Perth and Kinross

State of the Environment Report

PERTH & KINROSS COUNCIL

The Environment Service

Executive Summary

The purpose of this State of the Environment (SoE) Report is to provide a diagnostic tool that will help to inform plan-makers, decision-makers and the community about the condition of the environment, whose health is essential to the continued well-being and prosperity of residents and enterprise in Perth and Kinross.

Overall the state of the environment in Perth and Kinross is good. Landscape, biodiversity and the aquatic environment are generally in good and improving condition. The main areas of concern are emissions to the atmosphere, carbon dioxide in relation to climate change, and particulates and nitrogen dioxide in relation to air quality. However, air quality in most areas of Perth and Kinross is generally good. The main factor behind these emissions is transport, and indications are that traffic volumes are increasing.

Another key pressure identified in Perth and Kinross is development activity. Review of recent planning applications identified an increase in demand for development with the potential to impact the cultural heritage and prime agricultural land of Perth and Kinross.

Municipal waste production within the Council area is continuing to increase. However, the Council has a good record in waste management and recycling, exceeding its 2006 target.

A number of data gaps prevent the detailed reporting of the state of all aspects of the environment within Perth and Kinross. This will hopefully be rectified in future versions of the SoE report, through the development of new data sources and improvements to existing data sources.

Summary Scorecard

Indicator	State			Trend
	Poor	↔	Good	
Air Quality				
Number of days air quality exceeds legislative limits				
Mean annual levels of key air pollutants				
Landscape				
Area of derelict and vacant land				
Area of 'potentially' contaminated land				
Inland Waters				
Water chemical and biological quality				
Water bodies identified at risk				
Communities				
Neighbourhood satisfaction				
Transport				
Traffic volumes				
Waste				
Total municipal waste arising				
Treatment of municipal waste				

Trend Key	
	Worsening
	Improving
	No discernable change or trend unclear

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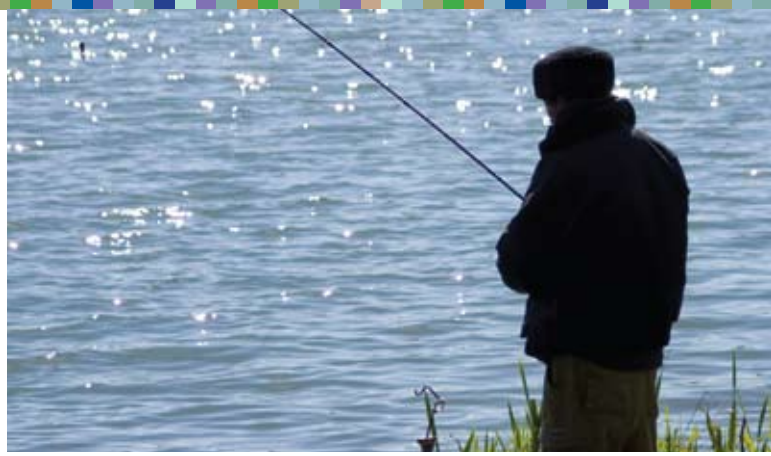
Acronyms and Abbreviations



AQMA	Air Quality Management Area
BPEO	Best Practical Environmental Option
CH_4	Methane
CO_2	Carbon Dioxide
EU	European Union
GIS	Geographic Information System
GWh	Gigawatt Hours. Unit of electrical-energy equal to one billion (10^6) watt hours, One watt-hour is the amount of energy expended by one-watt load drawing power for one hour eg a 60 watt light bulb uses 60 watt-hours of energy every hour.
Ha	Hectares
km^2	Square kilometers
KSI	Killed or seriously injured
kt	kilotonnes
LBAP	Local Biodiversity Action Plan
m	meters
m/s	Meters per second
MW	Megawatt Unit of electrical-energy equal to one million (10^6) watt hours, One watt-hour is the amount of energy expended by one-watt load drawing power for one hour eg a 60 watt light bulb uses 60 watt-hours of energy every hour.
N_2O	Nitrous Oxide
NIWT	National Inventory of Woodlands and Trees
No.	Number
NO_2	Nitrogen Dioxide
NO_x	Nitrogen oxides
NSA	National Scenic Areas
PKC	Perth & Kinross Council
PM_{10}	Particulate Matter
RIGS	Regionally Important Geological Sites
SAMs	Scheduled Ancient Monuments
SEA	Strategic Environmental Assessment
SHEP	Scottish Historic Environment Policy
SNH	Scottish Natural Heritage
SoE	State of the Environment
SSSI	Site of Special Scientific Interest
tactran	Tayside and Central Scotland Transport Partnership
UK	United Kingdom
UKBMS	United Kingdom Butterfly Monitoring Scheme
WFD	Water Framework Directive
WIAT	Woodland In and Around Towns
µg/m3	micrograms per cubic metre

Introduction 1

Background 1.1

The purpose of this State of the Environment (SoE) Report is to provide a diagnostic tool that will help to inform plan-makers, decision-makers and the community about the condition of the environment, whose health is essential to the continued wellbeing and prosperity of residents and enterprise in Perth and Kinross.

It will enable the measurement of the effects and impacts of Council and other policy initiatives in line with the requirements of Directive 2001/42/EC on Strategic Environmental Assessment and the Environmental Assessment (Scotland) Act 2005. It will assess 'the likely significant effects on the environment including issues such as, biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors'.

The environmental data used in this report has been taken primarily from information held on the Council's Geographical Information System (GIS) and from other Council departments. In addition, further information has been accessed from the Scottish Government and other governmental and non-governmental agencies. Two parallel pieces of work that support this report are an Indicators Report and a meta database providing details on the sources and quality of data used.

This report is an independent assessment of the state of Perth and Kinross' environment with a baseline of 2005/2006 unless otherwise stated.

Perth and Kinross 1.2

Perth and Kinross is located in the heart of the country just north of the central belt bordering Aberdeenshire, Angus, City of Dundee, Fife, Clackmannanshire, Stirling, Argyll and Bute and Highland Council areas (Figure 1.1).

Covering 5,286 km^2, Perth and Kinross is the fifth largest unitary authority in Scotland and is one of outstanding natural beauty, encompassing both highland and lowland landscapes. The area is characterised by a diverse mix of rural and urban land use, from the main population centre of Perth to extremely remote communities such as Kinloch Rannoch in the highland area. In 2005 the area had a population of 138,400 (approximately 30 % of which resided in Perth) making it the 14th largest population in a Scottish unitary authority.

Figure 1.1 Perth and Kinross

Structure of the report 1.3

The report considers the four main elements of the environment in turn; air, land, water and social aspects addressing the topics required by the European Union (EU) Directive 2001/42/EC on Strategic Environmental Assessment (SEA) currently implemented in Scotland by the Environmental Assessment (Scotland) Act 2005. Considering where appropriate:

- *the driving forces of change*
- *the pressures on the environment*
- *the state of the environment*
- *impacts on the population, economy and ecosystems*
- *society's response*

Atmosphere 2

Information and trends relating to Climate Change, Carbon Dioxide and Air Quality

Related sections:

Section 3.2 Geology and Soils
Section 4.1 Inland Waters
Section 5.1 Communities
Section 5.2 Transport
Section 5.3 Energy

Issues Summary:

	Current	Trend	Indicator
Climate Change			
	●	▲	Carbon emissons[1]
	●	▶	Timing of blooming and migration
Air Quality			
	●	▶	Mean annual level of air pollutants
	●	▶	Poor air quality days

Key			
●	Poor/area of uncertainty or potential problems	▶	No discernable trend or trend unclear but potential problems
●	Bad	▼	Worsening
●	Good/positive and expected to improve	▲	Improving
○	Fair/area of uncertainty or potential no problem	○	No discernable trend or trend inclear but potentially no problems
–	Unknown/not applicable	–	Unknown/not applicable

[1] Based on national trends identified in Scottish Executive (2006) *Changing our ways: Scotland's Climate Change Programme. A Summary.* www.scotland.gov.uk/Resource/Doc/100926/0024397.pdf

Climate Change 2.1

Climate is not static, it has changed in the past and will continue to change. Climate and weather are of great importance to the economic, social and environmental health of Perth and Kinross.

Driving forces and pressures 2.1.1

Natural causes of climate changes include volcanic eruptions, solar variation, variation in the earth's orbit and natural fluctuations in the climate system itself. Current scientific consensus is that most of the observed increase in global average temperatures since the mid-20th century is predominantly due to the observed increase in greenhouse gases related to human activity, such as the burning of fossil fuels, land-use and land-use change (deforestation, degradation of soils).

The gases that contribute most to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorine compounds. Carbon dioxide from transport, industry and domestic sources (such as heating, lighting and cooking) is the main greenhouse gas emitted in Scotland and Perth and Kinross.

Human activity can act to remove carbon from the atmosphere through carbon sequestration to forests via reforestation, and to soils via cultivation practices encouraging retention of carbon in the soil (eg no-till farming, residue mulching, cover cropping and crop rotation).

Perth and Kinross soils are relatively rich in organic matter (and hence carbon), particularly in the upland area. There is some evidence in Scotland of increased losses of organic matter from peaty soils. Large decreases in organic carbon concentrations in soils in England and Wales have been reported and linked to climate change. This trend, if also occurring in Scotland, would have serious implications for Scottish soils as a carbon store and in the climate change debate[1]. Data on changes in soil carbon levels is not currently available. However, with the introduction of the EU Soils Thematic Strategy (COM(2006)231), and the development of a Scottish Soils Strategy, methods to collect this data are currently being examined.

Estimated emissions data are available for carbon dioxide at the local authority level. Table 2.1 summarises the sources of carbon emissions in Perth and Kinross relative to Scotland, in 2004. Figure 2.1 shows the distribution of emissions in Perth and Kinross.

Within Perth and Kinross the majority of total carbon released (45 %) is attributed to road transport, with industry and domestic sources providing 30 % and 25 % respectively. Within Scotland as a whole, Industry is the greatest source of carbon emissions, (46 %). A relatively larger proportion of carbon emitted in Perth and Kinross is taken up by land use, land use change and forestry than at the Scottish level.

On a per capita basis, domestic emissions of carbon are greater than on average in Scotland.

Legislation, targets and action plans described under society's response (section 2.1.4) are forces driving to reduce the pressure on the environment exerted by greenhouse gases.

[1] Towers, W; Grieve, I C; Hudson, G; Campbell, C D; Lilly, A; Davidson, D A; Bacon, J R; Langan, S J and Hopkins, D W (2006) *Scotland's Soils Resource Current Sate and Threats*

Figure 2.1

Perth and Kinross Carbon Emmissions 2004

1x1km emmissions of CO_2 in 2004 (as tonnes of Carbon)

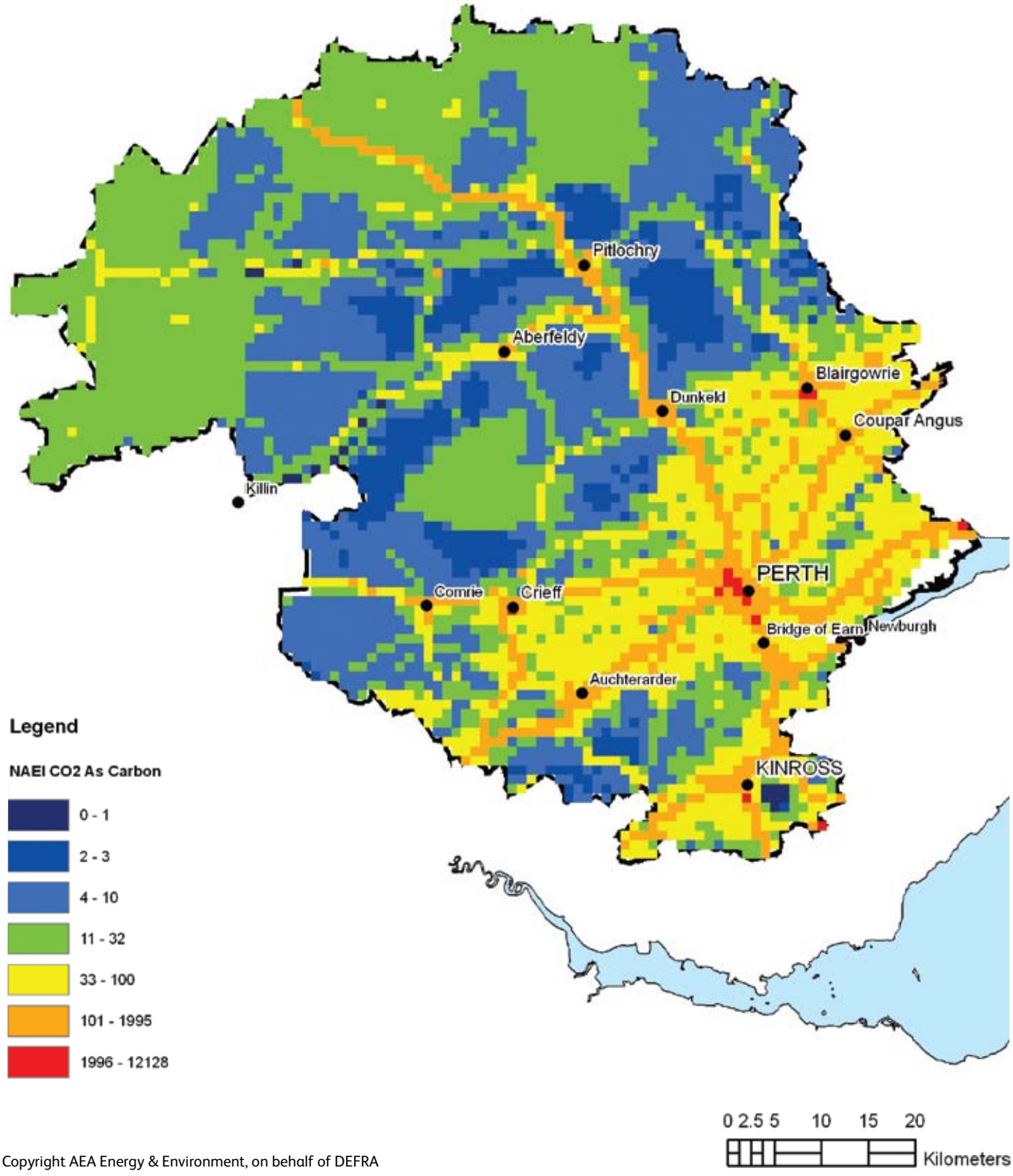


Table 2.1 Perth and Kinross Estimated Carbon Emissions (kilo tonnes CO_2), 2004[2]

	Carbon Dioxide Emissions (kt CO_2)	
	Perth and Kinross	Scotland
Industry and Commercial	516	23,296
Domestic	435	14,389
Road Transport	751	12,388
Total not including Land Use, Land Use Change and Forestry	1,702	50,073
Land Use, Land Use Change and Forestry	-325	-4,865
Total including Land Use, Land Use Change and Forestry	1,378	45,209
Population Thousands (2004)[2]	136	5,057
Domestic per capita Carbon Dioxide (tonnes)	3.2	2.8

Due to the variation in the methodology used to estimate annual carbon emissions it is not possible to comment on trends at the local authority level. The following figures were published by the Scottish Executive in 2006[3]:

- *Emissions of greenhouse gases fell by 10% between 1990 and 2003.*
- *Carbon dioxide emissions over the same period fell by 8% (more than any other UK country).*
- *Scotland's soils and trees removed 20% more carbon dioxide from the atmosphere in 2003 than in 1990.*
- *Including this carbon sink, Scotland's 2003 greenhouse gas emissions were 14% lower than in 1990.*

The rate of change in carbon dioxide emissions will be influenced by economic, social, technological and natural developments. The ultimate limiting factor for carbon dioxide emissions will be the availability of fossil fuels.

State 2.1.2

The 2003, 2004 and 2005 temperatures for Scotland were the highest since the record began in 1914. By the end of the century, temperatures in Scotland are predicted to increase by up to 3.5˚C during the summer months and around 2.5˚ C during the winter[4].

The UK Meteorological Office regularly updates an All Scotland Series of monthly figures for mean temperature, rainfall and sunshine. The former two series originate in 1914, the latter in 1929. Trends in all monthly temperatures have indicated warming, but only the month of August has shown a significant trend. Changes in rainfall and sunshine have been less clear[5].

[2] Data from Defra Environment Statistics and Indicators Division, published 2006 www.defra.gov.uk/environment/statistics/globatmos/index.htm

[3] Scottish Executive (2006) *Changing our ways: Scotland's Climate Change Programme. A Summary.* www.scotland.gov.uk/Resource/Doc/100926/0024397.pdf

[4] Bennet, C; Hossell, J; Perry, M; Procter, C and Hughes, G. (2006) *A handbook of climate trends across Scotland.* SNIFFER project CC03, SNIFFER

[5] Source Sparks, T H; Collinson, N; Crick, H; Croxton, P; Edwards, M; Huber, K; Jenkins, D; Johns, D; Last, F; Maberly, S; Marquiss, M; Pickup, J; Roy, D; Sims, D; Shaw, D; Turner, A; Watson, A; Woiwod, I and Woodbridge, K. (2006). Natural Heritage Trends of Scotland: phenological indicators of climate change. *Scottish Natural Heritage Commissioned Report No 167* (ROAME No F01NB01).

Rainfall data from key gauges in Perth and Kinross (section 4.1.1) show there has been no clear upward or downward trend in total or seasonal rainfall in Perth and Kinross in the last 30 years. However, figures calculated at the national level show that there was a significant increase in winter and annual rainfall throughout Scotland, 58 % and 20 % respectively[5].

Impact on population, economies and ecosystems 2.1.3

Whilst the global impacts of climate change are immense, there are also wide-ranging implications for Scotland. These include increased flood risk, and impacts on water resources, agriculture, transport, tourism and disease; all of great economic, social and environmental importance.

Yields of agricultural and forestry products may be adversely affected if summer rainfall decreases and temperature increases, thus causing reductions in soil moisture content.

Changes in climate causes phenological change (phenology is defined as the study of the relationship between climate and the timing of natural biological events), impacting the timing of migration of fauna and the flowering of flora. Many species will not be able to adapt to changes in climate quickly enough and species of flora and fauna native to Perth and Kinross may be under real threat.

The UK Phenology Network contains a number of longer term records (greater than ten years) from individuals in Perth and Kinross (Table 2.2). Two significant trends are noted in Aberfeldy for the first flower of the Dog Rose and Snowdrop, -0.32 days/year (three days per decade earlier) and -0.28 days/year (three days per decade earlier) respectively. However, Snowdrop records in Abernethy and Skye did not show a significant advance. Flowering of the Dog Rose was not monitored elsewhere in Scotland. From the limited available results it is not possible to conclude that there are any significant trends in the timing of migration of fauna and flowering of flora throughout Perth and Kinross.

Table 2.2 Trends (days per year) in long term UK Phenology Network records[6]

Species	Event		n[1]	Date Mean[2]	Trend[3]	SE[4]
Plant Species						
Snowdrop	First flower	Abernethy	12	47.3	-1.07	0.87
Daffodil	First flower	Abernethy	12	99.8	-0.96	0.68
Dog Rose	First flower	Aberfeldy	21	156.0	**-0.32**	**0.14**
Snowdrop	First flower	Aberfeldy	38	17.3	**-0.28**	**0.13**
Larch	First leaf	Aberfeldy	27	74.4	-0.25	0.16
Beech	First leaf	Aberfeldy	24	112.9	-0.18	0.12
Daffodil	First leaf	Aberfeldy	23	72.4	0.0	0.23
Bird Species						
Willow Warbler	First seen	Aberfeldy	21	116.3	-0.13	0.10
Swallow	First seen	Aberfeldy	46	112.3	-0.1	0.07
Cuckoo	First heard	Aberfeldy	46	118.8	-0.02	0.06
Swift	First seen	Aberfeldy	42	133.5	0.20	0.16
Sandpiper	First seen	Aberfeldy	18	115.5	0.53	0.38
Wheatear	First seen	Aberfeldy	19	97.2	0.57	0.29
Bumblebee						
Bumblebee	First seen	Abernethy	13	95.2	-0.87	0.61
Frog						
Frogspawn	First seen	Abernethy	12	72.9	-0.02	0.38
Lawn						
Lawn	First Cut	Abernethy	10	129.6	-1.67	1.79

[1] n - Number of year's data collected

[2] Mean dates (expressed in days after December 31)

[3] Trend as days per year

[4] Standard Error (measures the amount of variability around the sample mean)

Trends in **bold** are statistically significant

[6] Source: Sparks, T H; Collinson, N; Crick, H; Croxton P; Edwards, M; Huber, K; Jenkins, D; Johns, D; Last, F; Maberly, S; Marquiss, M; Pickup, J; Roy, D; Sims, D; Shaw, D; Turner, A; Watson, A; Woiwod, I and Woodbridge, K. (2006). Natural Heritage Trends of Scotland: phenological indicators of climate change. *Scottish Natural Heritage Commissioned Report No 167* (ROAME No F01NB01)

Society's response 2.1.4

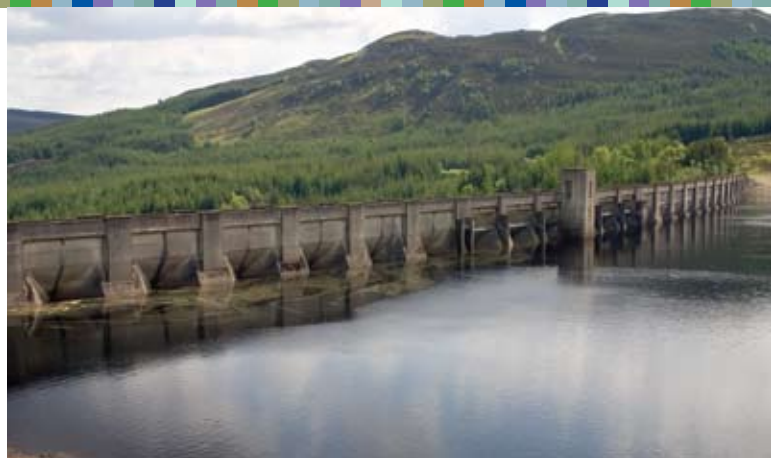
Society is responding to climate change in two ways:

- *mitigation of greenhouse gas emissions;*
- *reduction in vulnerability to impacts of climate change.*

Through Scotland's new Climate Change Programme[7], the Executive is committed to tackling the issue and securing a safer, sustainable future for Scotland. The Executive have set a target to cut green house gas emissions by 20 % below the 1990 level by 2010 and a 60 % reduction by 2050. The Executive have also set a Scottish Share and Target, of an annual reduction in 2010 of 2.7million tonnes of Carbon. Reductions will be achieved through:

- *encouraging efficient use of energy in association with increases in "greener'' renewable sources of electricity and heat.*
- *promotion of new and cleaner vehicle technology and fuel, and encouraging the public to consider alternatives to driving cars.*
- *increase carbon sequestration by increasing forest cover and using more wood as fuel.*
- *waste recycling initiatives.*
- *participation in the development of a UK-wide policy framework on preparing for climate change[7].*

Perth & Kinross Council (PKC) signed up to Scotland's Climate Change Declaration in January 2007, committing to recognise the challenge climate change poses; acknowledging the work already being done to address this; and to produce a plan to improve and report on its performance on climate change.



The declaration requires that the Council achieve a significant reduction in greenhouse gas emissions, including those arising from energy use and sourcing (Section 5.5), travel and transportation (Section 5.2), waste production and disposal (Section 5.3).

Around 52 % of the UK's carbon dioxide emissions come from creating or using buildings. The UK government have set a target of carbon neutrality for all new buildings by 2016. "Carbon Neutrality" is yet to be fully defined. Once it is defined and data is made available future versions of the SoE report will comment on the performance within Perth and Kinross relative to this target.

Opportunities and threats 2.1.5

The following key assets, opportunities and threats for air quality in Perth and Kinross have been identified (Table 2.3).

[7] Scottish Executive (2006) *Changing our ways: Scotland's Climate Change Programme. A Summary.* www.scotland.gov.uk/Resource/doc/100926/0024397.pdf

Table 2.3 Climate assets, threats and opportunities

Asset	Opportunities and Treats
Current Climate Soils Forests	Opportunities ▪ *Air Quality Action plan* ▪ *Regional Transport Strategy* ▪ *Growing awareness* Threats ▪ *Potential positive feedback* ▪ *Transboundary effects* ▪ *Lack of awareness*

Data gaps and limitations 2.1.6

The key limitation to reporting on climate change is the limited availability of data relating to the key pressures and impacts of climate change (eg continuity in carbon dioxide emissions data) allowing minimal reporting on trends and the impacts on fauna and flora.

Air Quality 2.2

Good air quality is critical for the health of residents and visitors to Perth and Kinross as well as the condition of the area's wildlife, habitats and built environment.

Driving forces and pressures 2.2.1

The primary cause of poor air quality in Perth and Kinross is emissions from road traffic, particularly where relatively narrow streets, bounded by tall buildings, form 'street canyons' which restrict air movement and can cause pollution to increase at times. There are no significant industrial or domestic sources of air pollutants in Perth and Kinross.

Some pollution is transported into the area by winds from elsewhere. A significant proportion of the current annual average particulate matter concentration (PM_{10}) is due to the secondary formation of particulates from regional scale pollutants, for which, the annual concentrations do not vary greatly over a scale of tens of kilometres. There are also natural or semi-natural sources such as wind-blown dust and sea salt particles. The Council's 2005 Air Quality Report identifies the average background concentrations of nitrogen dioxide and particles to be 5 $\mu g/m^3$ (peaking at 18.1 $\mu g/m^3$ in Perth) and 12.7 $\mu g/m^3$ (peaking at 15.8 $\mu g/m^3$) respectively. The impact of local urban sources is superimposed on this regional background. Such local sources, together with poor dispersion, are generally responsible for winter episodes of hourly mean concentrations of particulate matter above guideline values. However, it is clear that many of the sources of particulate matter are outside the control of individual local authorities.

In accordance with criteria in available guidance, the absence of roads classified as 'very busy', oil refineries or significant industrial or domestic sources within the Perth and Kinross area means that PKC has not been

required to carry out detailed assessments for carbon monoxide, benzene, 1,3-Butadiene, lead or sulphur dioxide. In Perth and Kinross, the two pollutants identified as requiring detailed assessment due to a significant risk of exceedance of guideline values are nitrogen dioxide and particulate matter.

State 2.2.2

The Scottish Government has set targets on the basis of scientific and medical evidence on the health effects of each pollutant and according to practicability of meeting the standards. Recent findings based on samples taken at a number of locations in Perth indicate that local air quality is very good. Perth and Kinross meets all of the Government's targets except at a few traffic hotspots in Perth where levels of nitrogen dioxide and for particulates in 2010 are unlikely to be met (Table 2.4 and 2.5) based on the annual average. Atholl Street is the main area of Perth for which the objectives for nitrogen dioxide and particulate matter are unlikely to be met.

Limited data availability means it is not possible to comment on trends at Atholl Street at present. Results for the High Street in Perth are relatively stable, although continued higher results for particulate matter may indicate a negative trend.

Table 2.4 Number of days' air quality exceeds legislative limits

Location	No of days air quality exceeded legislative limits			
	2003	2004	2005	2006
Nitrogen Dioxide, NO_2				
Perth, Atholl Street	NA	NA	0	0
Perth, High Street	0	0	0	0
No of days exceedance allowed	18	18	18	18
Particulate Matter, PM_{10}				
Perth, Atholl Street	NA	NA	4	6
Perth, High Street	0	0	1	2
No of days exceedance allowed	7	7	7	7

Bold where legislative limit is exceeded

Table 2.5 Mean annual levels of key air pollutants (micrograms per cubic metre (µg/m³))

Location	Mean annual levels (µg/m³)			
	2003	2004	2005	2006
Nitrogen Dioxide, NO_2				
Perth, Atholl Street	NA	NA	**54**	**57**
Perth, High Street	26	28	28	28
Legislative Limit	40	40	40	40
Particulate Matter, PM_{10}				
Perth, Atholl Street	NA	NA	**19**	**22**
Perth, High Street	12	13	14	16
Legislative Limit	18	18	18	18

Bold where legislative limit is exceeded

Impact on population, economies and ecosystems 2.2.3

Nitrogen dioxide (NO_2) is thought to have both acute and chronic effects on airways and lung function, particularly in people with asthma[8]. It can irritate the lungs and lower resistance to respiratory infections such as influenza. The effects of short-term exposure are unclear, however it is believed that continued or frequent exposure to concentrations that are higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children[8 9].

Nitrogen oxides (NO_x) contribute to ground level ozone formation and can have adverse effects on both terrestrial and aquatic ecosystems. Nitrogen oxides in the air can significantly contribute to environmental effects such as acid rain and eutrophication[9]. Eutrophication occurs when a body of water suffers an increase in nutrients. This can lead to excessive algal growth and decay, which can cause serious fluctuations in pH, oxygen, and light levels in the water to the detriment of fish and other aquatic life. In some cases, oxygen levels have been severely depleted killing aquatic life and toxins released from algal blooms have harmed livestock, dogs and humans that have come in contact with the affected water[9].

Airborne particles can cause serious health problems and particulate air pollution episodes are believed to be responsible for causing excess deaths among those with pre-existing lung and heart disease. Scientists have correlated exposure to airborne particles with increased hospitalisations for asthma attacks, worsening of lung disease, chronic bronchitis, and heart damage[10]. In addition to these human health effects, particulate matter is the main cause of haze which decreases visibility. Particulates eventually settle on land or water and may lead to the acidification of lakes, the depletion of nutrients in soil, and the damage of sensitive forests and crops[10].

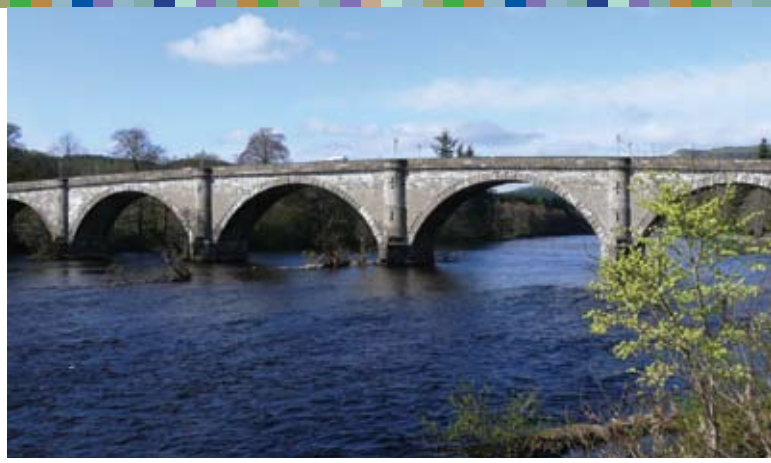
Society's response 2.2.4

Effective from 5 May 2007, PKC has declared the whole of Perth and Kinross an Air Quality Management Area (AQMA) because air quality targets in central Perth have been exceeded in areas where there is relevant public exposure.

[8] WHO Europe (2004) *Health aspects of air pollution: Results from the who project "Systematic review of health aspects of air pollution in Europe"* www.euro.who.int/document/E83080.pdf

[9] US Environmental Protection Agency (2007) *Nitrogen Dioxide* www.epa.gov/ARD-R5/naaqs/no2.htm

[10] US Environmental Protection Agency (2007) *Particulate Matter* www.epa.gov/ARD-R5/naaqs/pm.htm



By November 2007, PKC will develop an Air Quality Action Plan for the alleviation of elevated air pollution in the areas of exceedence. The Action Plan will consider and assess the sustainability of all options available to the Council. Periodic assessments of the outcomes of the Action Plan will be carried out and the Council will also continue to monitor and assess air quality for all of the pollutants for which the Government has set targets.

Opportunities and threats 2.2.5

The following key assets, opportunities and threats for air quality in Perth and Kinross have been identified (Table 2.6).

Table 2.6 Air quality assets, threats and opportunities

Asset	Opportunities and Treats
Actual high air quality Perceived high air quality Opportunity to improve air quality in specific location within Perth	Opportunities ▪ *Air Quality Action plan* ▪ *Regional Transport Strategy* Threats ▪ *Location specific transport issues* ▪ *Transboundary effects* ▪ *Biomass proliferation*

Data gaps and limitations 2.2.6

Air quality monitoring within Perth and Kinross is carried out to a satisfactory level in line with government guidance. Although air quality is only measured in two locations the criteria used to select these locations should mean they represent the worse case scenario.

Terrestrial 3

Information and trends relating to Landscape, Geology and soils, Biodiversity and the Historic environment

Related sections:

Section 2.1 Climate Change
Section 4.1 Inland Waters
Section 5.3 Waste

Indicator Summary:

	Condition	Trend	Indicator
Landscape			
	–	○	Area of woodland type and condition
	○	–	Area of urban open space
	○	▲	Area of derelict and vacant land
	○	–	Wild land
	–	–	Greenfield development in the greenbelt
	–	–	Development on Greenfield land compared to brownfield land available
Geology and Soils			
	–	–	Condition of Geological SSSI
	○	▲	Area of contaminated land
	●	▼	Planning applications on prime land
	–	–	State of soil
	●	▼	Extent and state of peat stores
	○	▶	Extraction of permitted mineral reserves
	○	▲	Area under environmental and organic farming schemes

	Condition	Trend	Indicator
Biodiversity			
	–	–	Condition of biological and mixed SSSI's
	–	–	Net change in natural and semi-natural habitats
	–	–	Tayside Local Biodiversity Action Plan (LBAP) priority species
	–	–	Tayside LBAP priority habitats
			Key species
			New and non-native species
Historic Environment			
			Conservation areas appraised in last 5 years
		–	Listed buildings at risk
	–	–	Monuments at risk
			Planning applications impacting with potential to historic environment

Key			
	Poor/area of uncertainty or potential problems		No discernable trend or trend unclear but potential problems
	Bad		Worsening
	Good/positive and expected to improve		Improving
	Fair/area of uncertainty or potential no problem		No discernable trend or trend inclear but potentially no problems
–	Unknown/not applicable	–	Unknown/not applicable

Landscape 3.1

Landscape incorporates the environmental and cultural features present in an area. Preservation and enhancement of the distinctive landscape of Perth and Kinross is important to maintain community well being, biodiversity and to support the local economy, which are dependent on tourism and maintenance of a healthy environment.

Driving forces and pressures 3.1.1

The natural physical influences which originally shaped the landscape of Perth and Kinross and continue to cause it to change are solid and drift geology, hydrology and climate.

Current driving forces and pressures leading to change in landscape are summarised in Table 3.1

Table 3.1 Current forces of change in landscape[11]

Driving force/pressures	Details
Agricultural change	Forestry is the main viable alternative to the decreasingly viable upland farming and is supported by EU and national policies. Extensification of lowland farms is leading to erection of large agricultural buildings and loss of trees and hedgerows.
Forestry and woodlands	Depending on the planning process undertaken pressure for development of new woodland areas for commercial activity has the potential to enhance or detract from the landscape. The required development/improvement to roads can also detract from an area's sense of wildness. Semi-natural and ancient woodlands are threatened, or potentially threatened by grazing pressure, grey squirrel encroachment and general lack of management.
Development pressures ▪ *Urban expansion*	Demand for greenfield sites on the periphery of settlements, adjacent to strategic roads, potential development of new villages and demands for isolated developments in the countryside.

[11] Land use consultants (1999) *Tayside Landscape Character Assessment*

Driving force/pressures	Details
Building in the countryside	Demand for houses, agricultural buildings and tourist accommodation. Restoration of traditional buildings generally has significant environmental benefits, however in some cases, there are associated changes in character eg changes in windows, white wash treatments and the creation of driveways.
Wind Farms	There is growing pressure for wind farm development within Perth and Kinross and there is potential for severe landscape impacts, particularly when built in otherwise undeveloped areas. Impacts include visual intrusion and effect on landscape character, noise and secondary effects from links to national grid or provision of road access.
Tourism	Economic benefits of tourism have supported many positive works in the landscape eg building restoration and upkeep of designed landscapes. However negative impacts include the appearance of caravans and chalet parks, major tourism developments at 'honey pot' towns, need to control private signs to prevent signage clutter and the implications of growing volumes of visitor traffic- both direct (noise, movement etc) and indirect (demand for car parks, road improvements etc).
Road Developments	Strategic improvements to the major roads that run through the area (A9, M90, A90) have changed the landscape through the scale of construction works and the volumes of traffic generated. Changes to minor roads are less noticeable, but the compounded effect can become significant due to removal of characteristic features such as hedgerows, walls, trees and old signs. Improvements to rural roads may be required in future to facilitate forestry haulage.
Climate Change	It is not possible to draw firm conclusions about the scale and nature of changes which may occur in relation to the landscape of Perth and Kinross, but possible scenarios include rising sea levels creating pressure along the Tay Estuary, changing temperature and rainfall patterns with implications for upland vegetation, woodland etc, increased incidence of drought with implications for agriculture and soil stability. Changes in land use and land management to increase carbon sequestration may also effect the landscape e.g. forestry and changes to agricultural practice.

Currently there is insufficient information available to comment on the existing situation and trends in development pressure within Perth and Kinross. Once data is available, future versions of the SoE report will comment on the area of planning applications on greenfield land, in the designated greenbelt surrounding Perth and the area of greenfield development undertaken in Perth and Kinross in comparison to brownfield development considering the availability of suitable brownfield land.

State 3.1.2

The landscape within Perth and Kinross is divided into two main units: highlands and lowlands, reflecting geology, topography, vegetation and land use. Key information on the landscape character areas is summarised in Table 3.2 and presented in Figure 3.1.

Figure 3.1
Landscape Classifications

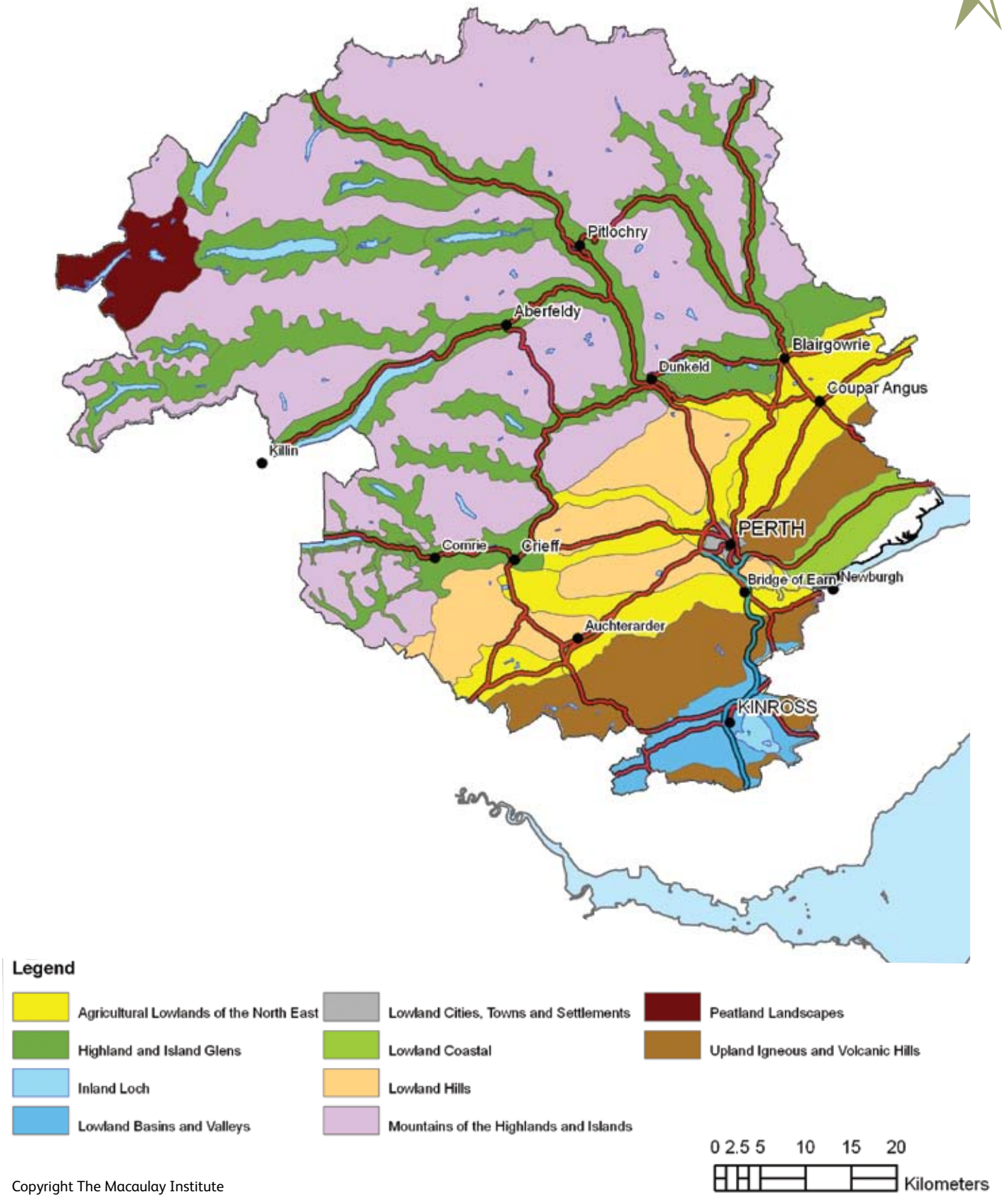


Table 3.2 Key landscapes within Perth and Kinross[12]

Landscape Character Area	Area (hectares)	Percentage of Perth and Kinross Area
Mountains of the Highlands and Islands	229,683.0	42 %
Highland and Island Glens	122,479.7	23 %
Agricultural Lowlands of the North East	54,688.8	10 %
Lowland Hills	41,979.4	8 %
Upland Igneous and Volcanic Hills	40,657.1	8 %
Lowland Basins and Valleys	14,529.6	3 %
Peatland Landscapes	12,328.8	2 %
Inland Loch	11,357.2	2 %
Lowland Coastal	9,353.7	2 %
Lowland Cities, Towns and Settlements	1,466.0	0 %
Lowland Rolling or Undulating	211.1	0 %
Foothills and Pronounced Hills	72.8	0 %
Total	538,807.2	

A Historic Land Use Assessment has been undertaken for approximately 20 % of the Council area (see Figures 3.2 and 3.3). There are no firm plans in place to extend the coverage in Perth and Kinross in the immediate future. The basic categorisation of historic land use types provides a generalised land-use related characterisation of the Perth and Kinross area and this is summarised in Table 3.3 and Figure 3.2. Figures 3.3 provides an indication of the period the land use categories identified in Figure 3.2 were/have been present. The area covered by the Historic Land Use Assessment is in the majority classified as moorland and rough grazing, fields and farming and woodland and forestry. In general these categories of land use have been present between prehistoric and present time, the 18th- 19th century and the 20th century respectively.

[12] Land use consultants (1999) *Tayside Landscape Character Assessment*

Figure 3.2
Historic Landscape Classification Category

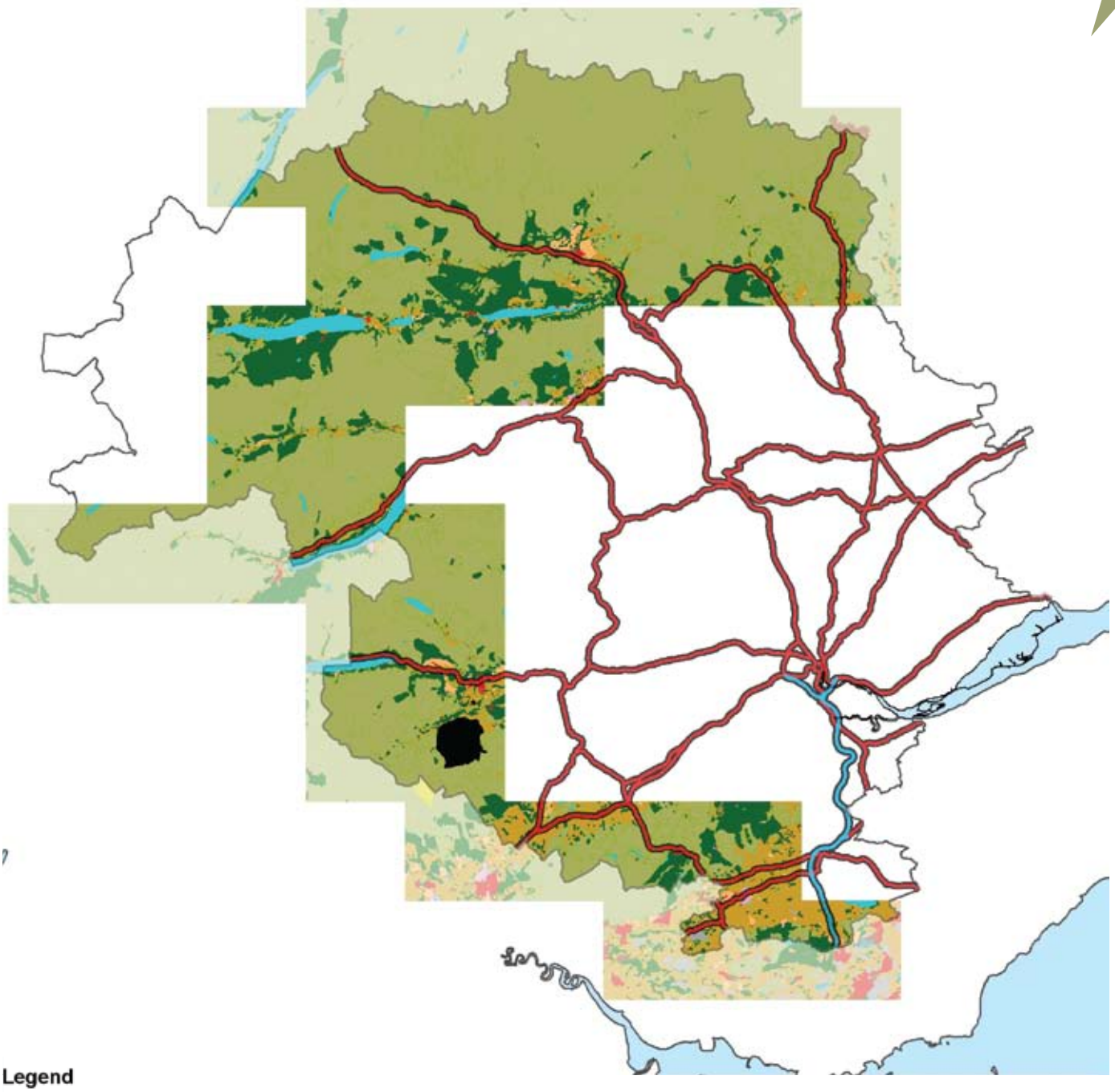


Figure 3.3
Historic Landscape Classification Category

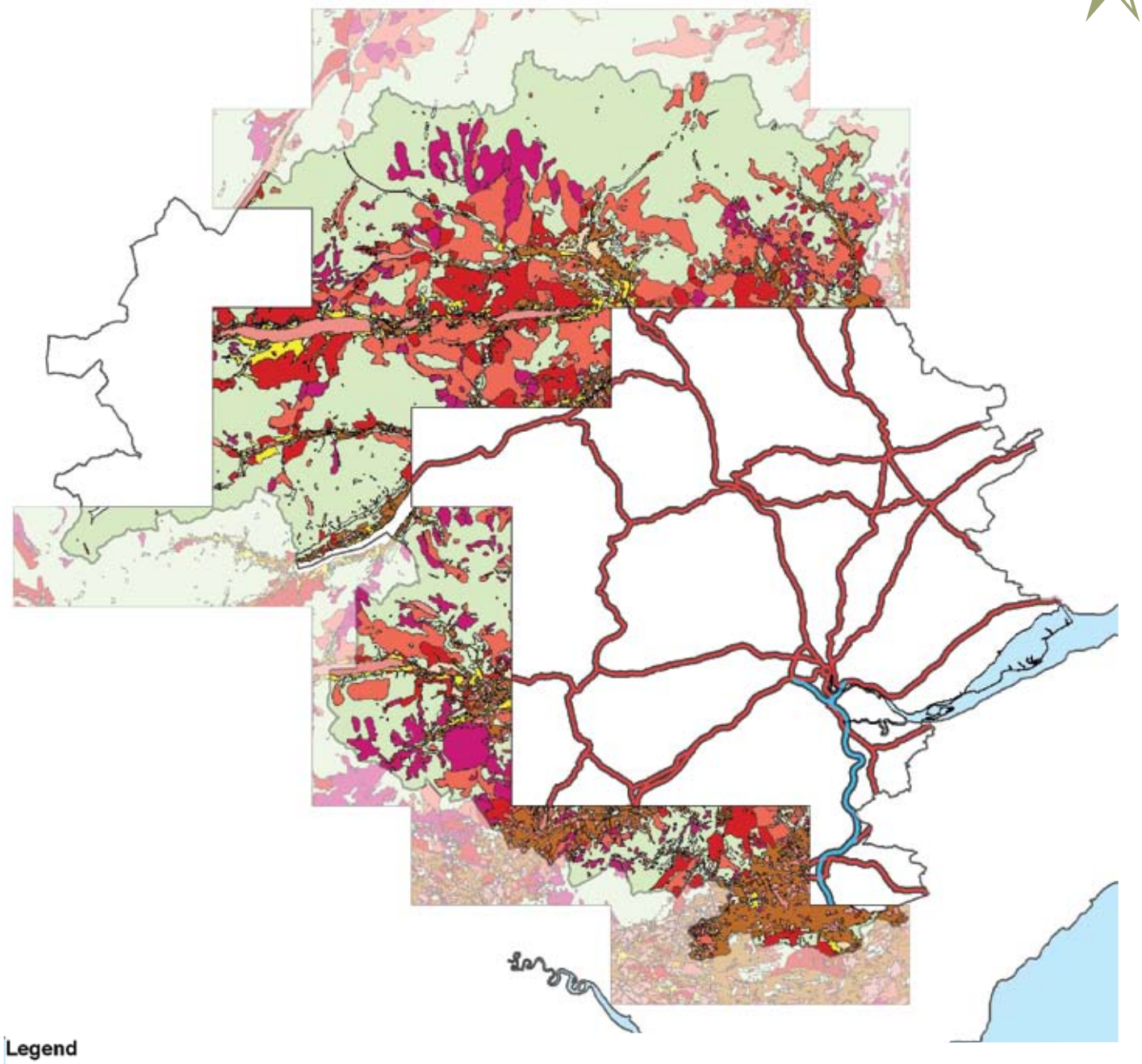


Table 3.3 Key historic land use within Perth and Kinross

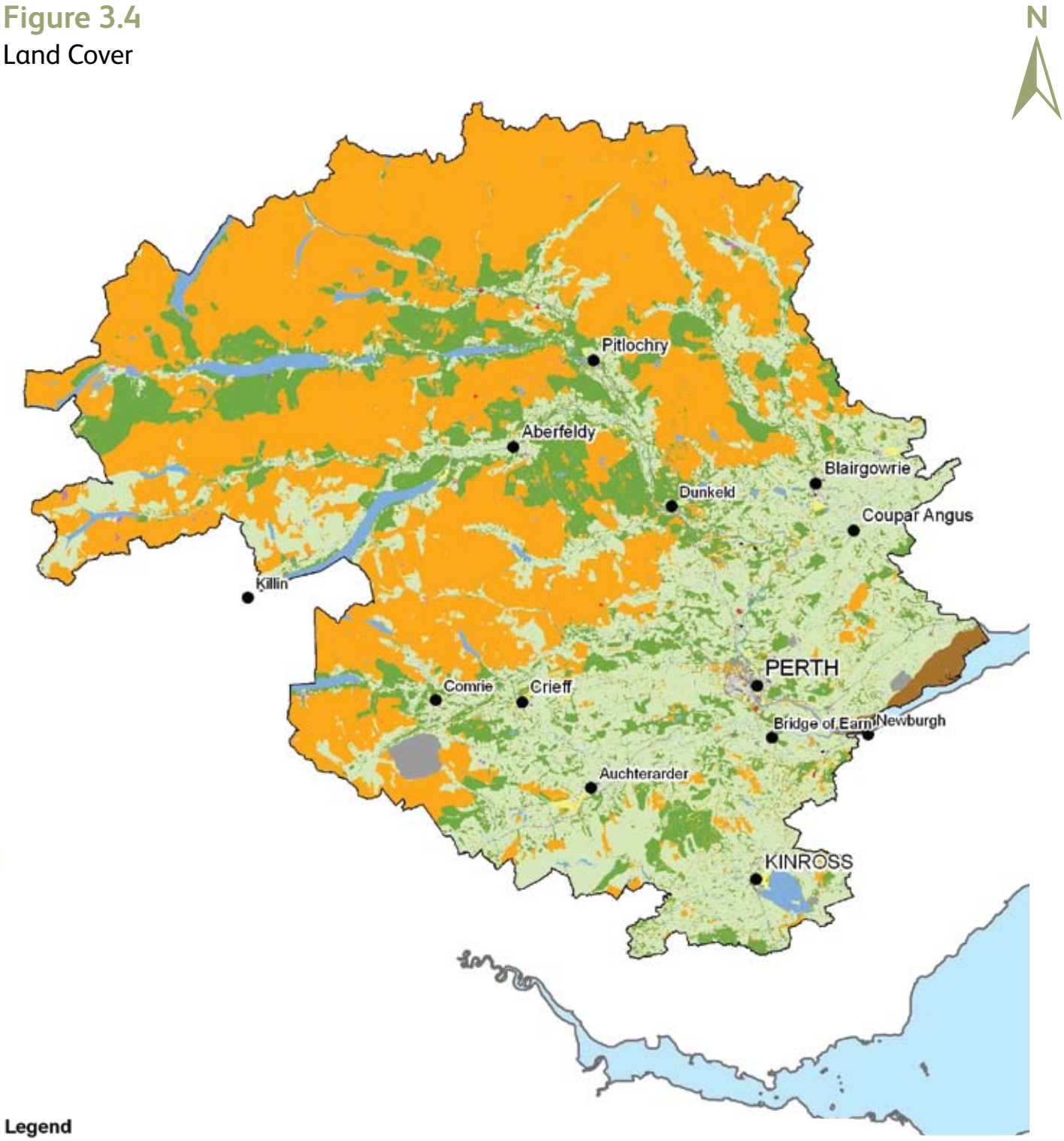
Historic land use category	Area (hectares)
Built-up Area	2250.0
Crofting	447.4
Defensive Establishment	1909.5
Designed Landscape	3203.7
Energy Establishment	345.1
Fields and Farming	40,389.8
Mineral, Waste and Peat Industries	2020.2
Moorland and Rough Grazing	29,1242.7
Planned Village	47.4
Recreation Area	1467.6
Ritual Area	16.0
Transport	218.9
Water Body	8922.2
Woodland and Forestry	47,517.2

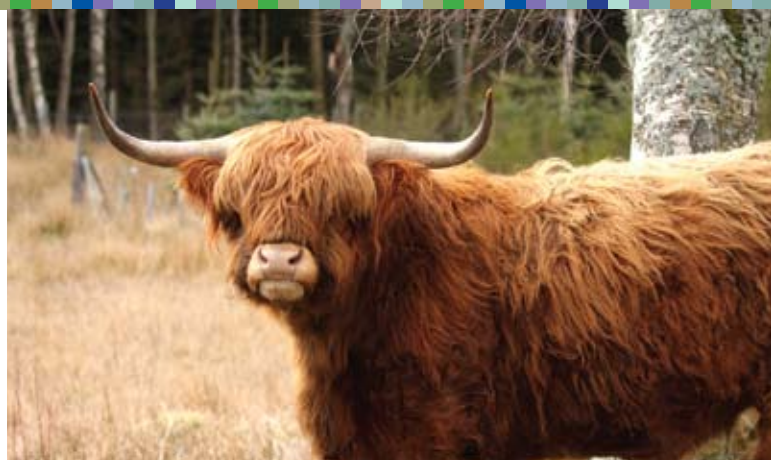
Land cover as assessed by the GeoInformation Group follows geology, soils, topography and hydrology. There is a clear distinction between scrub, heath and moorland in the upland area in the north west and agriculture in the lowland areas of the south east and river valleys. Table 3.4 and Figure 3.4 summarises the main land cover categories within Perth and Kinross.

Table 3.4 Land cover

Land cover	Area (hectares)	% of Perth and Kinross area
Agriculture	178,788	33.0
Forestry/woodland	84,444	15.6
Scrub/ Heath/Moor	242,039	44.6
Water Bodies and Bog	15,701	2.9
Inter-tidal sand and mud	3,069	0.6
Inland Rock	857	0.2
Minerals and waste	127	0.0
Urban (Industrial/ commercial)	10,634	2.0
Urban (Predominantly Residential)	4,677	0.9
Outdoor Recreational/ open space	2,068	0.4
Not categorised	73	0.0

Figure 3.4
Land Cover





More recent data, based on the agricultural census of the area of agricultural land in Perth and Kinross are available from the Scottish Executive (Table 3.5). These data cannot be directly compared to the land cover data in Table 3.4 due to the different classifications used. In the last six years there appears to have been a slight increase in the total area use for agriculture, with an increase in grassland and a decrease in arable and tilled land. Insufficient data are available to comment on whether these observed trends are statistically significant.

Table 3.5 Agricultural land use within Perth and Kinross

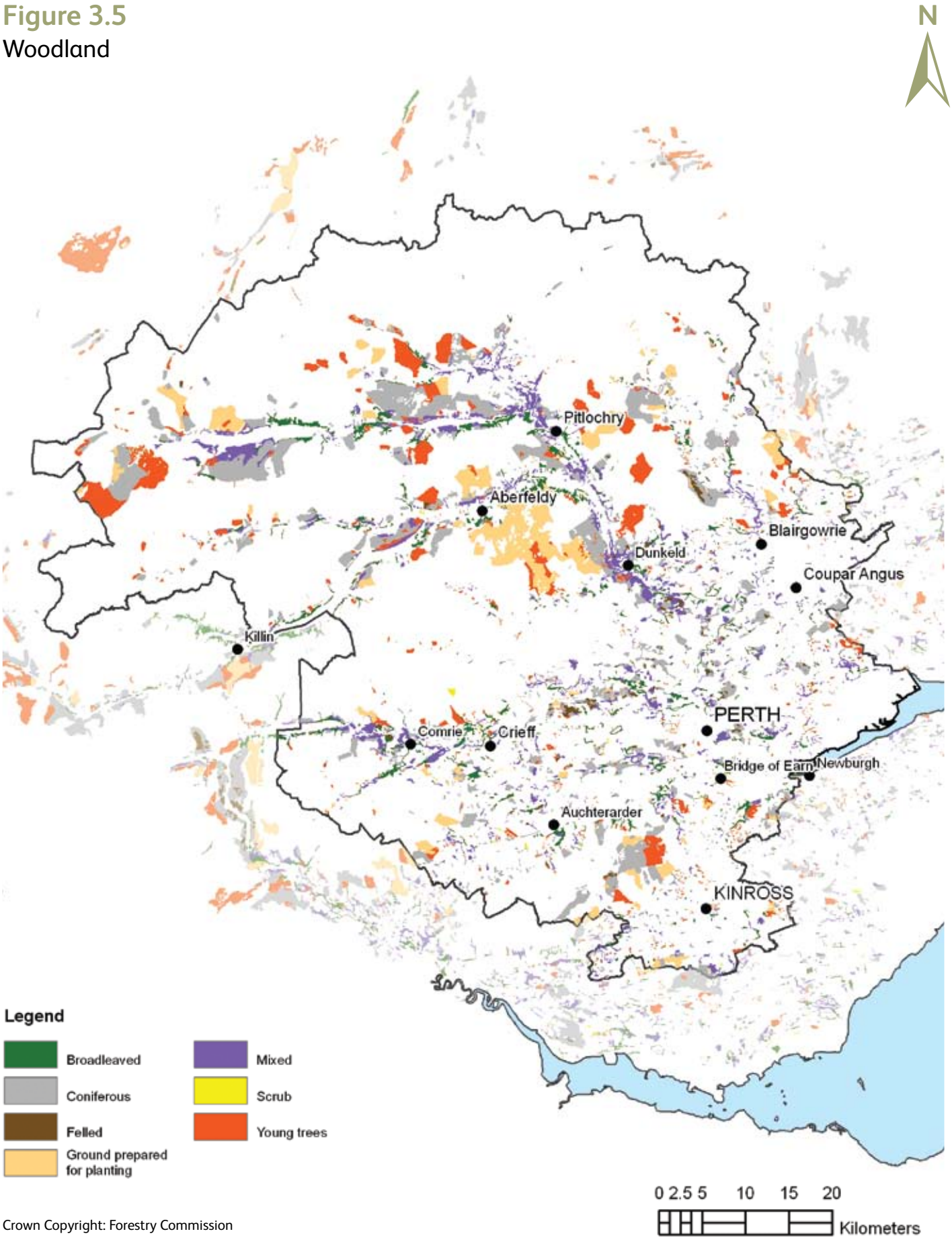
	Area (hectares)						
Agricultural Land Use	2000	2001	2002	2003	2004	2005	2006
Tillage	67,603	67,278	66,720	66,118	65,201	62,217	60,633
Grass under 5 years old	17,550	17,995	18,765	18,415	18,240	18,844	19,781
Arable	85,153	85,272	85,485	84,534	83,441	81,061	80,414
Grass over 5 years old	40,327	42,295	42,186	44,561	45,039	45,637	46,296
Total crops and grass	125,480	127,568	127,670	129,095	128,480	126,698	126,710
Sole right rough grazing	288,838	287,187	288,706	282,410	290,002	290,066	293,687
Sole right agricultural area	414,317	414,755	416,376	411,505	418,482	416,763	420,397
Woodland	17,625	17,918	17,863	18,579	18,885	18,585	18,973
Roads, yards and buildings	7,252	7,033	7,218	7,320	7,364	7,544	7,781
Total Area	439,194	439,706	441,457	437,404	444,731	442,893	447,151

Table 3.6 and Figure 3.5 summarise the woodland cover categories reported in Perth and Kinross by the forestry commission as part of the National Inventory of Woodland and Trees (NIWT)[13]. There has been a clear upwards trend in woodland cover since 1905.

The Scottish Forestry Strategy sets an aspirational target of 25 % woodland cover in Scotland by 2025. In 2002, 17 % of Perth and Kinross was forested (including felled ground and land prepared for planting).

[13] Forestry Commission (2002) *The National Inventory of Woodland and Trees - Scotland, Forestry Commission, Edinburgh* www.forestry.gov.uk/pdf/niscotland.pdf/$FILE/niscotland.pdf

Figure 3.5
Woodland



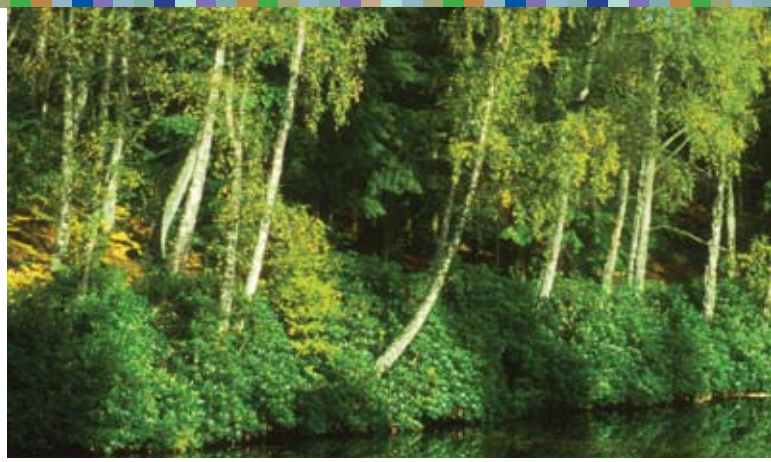
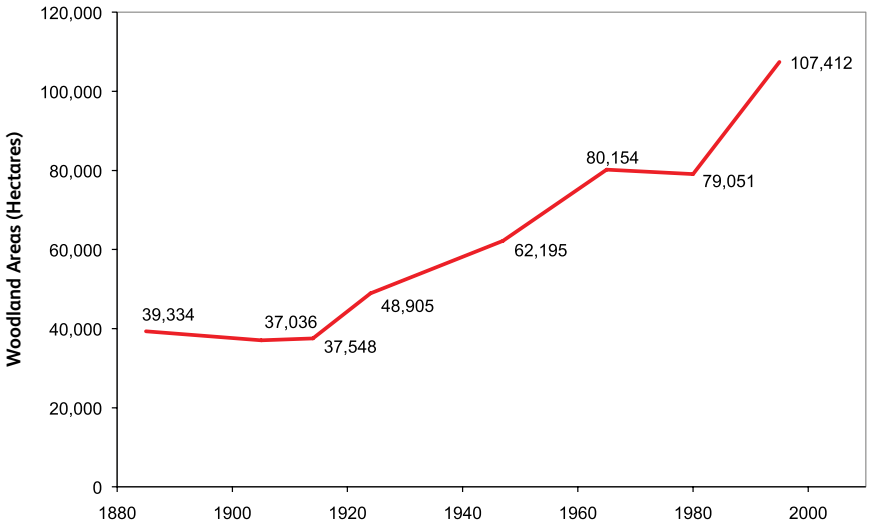


Table 3.6 Woodland types within Perth and Kinross (2002)[14]

Inferred Forest Type	Total	% of forest
Broadleaved	12,246	11 %
Coniferous	46,165	40 %
Felled	2,225	2 %
Ground prepared for planting	18,973	16 %
Mixed	15,242	13 %
Shrub	207	0 %
Young trees	20,902	18 %
Total	115,959	100 %

Data from Forestry Commission, reference date March 2002

Figure 3.6 Woodland cover within Perth and Kinross[14]



Data provided by Forestry Commission

Different methods used mean it is not possible to break trend into woodland types

Using the current method recommended by SNH (currently under revision to include visual impact of structures) wild land is defined as land located at set distances from public and private roads. A relatively large proportion of Perth and Kinross is 2000 metres from public roads (Table 3.7, Figure 3.7 and 3.8). The proportion of PKC categorised as wild decreases significantly once all roads are considered and the distance is increased to 5000 metres. Currently there is insufficient information available to comment on trends in the area of wild land.

[14] Forestry Commission (2002) *The National Inventory of Woodland and Trees - Scotland, Forestry Commission, Edinburgh* www.forestry.gov.uk/pdf/niscotland.pdf/$FILE/niscotland.pdf

Figure 3.7
Wild Land Public Roads

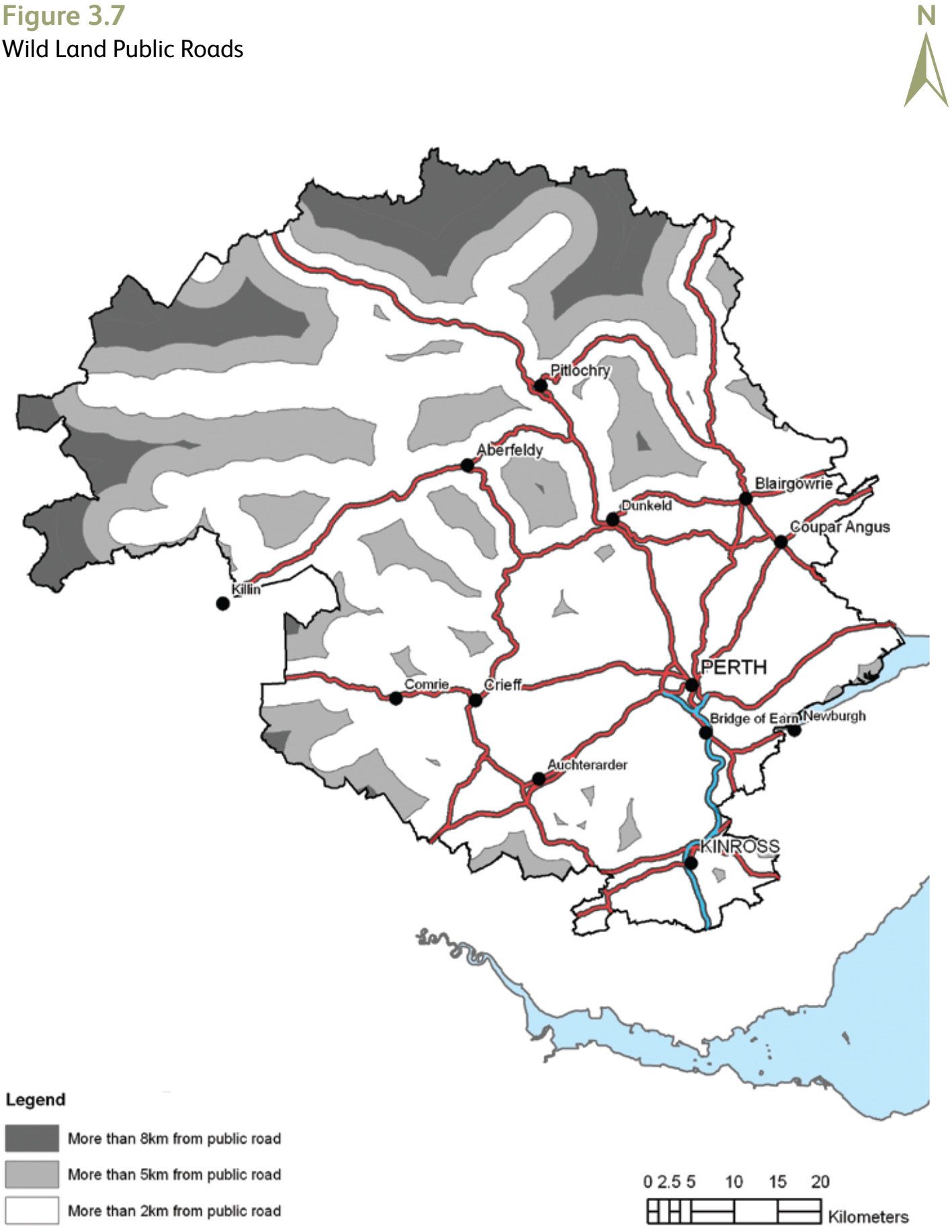


Figure 3.8
Wild Land All Roads

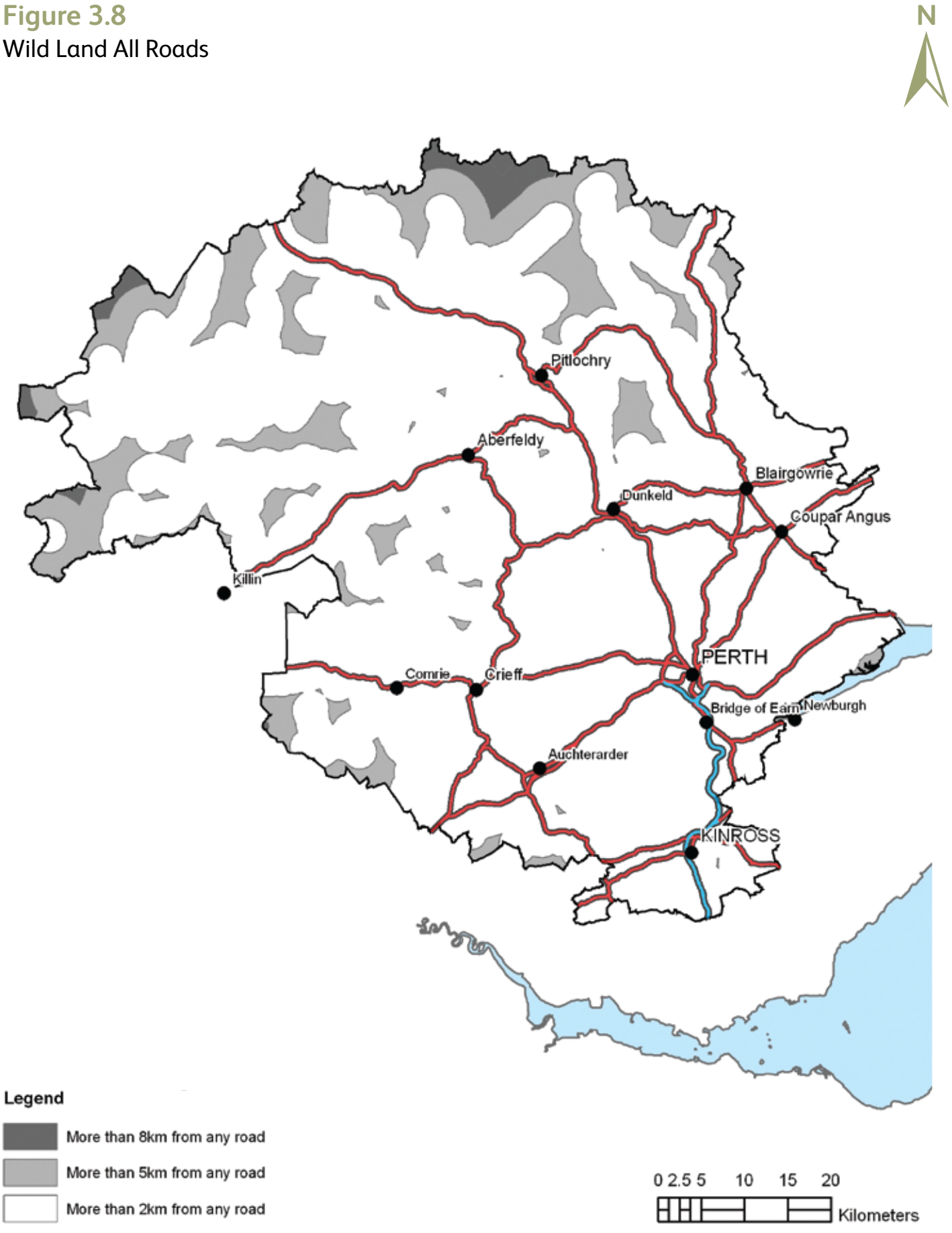


Table 3.7 Percentage of Perth and Kinross classified as wild land

Proximity to public roads	2006 % of PKC
Land more than 2000 m from public roads	31.8 %
Land more than 5000 m from public roads	9.9 %
Land more than 8000 m from public roads	2.7 %
Proximity to all roads	**% of PKC**
Land more than 2000 m from all roads	12.6 %
Land more than 5000 m from all roads	1.3 %
Land more than 8000 m from all roads	0.1 %

Perth and Kinross possesses some of the finest parks, gardens and open spaces in the country. Some were created as parks in their own right, several were donated, others were former bleaching greens associated with the linen industry, and a few may have been livestock market areas.

PKC is currently producing an Open Space Strategy, and as such, only preliminary data is available on the amount of open space in Perth and Kinross (Table 3.8). Preliminary data suggests a total of 827.9 hectares of urban open space in Perth and Kinross. The data will be updated in a future version of the SoE report. Insufficient data is available to comment on trends at present.

Table 3.8 Open space summary

Type of open space	Area (hectares)
Undefined	681.4
Amenity Greenspace	33.7
Civic Space	0.2
Functional Greenspace	3.0
Green Corridors	12.4
Natural/Semi-natural Greenspace	7.7
Other Functional Greenspace	22.3
Playspace	4.8
Private Gardens and Grounds	4.6
Public Parks/Gardens	43.4
Sports Areas	24.4
Total	837.9

A relatively small area of the land stock in Perth and Kinross is derelict or vacant. In the last five years it would appear there has been an overall decrease in the total area of land designated as derelict or vacant, with a decrease in area of derelict land and an increase in the area of vacant land (Figure 3.9).

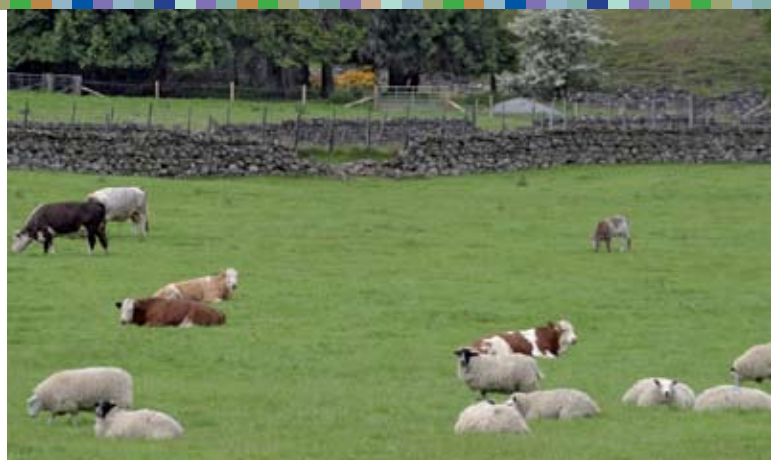
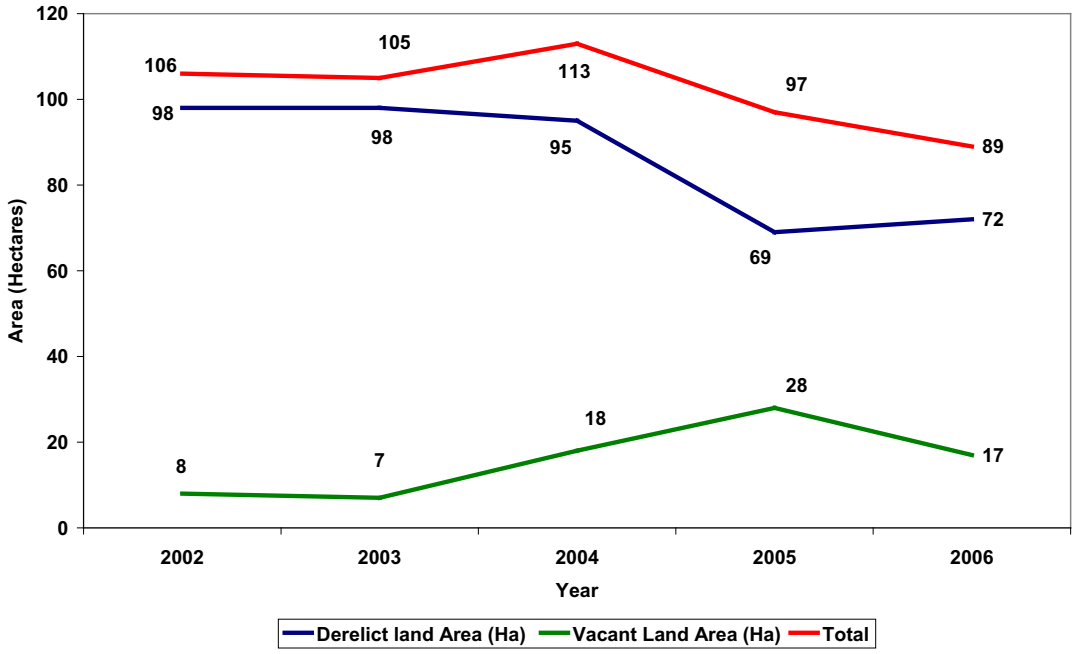


Figure 3.9 Area of land stock that is derelict and vacant



Impact on population, economies and ecosystems 3.1.3

Decline in landscape quality can have a significant impact on quality of life and human health (see Section 5.1). It also has the potential to impact tourism as the area relies heavily on visitors attracted to Perth and Kinross for the quality of landscape. A decline in tourism would affect the economy of the local areas, especially in more remote communities.

Changes in the amount and quality of open space and natural and semi-natural habitat will have a significant impact on species and habitat diversity in Perth and Kinross (see Section 3.3).

Society's response 3.1.4

The only national landscape designation in Scotland is National Scenic Area. These areas are considered to be of national importance due to their outstanding scenic interest which must be conserved as part of the country's natural heritage. National Scenic Areas are selected for their characteristic features of scenery including a mixture of richly diverse landscapes[15].

Currently a total of 13.1 % of Perth and Kinross is designated as part of five National Scenic Areas (Table 3.9 and Figure 3.10).

[15] SNH (unknown) *National Scenic Areas* www.snh.org.uk/scripts-snh/ab-pa03.asp

Figure 3.10
National Scenic Areas

Table 3.9 National Scenic Areas (NSA) in Perth and Kinross

Name of NSA	Area of NSA in PKC (ha)	Total Area of NSA (ha)	% of NSA that is in PKC	% of total area of PKC
Ben Nevis and Glen Coe	4,933	92,278	5.3 %	0.9 %
Loch Tummel	9,013	9,013	100.0 %	1.7 %
Loch Rannoch and Glen Lyon	47,488	48,625	97.7 %	8.8 %
River Tay	5,708	5,708	100.0 %	1.1 %
River Earn	3,108	3,108	100.0 %	0.6 %
Total	541,890			13.1 %

(area expressed in hectares)

PKC run "friends of parks" groups, which are involved in the management of the majority of the parks in Perth and Kinross. PKC also have a plan for improving every major park in Perth and Kinross and is working hard to obtain the funding for this.

Table 3.10 summarises the main responses of society to the driving forces and pressures identified in Table 3.1.

Table 3.10 Society's response to identified current forces of change in landscape[16]

Driving force	Details
Agricultural change	Farm stewardship schemes provide a framework for conserving important characteristic features such as meadows, dry stone walls, hedgerows, farm wetlands etc.
Forestry and woodlands	Designation of some semi-natural and ancient woodlands as SSSI and production of guidelines for management means future outlook for these woods is better than it has been for the past 200 years.
Development pressures	Perth and Kinross planning policies are restrictive, presuming against development of outside settlements, except where certain criteria are satisfied, apart from within identified development zones.
Wind Farms	SPP6 requires local authorities to use the development plan process to support continuing growth of all renewable technologies by guiding developments to appropriate locations. This involves a consideration of the potential impact on landscape.[17].
Climate Change	See Section 2

[16] Land use consultants (1999) *Tayside Landscape Character Assessment*

[17] Scottish Executive (2006) *Scottish Planning Policy (SPP6) Renewable Energy* www.scotland.gov.uk/Resource/Doc/135497/0033580.pdf

In addition and association with the measures listed above the European Landscape Convention came into force in March 2004. The aims of the convention are to promote protection, management and planning of European landscapes through the adoption of national measures, and to organise European co-operation on landscape issues[18].

Opportunities and threats 3.1.5

The following key assets, opportunities and threats for landscape in Perth and Kinross have been identified (Table 3.11).

Table 3.11 Landscape assets, threats and opportunities

Asset	Opportunities and Treats
Diverse range of landscape Local distinctiveness Wildness Prime agricultural land Publicly accessible open space River valleys Wood land, woodland diversity and trees	Opportunities ▪ *Integrated general land management policy for PKC* ▪ *Open Space Strategy* Threats ▪ *Complacency - lack of awareness* ▪ *Development pressure* ▪ *Climate change* ▪ *Agricultural change* ▪ *Forestry*

Data gaps and limitations 3.1.6

Reporting on landscape in Perth and Kinross is limited by the age of data available and the lack of data on the actual condition of the different aspects of landscape.

[18] www.coe.int/t/e/Cultural_Co-operation/Environment/Landscape/

Geology and Soils 3.2

The contribution of geology and soils to the environment, human health and the economy is becoming increasingly recognised. The geology in Perth and Kinross contributes significantly to the economy, through the provision of mineral resources, landscape, and cultural heritage. Geology also supports soil in performing a number of its key roles. Healthy soils provide a range of environmental, economic and social benefits, which include:

- *providing the basis of the agricultural and forestry industries;*
- *underpinning nationally and internationally valued and rare habitats;*
- *protecting water from the effects of many pollutants;*
- *storing carbon;*
- *contributing to biodiversity;*
- *providing a foundation for buildings and roads*[19].

Driving forces and pressures 3.2.1

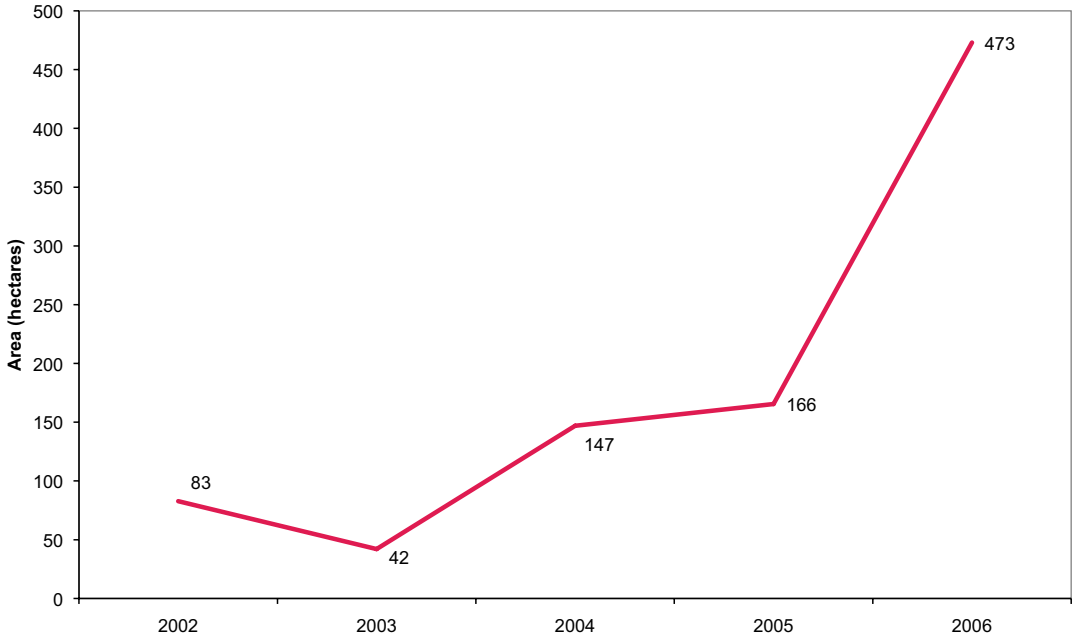
Threats to soil functions are erosion and compaction related to land management, contamination, sealing, loss of biodiversity, acidification from acid rain, climate change and loss of organic matter. Erosion, compaction and contamination are relatively straightforward to rectify. Soil sealing refers to covering the surface of soils with impervious materials or changing its nature so it becomes impermeable, affecting all soil functions. Sealing, loss of biodiversity and acidification of soils are believed to be of greater importance at a national level. Climate change and loss of organic matter are believed to be the greatest pressure to soil function, although there is greater uncertainty in the evidence[19].

[19] Towers, W; Grieve, I C; Hudson, G; Campbell, C D; Lilly, A; Davidson, D A; Bacon J R; Langan, S J and Hopkins, D W. (2006) *Scotland's Soil Resource - Current State and Threats*

Currently the Council has insufficient information available to identify the area of new development on green field land compared to brown field land considering the amount of brown field land available for development. However, from the information available on planning permission applications for the development of prime agricultural land there appears to be increasing demand to develop high quality agricultural soil (Figure 3.11)

Pressure and driving forces for change in relation to the geology within Perth and Kinross include mineral extractions, landfill, the grading of roads/motorway cuttings and restoration of quarries. The latter can have both positive and negative impacts on the geology of Perth and Kinross.

Figure 3.11 Area of planning applications on prime agricultural land



State 3.2.2

The geology of Perth and Kinross is composed of a wide range of rock types (see Figure 3.12). Varying rock types make a significant contribution to the area's economic well-being, both in the mineral deposits that they contain and in the wide range of scenery that they provide. The close relationship between geology and topography is evident in the Sidlaw, Ochil and Lomond hills which are largely composed of harder igneous rocks. However, the most evident surface expression of a geological feature is the line of the Highland Boundary Fault, which traverses Perth and Kinross from the Forest of Artney to Bridge of Cally, and separates the older highland rocks from the younger and generally softer rocks which underlie much of the lowland area.

Perth and Kinross contains a wide range of mineral resources including hard rock (suitable for aggregates, building and dimension stone and agricultural liming), sand, gravel, coal, baryte, slate, brick clay, fireclay, silica sand, diatomite, gold, silver, copper, lead, zinc, molybdenum, garnet and mica. In 2003 there were nine working mineral sites in Perth and Kinross, four producing sand and gravel, three working in hard rock and one each working brick clay and barytes. Coal was previously worked in the southern part of the area by both deep and opencast mining. The mining of building and dimension stone was previously an important industry in lowland Perth and Kinross, whereas copper and lead were both mined in the highland part.

Presently there is insufficient information to comment in detail on the extraction of permitted mineral reserves in relation to the land bank. In 2003, the Perth and Kinross Structure Plan Survey reported that the permitted reserves of hard rock aggregate in the Council area amount to 4.7 million tonnes. At present rates of production, this amounts to around 12 years supply, however it will be necessary to allocate more land for extraction. Permitted reserves of sand and gravel were reported to amount to over 22 million tonnes, equivalent to a 50 years supply at 2003 demand level. In 2003, less than a seventh of these reserves that are contained in deposits were being worked.

Figure 3.12
Geology

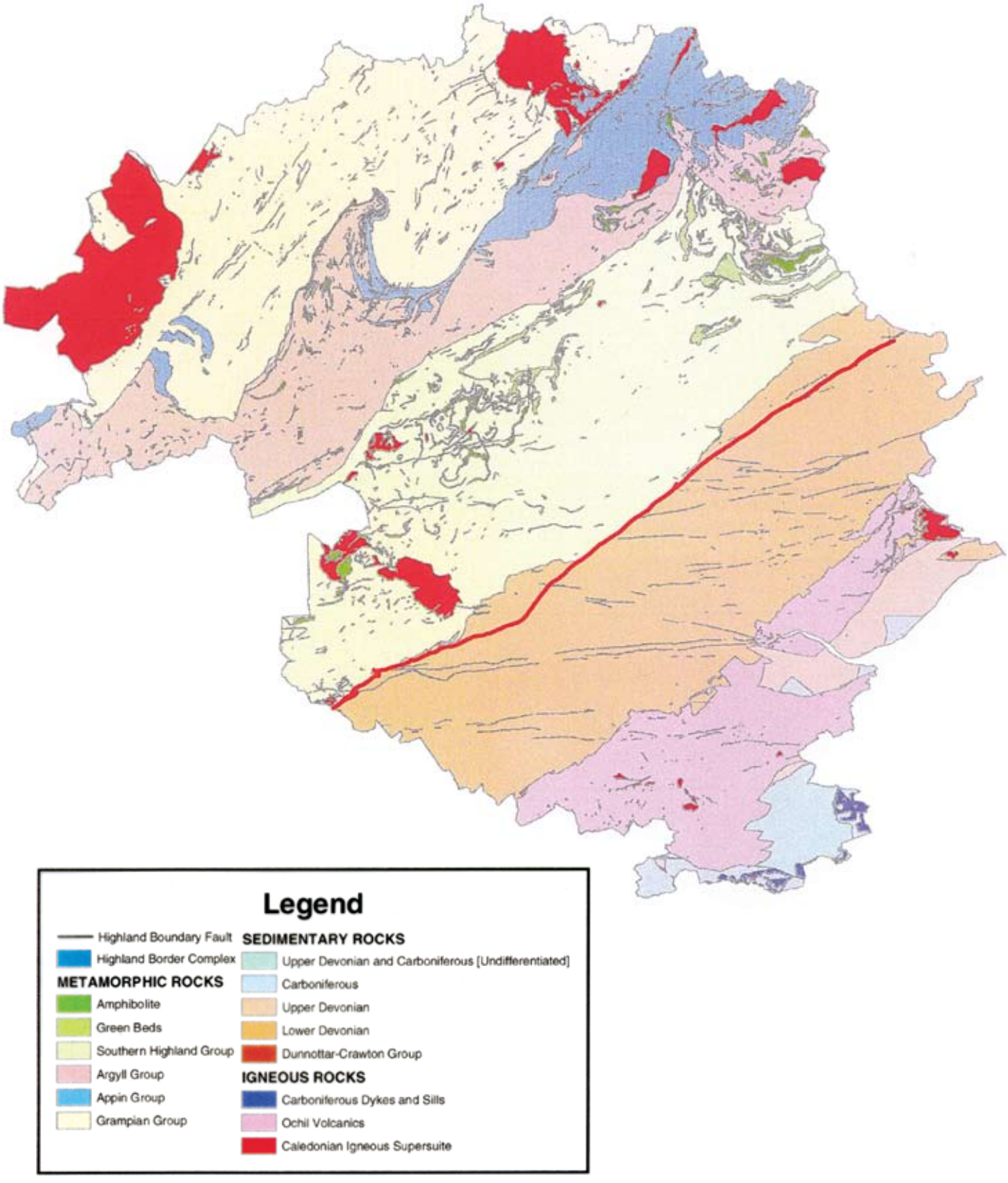
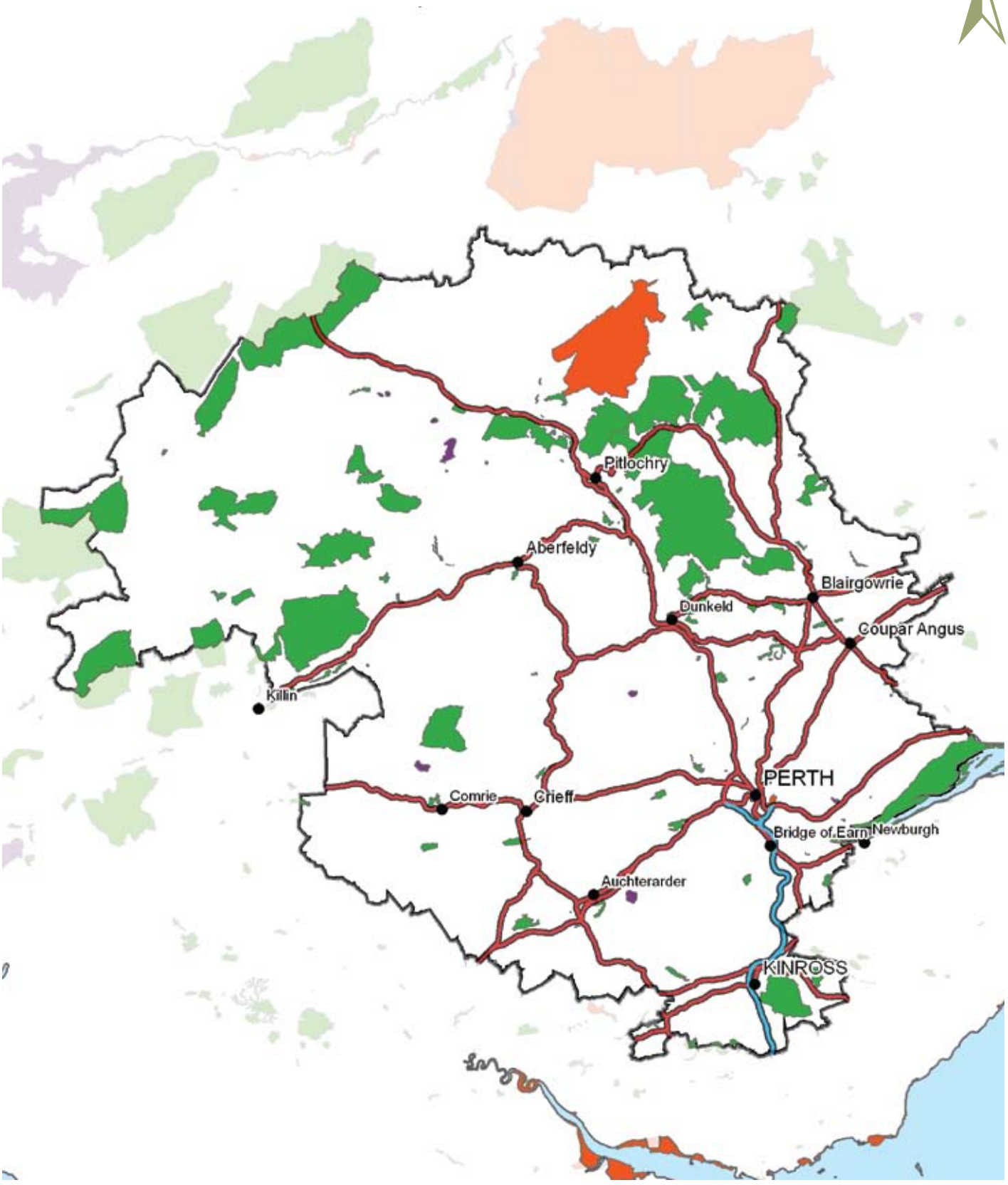


Figure 3.12 Geology

Figure 3.13
Sites of Special Scientific Interest



Files provided by British Geological Survey, Perth and Kinross Geology and Hydrology Report 2002

Within Perth and Kinross, there are 31 Sites of Special Scientific Interest (SSSIs) covering an area of 657.6 hectares that are designated solely for geology (Table 3.12, Figure 3.13). Information is not currently available form SNH on their quality. There are no designated Regionally Important Geology Sites (RIGS) yet, but Kinnoull Hill (Perth) and Knock (Crieff) are under consideration.

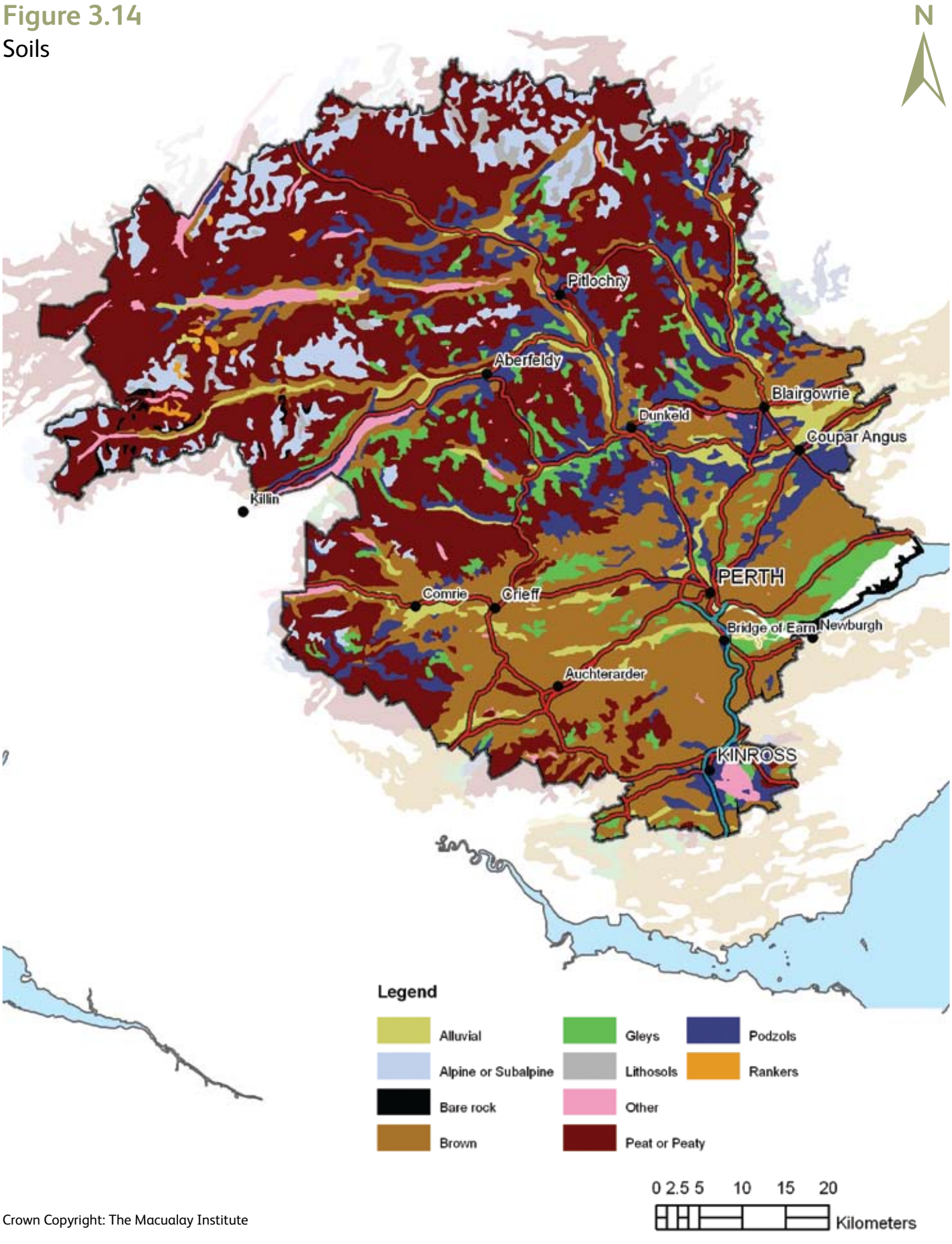
Table 3.12 Geological SSSIs in Perth and Kinross

Name	No sites	Date notified	Total Area (ha)	Condition
Shochie Burn	1	05/10/84	0.07	Unknown
Almondbank	1	29/11/84	0.96	Unknown
Inchcoonans Claypit	1	21/02/85	1.11	Unknown
Gallowflat Claypit	1	21/02/85	5.43	Unknown
Tay Bank Section	1	16/03/87	1.83	Unknown
Fintulich	1	09/06/87	105.02	Unknown
Craig More	1	09/06/87	27.94	Unknown
Pitlowie	1	21/12/89	25.66	Unknown
Glen Garry	15	23/02/90	28.59	Unknown
Tomnadashan Mine	1	30/03/90	6.10	Unknown
Meall Dail-Chealach	2	26/09/90	36.55	Unknown
Creag Kinaldy	1	26/09/90	30.72	Unknown
Meall Reamhar	1	26/09/90	221.09	Unknown
Little Glenshee	1	26/09/90	42.51	Unknown
Carey	1	26/09/90	1.59	Unknown
Craig Rossie	1	20/04/94	122.47	Unknown
Total	31		657.63	

The distribution of soils in Perth and Kinross is closely aligned with topography and geology. Therefore, there is a clear distinction between the upland areas north of the highland boundary fault and the lowland areas south of the fault (Figure 3.14). The northern upland areas are primarily high organic matter, poorly draining peats or peaty soils, whereas the southern areas are dominated by brown earths, rich in nutrients and organic matter.

Currently there is no systematic data collection relating to the quality of soil. However, with the introduction of the EU Soils Thematic Strategy and development of the Scottish Soils Strategy and associated soil indicators and monitoring scheme, this information should become available in future,

Figure 3.14
Soils



although it may not be reportable at the Perth and Kinross level.

Some scientific evidence indicates that losses of dissolved organic carbon in streams draining peaty soils have increased in the last two decades. This indicates a possible increase in losses of organic matter from these soils[20]. In England and Wales large decreases in organic carbon concentrations of soils, particularly in soils of greater initial organic carbon concentration, have been reported[21]. Work presently being undertaken by the Macaulay Institute should allow future comment on changes in soil carbon in Scotland, if not within Perth and Kinross.

Industrial processes such as town gas production, waste disposal and former garages (amongst others) caused the majority of the observed historical contamination of land in Perth and Kinross. However, Perth and Kinross has remained relatively unaffected by the onset of the industrial revolution and does not suffer from the concentration of sites that have been affected by unregulated polluting activities in other areas of Scotland. Perth and Kinross has small scale problems over a large geographic area.

The information in Table 3.13 identifies sites that may be contaminated based on their previous use and other historical information. These sites require a detailed inspection before any judgement can be made as to their current condition under the statutory definition of 'contaminated land'. Therefore, the data should be treated with caution as this is a dynamic process and is subject to radical change as more information becomes available.

Table 3.13 Area of Contaminated Land

Type of Site	Number
Preliminary Risk Assessed	5,087
Potential Landfill (No Risk Assessment)	1,709
Petroleum Records	3,000
Total	9,796

There are 870 hectares of identified raised lowland and blanket bog in Perth and Kinross, in 22 separate sites (Figure 3.15). Six of these sites are designated SSSIs (Table 3.14 and 3.15). Comment will be made on the condition of the SSSIs once information is available. As part of the lowland raised bog inventory SNH surveyed a number of the sites identified in Perth and Kinross, details of the damage recorded in these surveys in 1994 are recorded in Table 3.14.

[20] Towers, W; Grieve, I C; Hudson, G; Campbell, C D; Lilly, A; Davidson, D A; Bacon J R; Langan, S J and Hopkins, D W. (2006) *Scotland's Soil Resource - Current State and Threats*

[21] Bellamy, P H; Loveland, P J; Bradley, R I; Lark, R M; Kirk, G J D. (2005) *Carbon losses from all soils across England and Wales 1978-2003 Nature* **437** (7056)245-148

Figure 3.15

Lowland Raised and Blanket Bogs

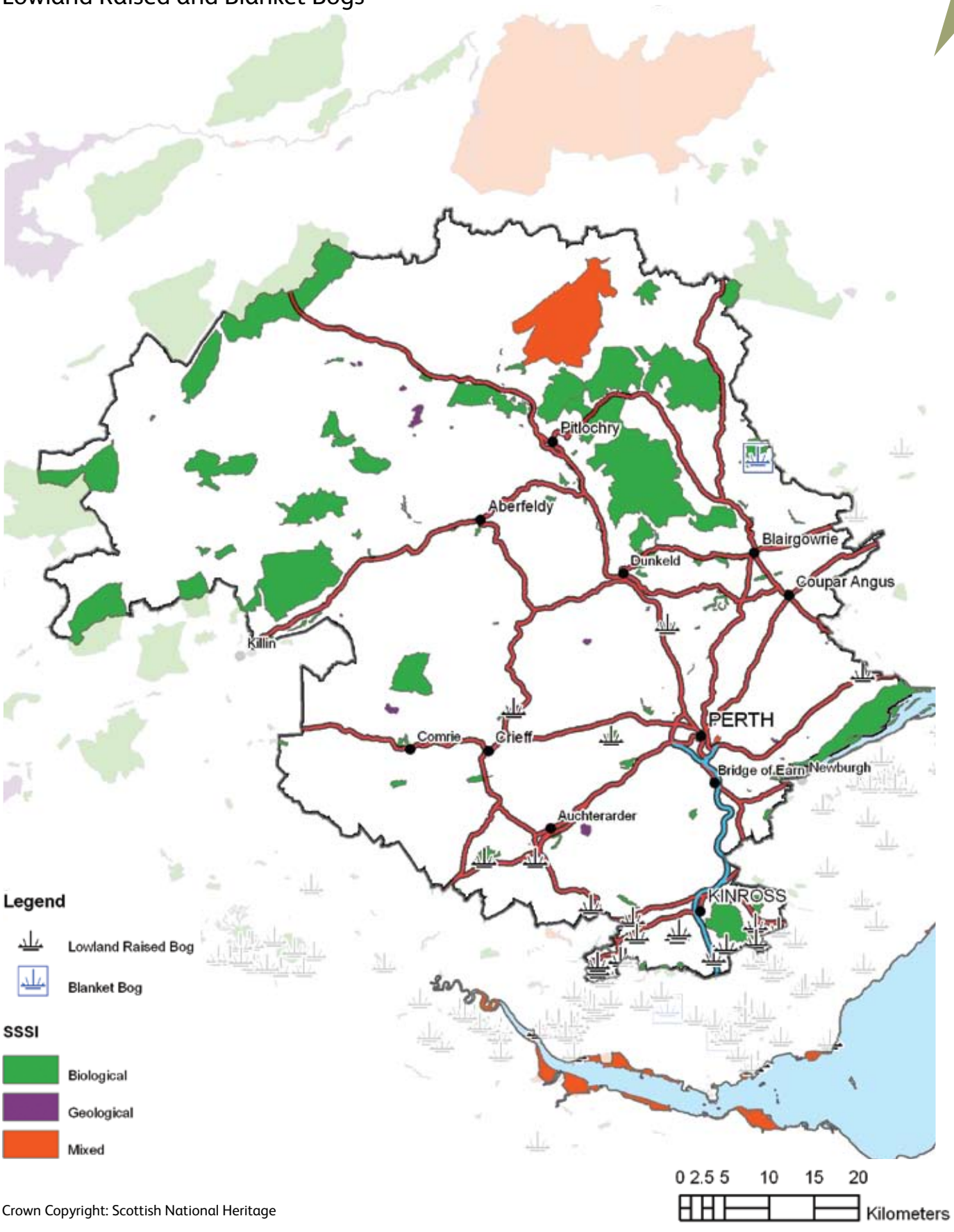


Table 3.14 Lowland Raised Bogs

Site	Area (ha)	SSSI	SSSI Condition	SNH Lowland Raised Bog Survey					
				Date	General	Grazing	Trampling	Enrichment	Peat Cutting
Muirhead Moss	4	No							
Powmill	15	No							
Portmoak Moss	4	No							
Bog Wood & Meadow	14	Yes	unknown	unknown	Afforestation, widespread				
Cairnleith Moss	17	Yes	unknown	1/12/94	Drainage, scouring	Insignificant	Insignificant	Insignificant	
Claysike	29	No		20/10/94	Drainage, scouring, afforestation	Moderate, localised	Moderate, localised	Insignificant	Localised
Coldrain Farm Wood	13	No							
Coldrain Meadow	17	No							
Connachan Marsh	9	Yes	unknown	2/12/94	Drainage, scouring, scrub encroachment	Sever, Localised	Moderate, localised	Insignificant	Localised
Crook of Devon Moss	13	No			Widespread scrub encroachment				
Glenquey Moss	11	No		3/12/94	Drainage, scouring	Insignificant	Insignificant	Insignificant	Localised
Lambhill Moss	2	No							
Methven Moss	142	Yes	unknown	1/12/94	Drainage, scouring	Insignificant	Insignificant	Insignificant	Localised
Muirhead Moss	5	No							
Muirmill	1	No							
Portmoak Moss	198	No							
Powmill	27	No							
Red Moss Wood	25	No							
Shelforkie Moss	57	Yes	unknown	2/12/94	Drainage, scouring	Insignificant	Insignificant	Insignificant	Localised
Waterbutts Plantation	6	No							
Whitegates Moss	3	No							
Total	612								

Table 3.15 Blanket Bog Inventory Sites

Site	Area (hectares)	SSSI	SSSI Condition
Dun Moss	258	Yes	Unknown

Impact on population, economies and ecosystems 3.2.3

Negative impacts on geology and soils will affect the economy through loss of tourism, loss of mineral resources and reduction in agricultural and forestry yields. Degradation of geology and soils can also lead to increased water treatment costs due to loss of natural filtration capacity.

Damage to soils can negatively impact ecosystems directly through the loss of the biodiversity living within the soil, but also indirectly due to negative impacts on the habitat supported by the soil and species dependent on soil organisms for food.

In Scotland there is 170 times more carbon in the soil than all the vegetation[22]. It is estimated that UK soils contain the order of 10,000 billion tonnes of carbon[23], and over 50 % off this is believed to be in Scotland's soils[24]. If the trend for decreased soil organic carbon concentrations identified in England and Wales is occurring in the carbon rich soils of Perth and Kinross there would be serious implications for the state of the environment through the contribution of carbon dioxide to climate change (see Section 2.1).

[22] Defra (2006b) UK Climate Change Programme (2006). Available at: www.defra.gov.uk/ENVIRONMENT/climatechange/uk/ukccp/pdf/ukccp06-all.pdf London: Defra.

[23] Milne, R and Brown, T A. (1997) *Carbon in the vegetation and soils of Great Britain.* Journal of Environmental Management 49, 413-433.

[24] Towers, W; Grieve, I C; Hudson, G; Campbell, C D; Lilly, A; Davidson, D A; Bacon J R; Langan, S J and Hopkins, D W. (2006) *Scotland's Soil Resource - Current State and Threats*

Society's response 3.2.4

To maintain and improve the condition of the geology in Perth and Kinross as detailed above, a number of areas have been designated as SSSIs (see Figure 3.13 and Table 3.12) and mineral extraction has been controlled via the planning permission process.

Society is gradually becoming more aware of the importance of soils. The roles that they play in the environment have only recently been acknowledged by the government. Society is responding to the driving forces and pressures identified through the development of an EU Soils protection policy and Thematic Strategy (adopted September 2006) and on a more local level with a Soils Strategy for Scotland (presently under development). Peat is protected under the Habitats Directive and SSSI legislation for its biodiversity benefits.

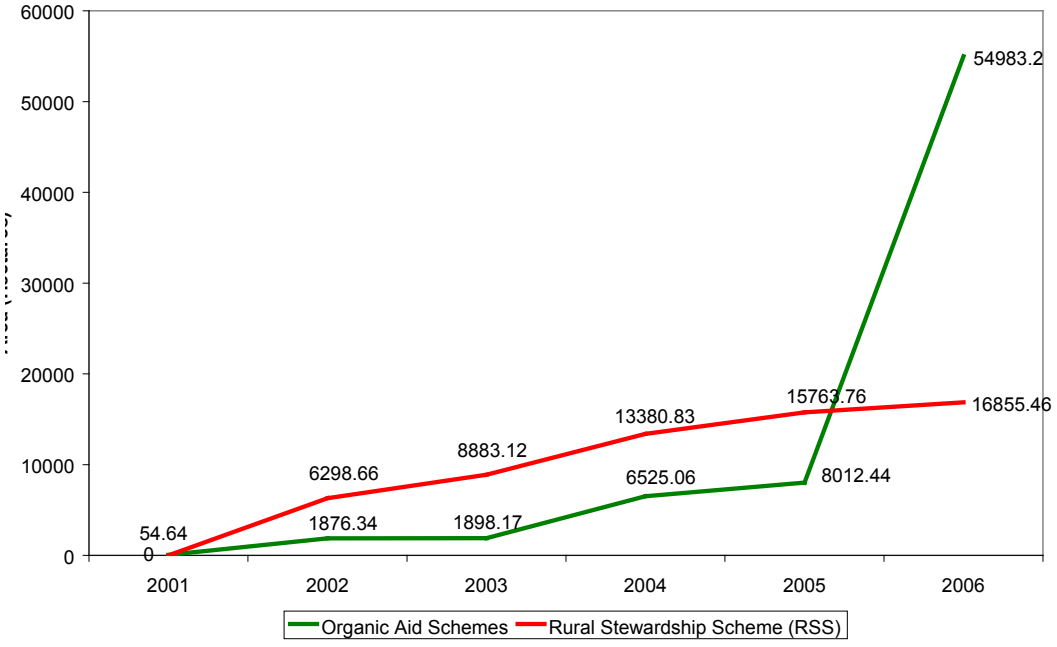
The primary legislation for dealing with this historical legacy is the Contaminated Land (Scotland) Regulations 2005, as amended. Section 57 of the Environment Act places a duty on Local Authorities to "inspect its area from time to time for the purposes of identifying contaminated land". It also requires Local Authorities to prepare and publish a strategy as to how it will inspect its area. In October 2001, Perth & Kinross Council published the Contaminated Land Strategy and has been inspecting the area for the purposes of identifying sites that are potentially 'contaminated land'.

The Contaminated Land Strategy is designed to deal with those sites that are identified as potentially causing harm to human health or the wider environment and, where necessary to remediate those sites. It is also important to recognise that sites that are contaminated are required to be prioritised and dealt with where they are causing the worst harm or pollution of the water environment. In implementing the strategy the next phase of Risk

Based Management has commenced, which has allowed resources to be targeted to delivering the Contaminated Land Strategy in line with central government policy. Resources are allocated based on sites that meet the statutory definition of 'contaminated land' and pose the highest risk.

A number of other initiatives which are not primarily aimed at soil protection do contribute to safeguarding soils. For example areas managed under organic farming and agricultural environmental schemes are likely to be managed in ways that promote the maintenance and establishment of good soil conditions. Maintenance of soil organic matter in soils is a Good Agricultural and Environmental Condition GAEC requirement within the Single Farm Payment. Figure 3.16 summarises the total area managed under these schemes in Perth and Kinross. There has been a steady increase in the area managed under Rural Stewardship Schemes however this appears to be levelling off. A similar trend was observed in the area managed under organic farming until a sharp rise was observed in 2006. Reforms to the Common Agricultural Policy may lead to a sudden change in the Rural Stewardship Scheme in the near future.

Figure 3.16 Area managed under agricultural/environmental schemes and organic farming



Opportunities and threats 3.2.5

The following key assets, opportunities and threats for geology and soils in Perth and Kinross have been identified (Table 3.16)

Table 3.16 Geology and soils assets, threats and opportunities

Asset	Opportunities and Treats
Actual and potential SSSIs & RIGS Peat resource Aggregate resource Soil functions, including significant carbon store	Opportunities ▪ *Developing policy eg Scottish Soils Strategy, EU Soils Thematic Strategy and proposed Soil Framework Directive* ▪ *Potential to restore natural capital through appropriate management* ▪ *RIGS* Threats ▪ *Irresponsible use/ inappropriate management and exploitation* ▪ *Development, particular wind farms* ▪ *Climate change* ▪ *Loss of geological exposures through landfill, grading of road/motorway cuttings* ▪ *Lack of awareness* Both ▪ *Mineral extraction* ▪ *Restoration of quarries*

Data gaps and limitations 3.2.6

Limited data are available at present to comment in detail on the current condition of the geology and soils in Perth and Kinross. Publication of the status of geological SSSIs and the developing soils monitoring scheme will hopefully fill this gap in the future.

Biodiversity 3.3

The diverse wildlife and habitats of Perth and Kinross are highly valued locally, nationally and internationally and are resources that need to be protected. Biodiversity contributes significantly to the economy in a number of ways: it is fundamental to the high quality of the local environment; integral to the productivity and beauty of the countryside; tourists visit the area each year specifically because of its unique wildlife; and it benefits communities and human health through the provision of a high quality environment in which to live.

Driving forces and pressures 3.3.1

Strategic level challenges to biodiversity include pollution, acid rain, waste production, climate change, land claim and development and the EU Common Agricultural Policy. Climate change also may have a profound effect on many of our habitats, with montane habitats highlighted as being particularly at risk and could virtually disappear if temperatures increase significantly.

Natural and semi-natural habitats are subject to pressure due to the rising demand for residential and commercial development. Factors include the increasing number of households in Perth and Kinross increases, and commercial development pressures to support tourism and maintain job supplies. Presently the Council does not have sufficient information to comment on the net change in natural and semi-natural habitats each year.

The Tayside Biodiversity Action Plan (LBAP) identifies the lack of information on the quality of existing habitats and effective management techniques to protect them, as the key factors contributing to the loss of habitat and species. Table 6.1 summarises some of the additional local pressures and driving forces identified in the Tayside LBAP.

At present, insufficient information is available to comment on trends concerning the extent and abundance of invasive species at the Perth and Kinross scale. However a survey in 2006 by Tay Salmon Fishery showed that invasive non-native plant species, such as Japanese knotweed, giant hogweed and Himalayan balsam have a widespread distribution and there was approximately 200,000 m^2 of these plants in the Tay District upstream of Perth Harbour. For more details on the result of this survey and to view maps of the observed distribution of the species studied contact the River Tay Salmon Fisheries Board or visit their website[25]. Invasive species, such as these, can often out-compete native species and may not provide suitable habitat or food for insects and wildlife.

Table 3.17 Additional driving forces and pressures identified in Tayside LBAP

Driving force/pressure	Details
Agricultural practices	Agricultural intensification and changes in management, including fertiliser, herbicide applications and ploughing are damaging and destroying grasslands. Removal of hedgerows and trees due to agricultural expansion and increase use of stock proof fencing is affecting habitat for foraging and nesting and removing wildlife corridors. Over grazing by sheep, cattle and horses affect species-richness and structural diversity of grassland and montane environment. Very light or absent grazing results in scrub encroachment and the loss of species diversity. Restoration of farm buildings may eliminate essential features such as holes, cracks and lofts used by wildlife or these may be deliberately blocked to exclude wildlife in order to comply with Farm Assurance Schemes. New farm buildings tend not to be wildlife-friendly. Nutrient enrichment of lochs and rivers from fertiliser and soil erosion e.g. Loch Leven. Pressures from agriculture can lead to bank trampling and erosion and the loss of riparian zones due to cultivation right up to the water's edge.
Afforestation	Shading of ground, particularly by conifers can adversely affect species richness. Past poor design or new commercial woodlands has prevented integration with surrounding habitat causing the woodland to act as a barrier. Deer fencing associated with forestry can cause a collision hazard for wildlife.
Deer Grazing	Over grazing can affect species-richness and structural diversity of grassland and montane environment. Grazing by deer, in particular, has had a major impact in recent years on the ability of pine seedlings to survive.

[25] Tay District Salmon Fisheries Board (2006) *River Tay District Invasive Plants Survey 2006* www.tdsfb.org/invasiveplantsreport.htm

Table 3.18 (continued)

Driving force/pressure	Details
Excessive burning	Insufficient time is being left between burning cycles implemented on game reserves in some upland areas.
Abstraction and impoundment	Changes in hydrology, for example abstraction of surface or ground water, or drainage, can seriously affect habitats and reduce biodiversity. Most of the major lochs in Tayside are impounded for drinking water or hydroelectric purposes. The impoundments have created an entirely new loch such as Loch Errochty or altered the level of an existing loch such as Loch Ericht. However, it is important to remember that impoundments have also created large numbers of smaller lochs and ponds many of which are of considerable conservation value. Dunalastair reservoir, Loch Moraig and Drumore Loch SSSIs are excellent examples. How the water body is subsequently managed following impoundment may be crucial to its biodiversity value.
Recreation	Recreation in the countryside can lead to loss and damage of habitat through erosion, litter and the provision of car parking and other facilities. In addition to this, biodiversity can be lost due to the disturbance of species at key times eg breeding wildfowl.
Construction, engineering and alteration of buildings	Construction of new development sites on greenfield areas leads to destruction and fragmentation of existing habitats. In addition to the direct loss of habitat, increased road kills, pollution/contamination of air, land and water, and litter contribute to the loss of species. Engineering and river management works associated with development such as flood defences, erosion control, culverting, drainage work and inappropriate bank side management may also lead to habitat fragmentation and loss.
Introduction of new and non native species	Non-native plant species such as Canadian pondweed, Japanese knotweed and giant hogweed are already firmly established in Tayside, but other less well-known invasive plants such as the Australian swamp stonecrop, water pennywort and water fern have the potential to cause serious habitat loss and damage to native species. Invasion by alien species may represent one of the most significant long-term threats to standing waters because once established their elimination may prove impossible. In many cases the spread of alien species requires human intervention, for example the selling of invasive plants through garden centres or deliberate introduction of fish species. Lack of awareness is therefore a key issue.
Wildlife crime	There are instances of birds, badgers and feral cats being purposely killed, and many people still collect eggs, uproot wildflowers and kill insects. Species such as house martins and bats are often perceived as 'pests' and illegally excluded from private houses and public buildings. Tayside is a 'hotspot' in for wildlife crime in the United Kingdom.

State 3.3.2

Approximately 27.5 % of Perth and Kinross is designated under national or international legislation to protect the habitats and species present (Table 3.18, Figure 3.17).

Table 3.18 Number and total area of sites by designation

Conservation designations in PKC	Area (hectares)	% of PKC	Areas	Different named sites
National Nature Reserve	7280	1.3 %	7	5
Ramsar	6555	1.2 %	9	4
Special Areas of Conservation	37,758	7.0 %	80	23
Special Protection Area	30,099	5.6 %	19	7
SSSI	67,142	12.4 %	178	125

Information is not currently available on the condition of SSSIs designated for biological or a mixture of biological and geology reasons.

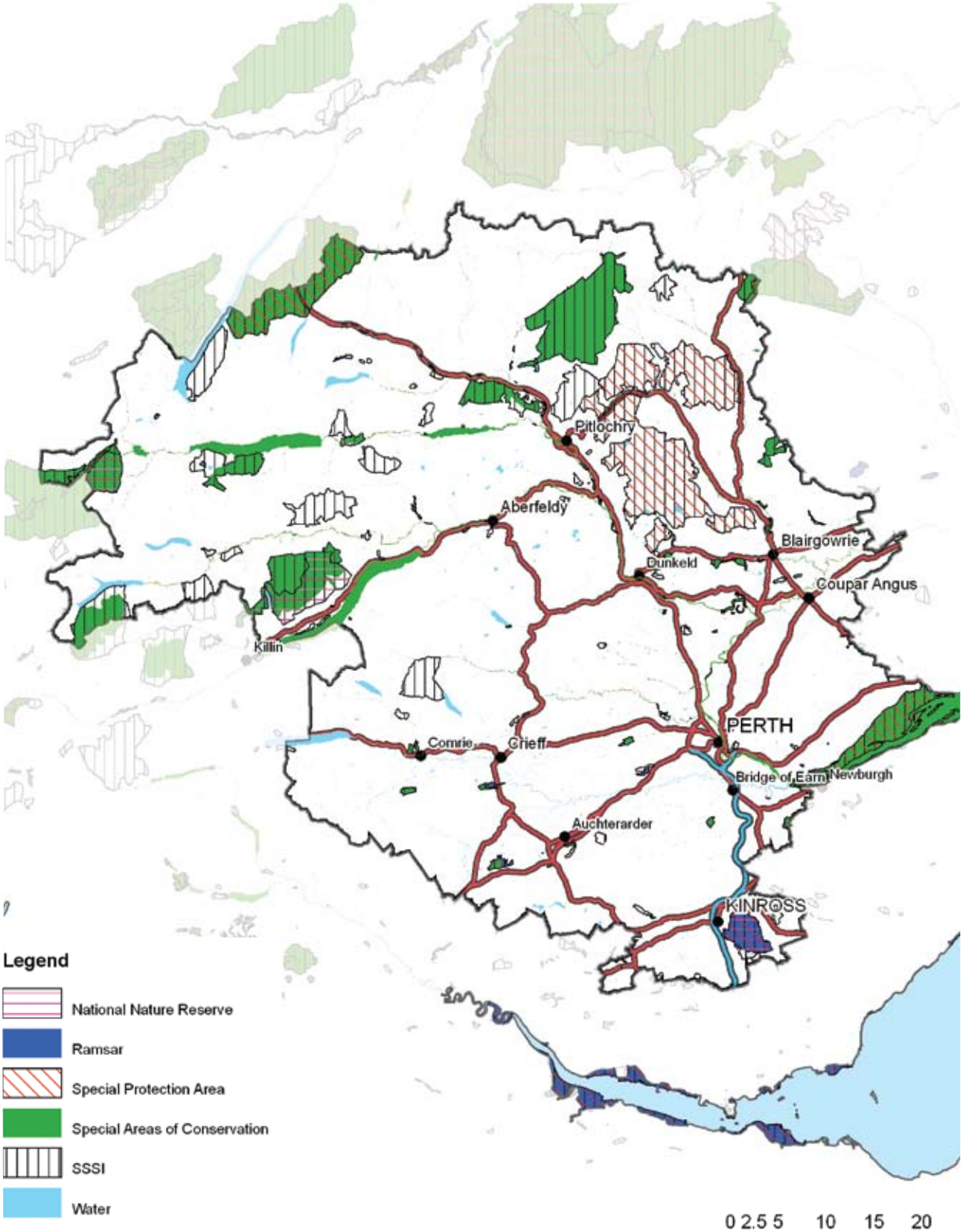
The Tayside LBAP has identified a number of priority habitats and species (Table 3.19). In the future information will be available from the Tayside LBAP on the proportion of priority species showing net population or range recovery, and the proportion of priority habitats showing recovery in condition and/or extent.

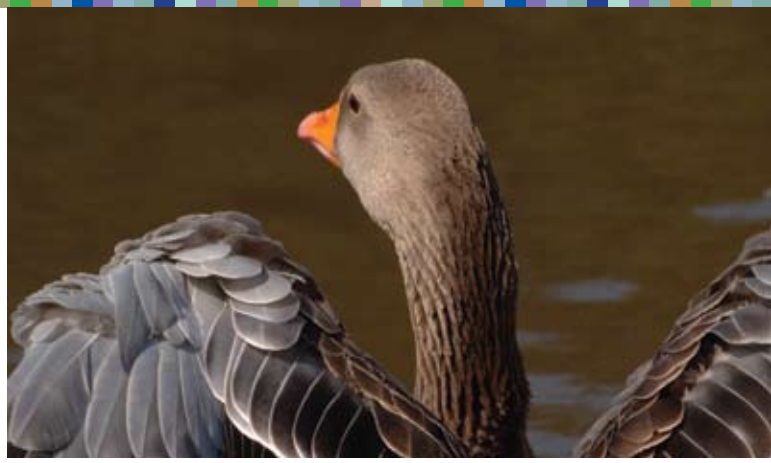
Table 3.19 Tayside LBAP Priority Habitats and Species 2005/06

Habitats		
Grass Margins in grassy fields	*Marshy grassland and rough pasture*	*Rushes and marginal vegetation*
Water courses	*Farm ponds and lochans*	*Acid grassland*
Riparian woodland	*Arable field margins*	*Scrub woodland*
Non-species rich hedgerows	*Species rich grassland*	*Arable field margins*
Upland heathland	*Over wintering crops*	*Wetland margins*

Species		
Badger	*Common shrew*	*Swallow*
Yellow hammer	*Short-eared owl*	*Goldfinch*
Brown trout	*Redshank*	*Devil's bit*
Scabrous	*Barn owl*	*Common frog*
Ringlet butterfly	*Small pear-bordered fritillary*	*Lapwing*

Figure 3.17
Biodiversity Conservation Designations





The strategy for the conservation and enhancement of biodiversity in Scotland includes indicators relating to the abundance of terrestrial breeding birds, the abundance of non-breeding water birds, vascular plant diversity and terrestrial insect abundance (in addition to the state of LBAP priority species and habitats).

The Breeding Bird Survey aims to keep track of changes in the breeding populations of widespread bird species in the UK, however insufficient data is collected in the survey to comment on populations at the Tayside or Perth and Kinross level. Data collected at nature reserves in the Perth and Kinross area were not available at the time of writing this report.

The Wetland Bird Survey has undertaken surveys for a number of years for different nationally and internationally important bird populations at Loch Leven (Table 3.20). At present there are no clear trends in population numbers.

Table 3.20 Wetland Birds Loch Leven

	Count Data from Wetland Bird Survey						Importance Thresholds	
	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	Mean	International	UK
Mute Swan	**496**	**506**	**550**	**526**	*202*	**456**	380	375
Whooper Swan	**144**	*0*	*13*	*19*	**66**	*48*	210	57
Pink Footed Goose	**14,700**	**16,200**	**(12,874)**	**15,120**	**14,750**	**15,193**	2,400	2,400
Gadwell	270	320	**840**	**635**	360	485	600	171
Teal	2,940	**4,100**	**6,562**	**4,847**	**6,060**	**4,902**	4,000	1,920
Shoveler	**480**	**400**	**550**	295	386	**422**	400	148
Pochard	1,330	**4,074**	2,934	2,548	2193	2,616	3,500	595
Tufted Duck	3,900	3,650	4,872	3,913	3,826	4,032	12,000	901
Goldeneye	*215*	249	*153*	*86*	385	*218*	4,000	249
Great Crested Grebe	*131*	222	*127*	204	*127*	162	4,800	159
Cormorant	488	421	*68*	310	*222*	302	1,200	230
Coot	2,100	1,818	3,205	2,650	2,375	2,430	17,500	1,730
Total number of water birds	31,865	38,128	39,588	37,334	33,773	36,138		

NB ( ) - Incomplete Count

Bold - Internationally important population

Italic - Below national and international importance threshold

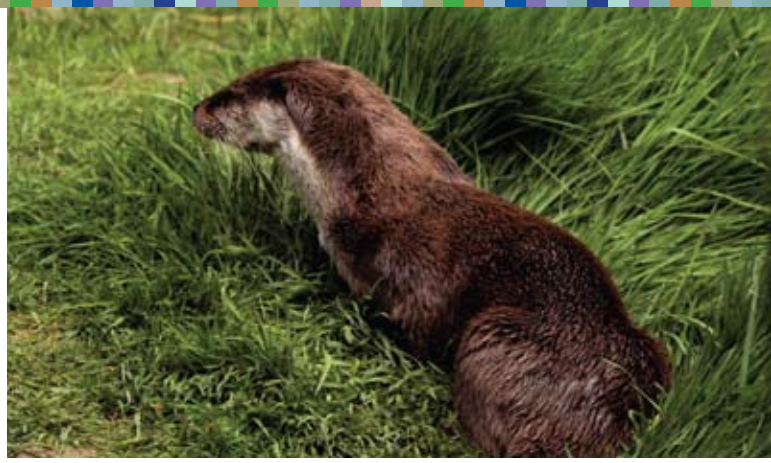
The United Kingdom Butterfly Monitoring Scheme (UKBMS) coordinates the systematic survey of butterfly populations in two locations in Perth and Kinross, Vane Farm and Ben Lawers (Table 3.21 and 3.22 respectively). Each site has sufficient information to comment on the status of approximately 50 % of the species identified. Although the majority of these species are believed to be stable, one species on each site, the small Heath at Vane Farm and the small Tortoiseshell at Ben Lawers are identified as decreasing. These species are stable on the alternative farm.

Table 3.21 UKBMS Results Vane Farm

Species	Status	Colonised/ extinct	Mean annual count
Common Blue	Unknown		0.07
Green-veined White	Stable		68
Large White	Stable		4.8
Meadow Brown	Stable		21
Orange Tip	Unknown		2.5
Painted Lady	Unknown		1.1
Peacock	Unknown	Colonised 2002	1.1
Red Admiral	Unknown		1.8
Ringlet	Unknown		2.4
Small Copper	Stable		4.3
Small Heath	Decreasing		9.3
Small Tortoiseshell	Stable		18
Small White	Stable		5.5

Table 3.22 UKBMS Results Ben Lawers

Species	Status	Colonised/ extinct	Mean annual count
Dark Green Fritillary	Unknown		0.25
Green-veined White	Unknown	Recolonised 1994	0.65
Mountain Ringlet	Stable		41
Pearl-bordered Fritillary	Unknown		0.07
Small Heath	Stable		20
Small Pearl-bordered Fritillary	Unknown		0.09
Small Tortoiseshell	Decreasing		4.7



A national survey of otters has been undertaken three times in Scotland. Table 3.23 summarises the results for Tayside. The results show a significant increase in the number of sites with observed otter presence each time the survey was carried out in Tayside.

At present there is insufficient information available to comment on trends in vascular plant diversity and bats in Perth and Kinross.

Table 3.23 Otter in Tayside[26]

Year	No of sites surveyed	No of sites with otter presence	Statistically significant change(1)	% of sites with otter presence	Total spraints(2)	Average spraints(2) per positive site	Statistically significant change(1)
1977-1979	410	251	No	61	769	3.06	No
1984-1986	410	311	Yes	76	1,025	3.29	No
1991-1994	410	372	Yes	91	1,424	3.83	Yes

Figures are only for sites that were surveyed in all three surveys (or in 1977-1979 and 1991 surveys if 1984 survey not performed)

(1) Statistically significant change since previous year, tested at the 5% level

(2) Spraints are faecal deposits with a characteristic musky odour

Society's response 3.3.3

Society is responding to the need to protect and improve the biodiversity of the area though the designation of protected area, detailed in section 3.3.2 above, and through the development and implementation of the Tayside LBAP. National legislation has also been developed, including the Nature Conservation (Scotland) Act 2004, which made additional provisions related to existing wildlife law and the SSSI system, and placed on all public bodies a duty to further the conservation of biodiversity.

Opportunities and threats 3.3.4

The following key assets, opportunities and threats for biodiversity in Perth and Kinross have been identified (Table 3.24).

[26] Green, J & Green, R (1980). Otter Survey of Scotland 1977-79; Green, J & Green, R (1987). Otter Survey of Scotland 1984-85; Green, R & Green, J (1997). Otter Survey of Scotland 1991-94. All published by the Vincent Wildlife Trust.

Table 3.24 Biodiversity assets, threats and opportunities

Asset	Opportunities and Treats
High levels of biodiversity Designated and undesignated areas of high biodiversity Priority habitats and species Wildlife corridors and links Symbolic species (eg ospreys)	Opportunities ▪ *Tayside LBAP* ▪ *Grant schemes eg Stewardship schemes, woodland grants* ▪ *Sensitive development, including brownfield sites* ▪ *Appropriate tourism* ▪ *Appropriate recreation - ownership* Threats ▪ *Inappropriate management* ▪ *Inappropriate tourism* ▪ *Inappropriate development* ▪ *Non-native species* ▪ *Climate change* ▪ *Wildlife crime* ▪ *Lack of awareness, ignorance & lack of data*

Data gaps and limitations 3.3.5

A significant data gap preventing detailed reporting on the state of biodiversity in Perth and Kinross is the gap in systematically collected data relating to the abundance, distribution and condition of species and habitats throughout the area. Reporting on priority species as part of the Tayside BAP should contribute significantly to filling this gap. Data relating to net changes in natural and semi-natural habitats will also support reporting on the state of biodiversity in Perth and Kinross.

Historic Environment 3.4

The 'historic environment' includes all of the material remains in the landscapes of town and countryside created by our ancestors. It includes all human activity from the largest - towns or motorways, to the very smallest - signposts or flint tools[27]. The historic environment is part of our everyday lives. It helps provide a sense of place, well-being and cultural identity. It enhances the local distinctiveness and forges links between residents and visitors to Perth and Kinross and the places where they live and visit[28]. The historic character of the environment is important to quality of life and sense of identity, and it is a vital contributor to the economy through the attraction of visitors

Driving forces and pressures 3.4.1

The environment changes, matures and decays. Constant change in the historic environment is a result of natural processes, such as climate change and erosion, and human interventions, such as land management, urban and rural development, transportation and pollution[27].

The Scottish Historic Environment Policy[28] (SHEP) documents identify the main pressures and driving forces affecting the historic environment as:

- *poor understanding of the positive role the historic environment plays in communities, their culture and their economy;*
- *short-term vision for the development of areas;*
- *restructuring in the farming industry and changing land-management practices;*

[27] Devon County Council (2003) *The human habitat: Devon's historic environment* - www.devon.gov.uk/human_habitat.pdf

[28] Historic Scotland (2007) *Scottish historic environment policy 1: Scotland's historic environment* - www.historic-scotland.gov.uk/shep1-3.pdf

- *lack of knowledge of how older buildings were constructed and perform, and their maintenance needs;*
- *coastal erosion and plough damage;*
- *inappropriate change reducing the cultural significance, or appearance or quality of conservation areas;*
- *renewable energy generation;*
- *improving the carbon footprint for older buildings;*
- *limited availability of traditional skills, suitably-qualified craftsmen and locally available materials for the maintenance and repair of the historic environment*[28].

To meet changing needs the historic environment has been adapted over time. The perception of what is important also develops and changes. Over time new buildings, sites and environments are created and become part of the historic environment[28].

Table 3.25 summarises the number of planning applications within Perth and Kinross that had the potential to impact the historic environment and their outcomes. Results show there is a general increase in the number of planning applications identified as having the potential to impact the historic environment of Perth and Kinross.

Table 3.25 Number of planning applications with potential to impact the historic environment

	Present outcome of planning applications					
	Appeal	Approved	Refused	Withdrawn	Unknown	Total
2002	1 (0%)	102 (76%)	23 (17%)	7 (5%)	1 (0%)	134
2003	1 (0%)	177 (75%)	43 (18%)	16 (7%)	0 (0%)	237
2004	2 (0%)	193 (64%)	75 (25%)	28 (9%)	3 (0%)	301
2005	2 (0%)	264 (76%)	44 (13%)	27 (8%)	9 (0%)	346
2006	0 (0%)	384 (70%)	51(9%)	45 (8%)	65 (12%)	545

Note: Number = Number of applications

Number in ( ) = Percentage of total applications that year

State 3.4.2

The areas within Perth and Kinross designated as heritage conservation areas are summarised in Table 3.26 and Figure 3.18. Although conservation areas were first designated around 1970 the Council did not have sufficient resources to undertake proper appraisals until 2006. At the time of writing, finalised appraisals are available for Pitlochry and Coupar Angus, and appraisals for Blair Atholl and Blairgowrie will be completed in 2007.

Table 3.26 Designated heritage conservation areas

	Number	Area
2006	28	677

Perth and Kinross contains a large number of Scheduled Ancient Monuments (SAMs) and listed buildings (Table 3.27 and 3.28, and Figure 3.19). A relatively small percentage of listed buildings within Perth and Kinross are registered as being at risk (Table 3.28). No information is available on the current status of the SAMs in Perth and Kinross.

Table 3.27 Scheduled Ancient Monuments

	Number	Area
2006	751	2685

Table 3.28 Listed buildings

	2006	
Class	Number	% of total
A	162	5%
B	1,457	47%
CS	1,449	47%
Total	3,068	

Table 3.29 Listed buildings included in the Buildings at Risk Register

	2006 Risk Category			
Class	Minimal	Low	Moderate	High
A		3		
B	2	9	3	13
CS				1
Unlisted		3		10
Total	2	12	3	14

There are 25 fields of conflict (battlefields) within Perth and Kinross (Figure 3.18). No information is available on their present condition.

In 2007 there were 41 historic gardens and designed landscapes, covering 9,413 hectares in Perth and

Figure 3.18

Historic Gardens and Designed Landscapes, Heritage Conservation Areas and Fields of Conflict

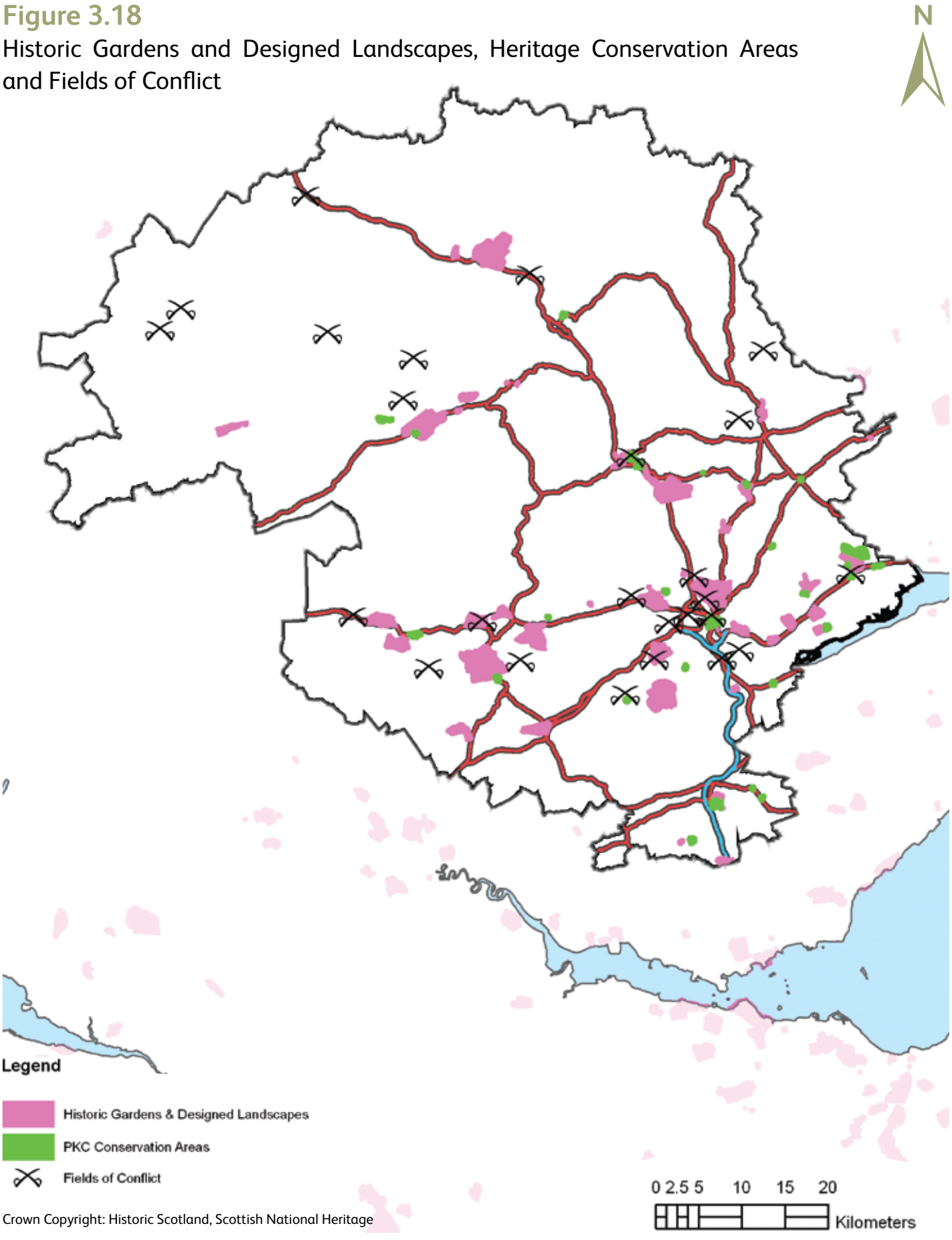
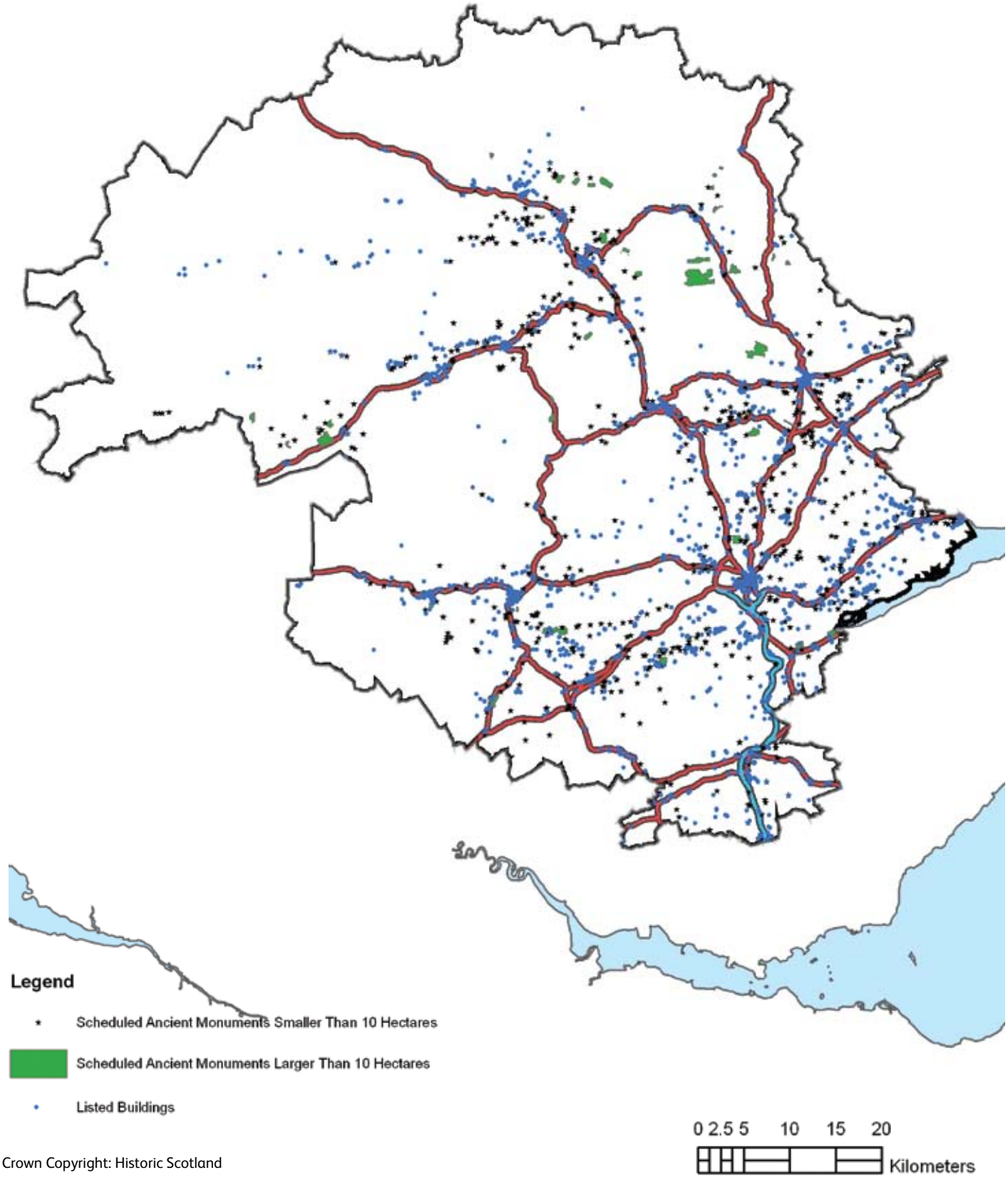
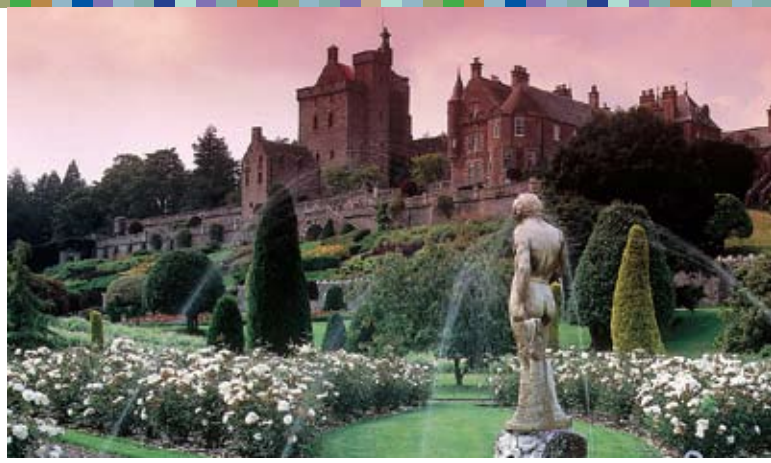


Figure 3.19
Scheduled Ancient Monuments and Listed Buildings





Kinross (Table 3.30, Figure 3.18). Thirty of these sites are believed to have management agreements in place.

Table 3.30 Historic Gardens and Designed Landscapes in 2007

Number	Approximate Area (hectares)	Number believed to have management agreements
41	9400	30

The Forestry Commission identified approximately 40,500 hectares of ancient and semi-natural woodland in Perth and Kinross using surveys undertaken in 2000 (Table 3.31, Figure 3.20). Presently no information is available on the condition of these woodlands however a small percentage are designated as SSSI and once information is available on the conditions of SSSIs it can be used as an indicator for the condition of the woodland. At present, the Forestry Commission are undertaking the native woodland survey for Scotland, which should include information on the condition of such woodland.

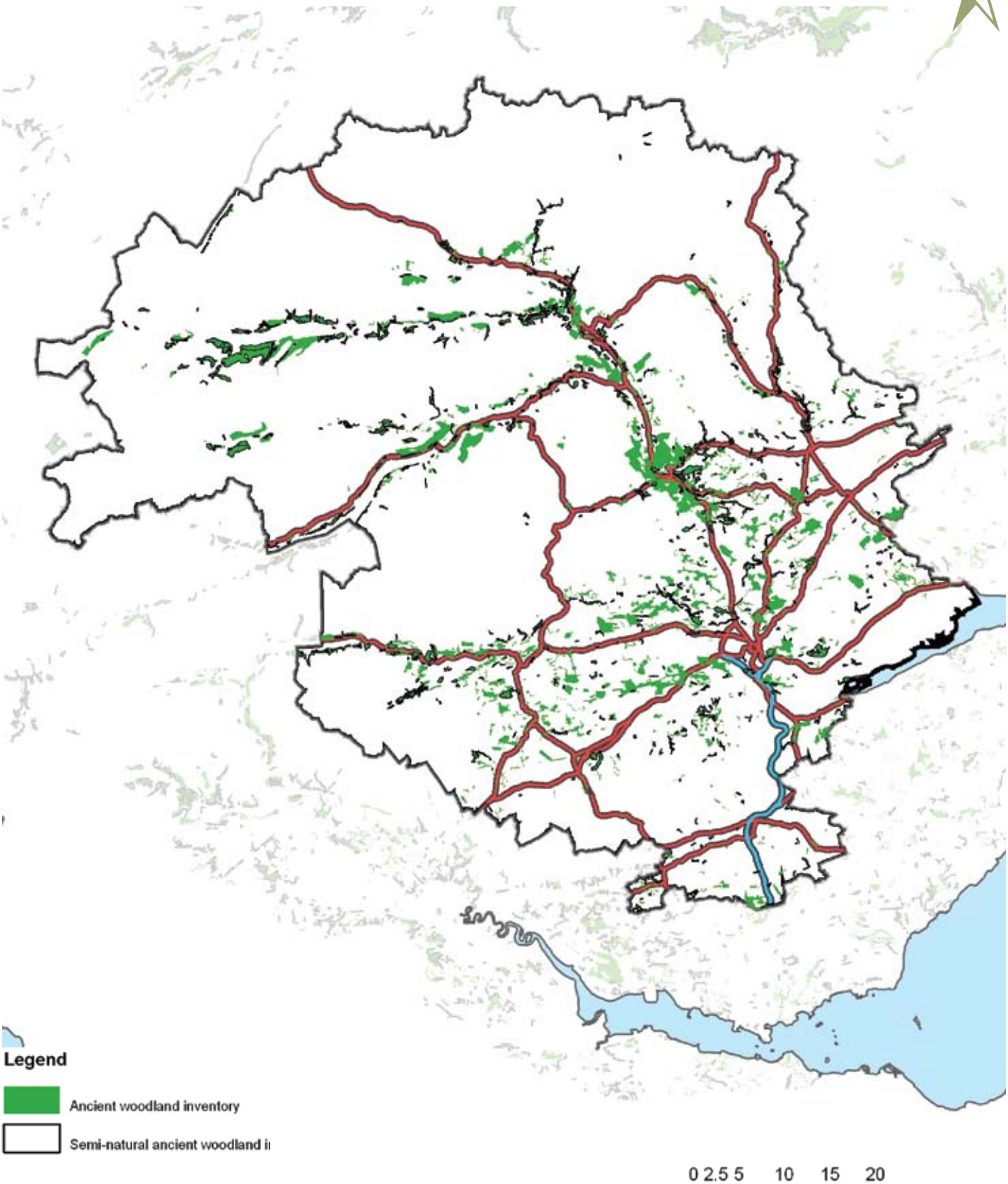
Table 3.31 Extent of ancient and semi-natural woodland

	1990s
Ancient woodland	
Total area (hectares)	31,390
Percentage designated as SSSI (%)	9%
Semi-natural woodland	
Total area (hectares)	9117
Percentage designated as SSSI	27%

Note - Biological and mixed SSSI only

Figure 3.20

Ancient Woodland Inventory, Semi-natural Ancient Woodland Inventory



Society's response 3.4.3

Society has responded to the need to protect the Historic Environment through the introduction of the various designations discussed in Section 3.4.2 and through the development of planning policies which protect these sites and their surroundings.

A new series of policy documents, Scottish Historic Environment Policy (SHEP) documents, setting out the Scottish Ministers' vision and strategic policies for the wider historic environment were published in 2007. These documents specify that the protection of the historic environment is not about preventing change, but about managing it intelligently and with understanding, in order to achieve the best outcome for the historic environment and for the people of Scotland. The historic environment reinforces the identity of communities, and can add value, particularly when that value is recognised at the outset and it becomes an integral part of any development or regeneration project.

The Scottish Historic Environment Policy[29] documents identify the main aims of the Scottish Ministers including:

- *realise the full potential of the historic environment as a cultural, educational, economic and social resource;*
- *make the best use of the historic environment to achieve social and economic regeneration;*
- *identify, protect and manage the many aspects of our historic environment in a sustainable way to ensure their long-term survival;*

- *improve the understanding of all aspects of the historic environment, their condition and inter-relationships;*
- *broaden access to the historic environment and break down intellectual, physical and economic barriers;*
- *ensure that effective systems are in place to conserve and manage the historic environment, underpinned by appropriate legislation and information*[29].

Opportunities and threats 3.4.4

The following key assets, opportunities and threats for cultural heritage in Perth and Kinross have been identified (Table 3.32).

[29] Historic Scotland (2007) *Scottish historic environment policy 1: Scotland's historic environment* - www.historic-scotland.gov.uk/shep1-3.pdf

Table 3.32 Cultural heritage assets, threats and opportunities

Asset	Opportunities and Threats
Designated areas Listed buildings, SAMs & their settings Archaeology sites (known & unknown) Ancient woodland and native trees Battlefields/ fields of conflict Wrecks Cultural, current and historic landscape	Opportunities - *Regeneration and reuse* - *Tourism* - *Life long learning* Threats - *Complexity of subject & number of bodies responsible for the historic environment* - *Inappropriate development* - *Natural degradation processes* - *Renewable energy* - *Lack of awareness*

Data gaps and limitations 3.4.5

A significant gap in the information available on the historic environment is details on the actual state of the areas designated. There is also the acceptance that what constitutes the historic environment is always evolving and a proportion of what exists is at present unknown.

A key resource in future will be the Scottish Historic Environment Audit.

Aquatic 4

Information and trends relating to water quantity and quality

Related sections:

Section 2.1 Climate Change

Section 3.3 Biodiversity

Issues Summary:

	Condition	Trend	Indicator
Inland Waters			
			Surface water quallity
			Groundwater quality
		None	Rainfall
			River flow
			Fish stocks

Key	
Poor/area of uncertainty or potential problems	No discernable trend or trend unclear but potential problems
Bad	Worsening
Good/positive and expected to improve	Improving
Fair/area of uncertainty or potential no problem	No discernable trend or trend inclear but potentially no problems
– Unknown/not applicable	– Unknown/not applicable

Inland Waters 4.1

Inland waters are a major source of water used for drinking and industry. Waterways and lochs support a wide variety of wildlife and recreational activities, and they are a key aspect of the landscape in Perth and Kinross.

Driving forces and pressures 4.1.1

Drivers and pressure influences two key aspects of the water environment: water quality and quantity.

A high level driver putting pressure on the inland water environment, primarily through alteration of rainfall and snow cover patterns, is climate change (see Section 2.1). Rainfall data from key gauges in Perth and Kinross (location shown in Figure 4.1, data Figure 4.2) show that over the last 30 years there has been no clear upward or downward trend in total or seasonal rainfall in Perth and Kinross. However figures calculated at the national level show that there was a significant increase in winter and annual rainfall throughout Scotland as a whole, 58 % and 20 % respectively[30]. The report containing these figures indicates a 5 to 50 % increase in rainfall across Perth and Kinross between 1961 and 2004, with the greatest increases in upland areas[30].

Local pressures on inland waters include[31]:

- *Point source pollution from industry, agriculture, sewage treatment works, sewer overflows and fish farms;*
- *Diffuse source pollution from agriculture, streets, yards, forestry and septic tanks;*
- *Abstraction and flow regulation including major hydropower and water supply schemes, the building of dams and weirs and the drilling of boreholes to extract groundwater;*
- *Morphological pressures including engineering works to channels (eg flood defence, straightening, building on floodplains), and inappropriate bank management practices (eg intensive live stock farming, cultivation to edge of river);*
- *Alien species.*

The latter two relate only to surface water, where as the first three relate to both surface and groundwater.

Table 4.1 and 4.2 summarises the proportion of surface and ground water bodies identified by SEPA as being subjected to the different pressures identified above. Table 4.3 provides further information on the significant issues affecting water bodies in the Tay catchment, which covers a significant proportion of the Perth and Kinross area, as identified by the Tay Area Advisory Group.

[30] Barnet, C; Hossell J; Perry M; Procter, C and Hughes, G (2006) *A handbook of climate trends across Scotland.* SNIFFER project CC03

[31] SEPA (2004) *Pressures and impacts on Scotland's Water Environment: Report and consultation*

Figure 4.1
Flow and Rainguages

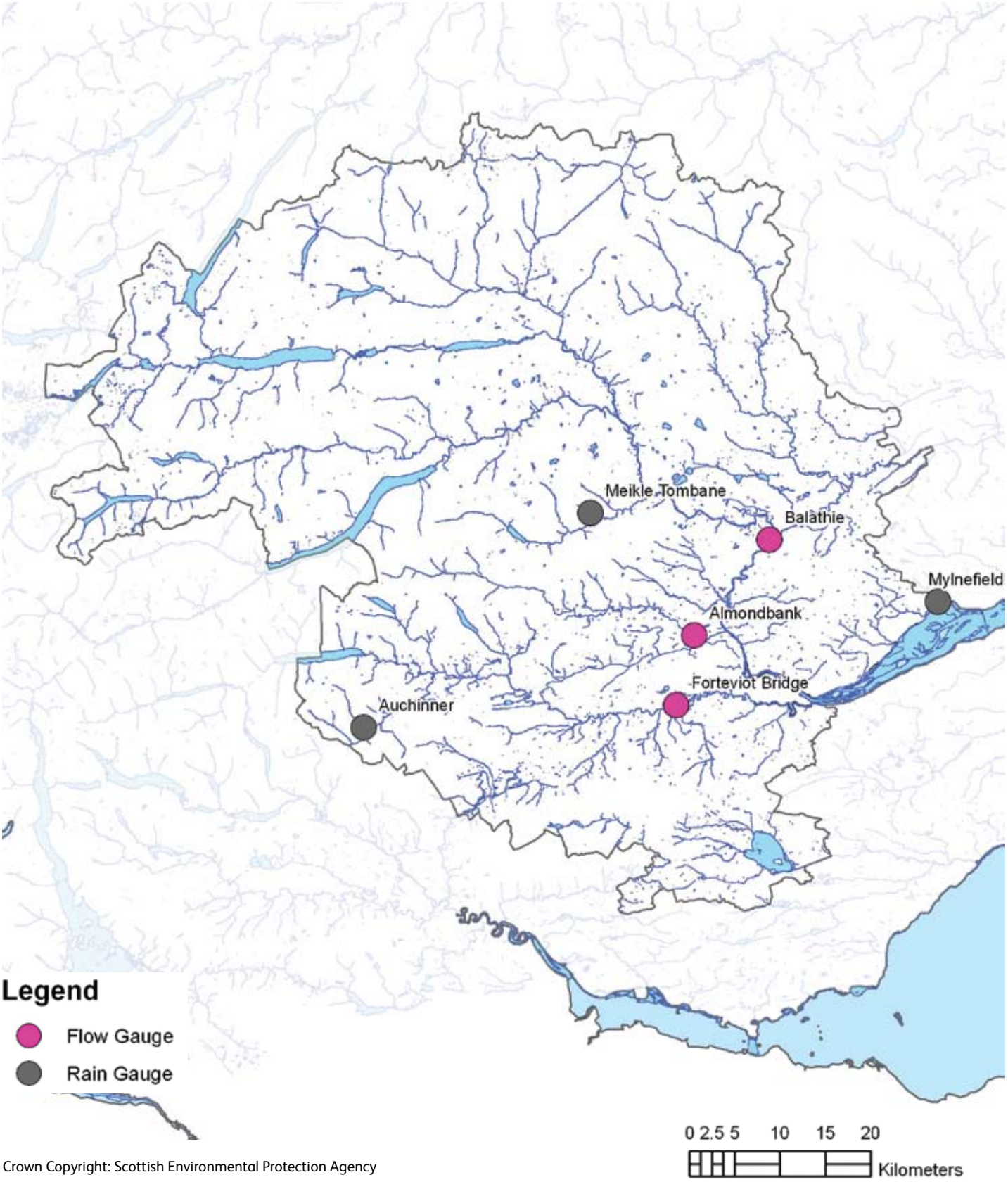
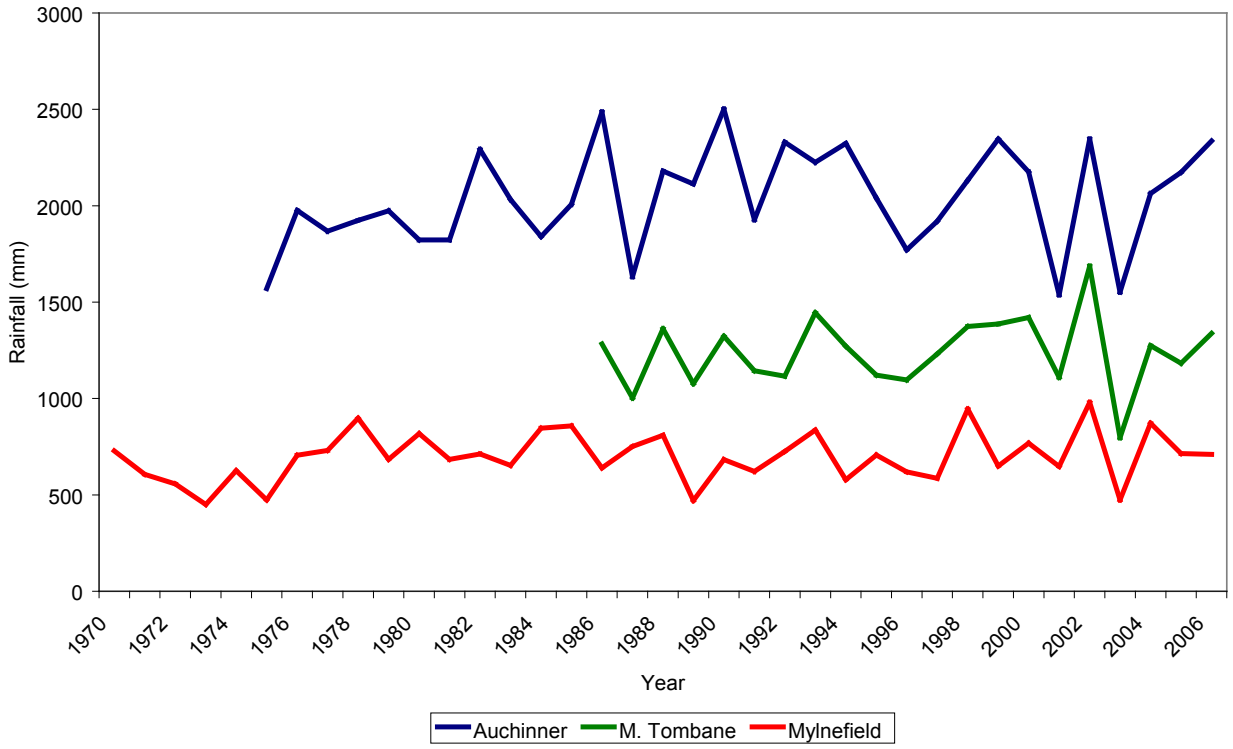


Figure 4.2 Rainfall at key gauging sites

(a) Total



(b) *Seasonal*

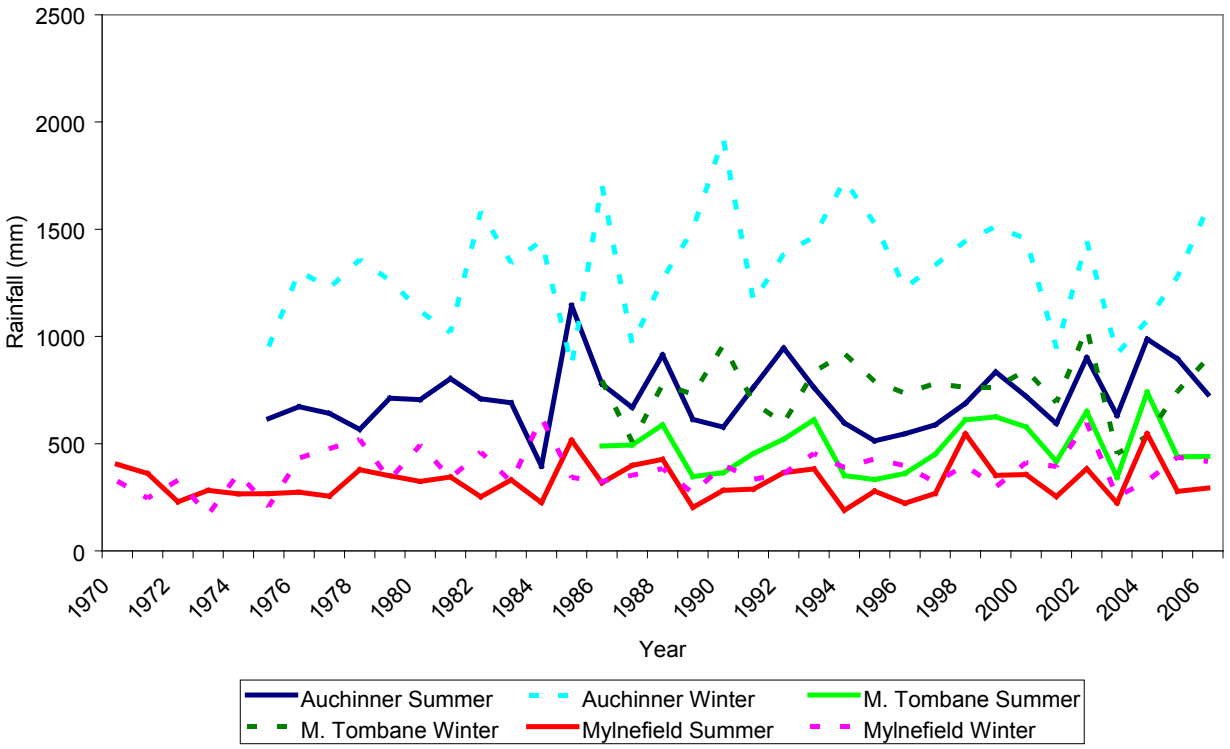


Table 4.1 Identified pressures to surface water bodies

(a) Rivers		Risk Category				
		1a	1b	2a	2b	Total
Overall water bodies	Length (m)	320,569	499,868	384,181	679,683	1,884,301
	Number	28	44	30	67	169
Point source pollution	Length (m)	156,480	136,406	148,904	0	441,790
	Number	14	12	8	0	34 **(20%)**
Diffuse pollution	Length (m)	175,703	240,313	152,919	31,215	600,150
	Number	16	19	12	2	49 **(29%)**
Abstractions	Length (m)	258,722	384,184	192,370	17,370	852,646
	Number	21	26	14	2	63 **(37%)**
Impoundments	Length (m)	211,094	257,657	104364	0	573,115
	Number	18	17	10	0	45 **(27%)**
Morphology	Length (m)	347,704	480,057	347,868	51,123	1,226,752
	Number	31	38	28	7	104 **(61%)**

(b) Lochs	Number of water bodies				
	Risk Category				
	1a	1b	2a	2b	Total
Overall water bodies	19	3		3	25
Point source pollution	2				2 **(8%)**
Diffuse pollution	11	2		1	14 **(56%)**
Abstractions	10	2			12 **(48%)**
Impoundments	14	2			16 **(64%)**
Morphology	13	1			14 **(56%)**

Table 4.2 Identified pressures to groundwater bodies

	Number of water bodies				
	Risk Category				
	1a	1b	2a	2b	Total
Overall water bodies	6	1	2	1	10
Point source pollution	4	1	1		6 **(60%)**
Diffuse pollution	6				6 **(60%)**
Abstractions	4				4 **(40%)**

1a - Water bodies at significant risk

1b - Water bodies probably at significant risk

2a - Water bodies probably not at significant risk

2b - Water bodies not at significant risk

Table 4.3 Significant issue for water bodies in the Tay catchment[32]

Issue impacts greater than 15% of river lengths	Issue impacts greater than 20% of water body area		
Rivers	**Lakes**	**Transitional**	**Coastal**
Diffuse source - *Farming of animals, growing of crops & mixed farming* Point source - *Sewage disposal activities* Abstraction and Flow Regulation - *Production and distribution of electricity* Morphology - *Farming of animals, growing of crops and mixed farming* Morphology - *Activity* Morphology - *Production and distribution of electricity* Abstraction and Flow Regulation - *Farming of animals, growing of crops and mixed farming*	Abstraction and Flow Regulation - *Production and distribution of electricity* Morphology - *Production and distribution of electricity* Diffuse source - *electricity gas and water supply* Morphology - *recreation, cultural and sporting activities*	Diffuse sources - *sea and coastal water transport* Morphology - *sea and coastal water transport* Point source - *sewage disposal activities* Morphology - *land reclamation* Morphology - *activity*	Diffuse source - *agriculture and forestry* Morphology - *commercial fishing* Point source - *sewage disposal activities*

(Tay Area Advisory Group 2007[32]*)*

Of concern to the Tay District Salmon Fisheries Board is the low flow in the River Garry, for some periods of the year, upstream of its confluence with Errochty Water. This is caused by the abstraction of water for hydro-power generation. The low flow in the river has implications for migratory fish and other wildlife. Invasive species such as signal crayfish also represent a major threat to the natural ecology of water bodies in Perth & Kinross [33].

Currently there is insufficient information available to provide details on the water use by sector in Perth and Kinross and how it has changed.

In the past forces for maintaining and improving inland water environments were driven by several pieces of European legislation including the Groundwater Directive, Nitrates Directive, Surface Water Abstraction Directive, Shellfish Directive, Freshwater Fish Directive, Bathing Water Directive, Urban Waste Water Treatment Directive, Birds Directive and Habitats Directive.

[32] www.sepa.org.uk/wfd/rbmp/aag/tay/index.htm

[33] www.tdsfb.org/garryriverscotland.htm

Presently the primary force driving the maintenance and improvement of inland water environments is the Water Framework Directive (WFD) transposed in Scotland via the Water Environment and Water Services (Scotland) Act 2003 (WEWS) Act). Its overall objective is to bring about the effective coordination of water environment policy and regulation across Europe in order to:

- *Prevent deterioration and enhance the status of aquatic ecosystems, including those dependent on groundwater;*
- *Promote sustainable water use;*
- *Reduce pollution;*
- *Help reduce floods and droughts.*

An additional pressure on inland waters is development of the floodplain.

State 4.1.2

River quality for the majority of the area is of excellent or good standard (Figures 4.3 to 4.5), with only a few stretches in the east of fair to poor quality. In general this lower river quality is associated with discharges. Figures 4.3 to 4.5 show that although there has been some decline in the percentage of river length classed as fair to seriously polluted the majority of the observed change is in the percentage of river length classified as excellent or good. For overall quality the trend is for an increase in the total percentage classed as excellent and a decrease in the percentage classed as good (Figure 4.3). At present there is no clear trend for changes in biological and chemical quality (Figures 4.4 and 4.5).

Figure 4.3 Overall water quality

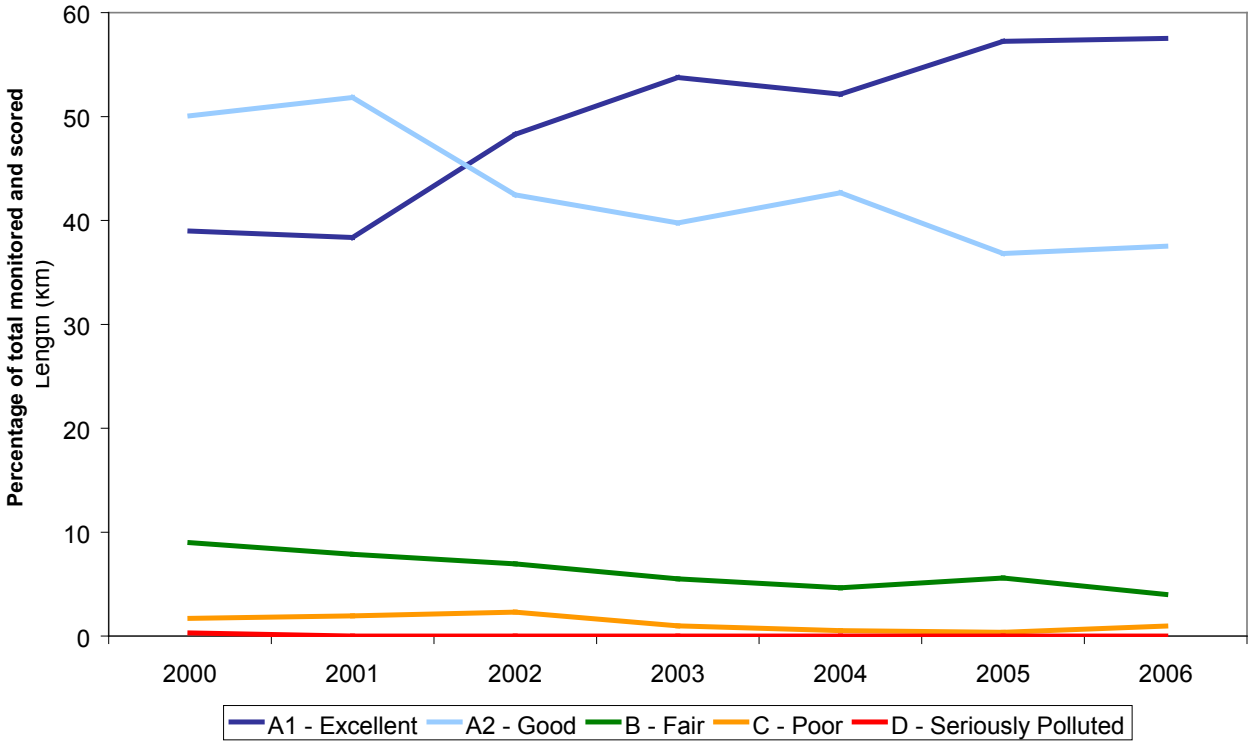


Figure 4.4 Biological water quality

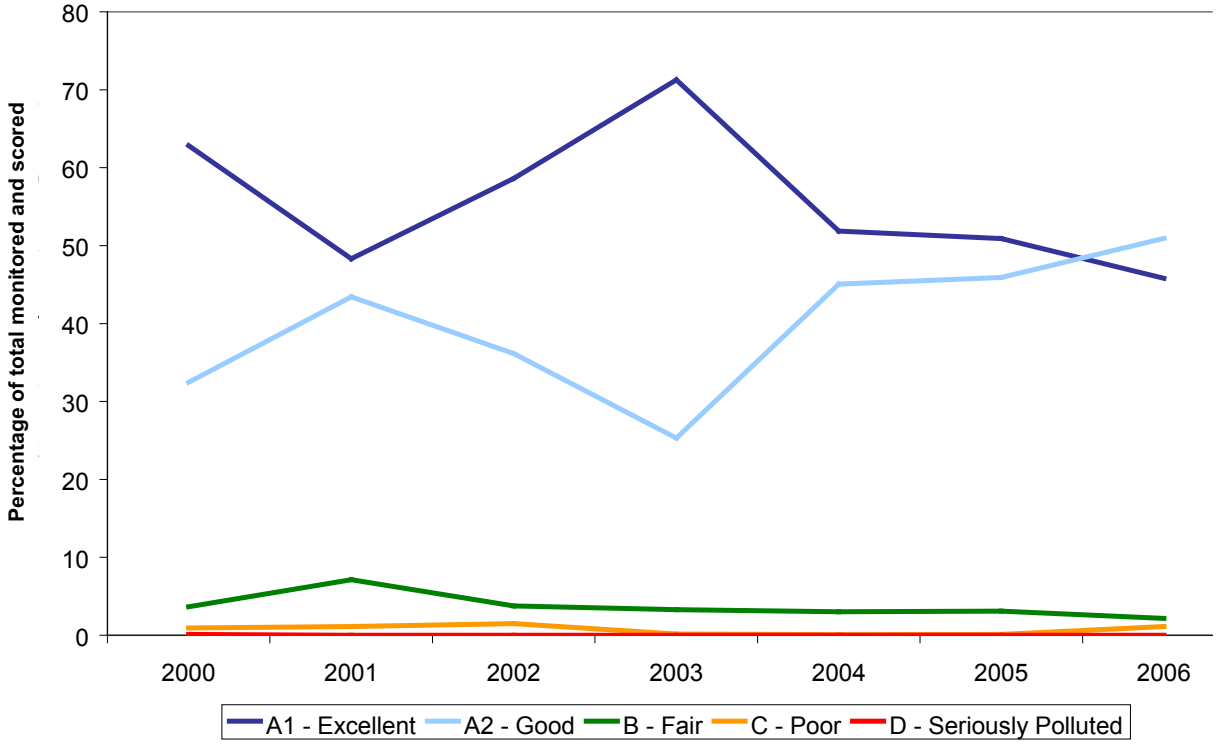
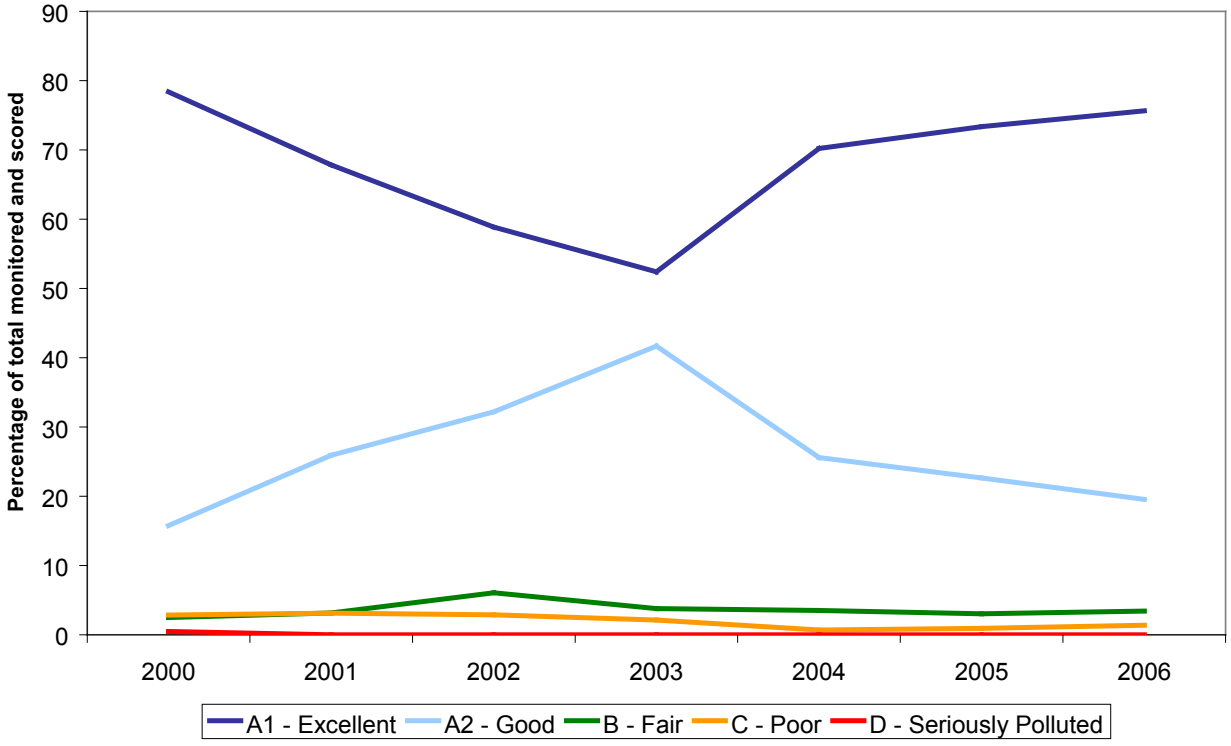


Figure 4.5 Chemical water quality



The WFD requires SEPA to identify those water bodies at risk of failing to achieve good status, as defined by the directive. Table 4.4 summarises the number of surface and groundwater bodies in Perth and Kinross identified as being at risk of failing to achieve good status.

Table 4.4 Water bodies achieving good water quality

	Number of water bodies Risk Category								
	1a		1b		2a		2b		Total
Rivers	28	17 %	44	26 %	30	18 %	67	40 %	169
Lochs	19	76 %	3	12 %		0 %	3	12 %	25
Groundwater	6	60 %	1	10 %	2	20 %	1	10 %	10
Total	53	26 %	48	24 %	32	16 %	71	35 %	204

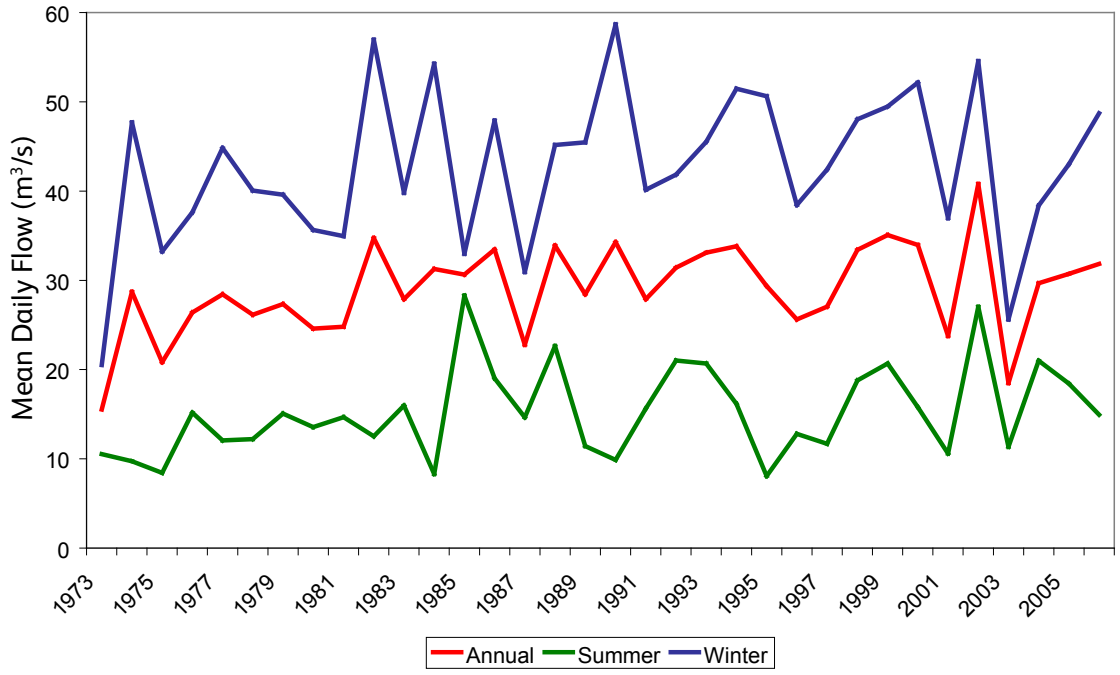
1a - Water bodies at significant risk
1b - Water bodies probably at significant risk
2a - Water bodies probably not at significant risk
2b - Water bodies not at significant risk

SEPA's state of the environment report, published in 2006, identified an approximate 30 % increase in annual flows of the River Tay between 1972 and 2005. No significant trends were identified in spring, however a 64 % increase between 1961 and 2005 winter flows was detected[34]. These changes are believed to relate to the impact of climate change on rainfall patterns (discussed Section 4.1.1). Figure 4.6 show trends in mean annual, winter and summer daily flows at key gauges in Perth and Kinross.

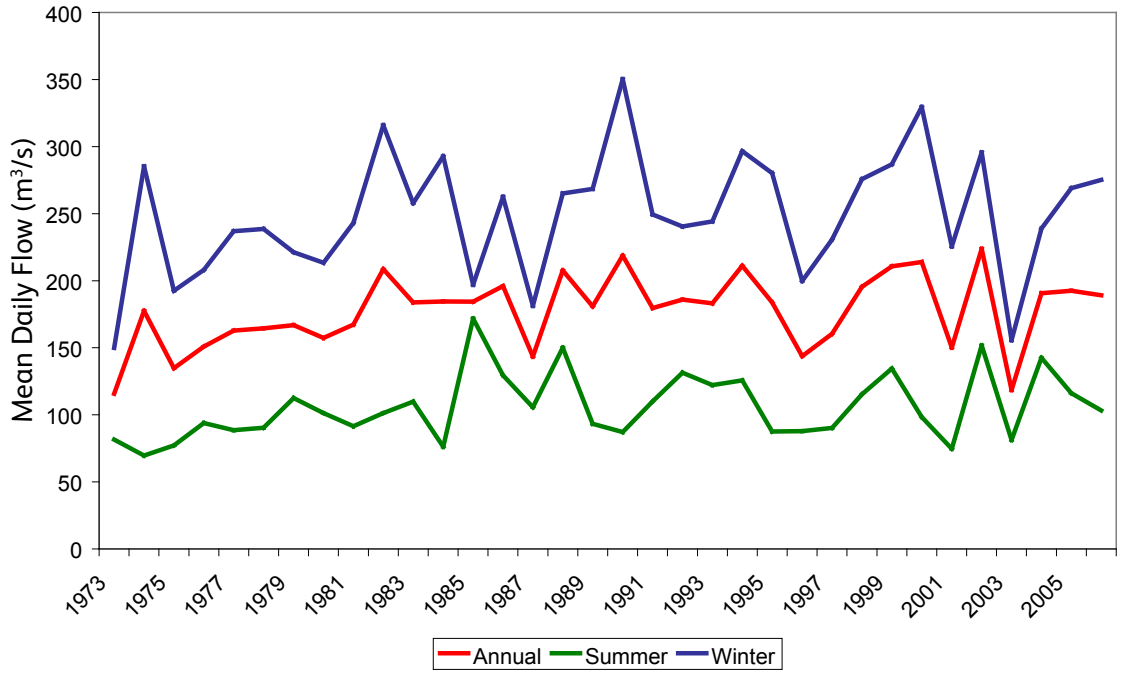
[34] SEPA (2006) *State of Scotland's Environment 2006: Change Tomorrow Today*

Figure 4.6 Flow at key gauging station

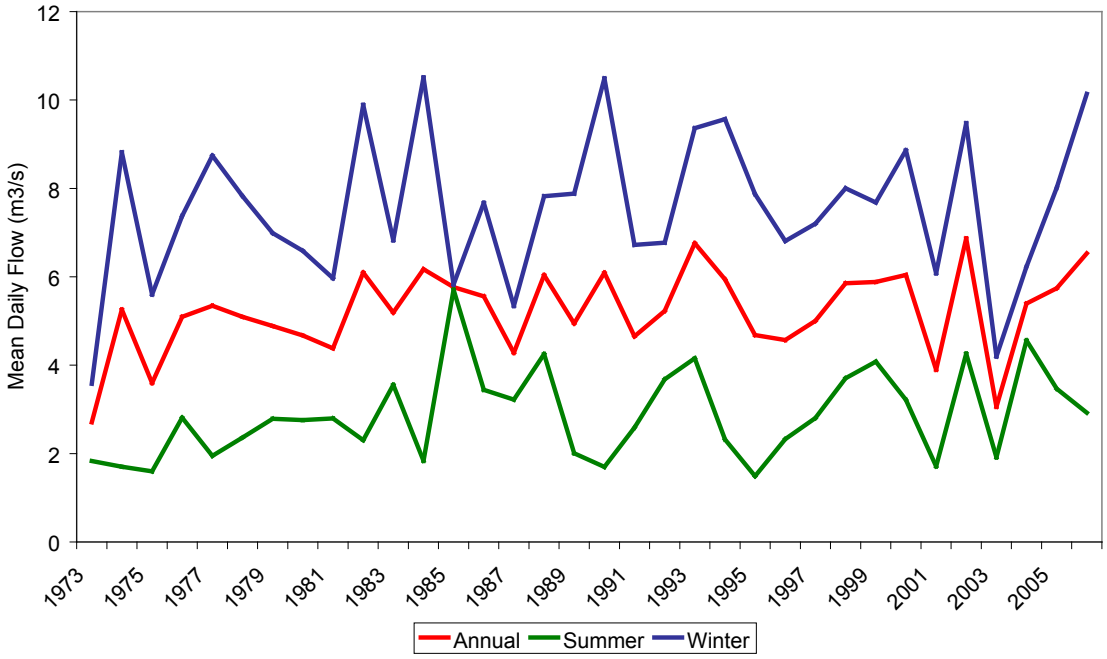
(a) Forteviot Bridge



(b) Ballathie



(c) *Almondbank*



The floodplain in Perth and Kinross remains relatively undeveloped and the majority of watercourses affect only agricultural or hill land. Key areas of floodplain identified using the current SEPA 1 in 200 year flood outline and the 2005 biennial flood report produced by PKC[35] include Perth, Bridge of Earn, Couper Angus, Blairgowrie, Little Dunkeld, Pitlochry, Killiecrankie, Blair Atholl, Weem, Milnathort, Birnam, Alyth, Almonbank and Tummel Bridge.

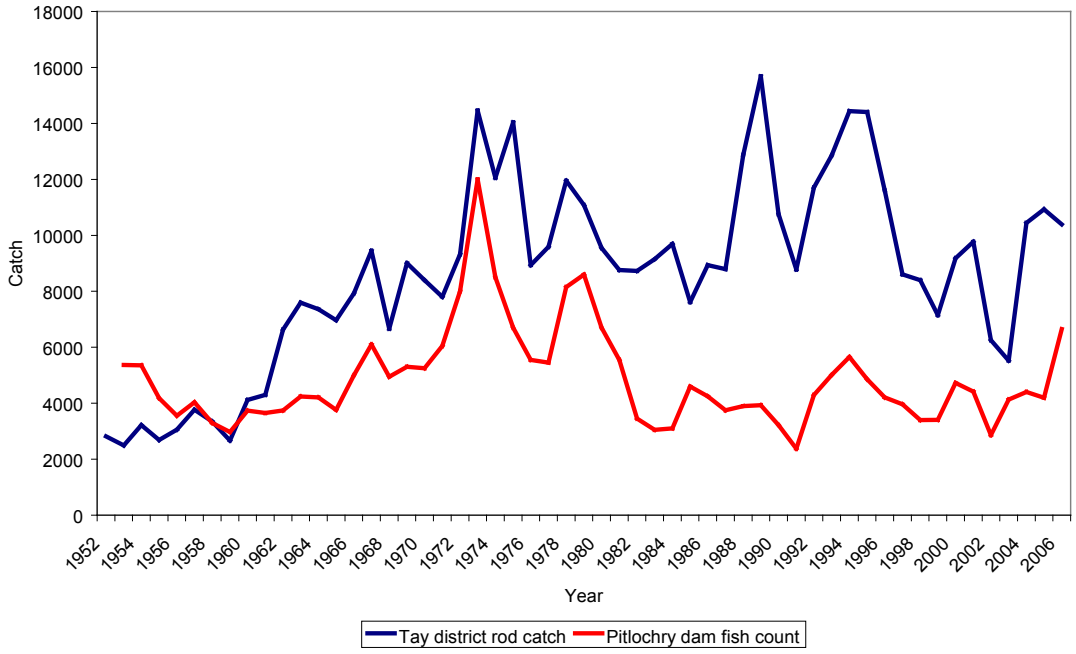
The majority of flooding incidences involving flooding of non-agricultural land relate to public roads, parks and gardens. Reported road flooding incidents are normally caused by blocked gullies, run off from farmers' fields, etc and not by blocked or overtopped watercourses[35].

Impact on population, economies and ecosystems 4.1.3

Fishing contributes significantly to the local economy and fish abundance is also a key indicator of ecosystem health. Figure 4.7 displays rod catch data for the Tay district and fish count data at Pitlochry Dam. When considering stock abundance prior to 2006, it should be remembered that there was much higher exploitation of salmon prior to the rod fishery or Pitlochry counter. Today there is very little exploitation of salmon upstream of the rod fishery. Therefore though the rod fishery and Pitlochry Counter appears relatively stable, total abundance was higher in 1960s -70s when there was a large net fishery which was bought and closed down in 1996 (see Figure 4.8).

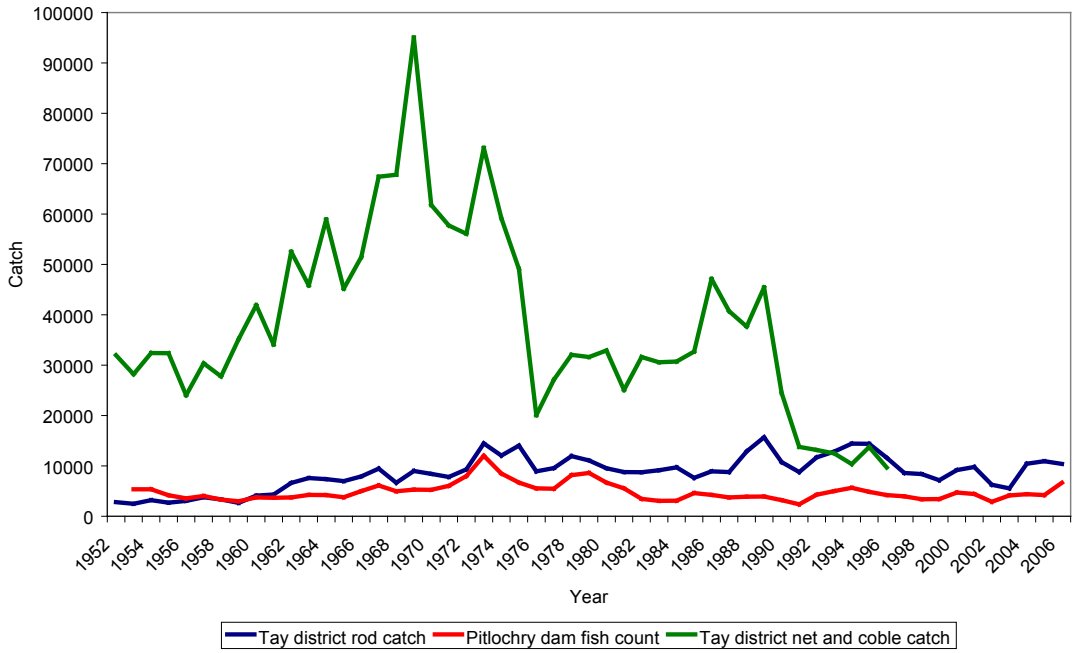
[35] Perth & Kinross Council (2005) Biennial report on flood prevention responsibilities

Figure 4.7 Rod and Fish Count Data



Data are from Fisheries Research Services (FRS)

Figure 4.8 Tay District Net and Coble Catch



Water quality has significant implications for the health of humans and fauna coming in to contact with or living within the water environment. For example pathogens from sewage effluent and livestock in bathing waters can cause diarrhoea and vomiting[36] and excessive nutrients in lochs and streams can lead to blue green algae blooms which are toxic to humans and fauna[37]. The quality of the aquatic environment can also indirectly affect human health through the influence of the quality of the environment on health, in particular mental health (see Section 5.1.3). Similarly water quality will also affect the economy through influencing tourism and recreational activity.

Society's response 4.1.4

As noted above in section 4.1.1 the main response to protecting and maintaining the inland water environment is now via the Water Framework Directive.

Opportunities and threats 4.1.5

The following key assets, opportunities and threats for inland waters in Perth and Kinross have been identified (Table 4.5).

Table 4.5 Inland water assets, threats and opportunities

Asset	Opportunities and Treats
Water courses, their catchments and riparian areas Lochs , including mesotrophic lochs Undeveloped Floodplain Groundwater Ponds and pools Inner Tay Estuary Rainfall	Opportunities ▪ *New legislation, Water Framework Directive and flooding directive* Threats ▪ *Climate change* ▪ *Inappropriate land management* ▪ *Development* ▪ *Diffuse and point source pollution* ▪ *Abstraction and flow regulation in particular for the production and distribution of electricity.* ▪ *Morphological change* ▪ *Invasive species*

Data gaps and limitations 4.1.6

Data availability on the quantity and quality of surface and groundwater is generally good. Limitations exist when it comes to identifying and measuring pressures.

[36] WHO (2001) *Bathing Water Quality and Human Health: Faecal Pollution* www.crid.or.cr/digitalizacion/pdf/eng/doc14603/doc14603.pdf

[37] Scottish Executive Health Department (2007) *Blue Green Algae (cyanobacteria) in inland and inshore waters: Assessment and minimisation of risks to public health: Revised Guidance* www.scotland.gov.uk/Resource/Doc/175959/0049536.pdf


XANDRINA

Socioeconomic 5

Information and trends relating to Communities, Transport, Waste and Energy

Related sections:

Section 2.1 Climate Change
Section 2.2 Air Quality
Section 3.1 Landscape

Issues Summary:

	Condition	Trend	Indicator
Communities			
			Access to open space
			Access to woodland
			Residents satisfaction with Neighbourhood
	–	–	Health including mental health
			Noise complaints
Transport			
			Carbon dioxide emissions
	–	–	Core path network
			Traffic Volumes
	–	–	Average distance travelled by mode
			Travel to work and school
			Use of public transport
		–	Access to bus stops
			Road traffic accidents

	Condition	Trend	Indicator
Waste			
			Municipal waste arising
	–	–	Commercial and special waste arising
			Waste treatment
			Street cleanliness
			Location and number of treatment facilities
Energy			
		–	Energy consumption
			Renewable sources
	–	–	Energy conservation rating of new public buildings
			Energy efficiency of housing stock
	–	–	Sustainability of new buildings

Key	
 Poor/area of uncertainty or potential problems	 No discernable trend or trend unclear but potential problems
 Bad	 Worsening
 Good/positive and expected to improve	 Improving
 Fair/area of uncertainty or potential no problem	 No discernable trend or trend inclear but potentially no problems
– Unknown/not applicable	– Unknown/not applicable

Communities 5.1

Communities within Perth and Kinross are not only one of the key pressures and driving forces changing the state of the environment, they are also one of the key receptors. There is growing evidence to support the connection between enhanced human health and a sense of well being with improved access and interaction with a good quality environment, including green and open spaces.

Driving forces and pressures 5.1.1

There is a growing understanding, both at the government and individual level, of the contribution of the environment to long term human health and well being. Understanding of this relationship is driving the implementation of measures to increase the interaction between communities and the environment. These measures include local planning, development of an open space strategy, core path planning and the Woodland In and Around Town (WIAT) initiative.

State 5.1.2

The Scottish National Household Survey indicates residents within Perth and Kinross are relatively more satisfied with where they live than residents are on average in Scotland (Table 5.1).

Table 5.1 Residents satisfaction with Perth and Kinross as a place to live

	Percentage of those asked					
	1999/2000		2001/2002		2002/2003	
Rating	P & K	Scotland	P & K	Scotland	P & K	Scotland
Very Good	*No results available*		66.5	50.8	68.7	52.3
Fairly Good			29.4	41.3	26.9	39.4
Fairly Poor			2.3	4.9	3.3	5
Very Poor			1.6	2.8	0.8	2.4
No opinion			1	0.4	0.4	0.4

Available open space data is currently being updated by the Council. However, using the data available from the Forestry Commission on open space and woodland in Perth and Kinross, a high proportion of the households in Perth and Kinross are within a 200 metres straight-line distance of an area of open space and within 4 kilometres of a 20 hectare woodland (Table 5.2 and 5.3). A much smaller percentage is within 500 metres of 2 hectares of woodland (Table 5.3).

Table 5.2 Proportion of households within 500 metres (direct line) from an area of open space

Year	Number	Proportion
2006	56,907	82 %

Table 5.3 Proportion of households in the vicinity of woodland

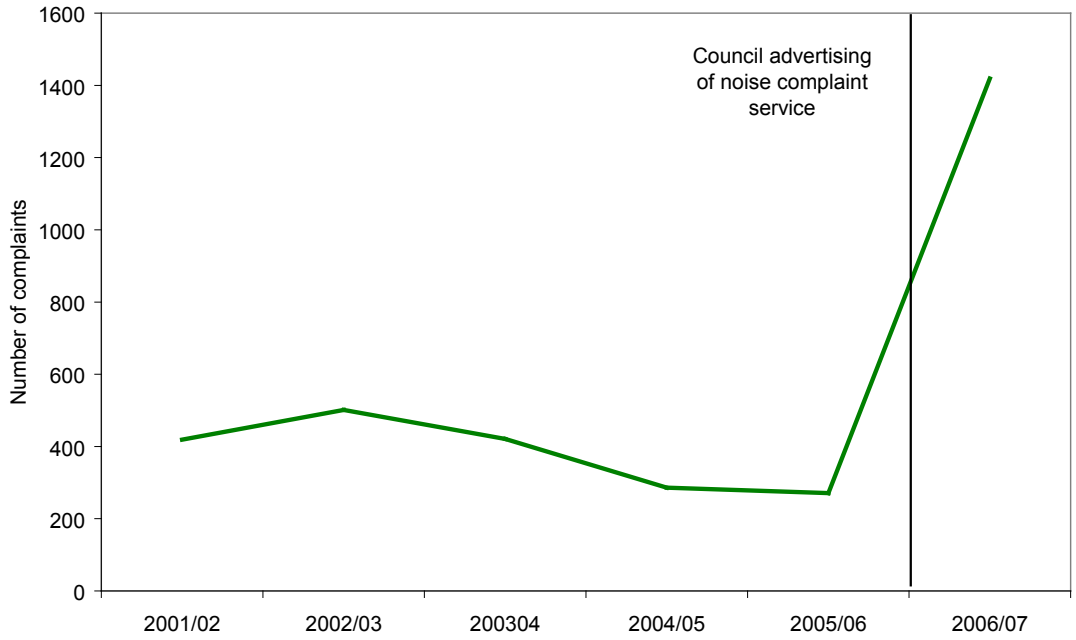
	Distance from Woodland			
	500m of 2 ha		4km of 20ha	
Year	No	Proportion	No	Proportion
2006	39,940	58 %	67,522	97 %

The majority of noise complaints within Perth and Kinross made in 2006 were for anti-social noise (Table 5.4). The increase in the number of noise complaints observed in 2006 relates to an advertising campaign undertaken by the Council for their noise complaint service (Figure 5.1). A breakdown between noise and antisocial noise complaints was not available prior to 2006.

Table 5.4 2006 noise complaints

		2006	
Code	Description	No	Percentage
Noise			
N01	Enquiries	95	6.7
N02	Industrial	11	0.8
N03	Commercial	33	2.3
N04	Domestic	1	0.1
N06	Railways	2	0.1
N08	Traffic	6	0.4
N09	Entertainment	23	1.6
N10	Leisure Activity	12	0.8
N11	Construction Sites	34	2.4
N12	Road works	3	0.2
N13	Bird scarers	10	0.7
N14	Noise in the street	13	0.9
N15	Audible Intruder	4	0.3
N16	Ice Cream Chimes	1	0.1
N19	Miscellaneous	10	0.7
N20	Passed other departments	5	0.4
Anti-Social Noise			
N30	Enquiry	53	3.7
N31	Loud Music	739	52.1
N32	Loud TV	47	3.3
N33	Musical Instruments	19	1.3
N34	Dogs (within premises)	40	2.8
N35	Neighbour Nuisance	169	11.9
N36	DIY	29	2.0
N37	Domestic Appliances	22	1.6
N38	Children Playing	15	1.1
N39	Poor Insulation	7	0.5
N40	Not Specified	16	1.1

Figure 5.1 Noise complaints



Impact on population, economies and ecosystems 5.1.3

A number of health conditions are directly related to the quality of the environment in which we live, for example asthma has been related to particulate matter in the air. However, there is growing evidence that the degree of interaction humans have with the natural environment, as well as the quality of the environment, influences other aspects of human health, in particular mental health. Although further research is required to prove these relationships, a recent report for the RSPB[38] indicates that interaction with nature may contribute to the following:

- *Treating children suffering from poor self-discipline, hyperactivity and Attention Deficit Hyperactivity Disorder*
- *Reducing crime and aggression*
- *Improving care of the elderly and treating dementia*
- *Increasing the concentration levels of school children and office workers*
- *Reducing anxiety and stress*
- *Improving hospital environments*
- *Strengthening communities*
- *Increasing a persons sense of wellbeing and mental health*[38]

These benefits, especially in relation to stress and sense of wellbeing, could have a significant impact on the local economy through reductions in absenteeism from work.

Urban open space and woodland can act as important habitats supporting ecosystems in their own right and also provide corridors or links between habitats which would otherwise become disconnected.

[38] Bird, W (2007) *Natural Thinking: Investigating the links between Natural Environment, Biodiversity and Mental Health* RSPB

Society's response 5.1.4

The importance of open space and woodland within the built environment have been identified within the development of local planning policy, the forthcoming open space strategy, current core path planning, and the WIAT initiative.

Opportunities and threats 5.1.5

The following key assets, opportunities and threats for communities and the built environment in Perth and Kinross have been identified (Table 5.5).

Table 5.5 Communities assets, threats and opportunities

Asset	Opportunities and Treats
People, their health and sense of wellbeing Housing, employment and community facilities Landscape Cultural heritage Sense of community and neighbourhood satisfaction Community participation Urban green space and quality of its management	Opportunities - *Forthcoming strategies* - *Potential human resource* - *Awareness raising* - *Eco-schools and woodland bus* Threats - *Failure to continue to engage communities*

Data gaps and limitations 5.1.6

A significant data gap in relation to communities is the availability of health data. This includes mental health data.

Transport 5.2

Transport has become an increasingly important element of day to day life within Perth and Kinross. The type of transport used by Perth and Kinross residents and visitors influences the built and natural environment, human health and climate change. Traffic exhaust emissions are the primary source of air pollutants in Perth and Kinross and transport is the principle source of carbon dioxide (see Section 2.1 and 2.2). Transport also directly endangers human health and fauna due to road accidents.

Driving forces, pressures 5.2.1

Increases in population and in the desire or need to travel are exerting greater pressure on existing transport networks. Insufficient public transport, increases in car ownership, and the desire for independence and convenience by residents and visitors in Perth and Kinross mean that the majority of this pressure is directed at road networks and manifested as an increase in traffic volume. Figure 5.2 shows the variation in the latest average annual daily traffic volumes on key roads across Perth and Kinross (latest survey dates vary from 2002 to 2006, the majority have been undertaken in the last two years). As would be expected, the greatest volumes of traffic are observed within Perth and on the roads south of Perth leading to Edinburgh and Stirling. According to the regional transport strategy traffic on the road network in Tayside and central Scotland has been increasing by an average of approximately 1.6 % per annum over the last 10 years. Local trend data was not available at the time of the writing of this report.

A key factor increasing the number of road traffic accidents is the speed vehicles are travelling on Perth and Kinross roads.

Figure 5.2

Average Annual Daily Traffic Volumes

Information provided by Perth & Kinross Council (june 2007)

Key drivers attempting to control increases in transport volume and road traffic accidents are the Road Safety Act and the Transport (Scotland) Act 2005. These acts are being implemented in Perth and Kinross via the Tayside and Central Scotland Transport Partnership (tactran) Regional Transport Strategy.

The UK national targets seek to reduce the 1994-98 average for the number of people killed or seriously injured on roads in Perth and Kinross by 40 % before 2010, and a 50 % reduction in the number of children killed or seriously injured.

State 5.2.2

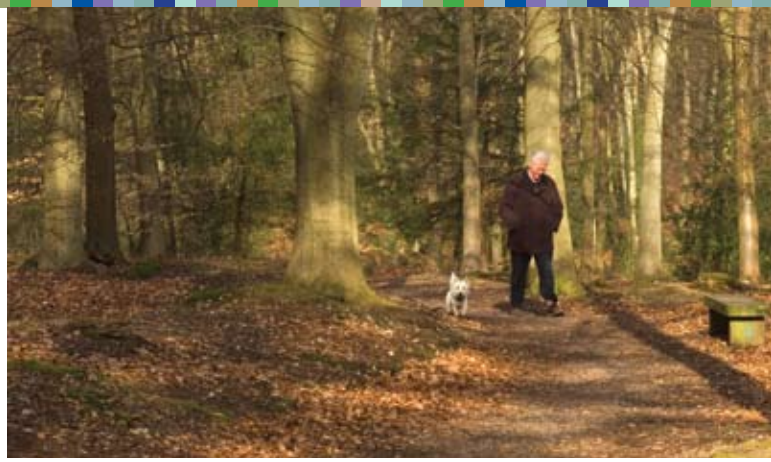
Detailed information on the transport network in Perth and Kinross is available in the tactran Regional Transport Strategy.

Currently, there is no data available to provide an indication of the average distance travelled by mode. Table 5.6 below provides an indication of the percentage of residents travelling to work or school by different modes in Perth and Kinross, as compared to Scotland as a whole. However, this information was obtained from the Scottish Household Survey and therefore, only provides an indication of the percentage of people within Perth and Kinross travelling by each mode. Data are not available for 2001/2. The data indicates that although more residents in Perth and Kinross walk to work/school than in Scotland as a whole, a much smaller percentage use the bus. This means a greater proportion of people travel to work/school by car in Perth and Kinross than in Scotland as a whole.

Table 5.6 Percentage of people travelling by different modes to work and school

	% asked travelling to work or school by each mode					
	1999/2000		2001/2002		2002/2003	
	P & K	Scotland	P & K	Scotland	P & K	Scotland
Walking	19.4	15.3	No results available		18.2	14.4
Driver car/van	58.1	51.7			61.6	55.7
Passenger car/van	11	10.7			6.2	8.2
Motorcycle/moped	0.3	0.3			Not Included	
Bike	1.1	1.8			1.2	1.7
School bus	1.3	0.7			10.5	14.1
Works bus	1.3	1.1				
Ordinary Service bus	7.0	12.7				
Rail	0.3	2.9			0	3.2
Other	0.3	1.7			2.2	2.6

Results taken from the Scottish Household Survey



The core path network within Perth and Kinross is presently in the planning stage, and as such, insufficient information is available to report on the length and use of the core path network. Information should be available in the future for inclusion in the SoE report.

Impact on population, economies and ecosystems 5.2.3

In Perth and Kinross, transport has been identified as the primary source of the greenhouse gas carbon dioxide and the key air quality pollutants, particulates and nitrous oxide. Further details on the potential implications of climate change and air quality for people, the economy and the environment are available in Section 2.1.3 and 2.2.3.

In addition to these indirect impacts, transport also directly impacts human health and ecosystems via traffic accidents. Table 5.7 summarises the number of people killed or seriously injured in road traffic accidents in Perth and Kinross (does not include information on the trunk road network). The number of accidents has not reduced but the casualty number and severity has improved. The tactran Transport strategy reports that over recent years, the region's local authorities have succeeded in significantly reducing the number of casualties from road accidents, in line with Scottish Executive targets. However, a number of casualty 'hot spots' remain, with particular concerns in Perth and Kinross along the A977 from Kinross to the Kincardine Bridge.

Table 5.7 Number of people killed or seriously injured in road traffic accidents

Year	Fatal Accidents	Serious Accidents	Total KSI Accidents	Fatalities Casualties	Seriously Casualties	Total KSI Casualties
2001	4	54	58	5	68	73
2002	2	56	58	2	67	69
2003	4	49	53	5	52	57
2004	5	46	51	6	56	62
2005	4	45	49	4	49	53
2006	5	54	59	5	59	64

KSI – Killed or Seriously Injured

Society's response 5.2.4

Key government objectives, implemented via the tactran Regional Transport Strategy and Local Plans, are to reduce dependence on cars and travel. The government aims to accomplish these by encouraging people to walk, cycle or use public transport more and to reduce the need for travel through better land use planning. Data collected by Perth & Kinross Council shows there has been a 1.8 % increase in public transport patronage when comparing 2005/06 to 2006/07 (Table 5.8). Although this appears a positive trend it needs to be compared to changes in the usage of other forms of transport ie the use of public transport may have actually decreased relative to an increase in private car usage.

Table 5.8 Percentage change in public transport patronage compare to previous year

Year	Change in patronage compared to previous year (%)
2006/07	1.8 %

Data reported by the Scottish Executive, estimates that there has been a 12 % reduction in the number of passengers on public transport over the last ten years in Tayside, compared to a 9 % reduction in Scotland as a whole. However, the Scotland-wide trend in the last 5 years has been an increase in pubic transport use (Figure 5.3). Compared to Scotland as a whole, the number of bus passengers in Perth and Kinross has remained relatively constant over the past ten years.

Figure 5.3 Number of passenger journeys on public transport

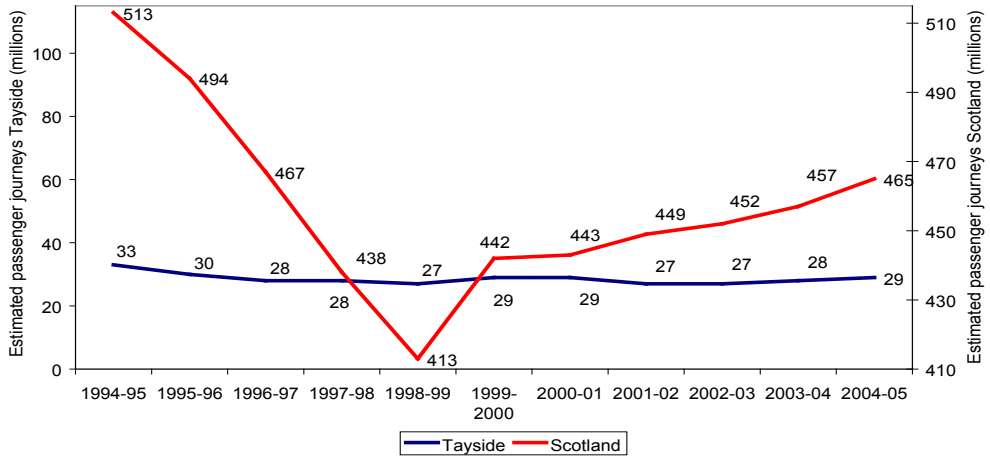
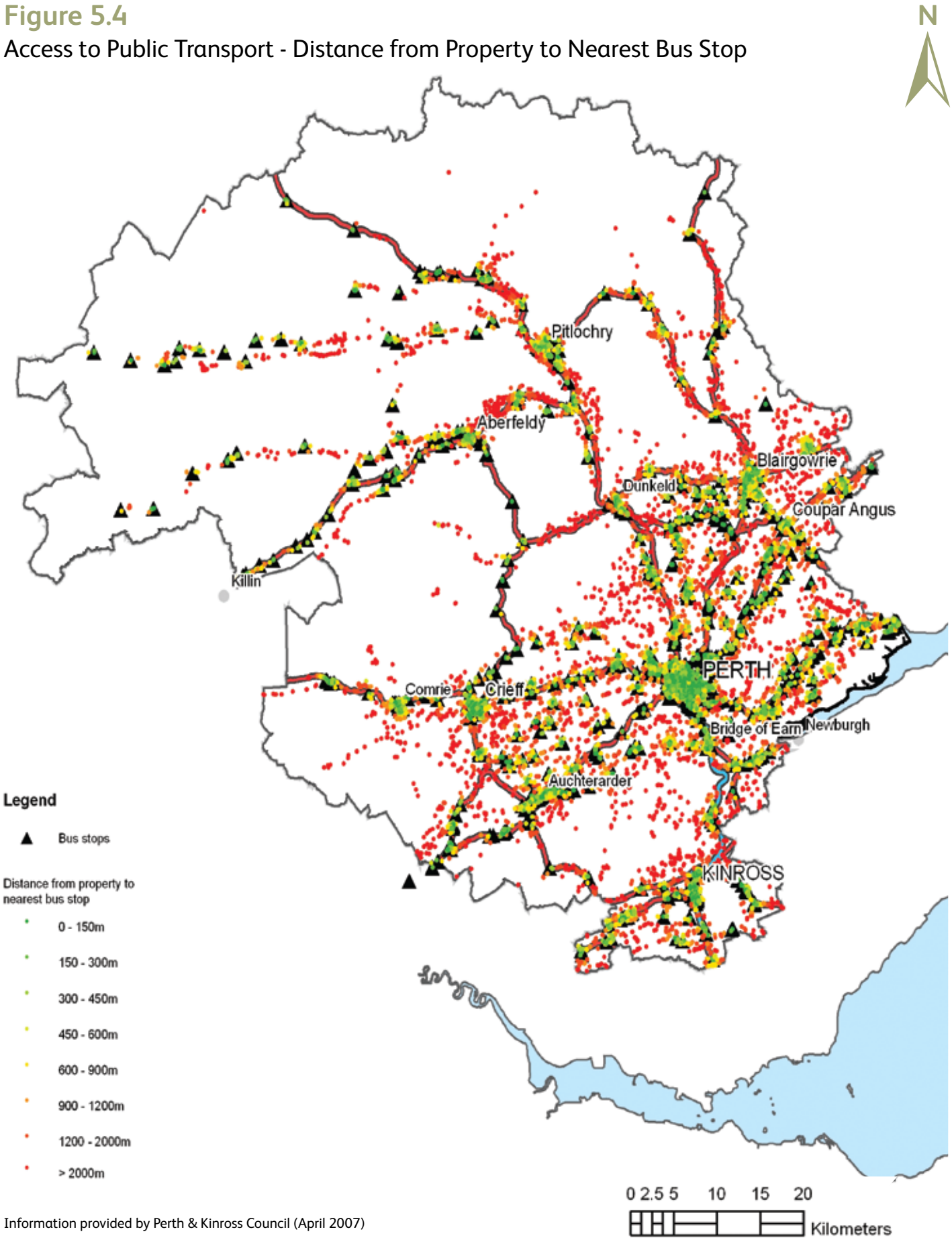


Figure 5.4

Access to Public Transport - Distance from Property to Nearest Bus Stop



Information provided by Perth & Kinross Council (April 2007)

Approximately 83 % of people (57,652 households) living in Perth and Kinross live within 500 metres of a bus stop (Table 5.9). However, Figure 5.4 highlights how sparse bus stops are in rural areas.

Table 5.9 Proportion of households within 500m of a bus stop

Year	Number	Proportion
2006	57,652	83 %

Opportunities and threats 5.2.5

The following key assets, opportunities and threats for transport in Perth and Kinross have been identified (Table 5.10).

Table 5.10 Transport assets, threats and opportunities

Asset	Opportunities and Treats
Community linkage Roads Public transport Core path network Harbour	Opportunities - *Transport strategy* - *Improve development planning to reduce the need for travel* - *Improve public transport in rural areas* - *Air quality action plan* - *Promotion of healthy lifestyles* - *Tourism* - *Promote wildlife corridors* Threats - *Rail issue - connections to Perth*

Data gaps and limitations 5.2.6

Better data is needed on the mode of transport used by residents in Perth and Kinross in order fully clarify the relationship between transport and the state of the environment. There is very little information available on the total distance travelled and purpose of journey by each transportation type. The information that is available relies on the Scottish Household Survey which is not designed to obtain representative information at the local authority level.

Waste 5.3

The volume of waste produced and its subsequent treatment is a growing social, economic and environmental issue. The type of waste we produce, all forms of waste management, and the transport of waste have impacts on the environment. Good waste management is essential to protect human health, long-term well being of the community and the environment that sustains it.

Driving forces and pressures 5.3.1

The amount of waste arising in Perth and Kinross is gradually increasing due to increases in population, households, levels of packaging and changes in consumerism and standard of living. The population and number of households in Perth and Kinross are expected to continue to increase by 5.6 % and 14 % predicted, respectively, by 2016 compared with 2001. Figures 5.5 and 5.6 show the recent trend for increases in the total amount of municipal waste arising and the total amount of municipal waste arising per household. Municipal waste consists of waste arising from households and other waste that, because of its nature or composition, is similar to waste from households. Non-municipal waste covers abroad range of waste types generated by individual producers including sole traders, small businesses to large scale industry. Insufficient information is available to comment on the amount of non-municipal waste arising in Perth and Kinross at present.

A key force driving recent endeavours to reduce the rate of increase and promote more sustainable methods of waste treatment is the European Landfill

Directive. The Directive has placed new constraints on the waste that can be sent to landfill and has set challenging targets for biodegradable municipal waste (e.g. kitchen and garden waste, paper etc collected by the Council). By 2010 society will be able to put only 75 % of 1995 quantities in its landfills. By 2013 this drops to 50 % and by 2020 only 35 %. Failure to meet these targets will result in heavy fines for the Council. To meet these National Waste Strategy Scotland objectives Tayside has developed an Area Waste Management Plan.

When identifying the appropriate waste management techniques it is necessary to consider the Best Practical Environmental Option (BPEO), the option that provides the most benefit or least damage to the environment as a whole, at acceptable cost both in the short and long term. Hence the location and number of waste treatment/disposal facilities have important implications for the sustainability of different waste treatment options. Currently within Perth and Kinross there are 53 recycling points and eight recycling centres. Recycling facilities and destinations for other waste materials are summarised in Table 5.11 to 5.13. Table 5.13 shows that in 2006/07 the majority of waste material generated in Perth and Kinross (89 %) was sent to destinations within Perth and Kinross.

Figure 5.5 Municipal solid waste arising

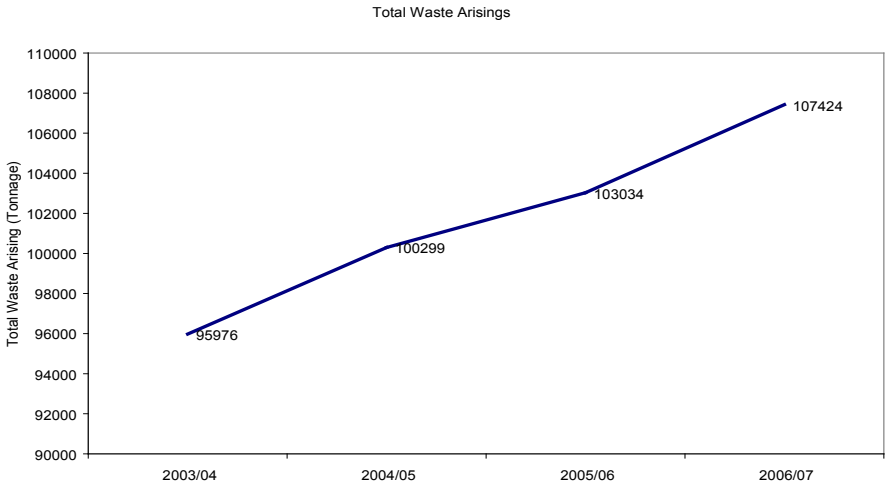


Figure 5.6 Total municipal waste arising per household

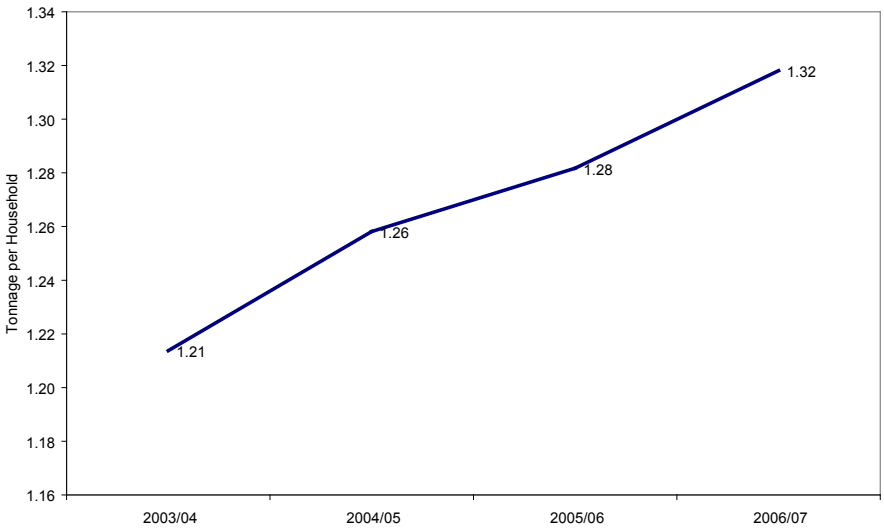


Table 5.11 Recycling centres in Perth and Kinross

Location	Material Accepted
Aberfeldy - Industrial Estate, Breadalbane	Bulky Goods, Cans (Aluminium & Steel), Car Batteries, Electrical & Electronic Equipment, Engine Oil, Fridges & Freezers, Garden Waste, Glass, Metal, Plastic bottles (Natural HDPE & PET), Paper, Telephone Directories, Textiles, Tyres
Auchterarder - The Public Park, Weston Road	Bulky Goods, Cans (Aluminium & Steel), Car Batteries, Cardboard, Electrical & Electronic Equipment, Engine Oil, Fridges & Freezers, Garden Waste, Glass, LPG Gas Bottles, Plastic bottles (Natural HDPE & PET), Metal, Paper, Telephone Directories, Textiles, Tyres
Bankfoot - Stanley Road	Bulky Goods, Cans (Aluminium & Steel), Car Batteries, Electrical & Electronic Equipment, Engine Oil, Fridges & Freezers, Garden Waste, Glass, Metal, Plastic bottles (Natural HDPE & PET), Paper, Telephone Directories, Textiles, Tyres
Blairgowrie - Welton Road, Industrial Estate	Bulky Goods, Cans (Aluminium & Steel), Car Batteries, Cardboard, Electrical & Electronic Equipment, Engine Oil, Fridges & Freezers, Garden Waste, Glass, Metal, Paper, Plastic bottles (Natural HDPE & PET), Telephone Directories, Textiles, Tyres
Crieff - North Forr, Brioch Forr	Bulky Goods, Cans (Aluminium & Steel), Car Batteries, Cardboard, Electrical & Electronic Equipment, Engine Oil, Fridges & Freezers, Garden Waste, Glass, LPG Gas Bottles, Metal, Paper, Plastic bottles (Natural HDPE & PET), Telephone Directories, Textiles, Tyres
Kinross - Bridgend Industrial Estate	Bulky Goods, Cans (Aluminium & Steel), Car Batteries, Electrical & Electronic Equipment, Engine Oil, Fridges & Freezers, Garden Waste, Glass, Metal, Paper, Plastic bottles (Natural HDPE & PET), Telephone Directories, Textiles, Tyres
Perth - Friarton Road	Aluminium Foil, Bulky Goods, Cans (Aluminium & Steel), Car Batteries, Cardboard, Electrical & Electronic Equipment, Engine Oil, Fridges & Freezers, Garden Waste, Glass, LPG Gas Bottles, Metal, Paint, Paper, Plastic bottles (Natural HDPE & PET), Telephone Directories, Textiles, Tyres
Pitlochry - Aldour Industrial Estate	Bulky Goods, Cans (Aluminium & Steel), Car Batteries, Cardboard, Electrical & Electronic Equipment, Engine Oil, Fridges & Freezers, Garden Waste, Glass, LPG Gas Bottles, Metal, Paper, Plastic bottles (Natural HDPE & PET), Telephone Directories, Textiles, Tyres

Table 5.12 Recycling points in Perth and Kinross

Location	Material Accepted				
	Glass	Cans	Paper	Textiles	Books
Aberfeldy - Leisure Centre	✔	✔	✔		
Aberfeldy - Moness Terrace Car Park	✔	✔	✔		
Abernethy - Jamesfield Organic Farm	✔	✔	✔	✔	
Abernyte - Antique Centre	✔	✔	✔		
Alyth - Mill Street	✔	✔	✔	✔	
Auchterarder - The Crown Inn, Wynd	✔	✔	✔	✔	
Balbeggie - Village Hall	✔	✔	✔		
Birnam - Willowbank	✔	✔	✔	✔	
Blackford - Main Street	✔	✔	✔	✔	
Blair Atholl - Bowling Green Car Park	✔	✔	✔	✔	
Blair Castle - Blair Castle Caravan Park	✔	✔	✔		
Blairgowrie - Croft Lane Car Park	✔	✔	✔	✔	
Blairgowrie - Tesco, Welton Road	✔	✔	✔		
Braco - Feddal Road	✔	✔	✔		
Bridge of Earn - Town Hall, Station Road	✔	✔	✔	✔	
Burrelton - Village Hall	✔	✔			
Comrie - Laggan Park	✔	✔	✔	✔	
Coupar Angus - Candlehouse Lane	✔	✔	✔	✔	
Crieff - Leadenflower Car Park	✔	✔	✔		
Crieff - Meadows Car Park, Burrell Street	✔	✔	✔	✔	✔
Crieff - Strathearn Leisure Centre	✔	✔	✔	✔	
Enochdhu - Dirnanean Car Park	✔	✔	✔		
Errol - Next to School	✔	✔	✔		
Glencarse - West Carse Community Hall	✔	✔	✔		
Glendoick - Glendoick Garden Centre	✔	✔	✔		
Guildtown - Community Hall	✔	✔	✔		
Invergowrie - Invergowrie Inn, Main Street	✔				
Kinloch Rannoch - Dunalastair Hotel	✔	✔	✔		
Kinloch Rannoch - Loch Rannoch Hotel	✔				
Kinnesswood - Lomond Inn	✔	✔	✔		
Kinross - Causeway Car Park	✔	✔	✔	✔	
Kinross - Somerfield, Station Road	✔	✔	✔	✔	
Milnathort - Thistle Inn, Back Loan	✔	✔	✔		

Location	Material Accepted				
	Glass	Cans	Paper	Textiles	Books
Murthly - Village Hall	✔	✔	✔		
Muthill - Coronation Park	✔	✔	✔		
Perth - AK Bell Library, Lower Car Park	✔	✔	✔		
Perth - AK Bell Library, Upper Car Park	✔	✔	✔		
Perth - Asda, Dunkeld Road	✔	✔	✔	✔	
Perth - Bells Sports Centre	✔	✔	✔		
Perth - Community Centre, Viewlands Road West	✔	✔	✔		
Perth - Community Church, Glenearn Road	✔	✔	✔		
Perth - Letham Centre, Tweedsmuir Road	✔	✔	✔		
Perth - Morrisons, Caledonian Road	✔	✔	✔	✔	
Perth - Perth High School Coach Park, Oakbank Road	✔	✔	✔		
Perth - Rannoch Road	✔	✔	✔		
Perth - Tesco, Crieff Road	✔	✔	✔	✔	✔
Perth - Tesco, Edinburgh Road	✔	✔	✔	✔	✔
Pitlochry - Car Park, Atholl Road	✔	✔	✔	✔	
Powmill - Gartwhinzean Hotel	✔	✔	✔		
Rait - Antiques Centre	✔	✔	✔		
Scone - The Wheel Inn, Angus Road	✔	✔	✔	✔	
St Fillans - Caravan Park	✔	✔			
Wolfhill - Community Hall	✔	✔	✔		

Table 5.13 Destination of waste material produced in Perth and Kinross

		Material Sent (tonnes) 2006/207
Material Destinations in Perth and Kinross		
Binn Skips Ltd	Binn Farm, Glenfarg, Perthshire	15,153.6
Teg Environmental Ltd	Binn Farm, Glenfarg, Perthshire	13,685.6
David Band (Metals)	Friarton Buildings, Friarton Road, Perth	59.9
Home Economics	Arran Road, North Muirton, Perth	48.0
Shore Recycling Ltd	Friarton Bridge Park, Friarton Road, Perth	289.0
Wyllie Recycling Ltd	Inveralmond Industrial Estate, Perth	1,095.8
SITA Binn Landfill	Binn Farm, Glenfarg, Perthshire	65,466.1
Perth Housing Association	14 Dunkeld Road, Perth	300.0
	Total	**96,098.0**
Material Destinations outside Perth & Kinross		
O.I.	Glasshouse Loan, Alloa, Clackmannanshire	2,051.0
UPM Kymmene (UK) Ltd	Weighbridge Road, Shotton, Deeside,	5,101.6
Nathans Waste Savers Ltd	13 Winchester Avenue, Denny, Stirlingshire	204.4
OSS Group Ltd	Aitkenhead Road, Uddingston, Glasgow	13.5
DAC	Unit 1 Old DRS Depot, Kilmarnock	54.4
Synergy	Kilmarnock	5.4
Flogas	104 Bandeasth Industrial Estate, Throsk, Stirling	5.4
Viridor Glass Recycling	Easthouses Road, Midlothian	1,473.6
GB Tyres	Thorton, Fife	41.0
Hannay Ltd	West Mains Industrial Estate, Broxburn	86.1
Oxfam	7-19 Lombard Street, Inverness	9.0
Delson Contracts Ltd	Orchardbank Industrial Estate, Forfar, Angus	144.5
John R Adam & Sons Ltd	Renfrew Road, Glasgow	59.6
DERL	Baldovie Incinerator, Baldovie Industrial Estate, Forties Road, Dundee	986.8
W Stewart & Sons	Back Dykes, East Wemyss, Fife	1,088.9
	Total	**11,325.3**

State 5.3.2

Road cleanliness within Perth and Kinross appears to be of consistently high quality, with the majority of sites begin awarded grade B (predominantly free of litter and refuse, apart from a few small items) in all three years data has been collected (Table 5.14).

Table 5.14 Road cleanliness data

	%A	%B	%C	%D	Index
2004/05	16 %	83 %	1 %	0 %	71
2005/06	18 %	81 %	1 %	0 %	72
2006/07	19 %	78 %	3 %	0 %	72

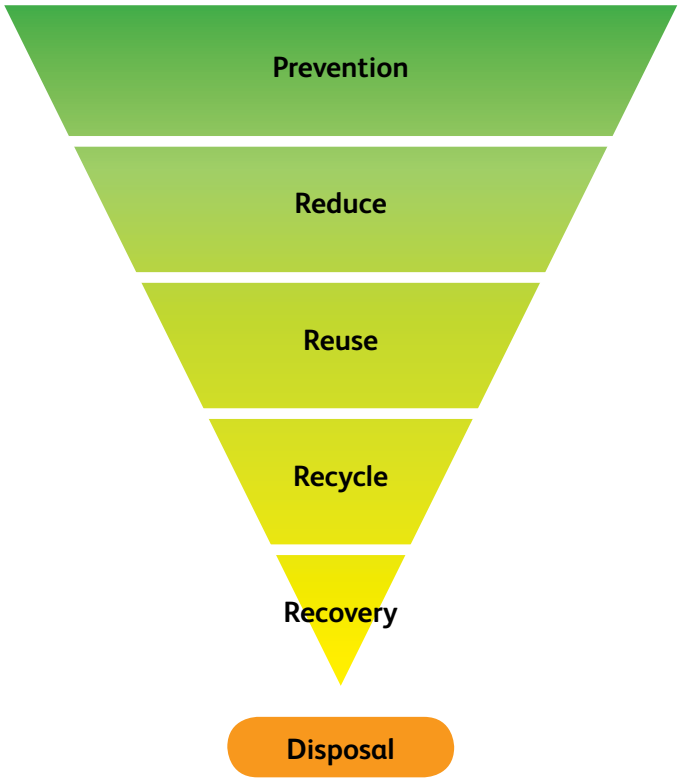
Society's response 5.3.3

Society can respond to the problems associated with waste in one of two ways:

- *Reduce the amount of waste arising*
- *Increase the amount of waste treated using more sustainable management options*

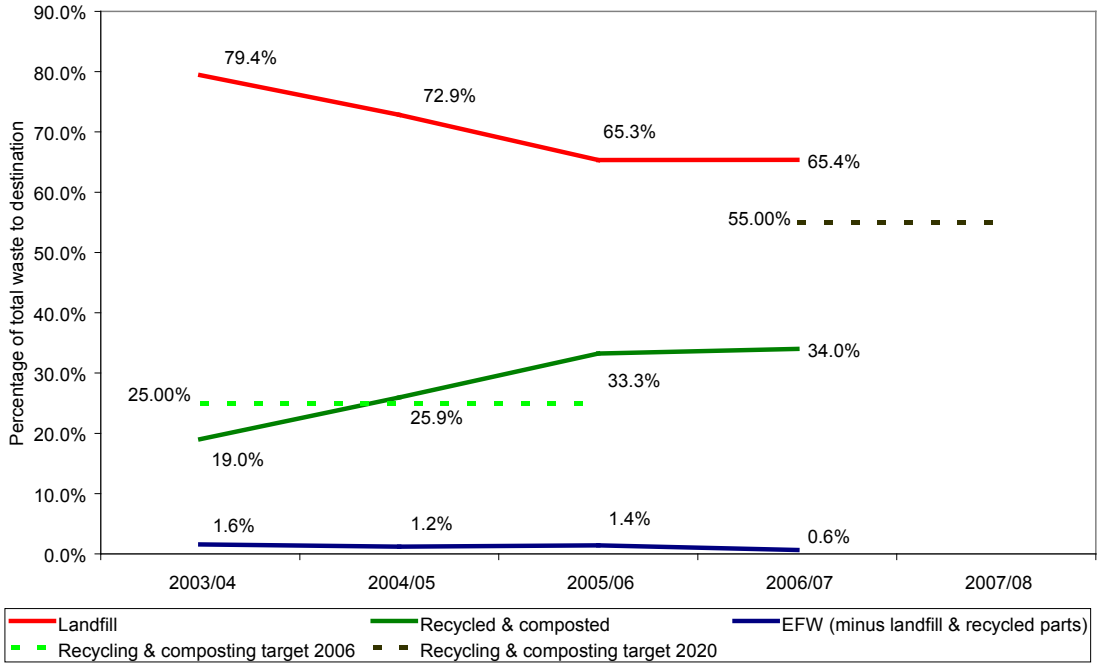
Within Scotland and Perth and Kinross a waste management hierarchy has been introduced with reduction of waste at source at the top followed by reuse or recovery through recycling, composting or energy recovery and disposal to landfill as a last resort (Figure 5.7).

Figure 5.7 Waste Hierarchy



Tayside Area Waste Management Plan has set a target for Perth and Kinross of 25 % of waste being recycled and composted by 2006, and 55 % by 2020 (35 % recycling and 20 % composting). Figure 5.8 show the Council has exceeded its target for 2006.

Figure 5.8 Treatment of municipal solid waste



Opportunities and threats 5.3.4

The following key assets, opportunities and threats for waste in Perth and Kinross have been identified (Table 5.15).

Table 5.15 Waste assets, threats and opportunities

Asset	Opportunities and Treats
Landfill void/ capacity Potential for reuse/ recycling/ energy recovery Excellent track record in the management of household and business waste Good awareness levels Infrastructure	Opportunities ▪ *Improved pre-treatment of waste* ▪ *Waste reduction* ▪ *Better rural recycling - cost/ benefit issues* ▪ *Energy production* Threats ▪ *Public reaction to alternate week collection and energy from waste* Both ▪ *Provision and planning of recycling facilities*

Data gaps and limitations 5.3.5

A significant gap exists in the data for non-municipal waste, including industrial[39] and special waste[40]. No information is available at present on the amount arising from these sources, or its subsequent management.

[39] 'Industrial waste' is defined by section 75(6) of the Environmental Protection Act, 1990 as waste arising from any of the following premises:

- *any factory;*
- *any premises used for the purposes of, or in connection with, the provision to the public of transport services by land, water or air;*
- *any premises used for the purposes of, or in connection with, the supply to the public of gas, water or electricity or the provision of sewerage services; or*
- *any premises used for the purposes of, or in connection with, the provision to the public of postal or telecommunications services*

In accordance with section 5(2) od the Controlled Waste Regulations 1992 it also includes waste arising from demolition or construction works and some septic tank sludge.

[40] 'Special waste' is defined as any waste which is hazardous waste as defined by Article 1(4) of the Hazardous Waste Directive

Energy 5.4

Energy use, conservation and supply are essential for the long term future of Perth and Kinross. Equally important is the provision of local solutions to reduce carbon dioxide production, contributing to global action against climate change.

Driving forces and pressures 5.4.1

Economic and population growth and changes in the standard of living are increasing the demand for energy and leading to greater consumption. However legislation, such as the Energy Act 2004 and the Scottish Executive target to provide 18 % of electricity generation from renewable sources by 2010 (described further in Section 5.4.2) are attempting to reduce carbon emissions, reduce rising energy demands, and to meet energy demands in a more sustainable manner. In addition to legislation, other forces contributing to these aims are increasing fuel costs, uncertainty in the continued supply of fossil fuels and technology changes that increase energy efficiency.

There is widespread consensus on the need to move towards sustainability in energy supply. In Perth and Kinross, the renewable energy technologies that offer the greatest potential, at least in the short term, are large-scale hydro schemes, wind energy, small-scale hydro and the use of forest residues for biomass boilers. The amount of energy that can be generated by these renewable sources is limited by the availability of the resource (ie wind speed, water movement and other environmental and social constraints, such as visual impacts, landscape degradation and threats to birds and habitats).

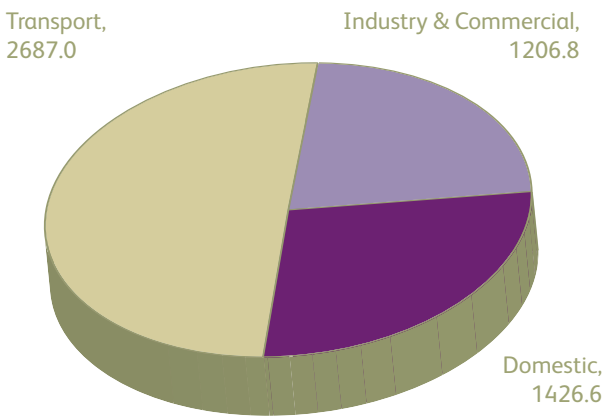
Significant areas of Perth and Kinross have mean annual wind speeds in excess of seven metres per second (m/s), which is considered suitable for commercial wind generation. Less windy areas may become commercially attractive in the future but are currently attractive only to smaller schemes for community or individual use. Analysis of the wind resource in Perth and Kinross estimated that 2,798 km^2 (approximately 50 %) of Perth and Kinross has a wind speed of greater than 7m/s. After consideration of a number of technical, environmental and social constraints, the available remaining areas suitable for wind energy is approximately 757 km^2 or 14 % of the land of Perth and Kinross[41].

State 5.4.2

Perth and Kinross' energy consumption data relative to consumption data for Scotland (based on 2004 statistics) are displayed in Figures 5.9 and 5.10 and Table 5.16. In line with results in Section 2.1, energy consumption by transport is the primary use of energy in Perth and Kinross, whereas industry and commercial use are the primary users in Scotland. The data reported in Table 5.16 indicates that consumption per capita in Perth and Kinross is on average 11.5 % higher than in Scotland as a whole.

Figure 5.9 Energy consumption by sector, 2004 (Gigawatt Hours (GWh))[42]

(a) *Perth and Kinross*



[41] Perth and Kinross (2005) *Supplementary Planning Guidelines for Wind Energy Proposals in Perth and Kinross*

[42] dti (2006) www.dti.gov.uk/energy/statistics/regional/total-final/page36187.html

(b) *Scotland*

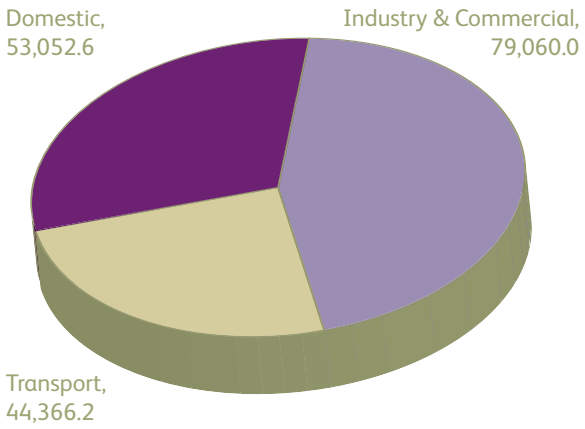
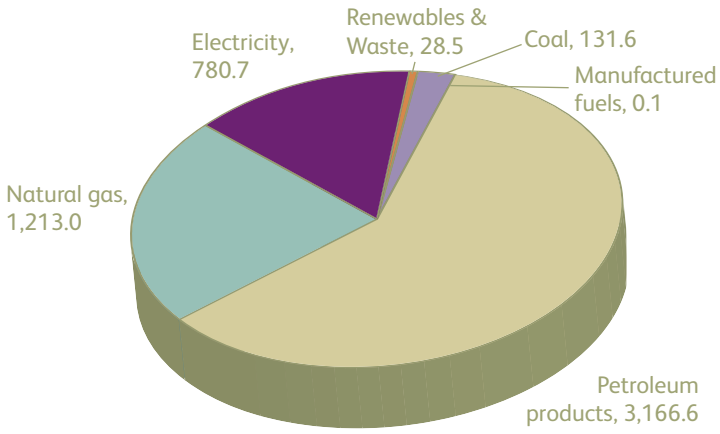


Figure 5.10 Types of energy used, 2004 (Gigawatt Hours (GWh))[42]

(a) *Perth and Kinross*



(b) *Scotland*

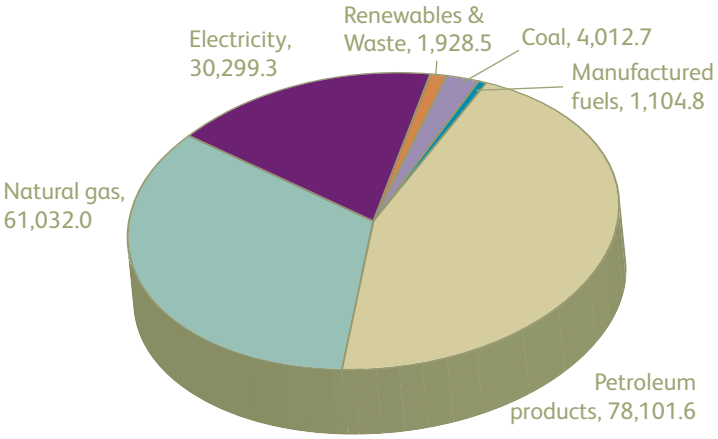


Table 5.16 High level energy indicators 2004[43]

	Perth and Kinross	Scotland
Total energy use per capita (kWh)	38,700	34,700
Total domestic energy use per household (kWh)	23,390	23,600
Total domestic energy use per capita (kWh)	10,380	10,400
Total industrial and commercial energy use per employee (kWh)	20,600	33,800
Total industrial and commercial energy use per pound of gross value added (kWh)/£GVA	1.1 (including Stirling)	1
Total vehicle use per capita (tonnes of fuel)	1.5	0.7

GVA - *Gross Value Added - measures the contribution to the economy of each individual producer, industry or sector*

[43] dti (2007) www.dti.gov.uk/energy/statistics/regional/high-level/page36161.html

Impacts on population, economy and ecosystems 5.4.3

Where energy supply is from fossil fuels, increasing energy use causes an increase in the amount of carbon dioxide released, contributing to climate change. The release of other substances related to energy use such as particulates and nitrogen dioxide, have implications for air quality. Further details on the potential implications of climate change and air quality are available in Sections 2.1.3 and 2.2.3.

Society's response 5.4.4

Society has responded to increasing energy demands in two ways:

1. *Reduce demand for energy*
2. *Production of energy from renewable resources*

In order to reduce energy demand, PKC has worked with SCARF (Save Cash and Reduce Fuel), on an energy awareness campaign to improve the energy efficiency of households and businesses within Perth and Kinross.

Domestic energy efficiency can be measured by the National Home Energy Rating (NHER) system where 0 = very poor, 10 = excellent. The latest NHER results are available for Perth and Kinross from the Scottish Household Condition Survey. The latest survey results indicate that 21-37 % of households in Perth and Kinross have a 'good' energy conservation rating (Table 5.17). Insufficient information is currently available to comment on trends. At the national level in 2004/05 44 % of households were rated as 'good', 51 % 'moderate' and 5 % 'poor', this would imply that houses in Perth and Kinross are on average less energy efficient than those in Scotland as a whole.

Table 5.17 Energy efficiency of housing stock in Perth and Kinross (combination 2003-04 and 04/05 data)

NHER band	Count	Lower CI	Upper CI	%	Lower CI	Upper CI
Poor (0-2)	7,000	3,000	10,000	11	5	16
Moderate (3-6)	37,000	32,000	43,000	60	51	68
Good (7-10)	18,000	13,000	23,000	29	21	37
Total	63,000			100		
NHER Score		**Lower CI**	**Upper CI**			
Mean	5.2	5.1	5.2			
Median	5					

CI = *Confidence Interval (the likely range of the true count value)*

Through the EU Energy Performance in Buildings Directive PKC introduced a scheme to award energy conservation ratings to new public buildings in 2006. Future revisions of the SoE Report will report on the results and success of this scheme.

The government has set a target of building carbon neutrality by 2016. However further details have not yet been made available to define what this target means. Once further information is provided on the definition, the SoE report will report on the Council's performance towards achieving this target.

Table 5.18 summarises the installed capacity of renewable energy schemes within Perth and Kinross. As the data relates to installed capacity not actual production it only provides an indication of the proportion of energy used that is generated from renewable sources.

Table 5.18 Total installed capacity of renewable schemes (MW)

	2006
Hydro	351.08
Wind (small Scale)	0.1
Wind (micro)	0.01
Landfill Gas	1.9

Figure 5.10 provides an estimate of the energy used in Perth and Kinross.

Opportunities and threats 5.4.5

The following key assets, opportunities and threats for energy in Perth and Kinross have been identified (Table 5.19)

Table 5.19 Energy assets, threats and opportunities

Asset	Opportunities and Treats
Potential for production of renewable energy in appropriate areas Potential for increased energy efficiency Public perception of PKC potential	Opportunities ▪ *Energy from waste* ▪ *Energy from energy crops or forest residues* ▪ *PKC energy advice project* ▪ *Increasing awareness of climate change* ▪ *SPP6: Renewable energy* Threats ▪ *Public perception of PKC potential* ▪ *Lack of awareness of impact of various types*

Data gaps and limitations 5.4.6

Due to the commercially sensitive nature of the data, limited information is available on the energy use and sources of the energy used within Perth and Kinross.

PERTH & KINROSS COUNCIL

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