficient to protect the special nature of such sites. Where further protection is needed this can be accomplished either through excluding permitted development through Article 4 directions or by amending the GDO as appropriate.

With regard to other types of sensitive areas there could be some potential for impacts on ASSIs declared for their bird or bat interest although little substantive evidence of the effect of microwind turbines exists. Protected species legislation will also offer some protection if building mounted turbines are found to have an effect on bats or bird species. As a precaution however we recommend removing permitted development rights for building mounted wind turbines in all ASSIs.

With regard SAIs we do not believe that allowing permitted development rights for building mounted wind turbines on existing buildings within SAIs is likely to have major impacts on the reason for their designation and do not recommend making any further limits in these areas.

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering removing permitted development rights where the turbine would be attached to an existing dwellinghouse or other buildings within the curtilage of a dwellinghouse which is a Listed Building, as this may adversely affect the setting of the Listed Building. Building mounted wind turbines could also adversely impact the setting of Listed Buildings in non-domestic situations and we therefore recommend the removal of permitted development rights within the curtilage of Listed Buildings in non-domestic land uses where Listed Building Consent has not been received for the development.

7.5 Evidence: Free Standing Wind Turbines

7.5.1 Case Studies

22 free standing wind turbine case studies that were of a size where permitted development may be possible have been examined for this review. All of these were single turbines, had submitted planning applications and all were approved by the Development Control (DC) Group. They ranged in tower (hub) heights from 10-37m and had



peak installed capacities (where known) of 6-25kW. In the majority of these examples, the turbines were located over 50m from the nearest residential dwelling with a total of 8 turbines at a distance of 100m or more. 5 of the case studies were located within 50m of residential dwellings although in all these cases the nearest dwelling was part of the farm holding to be served by the turbine.

Very few conditions were attached to these approvals. The majority of conditions were typically universal in their nature, i.e. that development must begin within 5 years and be carried out in accordance with approved plans, although conditions attached to 2 proposals related to hard and soft landscaping. There were no conditions relating to colour, nuisance, noise or safety although in many cases pre-application discussions or withdrawal/resubmission of amended applications may have resolved any issues that could have warranted such conditions.

4 of the case studies were recommended for refusal by the case officer. Refusal was recommended in 3 of these cases because of the detrimental impact on the amenity of an AONB due to the size and scale of the turbines which had total heights (i.e. to the blade tip) of 18m, 20m and 42m. In all cases the applications were approved by the DC Group, although in 2 of them this was after further consultation. A further 2 case studies were located in AONBs, one in school grounds and one on agricultural land. The 12m high turbine in the school was thought unlikely to have a significant detrimental impact because it would be screened from the main road by the school building and vegetation, although it was more open from another (minor) road. The turbine located on agricultural land had a total height of 18m and though visible from parts of the surrounding countryside the impact on visual amenity was judged minimal as it was set back from the road and would be screened by farm buildings. The other case study recommended for refusal by the case officer was for a turbine with a total height of 25m which was intended to serve a tea room and dog parlour. Although the turbine was not within a Designated Area, the case officer stated that the turbine would be a very prominent feature on the landscape when travelling in both directions along the main road and that it was above the normal height of 15m for single domestic turbines.

None of the case studies were located in other types of Designated Areas or within the curtilage of a Listed Building. As part of Entec's previous research in England and Wales, several case studies were examined within Listed Buildings and other sensitive areas. For example, a turbine mounted on a 12m tower within a Conservation Area and the curtilage of a Grade 1 Listed Building was refused on the grounds that it would be a prominent and incongruous feature within a Conservation Area and would have negative impact on views out of the Conservation Area. In addition, it was judged that the turbine would be detrimental to the setting of the Listed Building as well as the open character of the rural area. However, some applications in sensitive areas were approved where the impact on the surrounding environment was considered to be minimal. One example was an application for a 15m high turbine in the Lake District National Park that was approved by officers who felt that there were only limited views of the site from public vantage points.

7.5.2 Other Permitted Development Consultations

In the domestic consultation when asked whether tower (i.e. free standing) wind turbines erected within the curtilage of a dwelling house should have permitted development rights 50% of respondents supported permitted development rights with 50% not supporting (i.e. were against or didn't know). Amongst those organisations not



supporting permitted development were Action Renewables, NI Energy Agency and the Home Energy Conservation Authority due to visual intrusion, noise disturbance and health and safety issues. As with building mounted wind turbines, the Planning Service is considering delaying a decision on the way forward in relation to permitted development rights for free standing wind turbines until completion of work on industry standards by BERR and this review of non-domestic microgeneration. Should a way forward be agreed the Planning Service are considering incorporating a number of limits to permitted development for free standing wind turbines within the curtilage of a dwellinghouse. These limits are summarised in Table 7.2. A similar situation exists regarding draft permitted development rights for free standing wind turbines in the curtilage of a dwellinghouses in England which will not be introduced until standards regarding noise and vibration are agreed. The limits to permitted development that CLG are considering incorporating are included in Table 7.2. In the Republic of Ireland amendments for free standing wind turbines in domestic and non-domestic land uses have now been introduced and are also included in Table 7.2.

Table 7.2 Limits to permitted development in for free standing wind turbines being considered or introduced in England, Northern Ireland and Republic of Ireland

Limits being considered/ introduced	Domestic			Non-domestic
	England	Republic of Ireland	Northern Ireland	Republic of Ireland
Max total height	11m	13m	3m above the highest part of the roof	20m
Max blade length	2m diameter	6m diameter	2.5m diameter	8m
Min ground clearance	n/a	3m	n/a	3m
Location	At least 12m from a boundary	Total height + 1m from any party boundary Not to be constructed, erected or placed forward of the front wall of a house	Minimum of turbine height + 10% from neighbouring curtilage or any road No nearer to any road which bounds the curtilage than the part of the dwelling house nearest to that road	Total height + 5m from any party boundary (industrial, business or light industrial land uses) Total height + 1m from any party boundary (agricultural) Total height + 5m from any non-electrical overhead cable (all) 20m from any 38kV electricity distribution line (all) 30m from centreline of any electricity transmission line of 11kV or more (all)
Aircraft safety	n/a	n/a	n/a	Not within 5km of the nearest airport, aerodrome or any communication, navigation or surveillance facility designated by the Irish Aviation Authority except with written consent



Limits being considered/ introduced	Domestic			Non-domestic
	England	Republic of Ireland	Northern Ireland	Republic of Ireland
Noise	No PD rights until standards and safeguards on noise and vibration decided	Maximum of 43db(A) during normal operation, or in excess of 5db(A) above the background noise, whichever is greater, as measured from the nearest neighbouring inhabited dwelling	No PD rights until completion of work on industry standards by BERR and review of non-domestic microgeneration	Noise levels must not exceed 43db(A) during normal operation, as measured from the nearest party boundary (industrial, business, light industrial) Noise levels must not exceed 43db(A) during normal operation, as measured from the nearest habitable house (agricultural)
Number of turbines/ cumulative impact	n/a	Maximum of 1 turbine erected under PD within the curtilage of a house	1 turbine allowed permitted development rights	No more than 1 turbine within a building or premises curtilage (industrial, business, light industrial) No more than 1 turbine within the agricultural holding and not located within 100m of an existing wind turbine (agricultural)
Sensitive areas	Must not face onto and be visible from the highway in Conservation Areas or World Heritage Sites	n/a	n/a	Not permitted development within an Architectural Conservation Area
Listed Building	No permitted development within the curtilage of a Listed Building.	n/a	No permitted development within the curtilage of a Listed Building.	n/a
Other:	n/a	Turbine components shall have a matt, non-reflective finish and the blade made of material that does not deflect telecommunications signals No advertising, signs or non-required objects	n/a	Turbine components shall have a matt, non-reflective finish and the blade made of material that does not deflect telecommunications signals No advertising, signs or non-required objects

Note that these limits and conditions are an abridged version for ease of reference. See original reports or statutory instruments for full details.

Should permitted development rights be extended to free standing wind turbines, the Planning Service are considering providing guidance on their siting and location to minimise the potential detrimental impact on birds, bats, public broadcasting, etc.



7.5.3 Justification of Recommendations

In response to the findings of the domestic consultation, the Planning Service have made recommendations across several parameters in relation to potential permitted development rights for domestic free standing wind turbines. These parameters are addressed in the context of non-domestic land uses in this section.

Visual Impact

Like building mounted turbines, the visual impact of free standing wind turbines is one of the key considerations in a review of permitted development rights for this microrenewable technology. Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering recommending that permitted development for free standing wind turbines in the curtilage of a dwellinghouse should not exceed a height (inclusive of rotor blades) of 3m above the highest part of the existing roof. Consultation comments regarding this recommendation included that turbines should be allowed to project up to a suitable height for the site which could be as much as 30m, that it could project as far as necessary to obtain the best wind conditions and that efforts should be made to ensure restrictions are uniform across the UK.

At a stakeholder workshop for this review 41% of respondents agreed that in non-domestic situations permitted development could be allowed up to 4m above the roofline while 32% disagreed and 27% were unsure. Comments included that other factors such as trees and outbuildings should be considered and that permitted development is probably not the way forward for wind turbines. The majority of the Planning Service development control officers we consulted with were against allowing permitted development for wind turbines up to a total height of 15m. The only specific comment regarding this height limit was that a 15m high turbine can be quite substantial in terms of visual impact. Other comments included that permitted development would be acceptable where all electricity generated is for the user only and that there should be no permitted development rights for wind turbines.

Other parts of the UK are considering introducing permitted development rights for domestic wind turbines. In England CLG are considering allowing permitted development for domestic wind turbines less than 11m in height to the blade tip. In the Republic of Ireland permitted development for free standing wind turbines has been amended to allow turbines up to 20m in total height (i.e. to the blade tip) in non-domestic land uses and up to a total height of 14m for dwellinghouses.

The method for allowing permitted development in England and Ireland where a maximum height is allowed permitted development is fundamentally different to that being proposed for dwellinghouses in Northern Ireland which relies on the existing roof line to generate the maximum permitted height. The Northern Ireland method allows for the scale of the wind turbine to be comparable to the nearest building and should have less potential for visual impact than a fixed height limit. However, as highlighted in the building mounted wind turbine section, a report for the Carbon Trust notes that increasing the hub height of a turbine to 4m above the roofline provides efficiency gains when compared to hub heights 2-3m above the roof line.



We note that there are a large number of stakeholders who believe that permitted development for wind turbines should not be allowed in any circumstances. We can understand this viewpoint due to the potential for visual and other impacts and the site specific nature of many wind turbine developments. However, it seems very likely that permitted development for wind turbines will be allowed in other parts of the UK (after agreement is reached on certain standards) and permitted development is already allowed in the Republic of Ireland. In light of this, and the fact that following consultation on permitted development rights for householder microgeneration, the Planning Service is considering allowing permitted development for dwellinghouses in Northern Ireland, it would be anomalous for us to recommend that there should be no permitted development rights for wind turbines in non-domestic land uses in Northern Ireland. In fact we recognise the need to maximise the potential of wind turbines in a non-domestic context and that permitted development rights for this equipment should therefore be more relaxed than for dwellinghouses if possible.

We have considered recommending that permitted development for wind turbines with a hub height up to 4m above the roofline should be allowed, however we believe that there are some situations that this could prevent the maximum potential energy output being achieved. For example, a turbine erected on an agricultural unit may be located closer to another building outside the unit than the farm building or operation it is supplying with electricity (either directly or via the grid). In this case it would make more sense that the maximum height of the turbine should relate to the closer building. Another example where a height limit relating to the roof line may not be applicable is where a low lying building (or buildings) is located within a large curtilage where a tall turbine would not be seen from outside the boundary of the property, yet under permitted development rights utilising a height limit related to the roof, this would not be permitted.

To determine what might be an appropriate maximum height for a free standing wind turbine in a non-domestic land use we examined the existing GDO. Although this does not directly relate to wind turbines, it provides a useful indication of the scale of development that could be allowed. For example, Part 14 Class B of the GDO, which relates to development on operational land of the Civil Aviation Authority, permits the erection of masts up to a maximum height of 15m (from ground level). Similarly, Part 8 Class B, which relates to development carried out on industrial land for the purposes of an industrial process, allows plant or machinery up to a maximum of 15m above ground level. An examination of some of the UK's wind turbine suppliers showed that the total heights of their turbine installations varied between 8-20m, with the higher output turbines generally mounted on taller poles of up to 15m, the limit of the hub height allowed for wind turbines before an EIA may be required. There is however no reason to suppose that manufacturers could not mount the turbines on a pole of any height depending on what was best for the site. In the case studies examined as part of this review only 3 turbines had a total height of 15m or below, all of which received planning approval, however we recognise the concerns that increasing the height of wind turbines allowed under permitted development limit much further could compromise visual amenity. In accordance with the GDO, we therefore recommend that development of free standing wind turbines be permitted up to a maximum total height (to the blade tip) of 15m and that the effects of this are reviewed by the Planning Service and consideration given to extending the maximum height permitted if it can be shown that the impacts were limited. If the permitted development limits were to be increased in future we recommend that this should be a small step change up to a limit of 15m hub height, the current limit above which there may be requirements to carry out an EIA.



As a general rule, the bigger the turbine the more energy can be produced and the higher the potential for visual impacts. For cross-flow horizontal axis turbines this is dependant on the blade diameter. In the Republic of Ireland permitted development for free standing wind turbines has been amended to allow turbines with a blade diameter of up to 8m in non-domestic land uses and up to 6m in the curtilage of a dwellinghouses. In England, CLG are considering limiting the blade diameter of turbines within the curtilage of a dwellinghouse to less than 2m. Following consultation on permitted development for domestic microrenewables in Northern Ireland, the Planning Service is considering recommending that permitted development is restricted to turbines with a blade diameter of 2.5m or less.

An examination of some of the wind turbines available in the UK found a turbine with a blade diameter of 3.5m had a rated peak output of 2.5kW and could produce 2.5-5MWh of electricity per year depending on the site and wind conditions. Taking the BERR definition of small industry to be those that require 20-499MWh of energy (i.e. electricity plus heat requirements) per year it is unlikely that wind turbines with a blade diameter of up to of below 3.5m would have a significant effect on reducing the energy requirements of many small businesses at the higher end of this energy use scale. Wind turbines with a blade diameter of 5.4-5.5m (rated peak output of 5-6kW) were estimated to be able to produce 6-12MWh of electricity in a year and a turbine with blade diameter 9m (rated peak output of 15kW) was estimated as having an annual output of 15-30MWh depending on conditions. In light of this we believe that the maximum permitted development blade diameter for free standing turbines in non-domestic land uses needs to be bigger than the 2.5m recommended by the Planning Service for domestic use and believe that this needs to be at least 6m, and preferably 10m, to allow a reasonable contribution to the energy requirements of some non-domestic land uses to be made by permitted free standing wind turbines. In Entec's previous research into non-domestic microgeneration in England and Wales we recommended that a maximum diameter of 6m be allowed as permitted development such that meaningful contributions to energy requirements could be made. We also recommended that further consultation should take place to determine whether this limit could be increased to 10m in order to maximise energy gains.

At the stakeholder workshop there was no real consensus as to whether a maximum blade diameter of 10m for free standing wind turbines was appropriate, with comments suggesting that the diameter should be defined by the output of the turbine. On balance, we believe that the maximum blade length for permitted development should be set at 6m due to the potential for visual and other impacts that will increase if a 10m blade diameter is permitted. We also recommend that the effects of this are reviewed by the Planning Service and consideration given to extending the maximum blade diameter to 10m permitted if it can be shown that the impacts were limited.

As noted in the building mounted wind turbine section of this report, blade diameter is only applicable to horizontal axis cross flow wind turbines. The equivalent swept area maximum for a vertical axis wind turbines is 28.3m². For simplicity we recommend that a limit of 28m² is set for permitted development for vertical axis wind turbines.

The colouration of wind turbines can also have a detrimental visual impact. This issue was not addressed in the Northern Ireland domestic consultation however, it was noted that in several of the case studies examined as part of this review the colour of the tower was grey. In the Republic of Ireland, permitted development rights for non-domestic wind turbines are conditional on *'the turbine components shall have a matt, non-reflective finish'* and that



'no sign, advertisement or object, not required for the functioning or safety of the turbine shall be attached to or exhibited on the wind turbine.' Although Entec agree that inappropriate colour schemes and advertising logos on wind turbines could potentially have visual impacts we note that the Planning Service is not considering introducing a requirement that the design and external finishes of roof solar panels need to be in conformity with the original dwelling house. In light of this it seems unlikely that a requirement of permitted development for wind turbines should be to require its colouration to be in conformity with its surroundings. Draft PPS18 states that towers should have a semi-matt surface to reduce the reflection of light and that a white or off-white colour is generally preferred but that other colours may be acceptable in appropriate circumstances. We recommend that these requirements are included in a guidance document for installers. The issue of advertising logos being incorporated into wind turbines can be dealt with through the existing advertising consent regime.

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering incorporating a further measure to reduce the visual impact of free standing wind turbines, namely that *'no part of a tower mounted wind turbine, including any supporting structure, should be nearer to any road which bounds the curtilage than the part of the dwellinghouse nearest to that road.'* In essence this condition disallows permitted development in front of the building line of a dwellinghouse and is similar to the arguments we outlined in the free standing solar panel section of this review where we noted that such a restriction could prevent permitted development in some situations where there may be little visual impact, for example in front of a hotel, school, office park or supermarket. We therefore recommend that the limit to permitted development for free standing wind turbines is related to the distance of the wind turbine to the building curtilage rather than relating it to the building line.

Following consultation on permitted development rights for householder microgeneration, the Planning Service is also considering disallowing permitted development for tower mounted turbines in dwellinghouses *'where any part of wind turbine is nearer to the neighbouring curtilage or any road, than a distance equal to the overall height of the turbine (measured with the blade of the turbine in its vertical position).'* Although this limit to permitted development is being considered as a result of safety issues it will also have an effect on visual impacts. In light of our recommendations in relation to a maximum height for free standing wind turbines this would result in a minimum distance of up to 15m from a neighbouring curtilage or road would be required depending on the height of the turbine, however see our additional distance restrictions in the safety section of this report for our final recommendations regarding distance to neighbours and roads.

Safety

For the majority of safety issues related to free standing wind turbines i.e. vibration, flicker and radar interference, the recommendations relating to building mounted turbines are appropriate and should be addressed through an UKAS accredited certification scheme for microgeneration as outlined in that section of the report.

A further potential safety issue for free standing wind turbines is the, albeit limited, potential for them to fall over and cause damage or injury. There have also been a number of recent incidents regarding the failure of wind turbines (including where a blades has come off a turbine) in Northern Ireland, other parts of the UK and in



continental Europe which could have resulted in serious injury. Although we believe that the wind industry generally has a good safety record we recognise that there will be people who will be concerned that wind turbines erected under permitted development could be dangerous for neighbours and passers by. Following consultation on domestic microgeneration, the Planning Service is considering recommending that free standing wind turbines should not be permitted where any part of the wind turbine is nearer to the neighbouring curtilage or any road than a distance equal to the total height of the turbine.

We are in general agreement with this condition in order to protect public safety however we recommend that this should be slightly increased such that a turbine must be at least topple distance from a road or boundary, i.e. the total height of the wind turbine to the blade tip plus a 10% safety margin. At a stakeholder workshop, almost half of respondents agreed that permitted development rights should be limited to a topple distance (total height of turbine plus 10%). As this could prove complex to enforce if it is difficult to measure the height of a turbine to the blade tip, we recommend that the limit is given a simple numeric value that can be measured on the ground. If our recommendation regarding total height of 15m is accepted this would result in a turbine erected under permitted development rights being at least 16.5m from a road or boundary. For simplicity, we recommend that this minimum is rounded up to 17m. We believe that this distance criteria will also help to reduce the visual impact outside the curtilage of the building in which the turbine is mounted although we recognise that allowing permitted development up to this height will almost certainly have visual impacts outside the curtilage in many situations.

Should the Planning Service choose to increase the permitted development rights to a maximum *hub* height of 15m and blade diameter of 10m (i.e. a total height of 20m) we recommend the minimum distance from a property boundary or any road should be increased to 22m.

Another safety aspect related to wind turbine blades is the potential for harm to passers by if the blade is not high enough from the ground. We believe it is unlikely that any reputable wind turbine installer would recommend installing a wind turbine such that it may be a danger to passers by, however, as a precaution we recommend that turbines should not be permitted development unless the blades are 5m above the ground. This should be sufficient clearance to avoid dangers such as a person touching a blade.

Sensitive Areas and Listed Buildings

Following consultation on permitted development rights for householder microgeneration, the Planning Service is not currently considering implementing any specific restrictions to permitted development rights for free standing wind turbines in any sensitive areas. Discussions with the Planning Service revealed that the general condition allowing permitted development rights for free standing wind turbines only where *'no part of a tower mounted turbine, including any supporting structure, should be nearer to any road which bounds the curtilage than the part of the dwellinghouse nearest to that road'* should help protect all areas from visual impacts as the turbines would be located behind the building line. As we have not recommended such a restriction for non-domestic land uses we recognise the need to consider whether sensitive areas are adequately protected from impacts as a result of the limits to permitted development we have proposed. The different types of sensitive area will be examined in turn.



For this review we investigated 5 case studies for free standing wind turbines that had been granted planning approval in an AONB. These had total heights of 18-42m. This implies that wind turbines can be appropriate in AONBs and that it may be feasible to allow permitted development if potential impacts on the landscape can be minimised.

As outlined previously some AONBs have special countryside policy areas where specific policies are in place to protect the unique character of the area and some AONBs also have design guides which set out specific design principles focussing on local styles and layouts. The relaxation of permitted development rights in such areas may compromise the objectives of these policies and documents and the Planning Service considers that some constraints on permitted development rights for non-domestic land uses may be appropriate in AONBs and National Parks.

For building mounted wind turbines and solar panels in an AONB or National Park we argued that it was not necessary to remove permitted development rights in these areas as they would be mounted on already existing building which would already affect the landscape designations of the AONB or National Park. However we did recommend that permitted development rights should be limited in these areas if they are mounted on roof slopes or walls that face onto a road and would be visible from that road. However, free standing wind turbines would not, by definition, be mounted on existing buildings (although they may be in close proximity) and would not face onto a road as turbines are designed to move with the wind direction.

To minimise the visual impacts on the landscape in an AONB or National Park we believe that free standing wind turbines could be conditional on being in relatively close proximity to existing buildings. We recognise that this will be the likely scenario for most free standing wind turbines anyway as it is more economic to erect them close to where the electricity is to be used, however for AONBs and National Parks we think that even the potential for them to be erected some distance from buildings under permitted development rights should be removed. We also note that the nearer to a building that a free standing wind turbine is located the more wind turbulence will exist and therefore the less effective a wind turbine will be.

Taking all of the above into consideration means that a compromise between visual impact and the effectiveness of the turbines will be necessary if permitted development rights for free standing wind turbines in AONBs and National Parks is to be allowed. There are currently no additional restrictions in the GDO regarding agricultural permitted development in AONBs and National Parks. Agricultural permitted development generally currently allows structures up to 12m high (or 3m where within 3km of the perimeter of an aerodrome) provided it is within 75m of the nearest part of a group of farm buildings, however we do not believe that in most cases it will be necessary for a wind turbine to be located so far from the farm buildings and it is unlikely that the turbine would be thought of as a part of the group of farm buildings if located 75m from them. We also believe that there will not be many other types of non-domestic land use where such a separation distance will be feasible, economic or needed. A report published by the Carbon Trust⁴⁷ recommends that a turbine is located either a distance 3-10 times an

⁴⁷ Carbon Trust (2008) *Small-scale wind energy: policy insights and practical guidance*



obstacle height (or further if possible) or higher than 1 to 1½ times the obstacle height and higher still if possible. For an agricultural building with the maximum allowed permitted development height of 12m this would imply that the wind turbine should be located 36-120m away from the building or be of height 12-18m. For example, if a building of 6m in height a wind turbine should be located 18-60m from the building or to a height of 9m or more. We also believe that the siting of a wind turbine will play a vital part in determining the effectiveness of the turbine as it should be located upwind of obstacles where possible. Bearing all of this in mind we therefore recommend that for agricultural areas in an AONB or National Park that permitted development for free standing wind turbines should be allowed provided that the turbine is located within a distance of 50m of a group of farm buildings which will utilise the electricity being produced by the turbine.

For other non-domestic land uses we recommend that a similar condition is placed on permitted development such that it is allowed provided the free standing wind turbine is located within a distance of 50m of the building or group of buildings which will utilise the electricity being produced by the turbine.

In the case of solar panels and building mounted wind turbines in Conservation Areas we recommended a limit to permitted development such that it was removed if they (or the wall or they were mounted on) faced onto and was visible from a road. This type of restriction is not possible for free standing wind turbines as they do not 'face' any particular direction and, in many cases, will most likely be visible from a road. As we believe that the erection of a free standing wind turbine in Conservation Areas will, in many cases, cause a visual impact we recommend that permitted development for free standing wind turbines is not allowed in these areas.

We also recommend that as a precautionary measure permitted development rights for free standing wind turbines in ASSIs, SAIs and World Heritage Sites are not allowed as we cannot be sure that the erection of a turbine and works required for this would not significantly adversely affect the ecological, archaeological or heritage aspects for which they were designated.

Following consultation on permitted development rights for householder microgeneration, the Planning Service is considering removing permitted development rights for free standing wind turbines within the curtilage of a dwellinghouse which is a Listed Building, as this may adversely affect the setting of the Listed Building. The same argument applies in a non-domestic context and we recommend that permitted development is not allowed within the curtilage of Listed Buildings in non-domestic land uses.

Cumulative Visual Impacts

In order to prevent the cumulative visual impact of wind turbines, the Planning Service have suggested that only one free standing wind turbine should be allowed under permitted development rights. At a stakeholder workshop the greatest proportion of respondents agreed with this limit with some stakeholders raising particular concerns about the impact of proliferation. We therefore recommend that the same limit of one turbine within a building curtilage or agricultural unit is applied in a non-domestic context.



It is also important to consider how close a wind turbine erected under permitted development rights can be to another existing turbine in another building's curtilage or agricultural unit as there may be cumulative visual, noise or efficiency effects. For safety reasons, we have already recommended that there should be a minimum distance of 17m between turbines erected using permitted development rights and the boundary of the property or any road. Consideration needs to be given as to whether this implied minimum of 34m between turbines is sufficient to prevent cumulative impact or whether a further limit should be imposed, perhaps a minimum distance of 100m from any other turbine before permitted development is granted to another turbine. Although we can understand this viewpoint we have not included such a recommendation for limiting permitted development rights in this review as it may be seen as unfair by those who wish to erect a turbine but are prevented from doing so by a turbine located on an adjacent property who managed to erect theirs first. It could also be argued that the proliferation of electricity pylons in some areas has a bigger visual impact than two wind turbines located close together. Although we do not include another limit to permitted development to prevent cumulative visual impact we recommend that the issue is raised in the consultation document and stakeholders views are sought on what magnitude of limit might be appropriate if such a condition was imposed.

Other Parameters

There are two other parameters to be addressed in the consideration of permitted development rights in relation to free standing wind turbines: ecology and noise. For both issues we believe that the recommendations made for building mounted turbines should be applied to free standing turbines, i.e. that both aspects should undergo further investigation and be a requirement of accreditation by an UKAS accredited microgeneration certification scheme for installers and also, in the case of noise, manufacturers.

It should be noted that there is some potential for a cumulative noise impact if another turbine is located close to a residential window. In such circumstances it may be appropriate to include a limit to cumulative impact (as outlined in the previous section). We believe this issue may be better dealt with by installers with training for accredited installers outlining the potential health impacts associated with the cumulative effects of noise from turbines and that it is for Environmental Health Officers to assess these impacts where they occur. A question in the consultation document should ask whether this is a suitable way to minimise this risk or whether a distance limit should be imposed. It would be premature to recommend a distance limit in this consultation paper until a method of limiting noise impacts in permitted development has been reached between industry, the Planning Service and others. However, as outlined in the cumulative visual impact section, if the recommendation that permitted development for wind turbines is allowed where the turbines are a minimum of 17m from the building curtilage or agricultural unit boundary then there will be a default distance between wind turbines erected under permitted development of 34m. We therefore recommend that this is clearly outlined in the consultation document along with a question asking whether this distance is sufficient to protect residential amenity from noise impacts.



7.6 Summary of Recommendations

In summary, we recommend that wind turbines in non-domestic land uses should not be granted permitted development until issues surrounding noise and safety are resolved. If these can be resolved we recommend the constraints outlined in Table 7.3 should apply, along with any further constraints identified for noise and safety issues.

Table 7.3 Summary of permitted development recommendations for wind turbines

Recommendation	
Building mounted wind turbines	<p>No permitted development for any building mounted wind turbine until issues on noise, vibration, health, aircraft safety and other critical communications systems are resolved. If these can be agreed satisfactorily we recommend the following restrictions on permitted development:</p> <ul style="list-style-type: none"> • Maximum height to blade tip of 3m above the highest part of the roof • Maximum blade diameter of 2.5m for horizontal axis wind turbines and maximum swept area of 5m² for vertical axis wind turbines • Maximum of one turbine with permitted development on a single building • No permitted development for turbines that would extend over a highway or publicly accessible open space • No permitted development in an AONB, National Park, World Heritage Site or Conservation Area where mounted on a principal or side elevation that faces a road • No permitted development in an Area of Special Scientific Interest • No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted
Free standing wind turbines	<p>No permitted development for any free standing wind turbine until issues on noise, vibration, health and aircraft safety and other critical communications systems are resolved. If these can be agreed satisfactorily we recommend the following restrictions on permitted development:</p> <ul style="list-style-type: none"> • Maximum height to blade tip of 15m • Maximum blade diameter of 6m for horizontal axis wind turbines and maximum swept area of 28m² for vertical axis wind turbines • Minimum of 17m from the boundary of building curtilage or agricultural unit and from any road • Bottom of blade must be a minimum of 5m above ground level • No permitted development in an AONB or National Park unless the wind turbine is located within 50m of the building or group of buildings which will utilise the electricity being produced by the turbine • No permitted development in a Conservation Areas, World Heritage Site, Area of Special Scientific Interest or Site of Archaeological Interest • No permitted development within the curtilage of a Listed Building • Maximum of one turbine with permitted development within the curtilage of a property or within an agricultural unit



8. Hydro

8.1 Introduction

Hydroelectricity generation operates by converting potential energy stored in water held at height to kinetic energy which can be used to turn a turbine to produce electricity. Small scale hydro schemes can be an attractive means of producing electricity if a suitable resource is available.

Hydro schemes are much more site specific than other types of renewable energy generation and one of the main limiting factors to their development is finding a suitable location. Historically businesses and factories have used hydropower and many businesses are therefore built near old mills. There are opportunities, though limited, to either refurbish or rebuild small hydro systems by making minor repairs or replacing equipment, however if the site has been derelict for some time more major repairs may be needed or extra equipment such as trash screens or fish ladders.

A typical small hydro scheme requires water to be taken from a river by diverting it through an intake at a weir, sometimes via a small canal or 'leat'. The water may then be passed through a settling tank or 'forebay' and slowed down to allow suspended particles to settle out and debris removed by a trash screen, such as a set of metal or wooden bars to prevent large debris such as tree branches from reaching turbine. The water is then passed through the turbine, which may be enclosed in a powerhouse with a generator and control equipment before being discharged through a 'tailrace' canal back into the river.

The types of turbine that will be suitable for a hydro project will depend on the height from which the water travels (known as the "head") and the flow rate of the water. In turn, the size of the powerhouse containing the turbine and other equipment will vary depending on the size and type of devices that are stored within it.

Small scale hydro devices range from a few hundred watts for domestic schemes up to around 100MW hydro-electric power plants. When planning a small hydro system (in both domestic and non-domestic land uses) it is important that civil works, such as the building of a turbine house or the creation of a channel, are kept to a minimum in order to keep down the total system costs. The project may become uneconomic if there is a requirement to carry out major amounts of civil construction.

8.2 Draft PPS18

The draft PPS18 consultation document states that there is potential for development of sites in Northern Ireland in the range of 100-500kW and the possibility for a few sites of up to 1MW (1,000kW), which could be economically developed as a grid connected schemes. It also notes that there are a larger number of locations where smaller, domestic scale schemes in the range of 10-50 kW could be developed.



The planning issues identified in draft PPS18 include those relating to siting and design and recognises that hydro schemes are commonly located within sensitive rural landscapes which requires careful consideration as to their integration into those landscapes. Draft PSS18 suggests that assessments of the visual impact of schemes are necessary and even suggests the types of measures to minimise their visual impact e.g. requiring abstraction to be reduced during the day in summer months to reduce the effect on waterfalls. Draft PPS18 also discusses the potential that hydro schemes have for affecting ecology, hydrology and fishing.

8.3 Stakeholder Workshop

Entec identified the 3 top key issues with regard to hydro as:

- Visual e.g. turbine house, pipes and structures;
- Effect on riverine ecology;
- Water course diversion.

It was generally recognised by the stakeholder that hydro should not be permitted development due to the complexity of the issues involved although there was some support for permitted rights for the reinstatement of old mills. Comments included '*site specific criteria required*', '*could be permitted development and left to other consenting regimes*' and concerns regarding the impacts of hydro schemes on ecology and water levels.

Although almost half of respondents agreed that reinstating a derelict hydro project could be permitted development while over a third thought that permitted development was appropriate. Comments included '*would prior notification be useful?*', '*water wheels are not modern technology and permitted development rights should only be for state-of-the-art generators*' and '*potential for half way house; reduced application requirements for this type of hydro.*'

Other issues discussed in the workshops included the impact on fishing that hydro schemes can have such as weirs and that such schemes should allow for the free flow of migratory fish.

8.4 Evidence

8.4.1 Case Studies

A limited number of case studies relating to hydro were discovered for this review and the details of only 3 planning applications were obtained, all of which were granted planning permission. One application, for a scheme in Newcastle, County Down, consisted of a micro hydro electric turbine generation chamber with a feed pipe through Donard Forest to an intake point 1100 metres from the turbine house. The turbine house would be next to a primary school but in an underground chamber, located beneath the school's car park with dimensions of 4



metres in width and 4 metres in height. As the pipework was underground the only visible part of the hydro scheme was on the river itself at the intake point. The site is within an AONB and a proposed Green Belt as well as being within an Area of Special Scientific Interest and a candidate Special Area of Conservation. An EIA was requested by the Planning Service and submitted with the planning application.

This planning application is considered a good case study in that it demonstrates that hydro schemes involve structures (turbine houses), pipes that traverse quite significant distances (1100 m in this case) and that water intakes can be located in rivers and water bodies that have ecological value or in landscapes that have a high amenity value that are susceptible to visual impact. This particular case study also demonstrated that a number of organisations were consulted for their input, including the Rivers Agency and Natural Heritage, who requested further information about the scheme and require separate licence applications. A total of six conditions were attached to the consent specifically to protect the ASSI and the biodiversity of the area including the translocation of moss found by the abstraction point on the Glen River. Twenty one other conditions were attached aimed largely at avoiding the River Glen being polluted by the scheme.

The second case study that was subject to a planning application also demonstrates the complexity surrounding hydro schemes. This application was for a micro hydro generator, turbine house (of area 25m² and 4.5m high), lake intake and penstock and a revised route for the outflow to be located within the Glenvale Conservation site in Newtownards. Although the site is within a proposed Local Landscape Policy Area and Site of Local Nature Conservation Importance, the case officer commented that there would be no impact on visual amenity as the weir, penstock and turbine house would be contained discreetly within the site and not visible from any public viewpoint. The officer also stated that, given a separation distance of over 80m to the nearest dwelling, there would be a limited effect on residential amenity. Like the application in County Down, a wide range of organisations were consulted on the application including the Water Service, Natural Heritage, Rivers Agency and the Inland Waterways and Inland Fisheries Division although none raised objections to the scheme. However, 3 letters of objections were received from neighbours relating to the revised route outflow, access issues, requirement for EIA and integrity of the existing dam wall. A total of 24 conditions were attached to the consent which primarily related to the seeking of consent of the Rivers Agency and approval of the Water Service.

The third hydro application examined as part of this review was for a 75kW scheme to be located in Creggan Country Park, Londonderry. This scheme comprised a 26m², 4.6m high turbine house to harness the existing flow from reservoirs and feed in to the grid. The case officer recommended approval, stating that the proposal was relatively minor in scale and would have no adverse impact on adjoining land uses or adjacent residential properties.

8.4.2 Other Permitted Development Consultations

In the domestic consultation document it was recommended that permitted development for hydro was not appropriate and that hydro development should always be considered on a case by case basis through the planning process (see Table 8.1). 88% of respondents agreed with this approach with comments including that the technology is too complicated to be permitted development, that it could have an adverse impact upon biodiversity



and habitats and that ‘small scale hydropower which uses existing waterways or unmodified waterways or unmodified river beds should be allowed.’ As a result of this response, the Planning Service is minded to take forward their initial recommendations to prohibit permitted development rights for hydro schemes.

Permitted development rights have not been introduced for hydro in the amendments made to householder microgeneration in England or for either dwellinghouses or non-domestic land uses in the Republic of Ireland.

8.4.3 Justification of Recommendations

In Stream Works

The conclusion from the consultation on domestic hydro development was that this technology raises many issues due to the fact that schemes are very variable with regards to their scale, design and the locations they can be situated in. Also, the submission of a planning application acts as a catalyst for other regulatory requirements when constructing such developments such as licences required from the Rivers Agency.

Although it is considered that well thought out hydro schemes will not in the majority of cases have significant impacts on, for instance, ecology or landscape amenity, the issues involved are sufficiently complex as to preclude the in stream works necessary for a hydro development being considered for permitted development. For example, defining in which situations the size of a water course would limit permitted development rights is not considered practicable. This view is shared by the Planning Service Development Control officers and stakeholders.

Turbine House

We believe there may be potential for some permitted development for works associated with hydro but that are not located in the water body, in particular where an existing hydro scheme requires a new or replacement turbine house. The case studies examined as part of this review had turbine houses with surface areas of around 25m² and heights of between 4m and 5m, however we consider that a development of this scale would be too large to be considered permitted development. The current permitted development rights (Part 13) for statutory and other undertakers allows water and sewerage undertakers, under Class H(f), to install in a water distribution system a booster station, valve house, meter or switch-gear house provided they do not exceed 29m³ in capacity at or above ground level or under a highway used by vehicular traffic. We consider that the provision of a building to house a turbine and other equipment is similar to these uses and recommend permitted development is given to such structures subject to a number of conditions. To minimise visual impact we recommend that a size limit for turbine houses should be similar to the 29m³ maximum currently included in the GDO, as this is of a reasonable scale in terms of minimising visual impact whilst still allowing the installation of a turbine and other equipment.

Also of relevance to turbine house development is Part 8 Class A of the GDO, which sets out permitted development rights for the extension or alteration of an industrial building or a warehouse. This limits permitted development in these categories of development to a minimum distance of 5m from any boundary of the building curtilage. We believe that such a limit could also be used for turbine houses in non-domestic land uses to further



minimise any potential for visual impacts. We therefore recommend that development for hydro turbine houses be permitted providing that it is a minimum distance of 5m from any boundary of the building curtilage. To further reduce the potential for visual impact we recommend that any turbine house built under permitted development should be no nearer to any road which bounds the curtilage than the part of the existing building nearest to that road. However, the Planning Service could also consider including a question within the consultation document seeking views on whether the limits contained within Part 6 of the existing GDO would be more appropriate.

We note that under Part 13 Class H(f) of the GDO there are no restrictions on booster stations, etc, that are part of a water distribution system, in AONBs or National Parks, although Part 8 Class A of the GDO does not permit the extension or alteration of an industrial building or a warehouse within Conservation Areas, AONBs and National Parks.

On balance we feel that a requirement for all turbine houses to be located at least 5m from the boundary of the property and not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road should minimise impacts even in some sensitive areas. We therefore do not recommend removing permitted development rights in AONBs or National Parks but recommend that guidance is provided to encourage that the design and external finishing of any new or extended boiler house in these areas be in keeping with the existing buildings within the curtilage.

With regard other types of sensitive area we believe that there is some potential for a turbine house built under permitted development to impact on the setting of a Listed Building and recommend that permitted development rights are removed unless a Listed Building application for the same development has been approved. There is also some potential for visual impact in Conservation Areas or within a World Heritage Site and we recommend that permitted development rights are removed in such areas. We recommend that permitted development is removed for turbine houses within Sites of Archaeological Interest and Areas of Special Scientific Interest in order to protect such areas from impacts caused by excavation.

We also recommend that a specific question is contained within the consultation document seeking views on whether hydro development should have permitted development rights removed entirely in Conservation Areas, AONBs, World Heritage Sites and/or National Parks.

Although not part of the GDO we also recommend that any guidance produced by the Department regarding microgeneration permitted development should advise that the Rivers Agency be contacted in advance of carrying out any works to ensure that further licences and permissions are not required for the development.

Pipework

The use of permanent pipes above ground to extract water from a watercourse is considered to be development and likely to require planning permission. There would also be a need to obtain an abstraction licence from the Department of the Environment. In the stakeholder workshops it was suggested that permitted development could be extended for above ground pipes up to 0.5m above ground level. This suggested recommendation received a



mixed response from the stakeholders with those against expressing concerns that the visual impact that pipes can have in sensitive landscapes such as AONBs can be significant. The case study for a hydro scheme in Newcastle, County Down discussed in this chapter illustrates the length the pipes can extend for (1100 metres) and the sensitive landscapes that they can cross. In light of these concerns and the limited benefit such a permitted development right is likely to confer we therefore do not propose to allow above ground pipework to have permitted development.

8.5 Summary of Recommendations

In summary, we do not recommend allowing permitted development for hydro microgeneration in non-domestic land uses in Northern Ireland with a single exception. We believe where in stream works already exist that permitted development for a turbine house can be permitted development subject to the conditions in Table 8.1.

Table 8.1 Summary of permitted development recommendations for hydro

Recommendation	
In stream works	<ul style="list-style-type: none">• No permitted development for in-stream works
Turbine house	<ul style="list-style-type: none">• Maximum of 3m in height• Maximum floor area of 10m²• Development must be located at least 5m from the building curtilage and not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road• No permitted development in a Conservation Area, World Heritage Site, Area of Special Scientific Interest or Site of Archaeological Interest• No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted



9. Biomass and Combined Heat and Power

9.1 Introduction

For this review we have taken biomass to mean any biological material, derived from plant or animal matter, which can be used for producing heat or power. Biomass can include crops, forestry products and some waste products which contain some biomass. Combined heat and power (CHP) is the simultaneous generation of usable heat and power (usually electricity) in a single process.

The term biomass covers all plant and animal material, although wood is one of the commonest materials used. It's most frequent application is for direct heating with fuel sources including wood from forests, urban tree pruning, farmed coppices, and farm and factory waste. Fuel can now be commercially sourced in the form of wood chips or pellets and traditional logs can also be used. Biomass has the advantage that it can be grown, stored and transported and although it does emit carbon dioxide when burnt, it is considered close to carbon-neutral because the amount of carbon emitted when it is burnt is the same as that absorbed during growth.

Biomass boilers can be fed automatically from fuel hoppers, with larger systems likely to have a mechanical handling system, but small scale units may rely on manual loading. Pellets and chips are appropriate for these small systems, with pellets more efficient as the uniform size and density provides a consistent heat output. This typically requires a daily addition of bagged fuel to the hopper, and if there is sufficient space (or in colder regions with higher heat demand) a larger silo may be installed to remove the need for daily handling. A silo is also usually needed for biomass CHP because of the quantities of fuel needed to operate these systems. Electric firing and automatic de-ashing are also available and new biomass boilers will often provide fully programmable space and water heating and can be installed with a separate hot water tank to act as a thermal store. Typically these boilers are likely to require more frequent cleaning than gas or oil boilers and provision of secondary heat may be needed when maintenance is undertaken. The system will also need occupants to manage the fuel supply and to remove and dispose of ash.

In the Republic of Ireland, permitted development rights in some non-domestic land uses have been extended to include biomass and CHP within the amended Planning and Development Regulations. In this case a distinction between the two types of technology has been made with stricter height and area limits placed on buildings to house biomass than CHP systems. However, we do not think it necessary to make such a distinction given that the scale and many of the issues and potential impacts associated with biomass and CHP are similar. We also consider that separating biomass and CHP could serve to over complicate the GDO, for example where a biomass combined heat and power plant is installed. The main potential difference between some biomass and CHP boilers is the fuel used and the issues that this raises, in particular biomass refers to fuel derived from any living or recently dead organic material. This can include wood and plant material (e.g. oil derived from rape) but also includes carcasses and cow dung. In the case of the latter this could potentially have an odour implication for nearby residents.



Another form of biomass, anaerobic digestion is a process in which organic matter is broken down by bacteria in the absence of oxygen. For an anaerobic digestion biomass plant this involves fermenting the waste or “feedstock” (e.g., livestock slurry, kitchen waste, industrial food waste etc.) in an airtight container to produce a biogas of about 60% methane, 40% carbon dioxide. This can be used as a renewable energy source for both heat and power, as a transport fuel and the residue material that remains once the process is complete, known as ‘digestate’, is valuable as a fertiliser. The anaerobic digestion of manures, slurries and biowastes has been identified in the UK Biomass Strategy as having the potential to reduce a variety of greenhouse gases. In 2007 Defra had identified less than 20 agricultural anaerobic plants on farms in Great Britain compared to over 500 in Germany and identified that there was potential for the expansion of anaerobic digestion in agricultural areas.

A CHP engine simultaneously generates both heat and power and is a mature technology used in industry. Recovering the heat from a power generating process leads to high overall efficiencies (up to 90% compared to perhaps only about 30% for a small stand-alone power generating scheme) and if used at source can mean no electrical losses over transmission lines. Fuel-cell CHP offers one of the most interesting areas of development in the technology as it is easy to scale the technology down to domestic applications and offers ‘emissions free’ opportunities using hydrogen as a renewable fuel source.

Small-scale biomass systems are usually installed in the form of a single room heater or for multiple rooms as a boiler which feeds into a central heating system. Solid fuel biomass heating can produce from a few kilowatts through to 5MW thermal and more and Defra estimate that anaerobic digestion biomass plants could produce anything from 200kW to 2MW. Typically a micro-CHP unit will be operated on the heating demand rather than electricity demand, and can provide space and water heating in residential or commercial buildings, similar to a conventional boiler. Biomass and CHP units are available from very small sizes to large purpose-built units for factories.

9.2 Draft PPS18

Annex B of draft PPS18 outlines the role and limitations of the planning system in relation to the development of biomass. Paragraph B44 states that the ‘*remit of consideration for the planning system is around the power plant and associated impacts and not the production of the fuel source.*’ In this context the following key planning issues are highlighted:

- the local economic benefits of the plant;
- visual intrusion;
- noise from traffic and plant operations;
- effects of the plant and associated airborne and water borne emissions on health, local ecology or conservation;



- impact of associated traffic; and
- greenhouse gas mitigation.

The key issues outlined above, and especially those relating to visual intrusion, health and disturbance, serve as a useful starting point for determining the extent to which biomass and CHP schemes should be permitted development.

9.3 Stakeholder Workshop

In line with the key issues outlined in draft PPS18, Entec identified the top 3 planning issues with regard to biomass and CHP as:

- Access and delivery nuisance;
- Storage of fuels;
- Emissions and flue height.

Access and delivery nuisance was highlighted by stakeholders at a workshop as a key issue, specifically in relation to aspects of safety and delivery frequency. There was also a wider concern that the HGV movements required to transport fuel to biomass and CHP systems could serve to undermine any carbon benefits.

There was less concern regarding the storage of fuel with stakeholders commenting that this issue was '*not a major factor*' and that it was of '*limited risk in a controlled environment.*' Underground storage was viewed by one stakeholder as being appropriate permitted development. In relation to emissions, several stakeholders raised concerns relating to odour and the use of contaminated wood.

Stakeholders were asked whether they thought that installing a new biomass/CHP plant at a school in place of an existing boiler where a new chimney extending to 1m above the roof line and a new fuel store would be required could be permitted development. There was general support that the example could be permitted development with 64% of respondents agreeing and only 5% disagreeing. Comments included '*this is a good example and might also include Anaerobic Digestion, taking biodegradable waste from the surrounding homes*', '*potentially ok dependant on size of building requirement*' and '*effect of installations above a certain generating capacity on air quality*'. Around one third of respondents indicated that they were undecided as to whether the example could be permitted development with two respondents highlighting the delivery issues as a key concern, echoing the planning issues identified by Entec.



9.4 Evidence: Biomass and Combined Heat and Power

9.4.1 Case Studies

A total of 11 biomass projects were identified and researched as part of the review. The installed capacity of these biomass projects (where it could be identified) varied from 90kW to 1.65MW and for the majority of schemes a container or building was constructed to store fuel and/or the boiler. The Manor House Country Hotel in County Fermanagh, for example, installed a 500kW boiler in a 15m² containerised unit. An additional containerised unit with a volume of 25m³ was also installed to store wood pellets. Several of the schemes researched provide power to community buildings and facilities such as colleges and leisure centres. For example, a scheme at Creggan Country Park comprises a 150kW wood chip boiler, wood store with a 1 tonne capacity and a chimney approximately 1m above the roofline. An interview with the site manager revealed that no complaints had been received in relation to emissions from the boiler and delivery frequency was relatively low at an average of 2.5 per week. A biomass installation at Omagh College uses a 150kW wood chip boiler to feed an under floor heating system. The boiler and fuel store are contained within the college building and the system has a flue 3m above the ridge of the roof. Again the non-visual impact of the scheme appears to be minor with the site's project officer stating that deliveries of fuel take place once every two weeks and that no complaints had been received regarding emissions.

In all of the examples highlighted above it could not be determined whether planning applications were submitted. Applications were only identified for 3 of the 11 case studies researched as part of the review and in all these cases the schemes were part of larger applications involving either an extension or erection of a new building. For example, a CHP scheme at Ryobi Aluminium Casting (UK) Ltd in Carrickfergus was approved as part of an application for an extension to an existing office block. This system is contained within separate plant that is 6.1m high, has a floorspace of 207m² and includes a flue with a height of 2m above the roofline. In this case the planning officer dealing with the application recommended approval stating that the development would not be visible from the road.

9.4.2 Other Permitted Development Consultations

Permitted development rights for biomass/CHP boiler houses have not been introduced or are not currently being considered for dwellinghouses in England, Republic of Ireland or Northern Ireland. Permitted development rights have been introduced separately for biomass and CHP boilers for non-domestic land uses in the Republic of Ireland. These are shown in Table 9.1



Table 9.1 Limits to non-domestic permitted development for biomass and CHP boiler houses introduced in Republic of Ireland

Limit introduced	Republic of Ireland non-domestic Biomass	Republic of Ireland non-domestic CHP
Max area	All: 20m ²	Industrial: 500m ² (50mx10m) Business Premises/Light Industrial, Agric: 300m ² and no more than 40m in length
Max height	All: 3m	Industrial: Max 8m within 100 metres of any public road Business Premises/Light Industrial, Agric: 8m
Location	All: Not permitted within 10m of a public road, 100 metres of the nearest habitable house or residential building or school, hospital, church or building used for public assembly (other than the house or building of the person providing the structure), save with the consent in writing of the owner, and, as appropriate, the occupier or person in charge thereof.	Industrial, Business Premises/Light Industrial: Not permitted within 10m of a public road, 200 metres (100m agric) of the nearest habitable house or residential building or school, hospital, church or building used for public assembly (other than the house or building of the person providing the structure), save with the consent in writing of the owner, and, as appropriate, the occupier or person in charge thereof.
Noise	All: Must not exceed 43db(A) as measured from the nearest party boundary.	All: Must not exceed 43db(A) as measured from the nearest party boundary.
Other:	All: Not more than one structure	All: Not more than one structure All: The structure shall be used for the purposes of housing a CHP unit only.

Note that these limits and conditions are an abridged version for ease of reference. See original reports or statutory instruments for full details.

Permitted development rights for biomass/CHP fuel stores have been introduced for dwellinghouses and non-domestic land uses in the Republic of Ireland and are currently being considered for dwellinghouses in Northern Ireland. These are shown in Table 9.2.

Table 9.2 Limits to permitted development for biomass/CHP fuel stores being considered or introduced in Northern Ireland and Republic of Ireland

Limits being considered/introduced	Domestic		Non-domestic
	Republic of Ireland	Northern Ireland (solid biomass fuel)*	Republic of Ireland (biomass only)
Max area	n/a	Maximum capacity of 6,500 litres for above ground containers	Maximum capacity of 75m ³
Max height	n/a	3m for above ground containers	3m



	Domestic		Non-domestic
Limits being considered/ introduced	Republic of Ireland	Northern Ireland (solid biomass fuel)*	Republic of Ireland (biomass only)
Location	n/a	Not permitted nearer to any road which bounds the curtilage than the part of the dwellinghouse nearest to that road	n/a
Sensitive areas	Not permitted in Architectural Conservation Areas/Areas of Special Character or to houses that are Protected Structures	Underground solid biomass fuel storage containers not permitted within a site of archaeological interest	n/a
Other:	n/a	Fuel stored is used to provide heat within the curtilage of the dwellinghouse Container to be removed when no longer needed for the storage of biofuel	Not more than one structure

Note that these limits and conditions are an abridged version for ease of reference. See original reports or statutory instruments for full details.

* Existing permitted development rights for the storage of oil for domestic purposes are considered sufficient for bio-heating oils.

Permitted development rights for biomass/CHP flues have been introduced for dwellinghouses and non-domestic land uses in the Republic of Ireland and for dwellinghouses in England. These are shown in Table 9.3.

Table 9.3 Limits to permitted development for biomass/CHP flues being introduced in England and Republic of Ireland

	Domestic		Non-domestic	
Limits introduced	England	Republic of Ireland	Republic of Ireland biomass	Republic of Ireland CHP
Max height	1m above highest part of roof	Should be constructed inline with existing building regulations	Industrial, Light Industrial: 16m (measured from ground level) Agricultural uses: 20m	Industrial: 20m from ground level Business Premises/Light Industrial, Agric: 16m from ground level
Max diameter	n/a	n/a	1m	All: 1m



	Domestic		Non-domestic	
Limits introduced	England	Republic of Ireland	Republic of Ireland biomass	Republic of Ireland CHP
Sensitive areas	Not permitted in a World Heritage Site or Conservation Area if on wall or roof slope forming the principal or side elevation of the dwellinghouse and visible from a highway	n/a	n/a	n/a
Other:	n/a	n/a	All: No more than 2 flues Industrial, Light Industrial/Business: The fuel shall not include products derived from animal wastes or from wood containing dangerous substances. Agric: The fuel shall not include products derived from wood containing dangerous substances.	All: No more than 2 flues

Note that these limits and conditions are an abridged version for ease of reference. See original reports or statutory instruments for full details.

9.4.3 Justification of Recommendations

Where a biomass or CHP plant can be contained within an existing building and chimney there is generally no need to apply for planning permission (although there may be a need to apply for Listed Building Consent if within a Listed Building). However, there are three scenarios that we can envisage where planning permission may be needed to install a biomass or CHP system that are addressed in this section:

- i. when there is a requirement for an extension to a building to install a boiler;
- ii. where there is a need for a new building or extension to an existing building or a fuel hopper to store fuel; and
- iii. where there is a need to install a new flue pipe instead of utilising an existing chimney.

Boiler House

There was no recommendation in the Northern Ireland domestic consultation document to allow for an extension to a building to accommodate a biomass or CHP boiler using permitted development rights. This was understandable given that this could be used as a way to avoid planning controls on extending a house. Comments received from



Planning Service Development Control officers highlighted that officer knowledge of biomass and CHP systems is limited, perhaps reflecting the small number of case studies identified during this review. As a result, there were mixed views regarding the potential issues associated with biomass schemes. However, there may be some potential to allow for such an extension, or even a new building, to accommodate a new boiler in a non-domestic context where this would have limited visual impacts.

Area

At a stakeholder workshop, attendees were asked whether permitted development rights for biomass/CHP boiler rooms should be limited to a maximum floor area of 10m² where the boiler would serve a building of floorspace less than 1000m² and to a maximum area of 75m² where the building floorspace is greater than 1000m². The majority of stakeholders were unsure as to what the floor area limit to permitted development should be with about two-thirds stating that they did not know whether 10m² or 75m² was appropriate. Existing permitted development rights allow the extension or alteration of an industrial building or warehouse up to a maximum of 20% of the cubic content of the original building providing that the floorspace of the original building is not exceeded by 750m². Part 13 Class C of the existing GDO, which relates to electricity undertakings, also allows the installation of an above-ground sub-station enclosed in a chamber of up to a volume of 40m³. Although not directly comparable to the installation of a biomass plant on non-domestic land, it does provide a sense of scale of buildings that could be allowed under permitted development. A building with a volume of 40m³ is unlikely to cause a major visual impact in many non-domestic situations, particularly if further conditions are included relating to where the building can be built to prevent visual impact (see the height and visual location sections below).

Amendments to permitted development rights in the Republic of Ireland allow for the construction of a structure within the curtilage of an industrial building to house a CHP system up to a floor area of 500m² dependant on certain conditions and limitations. We believe that a building of this scale could have a significant landscape and visual impact and is not appropriate for permitted development. Moreover, given that the majority of biomass and CHP systems are likely to be installed within existing buildings, in the majority of cases permitted development rights will not be required. Regarding housing for biomass boilers, however, the maximum floor area allowed under permitted development rights is 20m² which would appear to be of a more appropriate scale in relation to the requirements of biomass boilers. Of those case studies researched as part of the review very few involved the expansion of an existing building or construction of a new building to contain a boiler. One example of a scheme that did involve construction of boiler housing is the Manor House Country Hotel which uses a 500kW boiler housed in a separate 15m² containerised unit. This is a very compact system and if a boiler of this capacity was to be housed in a building rather than a container a floorspace greater than 15m² would usually be required. Nevertheless, this example serves to illustrate that smaller boilers of around 50kW could be housed in a boiler room less than 15m² which supports Entec's findings⁴⁸ in previous projects.

⁴⁸ Department for Communities and Local Government and Welsh Assembly Government (unpublished) Prepared by Entec.



Based on the case studies researched as part of this review, together with evidence taken from schemes elsewhere in the UK, we recommend that permitted development is granted for the extension of an existing building or erection of a new building for the purposes of containing a biomass or CHP boiler up to a maximum floor area of 10m². This limit should allow small biomass and CHP boilers to have permitted development rights but will limit the potential for new buildings or extensions for larger scale boilers being erected under permitted development rights. This will reduce the potential for fuel deliveries for biomass boilers to significantly impact neighbouring properties as boilers of around 50kW capacity require an HGV fuel delivery approximately every 10 weeks.

However, the majority of boilers examined during this review, including the example of the Manor House Country Hotel, had boilers that would exceed the 10m² area limit. Similar larger biomass schemes elsewhere in the UK, such as a 300kW boiler at Swinton Park Hotel in Harrogate Borough, typically require a boiler room with a larger floorspace of around 75m². Placing a 10m² floor area restriction on all boiler rooms regardless of the scale of the site could therefore restrict the potential take-up of this technology. Indeed, comments made by some stakeholders at a workshop suggested that a flexible approach to boiler rooms and fuel stores should be adopted taking into account the size of the site. We therefore recommend that for larger buildings with a floorspace of 1000m² or more the extension of an existing building or erection of a new building for the purposes of containing a biomass or CHP boiler should be allowed up to a maximum floor area of 75m². This should be sufficient to accommodate a 300kW boiler together with passageways, access for cleaning and other associated equipment (not including a fuel store).

Height

Although the Planning Service is not considering extending permitted development rights for boiler rooms *per se*, they are minded to recommend that a height limit of 3m be applied to above ground solid biomass fuel storage containers. Consideration was given to increasing this limit to 4m in a non-domestic context for boiler rooms given that, for CHP housing, the height limit in the Republic of Ireland is 8m (for industrial uses there is no height limit except where the development is within 100m of a public road). However, at the stakeholder workshop the majority of respondents either disagreed with a height limit of 4m or were unsure as to whether the limit was appropriate. Consequently, we recommend that the extension or erection of a new building up to a maximum height of 3m for the purpose of housing a biomass or CHP boiler should be permitted. This recommendation mirrors those made by Entec within the non-domestic microgeneration permitted development review for England and Wales¹ and permitted development rights for biomass boiler houses in Republic of Ireland. It also remains consistent with recommendations the Planning Service is considering for domestic solid biomass fuel stores.

Location

To further minimise visual impacts, we recommend that a condition relating to the location of biomass and CHP schemes be included within the GDO. Part 6 of the existing GDO (agricultural buildings and operations) limits the erection or extension of buildings or structures to:

- no more than 75m away from the nearest part of a group of principal farm buildings; and



- no less than 75 metres away from a dwellinghouse (other than a dwellinghouse of any person engaged in agricultural operations on the said unit).

In addition both building and engineering works are not permitted within 24m from the nearest part of a special road, 24m of the middle of a trunk or a first or second-class road and 9m from the middle of other classes of road.

Similarly, in the Republic of Ireland, non-domestic buildings or structures associated with biomass schemes must not be within 10m from a public road. Nor must it be within 100m of the nearest habitable house or public building, save with the written consent of the owner or occupier. However, we believe that such conditions could potentially restrict the take-up of this technology and that both the visual and noise impacts associated with small scale biomass and CHP boilers are limited, especially given the area and height restrictions that we have recommended.

Following consultation, the Planning Service is minded to allow the development of fuel storage containers within the curtilage of dwelling houses providing that no part of a solid biomass fuel storage container, whether above or below ground is nearer to any road which bounds the curtilage than the part of the dwellinghouse nearest to that road. Part 8 Class A of the existing GDO, which sets out permitted development rights for the extension or alteration of an industrial building or a warehouse, meanwhile limits permitted development to a minimum distance of 5m from any boundary of the building curtilage or any classified highway. At a stakeholder workshop, this limit was supported by respondents with approximately half in agreement with this limit and only 15% in disagreement. We therefore recommend that development be permitted providing that it is a minimum distance of 5m from any boundary of the building curtilage or classified highway and that it is not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road. However, the Planning Service could consider including a question within the consultation document seeking views on whether the limits contained within Part 6 of the existing GDO or, alternatively, a condition restricting development to behind the building line, would be more appropriate.

Flue

The Planning Service are proposing that permitted development rights are provided for the installation, alteration or replacement of a flue forming part of a biomass heating or CHP system on a dwellinghouse. However the height of the flue will be limited to one metre, disallowed in Designated Areas where installed on a wall or roof slope facing onto and visible from any road, and the flue is to be removed when no longer needed for the relevant purpose.

In a non-domestic context, existing permitted development rights in relation to the extension or alteration of industrial buildings and warehouses (Class A of Part 8) state that the height of the building as extended or altered must not be exceed the height of the original building. Clearly such a restriction would result in inefficiencies for biomass and CHP schemes as flues must be taller than buildings in order to prevent backdraft. Part 8 (Class B), which relates, among other things, to the installation of additional or replacement machinery or structures and other apparatus, permits development up to a maximum height of 15m whilst Part 6, agricultural buildings and operations, allows the erection or extension of buildings up to 12m in height and up to 3m within 3km of the perimeter of an aerodrome. In the Republic of Ireland two flues mounted on a biomass or CHP unit can be



permitted development subject to a maximum height limit above ground level depending on the land use and whether the unit is a biomass or CHP boiler. This height limit to permitted development can be up to 20m for CHP on industrial land uses and biomass on agricultural holdings. There is a 16m height limit to permitted development for CHP unit flues on business, light industrial and agricultural land uses and a 16m height limit on permitted development for biomass unit flues on industrial and light industrial land uses.

We believe that two flues with a height of 16-20m above ground level could, in some settings, have a significant visual and landscape impact as well as potential implications in relation to aviation safety. For this reason we believe it may be more appropriate to try to attempt to limit the potential for visual impact from flues by making them relate to their height above the roofline in a similar way that the Planning Service is considering for wind turbines mounted on dwellinghouses and that we have recommended for building mounted wind turbines in non-domestic land uses in this report.

The height of flues above the roof line in the case studies researched as part of this review (where this could be determined) ranged from 1m to 3m. Whilst a high proportion of stakeholders at a workshop were unsure as to whether a maximum flue height of 1m above the ridge line should apply, almost a third agreed to the limit. Moreover, when stakeholders were asked whether they thought that installing a new biomass/CHP plant at a school in place of an existing boiler with a new chimney extending to 1m above the roof line could be permitted development, there was general support that the example could be allowed with 64% of respondents agreeing and only 5% disagreeing. Similarly, there was some agreement among Planning Service Development Control officers that a flue height of 1m could be permitted development.

We therefore recommend that a flue height of up to 1m above the highest part of the roof (not including any existing chimney) be permitted which should allow the installation of new flues in buildings with pitched roofs but will probably not allow sufficient flue height for buildings with flat roofs. To extend permitted development rights higher than 1m above the ridge could result in a higher degree of landscape/visual impact than would be acceptable. This aligns with current height limit proposals for domestic flue permitted development. In these circumstances it may be possible to reuse existing flues such that planning permission is not required. However, we suggest that a specific question be contained within the consultation document seeking views on whether a height limit of 12m (and 3m within 3km of the perimeter of an aerodrome), in line with Part 6 of the existing GDO, would be acceptable.

Sensitive Areas and Listed Buildings

The extension of buildings and erection of new buildings and flues may materially affect some sensitive areas or Listed Buildings. In the domestic context, the Planning Service did not propose to include any restrictions on the permitted development of biomass fuel stores in these areas, with the exception of underground solid biomass fuel storage within a Site of Archaeological Interest, in light of the lack of such constraints in Part 1 (Class F) of the existing GDO (domestic oil containers). The issue of development within Sites of Archaeological Interest was highlighted at the stakeholder workshop where a clear majority of stakeholders agreed that permitted development should not be extended to archaeological sites. To protect such areas, we recommend that permitted development



rights are removed in Sites of Archaeological Interest in non-domestic land uses. We also recommend that permitted development is removed in Areas of Special Scientific Interest as it is likely that these sites would be adversely affected by the excavation required for a boiler house, although we doubt this situation would arise often due to the other protections these sites have. These restrictions should also be applied to fuel stores.

We have some concerns about permitted development in other sensitive areas, such as AONBs and Conservation Areas, as we feel there are potentially significant visual impacts associated with the erection of new boiler houses given their potential scale in non-domestic contexts. We note that Part 8 (Class A) of the existing GDO does not permit the extension or alteration of an industrial building or a warehouse within Conservation Areas, AONBs and National Parks (although it does not refer to Listed Buildings).

On balance we feel that the requirement for all boiler houses to be located at least 5m from the boundary of the property and not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road should minimise impacts even in sensitive areas. We therefore do not recommend removing permitted development rights in Conservation Areas, World Heritage Sites, AONBs or National Parks but recommend that guidance is provided to encourage that the design and external finishing of any new or extended boiler house in all sensitive areas be in keeping with the existing buildings within the curtilage.

We consider that, as with other microgeneration technologies discussed earlier in this review, there is some potential that a biomass/CHP boiler house erected under permitted development within the curtilage of a Listed Building may not require Listed Building Consent. In line with our earlier recommendations we believe permitted development rights should be removed where Listed Building Consent has not been received for the development to prevent damage to the setting of the building.

Fuel Store

Fuel for a biomass boiler (or a combined biomass and CHP boiler) can be stored in an existing building, underground, in an extension or new building, or in a specially designed machine called a hopper which feeds the boiler with fuel. Following consultation, the Planning Service is considering allowing permitted development for domestic above ground solid biomass fuel storage containers up to a maximum capacity of 6,500 litres (which equates to a volume of 6.5m³) and height of 3m. In a non-domestic context we believe that a volume of 6.5m³ is too restrictive and would potentially impede the take-up of biomass. Indeed, in the case studies researched for this review fuel stores were larger, the Manor House Country Hotel, for example, has a fuel store of volume 25m³.

In the Republic of Ireland fuel stores in non-domestic land uses can be permitted if they do not exceed a volume of 75m³ and are 3m or less in height. On balance however, we feel that such restrictions to permitted development for fuel stores could be too restrictive for some land uses with a larger energy requirement. This could result in frequent HGV movements to ensure a steady supply of fuel to the boiler. We therefore recommend that permitted development rights for fuel stores replicate those for boiler houses outlined previously, that is they can be permitted development provided they are less than or equal to 75 square metres in area and have a maximum height of 3 metres. This will enable sufficient flexibility within the GDO so that larger sites with greater energy requirements



are able to install fuel stores sufficient for their energy needs without requiring constant HGV movements. This will limit the potential for disturbance and emissions impacts associated with deliveries.

Other Parameters

Emissions

Based on evidence from interviews undertaken as part of the case study review, nuisance and health effects of biomass schemes would appear to be minimal. However, details of statutory requirements regarding emissions that are appropriate to biomass and CHP boilers, for example the Clean Air Order (1981) and the Smoke Control Areas Regulations (1999), should be included in the guidance.

Fuel Type

Concerns were aired by some stakeholders at a workshop relating to the type of fuel that should be burned in biomass boilers installed under permitted development rights with comments including ‘*number 1 [issue] odour...e.g. manure as fuel*’ and ‘*need to consider impacts of contaminated wood.*’ In the Republic of Ireland, a condition has been placed on permitted development rights stating that fuel should not include products derived from animals or animal wastes for biomass boilers other than those in agricultural holdings and that the use of wood containing dangerous substances as a fuel is prohibited. In light of concerns expressed by stakeholders, we recommend that a similar condition to that imposed in the Republic of Ireland is adopted in Northern Ireland. However, we believe that further research and consultation relating to the burning of products derived from animal waste is undertaken before granting permitted development rights for boilers fed by such fuel in agricultural holdings.

Noise

The potential for disturbance caused by the generation of noise from biomass and CHP boilers was considered as part of this review. In the Republic of Ireland, for example, a condition has been placed on permitted development rights for biomass and CHP schemes stipulating that noise levels must not exceed 43db(A) during normal operation, as measured at the party boundary. However, we consider that the noise levels from biomass and CHP boilers of the scale that may be granted permitted development rights is limited, reflected in the fact that no such concerns were raised by stakeholders during this review. Consequently, a condition relating to noise level has not been included within our recommendations.

Cumulative Impact

To prevent the cumulative impact of many extensions or new buildings associated with a biomass or CHP boilers and fuel stores, we recommend that permitted development rights apply only to the first building/extension for a boiler or fuel store.



9.5 Evidence: Anaerobic Digestion

9.5.1 Case Studies

Only a single example of a recently installed anaerobic digestion plant could be found in Northern Ireland although some examples⁴⁹ of schemes built between 1985 and 1992 were identified as part of Entec's previous research. These digesters were of volumes ranging from between 60m³ to 210m³ and were dug into the ground such that only the surface of the digesters and pipework were visible. The digester examined as part of this review was installed at the Agri-Food and Bioscience Institute (AFBI) Renewable Energy Centre, Hillsborough in order to facilitate research into the feasibility of on-farm anaerobic digestion in Northern Ireland. Interviews with both a representative of the Greenfinch Ltd, who installed the digester, and the project manager, revealed that a planning application was submitted for the scheme although it was not subject to an EIA. According to the installer, the conditions attached to the consent focused primarily on visual amenity and landscaping. Interestingly, he stated that emissions were not considered to be a significant issue during the planning process.

Greenfinch Ltd has installed several other digesters across the UK including a 300kW system at Kemble Farm near Cirencester. This scheme was subject to a planning application as it was within 3 miles of the perimeter of an airstrip but was approved in August 2007. According to the installer, the conditions attached to the permission focused on the colour of the slurry tanks, requiring them to be green in order to reduce the impact on visual amenity. One further digestion scheme for slurry disposal was identified by Entec in Westray, one of the northern islands in Orkney. The intention of the scheme was to generate biogas and create energy through a CHP generator to supply heat and generate electricity although additional community benefits also arose. These benefits included a reduction in odour from land-applied slurry by 75%, killing of weed seeds and reduced pathogens by more than 99% and a reduction in the attractiveness of manure to rodents and flies.

9.5.2 Other Permitted Development Consultations

The Planning Service is not considering allowing permitted development for anaerobic digestion plants in domestic contexts and permitted development rights for anaerobic digestion have not been introduced elsewhere in the UK or the Republic of Ireland.

9.5.3 Justification of Recommendations

Comments received from both stakeholders and Planning Service Development Control officers suggest that there is some uncertainty with regard to extending permitted development rights for the installation of anaerobic digestion plants. At a stakeholder workshop, for example, half of respondents indicated that they did not know

⁴⁹ <http://dspace.dial.pipex.com/town/terrace/ae198/digesters.html#anchor1560096> [accessed 05/09/08]



whether an anaerobic digestion plant up to 300m² on agricultural land should be permitted development whilst just over 40% felt that it should not be permitted with comments including ‘*should require planning permission.*’ Similarly, half of the Planning Service Development Control officers were unsure as to whether a digester of this scale could be permitted development although half did agree that it could be. In the Republic of Ireland exemptions for digesters have not been provided in the amended Planning and Development Regulations. The summary paper on the public consultation undertaken in Republic of Ireland⁵⁰ notes that ‘*there would be little or no advantage to providing an exemption unless it was at a scale that would have a potentially significant impact on the area. For example, anaerobic digesters require a shed to hold a combined heat and power (CHP) unit and tanks for effluent and these would need to be quite large to provide an economic return.*’

Despite the uncertainty surrounding digesters, we believe that this form of microgeneration, particularly of slurries, offers significant potential to produce renewable energy and that a system of a scale that is economically viable could be installed under permitted development rights. It has been estimated⁵¹ that, if all the slurry from housed livestock in Northern Ireland was used for anaerobic digestion, 73MW could be generated, representing around 7% of the country’s electricity demand. Moreover, from the case studies examined and interviews undertaken during this review, anaerobic digestion would appear to offer other benefits including reducing odour from land-applied slurry.

In the recent past, time limited permitted development rights for storage of manure and slurry required to comply with the Nitrates Directive constraints on the spreading of slurry on land were provided of a scale similar to that of an anaerobic digestion plant. This allowed for the erection of a building or excavation on agricultural land for the storage of slurry manure up to 600m² and, amongst other conditions, a height of 12m (unless within 3km of the perimeter of an aerodrome within which the maximum height is 3m) although it should be noted that, as of 1st January 2009, the GDO will revert to allow for the erection, extension or alteration of a building or any excavation or engineering operations up to, amongst other conditions, an area of 300m². Discussion with Greenfinch Ltd revealed that digesters below 300kW would not be economically feasible and that a 500kW system would typically require between 3 to 4 tanks for storage, including a digester up to a height of around 12m to 15m high, and modular components usually housed in a container or existing farm buildings. Therefore, it would appear that the conditions contained within existing GDO Part 6 Class A allowing buildings up to 300m² in area would provide sufficient scope to install a digester of a size that would be economically viable.

We recommend that the limits contained within Part 6 Class A are set out in a new section which relates specifically to anaerobic digesters on agricultural land. This will serve to clarify the GDO in relation to anaerobic digestion, thereby increasing the potential take-up of the technology.

⁵⁰ Department of the Environment, Heritage and Local Government (2008) *Proposed amendments to the exempted development provisions of the planning and development regulations 2001 in respect of renewable technologies for industrial, commercial and agricultural use: Summary paper on public consultation process held between October 2007-February 2008*

⁵¹ Frost, P. Gilkinson, S. Buick, J. (2006) *The potential of on-farm anaerobic digestion for Northern Ireland*



Given the concerns and uncertainty expressed by some stakeholders and Development Control officers regarding the potential effect of odours from such plants, we suggest that an additional condition be included in the GDO which limits permitted development such that only material generated from agricultural activities on the unit should be used to feed the digester. This will limit the size of anaerobic digester that will be required on most farms and means that if a farmer wishes to develop a commercial anaerobic digester which will utilise materials from other farms then a planning application will be required.

With regard sensitive areas we recommend that similar limits that have been recommended for biomass and CHP boiler rooms and fuels stores are used for anaerobic digesters, namely that permitted development rights are removed in Sites of Archaeological Interest and Areas of Special Scientific Interest and within the curtilage of a Listed Building unless Listed Building Consent has been granted for the development.

9.6 Summary of Recommendations

A summary of the permitted development rights we recommend for biomass/CHP boilers, fuels stores and flues is included in Table 9.4 along with permitted development rights recommendations for anaerobic digesters.

Table 9.4 Summary of permitted development recommendations for biomass and CHP

Recommendation	
Biomass and CHP boiler room	<ul style="list-style-type: none"> • Maximum floor area of 10m² for buildings with a floorspace of up to 1000m² • Maximum floor area of 75m² for large non-domestic buildings with a floorspace of 1000m² or more • Must not exceed 3m in height • Development should be located at least 5m from the boundary of the property and not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road • Flue should not exceed a maximum height of 1m above the highest part of the roof • Maximum of one extension or new building to contain a biomass or CHP boiler within a building curtilage or agricultural unit to be permitted development • Fuel should not include products derived from animals or animal wastes other than those biomass and CHP boilers in agricultural holdings, or wood containing dangerous substances • No permitted development in an Area of Special Scientific Interest or Site of Archaeological Interest • No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted



Recommendation	
Biomass and CHP fuel store	<ul style="list-style-type: none"> • Maximum floor area of 10m² for buildings with a floorspace of up to 1000m² • Maximum floor area of 75m² for large non-domestic buildings with floorspace of 1000m² or more • Must not exceed 3m in height • Development must be located at least 5m from the boundary of the property and not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road • Maximum of one extension or new building to contain a biomass or CHP fuel store within a building curtilage or agricultural unit to be permitted development • No permitted development in an Area of Special Scientific Interest or Site of Archaeological Interest • No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted
Anaerobic digestion plant	<ul style="list-style-type: none"> • Maximum area 300m² • Must be located on agricultural land • Must be located within 75m of the nearest part of a group of principal farm buildings • Must be located at least 75m from any dwellinghouse (other than a dwellinghouse of any person engaged in agricultural operations on the said unit) • Height must be 3m or less within 3km of the perimeter of an aerodrome, or 12m in any other case • No part of the development should be within 24m of the nearest part of any special road, or within 24m of the middle of a trunk or a first or second-class road or 9m from the middle of other classes of road. • Only material generated from agricultural activities on the unit should be used to feed the digester • No permitted development in Sites of Archaeological Interest or Areas of Special Scientific Interest • No permitted development within the curtilage of a Listed Building unless Listed Building Consent for the development has previously been granted



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10. Heat Pumps

10.1 Introduction

A heat pump works on the principle of transferring heat from somewhere warmer to somewhere cooler, for example the air, ground or water to a building to provide heating, or in some cases to pre-heat domestic water systems. Pumps require electricity to transfer the heat and are therefore not strictly a renewable energy generation technology unless the power supply to drive them is provided by a renewable source. They are perhaps more accurately described as an energy efficiency technology as they consume one form of energy (electricity) to produce another (heat) at a high efficiency. Many heat pumps can convert energy at a rate of about 3 or 4 to 1, that is, it requires 1 unit of electrical energy to 'create' 3 or 4 equivalent units of heat energy. The technology used in heat pumps is very similar to that used in a refrigerator working backwards, i.e. it heats space rather than keeping it cool.

The three main types of heat pump are: ground source heat pumps (GSHP), which extract heat out of the ground; water source heat pumps (WSHP), which extract heat from a water body; and air source heat pumps (ASHP), which extract heat from the air.

A GSHP is used to extract heat from the ground for use in space and water heating and can also use the same process to supply cooling. These pumps use underground pipes laid in loops in trenches to a depth of 1-2m deep, where the average temperature (in the UK) is 11 to 12°C. Vertical systems use boreholes to a depth specific to the site and pump with systems usually to a depth of around 60m, although it may be possible to drill to 200m for larger applications. In closed loop systems the pipes contain a liquid (which includes antifreeze) which transfers the heat from the ground either directly into the building to be heated or via a heat exchange system. The cooled liquid then circulates back to the ground where it is reheated.

A WSHP is similar to a GSHP, except that the heat it extracts is from water, such as a lake, rather than the earth. WSHPs can be either closed loop systems (as outlined for GSHPs) or open loop systems where water is drawn directly from the water body and passed through a heat exchanger in the building before being discharged back into the water body.

An ASHP can be placed outside a building and draws heat from the ambient air. Air is passed across an evaporator unit by means of a fan. These systems are generally cheaper than GSHP and WSHP as they don't have high installation costs. Because of the variability in air temperature however they are on average 10-30% less efficient. Whilst it is still possible to extract considerable heat from the ambient air at temperatures as low as -15°C, the performance of an ASHP reduces the colder it is outside; therefore ASHPs are better suited to moderate climates. The smallest ASHP are those used on houses. The most obvious are the window-box type that can readily be fitted to any window. These look like window-box air conditioning units and are fitted to office blocks and the roofs or outsides of other buildings. Because of their similarity to air-conditioning units many of the planning considerations for air source heat pumps and air-conditioning units are similar.



Heat pumps can be built at a range of different scales from small systems to heat houses to large systems to heat office blocks and flats. A GSHP can be expected to produce between three to four times the amount of thermal energy than the electrical energy required to operate the pump.

10.2 Draft PPS18

Annex 1 (H) of draft PPS18 outlines the role and limitations of the planning system in relation to the installation of heat pumps. With regard to GSHPs, the draft guidance highlights disturbance of archaeological remains and contamination of land associated with the abstraction or discharge of water as key planning issues and states that authorisation may be required from the Department of Agriculture and Rural Development's Rivers Agency for the installation of WSHPs. In relation to ASHPs, the draft states that in Conservation Areas or within the curtilage of Listed Buildings, they should be sensitively designed and sited.

10.3 Stakeholder Workshop

Entec identified the top 3 planning issues with regard to heat pumps as:

- Impact on archaeology and ecology (GSHPs);
- Visual and noise impact (ASHPs);
- Construction (GSHPs).

General comments regarding heat pumps included that GSHPs are usually installed in new buildings which will require planning permission anyway and that there is potential for noise from ASHPs. Other comments included '*needs consideration of underground hydrology and the environmental impact of changes in soil temperature*', '*define limit of microgeneration*' and concern that aquifers could be contaminated.

Stakeholders were asked whether they thought that installing a medium sized GSHP at a country hotel requiring a large area of the grounds to be dug up and reinstated, and where the heat pump would be contained in an existing part of the hotel and a control kiosk of dimension 2 x 3 x 0.5m would be attached to a side wall could be permitted development. Over half of respondents thought that the example could be permitted development with a third unsure. Comments included '*GSHPs are likely to be significant developments so should probably require planning permission*', '*as long as excavation doesn't affect biodiversity and pump not close to bedroom window*' and '*this would not be microgeneration*'.



10.4 Evidence: Ground Source Heat Pumps

10.4.1 Case Studies

Only one Northern Ireland GSHP case study was identified and examined for this review. The scheme, which as far as could be ascertained was not the subject of a planning application, is a 20kW horizontal system located at the Camphill Community Centre in Omagh and comprises 1km of pipework 600mm below ground, covering an area of 1750m². As part of a previous study⁵² in England and Wales Entec only identified 6 applications for GSHPs including four horizontal and two vertical systems that were part of larger planning applications. The lack of case studies in Northern Ireland, as well as in the UK as a whole, suggests that either GSHPs are not currently being installed on a widespread basis or planning permission is not being sought. Discussion with manufacturers suggests the latter is the case in at least some instances.

10.4.2 Other Permitted Development Consultations

Limits to permitted development for GSHPs being considered or introduced in England, Northern Ireland and Republic of Ireland are shown in Table 10.1.

Table 10.1 Limits to permitted development for ground source heat pumps being considered or introduced in England, Northern Ireland and Republic of Ireland

	Domestic			Non-domestic
Limits being considered/ introduced	England	Republic of Ireland	Northern Ireland	Republic of Ireland
Max area	No limit	No limit	No limit	GSHPs to be installed at distances from party boundaries and from the foundations of any structure or building in line with the Sustainable Energy Ireland Renewable Energy Information Office Procurement Guidelines

⁵² Department for Communities and Local Government and Welsh Assembly Government (unpublished) Prepared by Entec.



Limits being considered/ introduced	Domestic			Non-domestic
	England	Republic of Ireland	Northern Ireland	Republic of Ireland
Sensitive areas	No limit	No limit	<p>Within the curtilage of a listed building the heat pump or its housing (above ground) may not exceed 10 cubic metres (note this applied to ASHPs only in the domestic consultation)</p> <p>Not permitted where the underground elements of the heat pump are within a site of archaeological interest</p>	No limit
Ground level alteration	No limit	Maximum ground level alteration of 1m above or below adjoining ground	No limit	Maximum ground level alteration of 1m above or below adjoining ground
Noise	No limit	Must not exceed 43db(A) during normal operation, or in excess of 5db(A) above the background noise, whichever is greater, as measured from the nearest neighbouring inhabited dwelling.	No limit	Must not exceed 43db(A) as measured from the nearest party boundary.

Note that these limits and conditions are an abridged version for ease of reference. See original reports or statutory instruments for full details.

10.4.3 Justification of Recommendations

Area of Excavation

The Planning Service is not currently considering restricting the maximum area of excavation for GSHPs within the curtilage of a dwellinghouse. Similarly, the recently amended General Permitted Development Order (GPDO) in England (Class C) does not place any area limit on the installation, alteration or replacement of domestic GSHPs. This is unsurprising given the fact that, in a domestic context, the area of excavation required to install a GSHP will be limited. In a non-domestic context, the output of GSHPs could be larger and, therefore, the area of excavation greater which could have an impact on ecology and archaeology. In terms of excavation limits, Part 6 Class A of the GDO, relating to agricultural buildings and operations, normally restricts the area of excavation to a maximum of 300m² (0.03ha) – this was extended 600 m² on a time limited basis for manure and slurry storage to enable farmers to comply with the requirements of the Nitrates Directive. However, even an area of 0.06ha would appear to be too small for the installation of a horizontal GSHP such as the 20kW system installed at the Camphill



Community Centre which covers an area of approximately 1750m² (0.175ha). It is also worth noting that EIA regulations⁵³ currently include a requirement for determination of the need for EIA if the Energy Industry carries out industrial installations for the production of electricity, steam and hot water on land over 0.5ha in area. Although the Energy Industry is unlikely to install GSHPs this provides a useful analogy for the amount of excavation that might be carried out within future permitted development limits. At the stakeholder workshop over 50% of respondents agreed with restricting permitted development for GSHPs to a maximum excavation area of 0.5ha whilst only 14% disagreed. Planning Service Development Control officers were more unsure as to whether this limit was acceptable although none felt that it was inappropriate. In the Republic of Ireland, no area restriction was placed on GSHPs although the level of ground should not be altered by more than 1m above or below the level of the adjoining land. Following consultation, a second condition was also included within the amended Republic of Ireland Planning and Development Regulations requiring GSHPs to be installed at distances from party boundaries and from the foundations of any structure or building in line with the Sustainable Energy Ireland Renewable Energy Information Office Procurement Guidelines on Heat Pump Systems. The purpose of this constraint is to prevent structural damage and to avoid technical operational problems if pumps in neighbouring properties are laid too close to each other.

Taking into account the comments from stakeholders and Development Control officers, the existing GDO and EIA Regulations as well as the Republic of Ireland position, we recommend that the maximum permitted excavated area for GSHPs be 0.5ha and that there is a requirement that excavated land should be made good after installation (i.e. it is returned to the condition it was in before the excavation took place).

Above Ground Elements

A GSHP will generally require the installation of above ground elements, e.g. a control unit, as well as the underground coils. In many cases it may be possible to locate above ground elements within an existing building, ideally within the building where the heating elements of the GSHP are to be located. We recognise that there may be some occasions however where above ground elements may need to be located in a new stand alone kiosk or mounted on an outside wall. In these cases we recommend that the size and location of the control panel allowed under permitted development rights is limited.

To limit visual impact outside the curtilage of the building we recommend that permitted development for the above ground elements of GSHPs are consistent with the recommendations previously made for hydro and biomass, i.e. that the above ground elements of a GSHP must be a minimum of 5m from the boundary of the building curtilage or any road and that it should not be nearer to any road which bounds the curtilage than the part of the existing building nearest that road.

⁵³ Statutory Rule 1999 No.73 The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999



To reduce the potential for visual impact further we also recommend that a maximum area and height limit is placed on the permitted development of GSHPs. Part 8 Class A limits permitted development to a floorspace of 750sqm and the height of the original building, however this is not necessarily appropriate for a control kiosk for a GSHP. Instead we recommend similar limits as have been set out for biomass and CHP boilers, i.e. a 10m² maximum floor area for buildings with a floorspace of up to 1000m² and 75m² for buildings with a floorspace of 1000m² or more.

We also recommend a maximum height limit of 3m as this should be more than sufficient for a kiosk or small building/extension to contain the above ground elements of a GSHP and yet be restrictive enough such that they do not need to be removed or limited if erected within 3km of the perimeter of an aerodrome (Parts 6, 7 and others of the GDO limit the height of buildings built under permitted development to 3m when within 3km of an aerodrome).

Sensitive Areas

For dwellinghouses, the Planning Service is minded to remove permitted development rights for GSHPs in Sites of Archaeological Interest given the potential impact that excavation for the installation of coils could have on archaeology. There was a general consensus among stakeholders at the workshop that this restriction would also be appropriate in non-domestic contexts with 76% of respondents agreeing and only 5% disagreeing. Similarly, the majority of Development Control officers were in support of restricting permitted development in Sites of Archaeological Interest. In conformity with the likely direction of the GDO for domestic land uses and with our recommendations for underground solid biomass fuel stores, we recommend that the installation of GSHPs in Sites of Archaeological Interest should not be permitted development. We also recommend that permitted development rights are removed in Areas of Special Scientific Interest as it is likely that these sites would be adversely affected by the excavation required for a GSHP, although given the other protections available to ASSIs we would hope it unlikely that such a situation would arise without the prior acknowledgement of the Department that such an action would not damage the site.

There is some potential for both underground and above ground development associated with GSHPs to affect Listed Buildings or their setting and we therefore recommend that permitted development rights should be removed where Listed Building Consent has not been received for the development.

With regard to AONBs, National Parks, World Heritage Sites and Conservation Areas the underground aspects of GSHPs are unlikely to have any effect on the reason for their designation (unless the areas were also SAIs or ASSIs). We note that Part 8 (Class A) of the existing GDO does not permit the extension or alteration of an industrial building or a warehouse within Conservation Areas, AONBs and National Parks.

On balance we feel that the requirement for all above ground elements of GSHPs to be located at least 5m from the boundary of the property and not nearer to any road which bounds the curtilage than the part of the existing building nearest to that road should minimise impacts even in sensitive areas. We therefore do not recommend removing permitted development rights in Conservation Areas, World Heritage Sites, AONBs or National Parks



but recommend that guidance is provided to encourage that the design and external finishing of any new or extended boiler house in all sensitive areas be in keeping with the existing buildings within the curtilage.

10.5 Evidence: Water Source Heat Pumps

10.5.1 Case Studies

No examples of WSHPs could be found in Northern Ireland. However, 2 case studies were identified by Entec elsewhere in the UK at Caerphilly Castle in South Wales and Stover Park visitor centre in Devon. In both cases planning applications had not been submitted as they did not entail the erection of a large visible structure.

10.5.2 Other Permitted Development Consultations

In a domestic context, the Planning Service is applying the same controls to WSHPs as it proposes for GSHPs. The Republic of Ireland has not introduced permitted development rights for either domestic or non-domestic land uses. In England WSHPs are permitted development for dwellinghouses and no limits to permitted development have been set.

10.5.3 Justification of Recommendations

Area of Pipework

The Planning Service does not propose any controls over the area of pipework in a domestic context. The amended GPDO in England (Class D) permits the installation, alteration or replacement of a WSHP within the curtilage of a dwellinghouse with no restriction as to its size. In a non-domestic context there is potential for WSHPs to expand over a large area of water bodies which could have an impact on water quality and ecological receptors and as such we believe that the maximum area of pipework allowed under permitted development rights should be at a similar scale to the excavation allowed for GSHPs. At the stakeholder workshop 43% of respondents were unsure as to what maximum area of pipework should be permitted. The same proportion of respondents agreed that the limit should be 0.5ha with only 14% in disagreement. Although Planning Service Development Control officers were, on the whole, unsure as to what the maximum area of pipework should be, none disagreed with the suggested limit of 0.5ha. We therefore recommend that the maximum area of pipework allowed under permitted development rights should extend to no more than 0.5ha.

Ecology

At the stakeholder workshop concerns were raised relating to the potential impact of WSHPs on ecology with comments including *'would this affect the ecology of the lake, water way etc'*, *'needs proper consideration of impact'* and *'WSHPs are likely to be significant development so should probably require planning permission.'*



Two Planning Service Development Control officers also raised concerns relating to contamination, stating ‘depends on planning history, previous use of site – contamination’ and ‘particularly in industrial areas the issue of ground contamination should be considered – disturbance.’ In addition, provision has not been made for extending permitted development rights for WSHPs in the Republic of Ireland due to the potential risks of leakage and temperature variations in aquifers.

Although WSHPs could potentially impact on water bodies if the refrigerant in closed loop WSHPs leaks, we believe that as this is a manufacturing and installation issue, it is not something that should necessarily be included as a condition to permitted development rights. For open loop systems there is potential risk to ecology as a result of changes in water temperature where water is abstracted and discharged and authorisation may be required from the Department of Environment, Northern Ireland Environment Agency. Advice on these issues and on regulatory requirements related to protected water bodies could be included in guidance.

Above Ground Elements

As with GSHPs, WSHPs will generally require the installation of above ground elements, e.g. a control unit, as well as the underground coils. There would be little difference between the impacts of the structures between these technologies and no reason, so far as we can ascertain, to have a different limit to permitted development. We therefore recommend that the above ground elements of WSHPs are permitted development if they are a minimum of 5m from the boundary of the building curtilage or any classified highway and that it should not be nearer to any road which bounds the curtilage than the part of the existing building nearest that road. The area and height limits set out for GSHPs are also relevant to WSHPs, i.e. a 10m² maximum floor area for buildings with a floorspace of up to 1000m², maximum floor area of 75m² for buildings with a floorspace of 1000m² or more and a maximum height of 3m.

As with GSHPs we believe that permitted development rights for WSHPs should be removed in SAIs and ASSIs and within the curtilage of a Listed Building where Listed Building Consent has not been granted for the development.

10.6 Evidence: Air Source Heat Pumps

10.6.1 Case Studies

Only one Northern Ireland ASHP case study was identified and researched as part of the review. This was a 10kW pump located at Park Civic Amenity Centre, Londonderry which serves an underfloor heating system. An interview with Derry City Council’s Energy Officer revealed that the ASHP was part of a larger planning application for the construction of the amenity centre itself which was completed in June 2008. According to the Energy Officer, the pump unit has a volume of only 1m³, is screened by trees and is situated over 100m from the nearest dwelling. The Officer also commented that a nearby river effectively screens out the noise generated by the system.



In addition to this case study, Entec has previously examined two schemes in England as part of a previous study¹. A heat pump at High Wray Village Hall in the Lake District National Park, which was not subject to a planning application, is located to the rear of the building and is of dimension 1396 x 402 x 780mm (approximately 0.5m³). A total of 3 heat pumps, comprising one 14kW pump and two 7kW pumps of dimension 1170 x 900 x 320mm and 797 x 960 x 390mm respectively (a combined volume of 1m³), have been installed on the rear wall of Barely Village Hall in Pendle. Interestingly, planning permission was sought for the heat pumps and although applications could not be found, a stakeholder involved with the project stated that the only potential issue was the colour of the heat pumps. This case study raises the point that if permitted development rights are to be extended for ASHPs it may be necessary to ensure any maximum size limits allows for the erection of more than one unit.

10.6.2 Other Permitted Development Consultations

In light of responses to the domestic consultation document, the Planning Service is minded to recommend that permitted development rights for ASHPs should not be introduced until noise issues can be satisfactorily addressed. This is due to the difficulty in measuring and enforcing noise restrictions in a domestic context. However, the document makes the following recommendations for permitted development rights in relation to ASHPs for incorporation in a future review. Limits to permitted development for ASHPs if these issues can be resolved and those that have introduced in the Republic of Ireland are shown in Table 10.2. Note that permitted development rights may be introduced for Air Source Heat Pumps in England if agreement can be reached on a way to minimise noise impacts.

Table 10.2 Limits to permitted development for air source heat pumps being considered or introduced in Northern Ireland and Republic of Ireland

	Domestic		Non-domestic
Limits being considered/ introduced	Republic of Ireland	Northern Ireland	Republic of Ireland
Size	Area, taken together with any other pump previously erected, must not exceed 2.5m ²	If within 3m of the boundary of the curtilage must not exceed 4m in height	Industrial: Maximum surface area of 15m ² Business Premises/Light Industrial/ Agric: Maximum surface area of 10m ²
Location	Must not be erected on or forward of, the front wall or roof of the house Minimum of 50cm from edge of roof or wall	Not permitted where any part of the heat pump or its housing is nearer to any road which bounds the curtilage than the part of the dwellinghouse nearest to that road	Light industrial/business premises: Must not be erected or placed forward of the front wall of the building All: Minimum of 50cm from edge of the wall or roof



Limits being considered/ introduced	Domestic		Non-domestic
	Republic of Ireland	Northern Ireland	Republic of Ireland
Sensitive areas	No limit	Not permitted if any external element of the heat pump within the curtilage of a dwellinghouse faces onto and is visible from a road in designated areas	No limit
Listed Buildings	No limit	Volume of pump must not exceed 10m ³ within the curtilage of a Listed Building	No limit
Noise	Must not exceed 43db(A) during normal operation, or in excess of 5db(A) above the background noise, whichever is greater, as measured from the nearest neighbouring inhabited dwelling.	n/a	Must not exceed 43db(A) during normal operation, as measured from the nearest party boundary

Note that these limits and conditions are an abridged version for ease of reference. See original reports or statutory instruments for full details.

10.6.3 Justification of Recommendations

The main limiting issues for permitted development rights in relation to ASHPs are their size, visual impact and noise impact.

Size

The Planning Service has not made any recommendations for restricting the size of heat pumps installed on dwellinghouses except for installations within the curtilage of a Listed Building or where a heat pump is within 3m of the boundary of the curtilage a dwellinghouse. This is understandable given the fact that, in a domestic context, the size of a heat pump will generally be restricted as the energy requirements of dwellings are relatively low. However, in a non-domestic context there is more potential to install large heat pumps given that energy requirements will be typically higher than for residential dwellings. This is supported by the concerns raised in relation to noise by stakeholders at a workshop with comments including ‘noise level criteria needs to be considered but difficult to implement under permitted development’, ‘air source is a noise generator – residential amenity’ and ‘air – be careful as can cause nuisance’. Therefore, we believe that there is a need to limit the size of ASHPs under permitted development rights.

The case studies highlighted in Section 1.4.1 include two single pumps with volumes of 0.5m³ and 1m³, the latter of which has a rating of 10kW, and 3 ASHPs with a combined volume of 1m³ and rating of 28kW. However, an



output of 28kW is unlikely to provide a significant proportion of a building's energy requirements in many non-domestic contexts. In the Republic of Ireland, ASHPs are permitted provided they do not exceed a surface area of 15m² on or within the curtilage of industrial buildings and 10m² for light industrial, business premises and agricultural holdings. In addition, heat pumps must be a minimum of 50cm from the edge of the wall or roof on which they are mounted. We have considered allowing permitted development for ASHPs with volumes up to the limit we recommended for biomass/CHP fuel stores and boiler rooms (i.e. up to a volume limit of 30m³ for buildings with a floorspace of up to 1000m² and a volume limit of 225m³ for buildings with a floorspace of 1000m² or more and a maximum height of 3m.). When consulted, the majority of Planning Service Development Control officers considered that the 30m³ volume limit would be an acceptable limit to permitted development rights for ASHPs in buildings with a floorspace of 1000m². For buildings with a floorspace of 1000m² or more we believe that a volume limit to permitted development of 225m³ still has potential to have visual impacts, particularly given ASHPs prominence if placed high up on an exterior wall. To reduce this potential for visual impacts we recommend that for buildings with a floorspace of 1000m² or more permitted development should be limited to 75m³. We also recommend that specific efforts are made to contact ASHP manufacturers and installers during the consultation period to ensure that an industry view is obtained prior to making any final amendments to the GDO.

Visual Impact

To further minimise visual impacts and protect road safety, following consultation, the Planning Service is minded to remove permitted development rights for ASHPs where any part of the heat pump or its housing is nearer to any road which bounds the curtilage than the part of the dwellinghouse nearest to that road. We do not believe that this limit would always be applicable in a non-domestic context as there may be areas that are closer to a boundary road that cannot be seen from it and therefore would not cause a visual impact. We therefore recommend restricting the installation of ASHPs to a minimum of 5m from the boundary of the building curtilage or any classified highway and that it should not be nearer to any road which bounds the curtilage than the part of the existing building nearest that road. We also recommend a height limit for permitted development of ASHPs is included such that they must not be higher than the existing building.

Sensitive Areas

The installation of ASHPs could have a detrimental impact on the visual amenity of some sensitive areas. For dwellinghouses, the Planning Service is minded to recommend a condition be included within the GDO that an ASHP or any external element of the heat pump within the curtilage of a dwellinghouse should not face onto and be visible from a road in Designated Areas (as defined by the existing GDO). At the workshop there was no consensus among stakeholders as to whether this restriction was appropriate with an equal proportion of respondents stating that they either agreed or disagreed with the constraint although the majority of Development Control officers were in favour. As outlined in earlier sections of this report we recommend that restrictions on permitted development rights in Designated Areas are differentiated. For ASHPs in non-domestic uses bearing in mind the 5m distance to the curtilage and that the ASHP should not be any nearer a road bounding the curtilage



than the existing building, we do not believe that it is necessary to introduce limits to permitted development in AONBs or National Parks.

In Conservation Areas and World Heritage Sites we recognise that there is more potential for visual impact given the smaller scale of these designations. We therefore recommend removing permitted development rights for ASHPs in these areas where any external element of the heat pump within the curtilage of the building is visible from a road and mounted on a wall that faces onto that road.

As with GSHP and WSHPs we believe that permitted development rights for ASHPs should be removed in SAIs and ASSIs as works outside the existing building will be required which could have an impact on the reasons for the sites designation.

Based on the responses to the domestic consultation, the Planning Services is considering limiting the volume of a domestic heat pump or its housing installed under permitted development rights to a volume of 10m³ within the curtilage of a Listed Building, consistent with Part 1 (Class D) of the existing GDO. At the stakeholder workshop slightly more respondents were in favour of this limit than against although 33% were unsure. The majority of Development Control officers were, however, against allowing the installation of ASHPs within the curtilage of a Listed Building under permitted development rights with comments including '*no permitted development rights for listed buildings. Conservation Areas should not benefit from PD also*' and '*no PD if within curtilage of a Listed Building.*' In light of this we recommend that permitted development rights are removed within the curtilage of a Listed Building for ASHPs unless Listed Building Consent for the development has been granted.

Noise

As part of the domestic consultation, a minimum distance of 5m from the façade of the nearest residential window was suggested in order to minimise noise nuisance. However, responses to the consultation paper suggest that further research and development in relation to noise restrictions needs to take place, including the establishment of an industry standard, before permitted development rights for ASHPs can be granted. Indeed, noise was raised as one of the key issues in relation to ASHPs at the stakeholder workshop. Several comments related to the need to ensure that noise is restricted including '*precise technical calculation of guidelines required*' and '*should be noise limits*'. A majority of stakeholders were in favour of limiting heat pumps such that they were only permitted development if 5m or more from a residential window although some stakeholders felt that again that this was dependent on noise limits.

The current position in England is quite similar to that in Northern Ireland with CLG awaiting further work before finalising recommendations. In the English domestic consultation a noise limit based on noise levels at receptors was recommended, an approach adopted in the Republic of Ireland where a noise limit of 43db(A) has been included within the amended Planning and Development Regulations. Many respondents to the English domestic consultation commented that this approach was far too complex and would lead to extra work for Council Environmental Health Officers and confusion for manufacturers, installers and customers. Conversely, those



respondents who dealt with noise on a regular basis, such as the Institute of Acoustics, commented that the recommendations were too simplistic.

In our review of non-domestic microgeneration in England and Wales Entec recommended that the most appropriate method of addressing the issue of noise was through a Microgeneration Certification Scheme (MCS) that permitted development rights would only be given to certified installers and products. As an interim measure we recommended that a distance criterion of limiting permitted development to those ASHPs at least 100m from a residential window which was also the recommendation in relation to wind turbines, however our understanding is that, as the issue of noise is nearing a conclusion in relation to wind turbines, it is likely that the issue should soon be resolved for ASHPs. We believe the outcome is likely to allow permitted development rights for products and installers certified by the MCS and will require ASHPs installed under permitted development rights to test their machines under certain conditions and publish a noise rating for them. It should then be possible for an installer to ascertain if the ASHPs would have a noise level at the nearest receptor above a certain threshold that would allow permitted development. We believe this threshold is likely to be either 40 or 45dB(A) at the receptor. Using such criteria would put the responsibility for minimising residential noise disturbance on ASHP manufacturers and installers.

The situation regarding noise limits in England has not yet been resolved and we recommend that the Planning Service liaise closely with CLG to ensure a similar approach is taken to what can be a complex issue. We believe there is little point in having differing standards relating to noise in the UK as this would be liable to confuse manufacturers, installers and customers and could lead to less ASHP products being available in Northern Ireland if manufacturer chose to confirm to the English requirements.

10.7 Summary of Recommendations

A summary of the permitted development rights we recommend for heat pumps is included in Table 10.3. Note that we do not recommend introducing permitted development for air source heat pumps until issues regarding noise are resolved.



Table 10.3 Summary of permitted development recommendations for heat pumps

Recommendation	
Ground source heat pumps	<ul style="list-style-type: none"> • Maximum excavation area of 0.5ha • Excavated land should be made good after the heat pump has been installed • Above ground elements must be a minimum of 5m from the boundary of the building curtilage or any road and should not be nearer to any road which bounds the curtilage than the part of the existing building nearest that road • Above ground elements must not exceed a maximum floor area of 10m² for buildings with a floorspace of up to 1000m² • Above ground elements must not exceed a maximum floor area of 75m² for large non-domestic buildings with a floorspace of 1000m² or more • Above ground elements must not exceed 3m in height • No permitted development in an Area of Special Scientific Interest or Site of Archaeological Interest • No permitted development within the curtilage of a Listed Building for above ground elements unless Listed Building Consent for the development has previously been granted
Water source heat pumps	<ul style="list-style-type: none"> • Area of pipework must not exceed 0.5ha • Above ground elements must be a minimum of 5m from the boundary of the building curtilage or any road and should not be nearer to any road which bounds the curtilage than the part of the existing building nearest that road • Above ground elements must not exceed a maximum floor area of 10m² for buildings with a floorspace of up to 1000m² • Above ground elements must not exceed a maximum floor area of 75m² for large non-domestic buildings with a floorspace of 1000m² or more • Above ground elements must not exceed 3m in height • No permitted development in an Area of Special Scientific Interest or Site of Archaeological Interest • No permitted development within the curtilage of a Listed Building for above ground elements unless Listed Building Consent for the development has previously been granted
Air source heat pumps	<p>No permitted development for any air source heat pump until issues regarding noise can be resolved. If these can be agreed satisfactorily we recommend the following restrictions on permitted development:</p> <ul style="list-style-type: none"> • Maximum combined volume of all air source heat pumps of 30m³ for buildings with a floorspace of up to 1000m² or 75m³ for large non-domestic buildings with a floorspace of 1000m² or more • Must not exceed height of the existing building • Must be a minimum of 5m from the boundary of the building curtilage or any road and should not be nearer to any road which bounds the curtilage than the part of the existing building nearest that road • No permitted development in a Conservation Area or World Heritage Site where the heat pump is visible from a road and erected on a wall that faces onto that road • No permitted development in an Area of Special Scientific Interest or Site of Archaeological Interest • No permitted development within the curtilage of a Listed Building for any external element of the heat pump unless Listed Building Consent for the development had previously been granted



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