

Delivering sustainable land use and management in Scotland: a Scottish Environment LINK paper

For internal use

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Summary:

- Land is a finite resource but we demand a lot from it
- There is uncertainty over the future of agricultural subsidy once the UK leaves the European Union and multiple competing drivers influence land use, including political, economic, social, environmental and other targets, which will not be met without a strategic, coordinated approach to land use
- Climate change presents challenges and opportunities to land use sectors
- The Land Use Strategy, with adequate political support and funding, has the potential to drive and secure sustainable land use in Scotland, delivering benefits for the environment, society and the economy; support delivery of Land Reform objectives and elements of the Land Commission's work programme; and inform better targeting of public money
- The national level strategy should be delivered at a regional and local level through roll out of Regional Land Use Frameworks
- Examples and expertise of this regional approach already exist in Scotland and lessons learned could inform development and delivery of future regional frameworks

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1 Introduction

Land in Scotland is a finite resource yet we expect a lot from it. In addition to existing land uses and industries, Scottish Government has set a range of targets which will influence both land use and ownership. If we were to deliver all of these targets, in isolation of each other and alongside existing land use, Scotland would need more land! Therefore, integrated, multipurpose land use, delivering multiple benefits is essential.

Development of a land use strategy (LUS) for Scotland was a key commitment of the Climate Change (Scotland) Act 2009 (hereafter referred to as the Climate Act), recognising the important role that influencing land use can play in reducing emissions and adapting to climate change. The first LUS¹ was published in 2011, with the following objectives:

- Land based businesses working with nature to contribute more to Scotland's prosperity
- Responsible stewardship of Scotland's natural resources delivering more benefits to Scotland's people
- Urban and rural communities better connected to the land, with more people enjoying the land and positively influencing land use

The accompanying LUS Action Plan² outlined 13 proposals and associated milestones for achieving the LUS Objectives, supported by 10 Principles for Sustainable Land Use. The Climate Act requires that the LUS be revised every five years. Thus, the LUS2 was published 2016, putting forward a series of policies and proposals to support embedding of the Principles and delivery of the Objectives, which remained unchanged from the previous strategy³.

Scotland was world-leading in this approach and since its first publication significant progress has been made in a number of areas, particularly on production of guidance, research to identify data gaps and information sharing. However, the high level, national strategy has proved difficult to translate into delivery of land use change on the ground and the non-statutory nature of the LUS means that delivery of its policies and proposals may not be prioritised as Scottish Government faces growing demand to deploy resources elsewhere. Full political and financial support for delivery of the LUS2 could help target investment of public funds where it will deliver most benefits for the environment, society and the economy. In addition, better coordination of policies, strategies and plans across sectors should make it easier for Scotland to deliver on a wide range of domestic and international obligations and aspirations. Regional Land Use Frameworks (RLUFs), trialled under the LUS, have the potential to steer delivery of this if rolled out further across Scotland but no firm commitment has yet been made by Scottish Government. This paper outlines why taking a strategic approach to land use in Scotland is more essential now than ever.

2 Drivers of land use change; opportunities and threats from land use

2.1 Climate change

By 2050, Scotland will see warmer, wetter winters and warmer drier summers, increased frequency and intensity of extreme precipitation events, reduced frequency of frost and snowfall and a rise in sea levels⁴. Many species are expected to experience shifts in their breeding distributions across Europe, both in location and in extent, as northern and southern range boundaries shift northwards in response to climate change⁵. Indeed, we have already started to see the impacts of climate change on wildlife^{6,7,8}. Coastal habitats will be particularly vulnerable due to sea level rise, and 79,000 homes and 29,000 non-residential properties are vulnerable to flooding in Scotland, with the

frequency and severity of flooding predicted to increase⁹. Health, agriculture forestry, transport, water resources and energy use are all predicted to be affected¹⁰. Climate change will also affect how land is used in the future as conditions are predicted to become more favourable for more productive forms of agriculture¹¹. Climate projections indicate that current trends will continue to intensify¹², so efforts to mitigate and adapt to the impacts of climate change will be more important now than ever. The Climate Change (Scotland) Act 2009 sets ambitious long term targets to reduce greenhouse gas (GHG) emissions by at least 80% relative to 1990 by 2050. This is supported by an interim target to reduce emissions by 42% by 2020. The Scottish Government is currently consulting on a new Climate Bill which aims to strengthen the emission reduction targets.

The Climate Act requires that the policies, proposals and objectives of the LUS contribute to the achievement of the Scottish Ministers' duties under section 1 of the Act (2050 emissions reduction target), section 2(1) (interim target) or 3(1)(b) (staying below annual emissions threshold) ; and achievement of the Scottish Ministers' objectives in relation to adaptation to climate change, including those set out in any programme produced by virtue of section 53(2) (programmes for adaptation to climate change). The LUS proposes 10 Principles for sustainable land use, including that: *"Land-use decisions should be informed by an understanding of the opportunities and threats brought about by the changing climate. Greenhouse gas emissions associated with land use should be reduced and land should continue to contribute to delivering climate change adaptation and mitigation objectives"*

Scotland's draft Climate Change Plan¹³ sets out policies and proposals to meet current annual emission reduction targets to 2032, including through measures to reduce GHG emissions from agriculture, through peatland restoration and by afforestation. However, whilst overall emissions have fallen by an average of 3.3% per year since 2009, little progress has been made in reducing emissions from transport or from agriculture and rural land use¹⁴.

Despite the opportunities for climate change mitigation and adaptation through land use change, sectoral priorities continue to be set in isolation of each other, which fails to maximise the potential benefits to be gained from a more coordinated approach to land use in Scotland.

2.2 Land based businesses

Collectively, agriculture and forestry dominate land use in Scotland, taking place on 92% of Scotland¹⁵. Agricultural production takes place on 75% of Scotland's land area¹⁶. Whilst traditional farming systems have a role in maintaining many important habitats, today around a fifth of green house gas emissions originate from agricultural activities¹⁷ and agricultural intensification has been linked to degradation and loss of habitats and declines in biodiversity¹⁸.

Around 18% of Scotland's land area is currently covered with forests and woodlands, of which 74% is coniferous and 26% is broadleaf. Forestry is the only industry which currently acts as a net carbon sink, absorbing more carbon than is emitted. Therefore, woodland expansion, with suitable trees in appropriate locations can play an important role in hitting our emissions reduction targets. However, past woodland expansion has, in some places, been at the cost of important open upland and grassland habitats¹⁹ and we need to avoid this in future.

Both agriculture and forestry have historically been and continue to be influenced by a suite of policies, strategies, plans and by subsidies in particular. The Common Agricultural Policy (CAP) has been a key driver of land use decisions in Scotland and provided a substantial level of financial support to landowners for farming, crafting and forestry initiatives. A series of reviews of the CAP introduced measures to support wider rural development and delivery of environmental outcomes. However, the CAP today remains poorly designed. It has failed to secure necessary improvements for biodiversity and to address the challenges facing farming and our rural areas²⁰.

Sporting estates can also have a significant influence on land use in upland rural areas, though it is difficult to quantify the area of land under their management due to lack of publically available land ownership data. Sport shooting of red grouse is a major land use in Scotland but has declined in some areas since the 1940s. Key land management practices associated with grouse moors include rotational muirburn, historical drainage, hill tracks and predator control involving both legal control and illegal persecution. Sporting estates also have an important role to play in deer management. Deer stalking is thought to generate £105M per year, with £70M of this staying in Scotland. Deer stalking directly supports 966 FTE jobs and indirectly supports a further 1554 FTE jobs. In addition, red deer also contribute to the capital value of sporting estates, with every stag and hind shot on a sporting estate contributing £ 22,000 and £2200 respectively to the value of the estate²¹. Therefore, there are a number of financial incentives to maintaining high deer numbers. However, deer are responsible for damage to some biodiversity, including degrading the condition of designated features. Elevated deer numbers also have significant economic impacts on commercial forestry and native broadleafs, causing further economic damage and public safety concerns by causing road traffic collisions. Therefore, the economic benefits must be set in the context of the societal, environmental and economic costs of the impacts.

Following the vote to leave the European Union (EU) in June 2016, the future availability of financial support and the form that this might take, remains unclear. Scotland currently receives 17% of the UK share of CAP funding. Post-exit from the EU, if funds are allocated per capita (using the Barnett formula) Scotland would only receive 8% of the UK total, significantly reducing the funding available. This could have a significant impact on farm incomes, which are not currently profitable without financial support. The Scottish food and drink industry generates £14Billion²² but average farm revenue for 2014-15 was £148,726, with costs at £167,955. Therefore, without average subsidy payments of £39,885, the farming sector would run at a loss, particularly mixed farms and mixed cattle and sheep farms in less favoured areas²³. 80% of Scotland is classified as less favoured area, which is disproportionately high compared to the rest of the UK. In addition, in 2014-15, 75% of money spent on maintaining or improving the condition of protected areas came from agrienvironment funding provided through the CAP. Thus there is a considerable risk of a reduction of funding available to positive land management for nature. However, with these risks come opportunities to better design a rural land use policy which is well targeted and delivers more for people and for nature. RLUFs could provide a mechanism for targeting funding where it will have maximum benefit.

2.3 Land Reform

The wheels were put in motion for land reform in Scotland in the lead up to the establishment of the Scottish Parliament in 1999, when the Scottish Office set up the Land Reform Policy Group (LRPG). The land reform programme during the 1999-2003 session, informed by the recommendations of the LRPG, led to flurry of land reform measures during this period, including the Abolition of Feudal Tenure etc. (Scotland) Act 2000 and the Land Reform (Scotland) Act 2003. However, the lack of a land reform programme in subsequent sessions made land reform measures less targeted.

The Land Reform Review Group, set up in 2012 to carry out an independent review of land reform in Scotland, published their findings and recommendations in 2014. The LRRG stated that the system a country has in place for the ownership and management of its land to be *"fundamental to the wellbeing, economic success, environmental sustainability and social justice of the country"*. They considered the concept of ownership to be central to how land is used²⁴. However, this link between land ownership and land use had not come through in land reform measures implemented, with the focus on access (Part 1, Land Reform (Scotland) Act 2003); community right to buy (Part 2, Land Reform (Scotland) Act 2003); registration of land (Land Registration (Scotland) Act 2012); community empowerment (Community Empowerment (Scotland) Act 2015) and right to buy land to further sustainable development (Part 5, Land Reform (Scotland) Act 2016). The Land Reform (Scotland) Act 2016 reintroduced the link between land use and ownership to some degree, by formally recognising links with the LUS in the remit of the Land Commission, introducing new powers to influence deer control and proposing a statement setting out the rights and responsibilities that come with ownership of land, including sustainable use.

The Land Commission is a new statutory public body charged with furthering land reform in Scotland. Functions include, on matters relating to land in Scotland, reviewing impact and effectiveness and recommending changes to any law or policy; gathering evidence; carrying out research; preparing reports; and providing information and guidance. The Land Reform (Scotland) Act 2016 makes clear that "matters relating to land" includes the LUS. The LUS could be a key mechanism through which to deliver on various strands of the Land Commission work programme, including land use decision making, identifying public interest and promoting the Land Rights and Responsibilities Statement. Thus, it would be useful if the Land Commission were to promote delivery of the policies and proposals in the LUS.

2.4 Land use targets, potential conflicts and opportunities

Scottish Government has set ambitious emissions reductions targets, some of which are directly linked to land use. A wide range of targets also exist across sectors, presenting challenges where there are potential land use conflicts (Figure 1). However, taking a strategic approach to land use, taking account of the range of targets and trade-offs, can help identify opportunities for delivery of multiple benefits (Table 1).



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Table 1: Land use targets, potential conflicts and opportunities from more strategic and coordinated land use planning

Driver	Targets	Potential conflicts	Opportunities
Energy	Equivalent of 100% demand for electricity from renewable energy and 11% renewable heat by 2020 ²⁵ .	Development of windfarms and hydro-electric schemes have generally been concentrated in the uplands, adding pressure to an already vulnerable system. Poorly planned energy infrastructure can have a negative impact on sensitive habitats such as peatlands through disruption of hydrology and loss of carbon stocks. Hydropower can cause severe harm to river and other freshwater ecosystems through barrier effects and fluctuating water levels. Construction can disturb surrounding ecosystems such as peatland and woodland. Poor planning can also delay roll out of renewable energy developments which make a vital contribution to hitting climate change targets. There are further potential conflicts between forestry and renewable energy development as trees are cleared to make way for turbines.	With careful planning, and consideration of other land use priorities, it is possible to meet climate targets using high levels of renewable energy, whilst avoiding significant negative impacts on nature. The RSPB's Energy Vision ²⁶ highlights that 2.2% of Scotland's land area could generate 41 TWh/yr under a low ecological risk scenario. Under the same scenario, 15.7% land area has the potential to generate 215TWh/yr from solar; and 10.3% area could generate 28 TWh/yr for biomass production. These figures represent the area available when physical and policy constraints have been considered. In some cases, opportunities may exist for multiple forms of renewable energy in the same area of land.
Forestry	Forestry expansion from 18% of land area to 21% by 2032, building on the current 10,000ha/yr target to 12,000ha/yr from 2020-21; 14,000ha/yr from 2022/23; and 15,000ha/yr from 2024/25 to 2032 ²⁷ . This will be complemented with a concurrent increase in the use of Scottish wood products.	From the 1940s-80s plantation of coniferous species on peat and mineral soils became much more widespread, most of which was encouraged by policy and economic drivers. One 10 th of blanket bog in Scotland is now covered by non-native plantation and whilst there is now a presumption against new planting on deep peat, the impacts of existing forestry are still being felt ²⁸ . Afforestation of the uplands has led to more drainage and increasing soil and water acidification. It has also been associated with declines of populations of wading birds, both from habitat loss and from the edge effects of forestry surrounding open habitat. There are also potential conflicts with other land uses, for example, agriculture, when trying to identify land available or suitable for tree planting.	Forestry is the only industry which currently acts as a net carbon sink, absorbing more carbon than is emitted. Therefore, appropriate forestry expansion can help meet our emissions reduction targets. Appropriately sited forestry, and the right mix of trees, can also deliver richer and more diverse habitats for wildlife; enhanced landscapes; sequestration and long-term storage of carbon; timber, wood-fuel and other woodland products; Ecosystem services, including clean water, mitigation of diffuse agricultural pollution, and reduction in flood risk; secure jobs and enhanced rural and national economies ²⁹ .
Peatland restoration	Restore 40% of degraded peat, from a 1990 baseline, to good condition by 2030, with	In some cases, peatland restoration will require removal of trees, mostly commercial plantation, which can result in	Peatlands cover 20% of the land area of Scotland. Intact peatlands are the single largest carbon store in the UK, making an important contribution to climate mitigation by capturing and

	50,000ha restored by 2020 and 250,000ha restored by 2030 ³⁰ .	tension between peatland restoration and tree planting targets.	storing carbon from the atmosphere and to climate adaptation by holding water and slowing runoff ³¹ . However, it is estimated that over 35% of Scottish peatlands have been degraded in some way due to unsustainable land management practices ³² . As damaged peatlands release carbon, they can become a carbon source, rather than a carbon sink. Therefore, restoration stops carbon release from the soil with additional benefit of carbon sequestration from the atmosphere when the habitat returns to a healthy state, and a net long-term cooling effect on the climate ³³ .
Agriculture	No statutory targets but there is ambition to grow Scotland's food and drink industry, making it more profitable, internationally recognised and less dependent on subsidies: - double turnover in farming, fishing, food and drink to hit £30 billion by 2030 ³⁴	Emissions from agriculture and related land use were around 11MtCO ₂ e in 2014, accounting for 24% of Scotland's total emissions that year ³⁵ . Aside from the role agriculture can play in reducing GHG emissions, climate change may bring both opportunities and threats to the agriculture sector. More frequent extreme weather events, flooding and drought could negatively impact the agriculture sector. Climate change may also bring higher prevalence and variety of pests and diseases. As stated previously, conflicts may arise between tree planting targets and maintaining productive agricultural land. Agricultural intensification has been linked to degradation and loss of habitats and declines in biodiversity ³⁶ . Overgrazing, undergrazing and agricultural operations all appear in the list of top ten pressures affecting condition of designated features in Scotland ³⁷ .	Elevated CO ₂ and warmer weather could increase growth rates of crops and grasses and the number of crops that are viable in Scotland ³⁸ . In response, farmers could change crop establishment and harvesting times, select different crops and adapt irrigation strategies. They could also look at alternative livestock breeds, change time of lambing and calving, housing and turning out.
Muirburn	No specific target regarding muirburn	Burning has traditionally been used across grass and heather moorland ³⁹ , to manage grazing conditions for livestock and deer and to create heather mosaics for food and cover for red grouse. However, burning can have negative impacts on carbon storage, peat hydrology and aquatic invertebrate populations, soil ⁴⁰ and water quality ⁴¹ . Despite a presumption against burning on deep peat ⁴² , recent research	Stricter control of muirburn could provide potential carbon savings which have not yet been recognised, as well as benefits for habitat management and water quality improvements.

		found that 28% of all 1-km squares subjected to burning in Scotland overlie deep peat, and the annual number of burns increased significantly between 2001 and 2011 ⁴³ . The draft Climate Change Plan ⁴⁴ does not mention muirburn; its associated emissions; nor targets to reduce emissions from this land management practice. This could be an opportunity missed, particularly as burning was listed as a pressure on 51% of designated blanket bog features ⁴⁵ and lack of stricter control could hinder progress towards peatland restoration targets.	
Natural Flood Management	The Flood Risk Management (Scotland) Act 2009 requires SEPA to work with responsible authorities to identify sustainable flood risk management solutions, including natural flood management. However, there are no spatial targets for this.	79,000 homes and 29,000 non-residential properties are vulnerable to flooding in Scotland and the frequency and severity of floods is predicted to increase with climate change ⁴⁶ . Land use and management practices such as agriculture and urban development have undermined the natural functioning of water systems, increasing flood risk downstream. Straightening of rivers and drainage channels increase volume and speed of water flow; overgrazing and heavy farm machinery cause soil compaction which reduces permeability; and drainage of and building upon natural floodplains has reduced flood water storage capacity and increased flood risk. Allowing temporary flooding of farmland in floodplains may not cause a conflict, however permanent erosion or loss of productive farmland to enable NFM may be a source of conflict.	Some historical damage can be reversed through land management changes. Re-meandering of rivers and restoration of wetlands, floodplains and woodland, can reduce volume and flow of water and provide flood water storage, reducing flood risk. For example, salt marsh is a valuable natural sea defence and conservation and restoration can reduce maintenance and construction costs of hard sea defences, with lower sea walls required ⁴⁷ . Riparian planting can significantly increase soil permeability ⁴⁸ ; blocking of drains on peatlands raises the water table and increases the ability of peat to hold water compared to unblocked drains ⁴⁹ ; and reduction of grazing pressure, soil aeration and more considered use of heavy machinery can reduce the impacts of soil compaction ⁵⁰ . Areas with high risk of flooding may still require hard (man-made) flood defences but natural flood management solutions can complement these, increase their lifespan and reduce maintenance costs, whilst delivering biodiversity and other benefits.

Nature Conservation	The Convention on Biological Diversity, Aichi Target 11 states that "By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes."	Around a fifth of designated features remain in unfavourable condition, and the proportion of features in favourable condition fell slightly between 2016-17 ⁵¹ so more work is required to meet the " <i>effective management</i> " element of Aichi Target 11. As eight of the top ten pressures impacting designated features are associated with current land use, such as grazing, forestry, recreation, water management and burning ⁵² , this will require a concerted effort to influence land use and management.	Managing land better for nature, both within and outwith protected areas, can ensure that displaced species have somewhere to move to as their range shifts. Several studies have shown that protected areas provide vital habitat for range- expanding species. Hiley <i>et al.</i> (2013) found that protected areas were the initial colonization points for all of the six species of wetland birds which have established breeding populations in the UK since 1960 ⁵³ ; and Gillingham <i>et al.</i> (2015) found that range- expanding butterflies and birds were more likely to colonize protected areas ⁵⁴ . Complementing the protected areas network by undertaking targeted and effective nature conservation in wider countryside, using the Lawton Principles of bigger, better, more and connected ⁵⁵ to create a Nation Ecological Network, will increase climate resilience and provide more space for species dispersal.
Water quality	"Member States shall protect, enhance and restore all bodies of surface water, subject to the application of subparagraph (iii) for artificial and heavily modified bodies of water, with the aim of achieving good surface water status at the latest 15 years after the date of entry into force of [the Water Framework] Directive" ⁵⁶ .	Around a third of water bodies are in less than good condition. Man-made barriers to fish migration, modifications to physical condition, diffuse pollution, waste water management and hydroelectricity generation are considered the most widespread pressures affecting the water environment. Agriculture is the primary source of diffuse pollution, through runoff of livestock excrement and excess fertiliser or pesticides. Forestry and septic tanks contribute to a lesser extent. Modifications for agricultural land use, including straightening, deepening and narrowing for land drainage; re-enforcement or construction of embankments; and degradation of bank-side vegetation, account for 95% of modifications to physical condition. Flows and levels are affected in 237 water bodies, of which 35% are affected by agricultural irrigation; 34% by hydroelectricity generation; 30% by other industries; and 9% by use for public water supply ⁵⁷ .	Rivers and lochs in Scotland cover 2% of the land area and hold 90% of the UK's surface water ⁵⁸ . Water is an essential component of healthy, functioning ecosystems and supports a wide variety of wildlife. Thus improving water quality by influencing land management within water catchments will benefit Scotland's biodiversity. A healthy water environment also has social and economic benefits, in the form of recreation, health and well being, providing our drinking water and supporting industries such as food, drink, agriculture and forestry. Managing our water environment more sustainably can also aid climate adaptation and mitigation by reducing flood risk caused by physical modifications and improving water security by carefully managing abstraction.

Drinking water	The Water (Scotland) Act 1980 requires that water authorities must supply wholesome water for domestic use. The Public Water Supplies (Scotland) Regulations 2014 and Private Water Supplies (Scotland) Regulations 2006 define wholesomeness for public and private water supplies respectively.	 84% of Scotland's drinking water supply comes from open sources such as lochs and reservoirs (46%) and rivers and streams (38%)⁵⁹, which makes it susceptible to pollution from surrounding land uses. Thus, pesticides and nitrates from agricultural diffuse pollution are key pressures on the integrity of raw drinking water supplies in Scotland⁶⁰. Colour is also an issue. Around 83% of raw water sources are in upland catchments⁶¹. Colour is caused by dissolved organic carbon (DOC) washed off degraded peat, turning water brown. DOC concentrations have increased by 91% in UK rivers and lochs in recent decades⁶², a trend which could continue as climate change and land use put pressure on our sensitive peatland habitats. Removing DOC is energetically costly and produces waste products which are difficult to dispose of. However, this step is essential because DOC reacts with chlorine during water treatment, producing carcinogenic trihalomethanes. Raw water affected by diffuse pollution and colour is expensive to treat and in some cases upgrades in equipment or whole treatment works are required to deal with increased levels of pollutants. 	Scottish Water operates a Drinking Water Protection Scheme (DWPS), which replaced the previous Sustainable Land Management Incentive Scheme. The DWPS offers financial support to land owners, managers and tenants to help protect drinking water from diffuse pollution at source, before it reaches the treatment works ⁶³ . The scheme supports action which delivers above and beyond legal requirements under SEPA's General Binding Rules. Peatland restoration within water catchments can reduce runoff of DOC into the water and reduce water treatment costs. Water companies are increasingly using catchment based solutions, restoring degraded peatlands, to reduce water quality issues at their source. United Utilities, a water company in England, found that previously upward trends in water colour levelled off and peaks in colour were reduced in response to peatland restoration ⁶⁴ . Opportunities may be available for Scottish Water to get involved with peatland restoration projects in partnership with land owners and managers.
Land Reform: Community Ownership	One million acres of land in community ownership by 2020 ⁶⁵ .	Community ownership, whether it be by communities of place or communities of interest, can be very beneficial but remains contentious issue amongst private land owners who may perceive it as a threat to their land assets.	Community ownership can have wide-ranging benefits, as demonstrated by a study of 12 Community Land Scotland members which have owned land for more than five years ⁶⁶ . The study observed population rise, increase in the number of young people, an increase in capital value and turnover, housing upgrades and new builds, investments in infrastructure and empowerment of other community led initiatives, all of which deliver significant benefits to local communities. Community ownership and empowerment can also increase the connection of those communities to the land and give them more influence over drivers that may impact them.

Recreation	Increasing people's use of the Scottish outdoors is a national performance indicator ⁶⁷ .	Pressures associated with recreation include erosion, littering and fouling form car parking, cycling, dog walking, fishing, motor bikes, off road vehicles, walking and wild camping. Therefore, access must be carefully managed to ensure that people have an opportunity to enjoy the natural environment whilst the landscapes and wildlife that draw them there are protected.	Around 50% of adults visit the outdoors at least once a week. Scottish landscapes are iconic and attract opportunities for tourism and recreation, which in turn provides a boost to the economy. Nature-based tourism in Scotland is worth £1.4 billion per year and supports 39,000 jobs ⁶⁸ . There are also health benefits to outdoor recreation. Wildlife-rich green space has been linked to stress reduction in adults ⁶⁹ and children ⁷⁰ ; and individuals with access to nature are less likely to become overweight or obese ⁷¹ .
Planning	50,000 affordable homes by 2021 ⁷² .	Demand for housing and associated infrastructure has led to development on natural flood plains, increasing the flood risk to properties built there and downstream. It has also led to loss of biodiversity rich habitats and the species they support.	If carefully planned and built in the right place, new housing developments could deliver wider social and environmental benefits by incorporating elements such as wildlife rich green space, sustainable urban drainage, good public transport links and connection to cycle networks.

3 Opportunities for strategic land use planning in Scotland

Strategic land use planning is already happening to some degree in Scotland and expertise and experience exists which could support development and delivery of RLUFs. Some examples are discussed.

3.1 Regional Land Use Pilots

In 2013, Scottish Government commissioned two regional land use pilot projects, under the LUS, which aimed to "pilot a mechanism which considers existing and future land uses in a collective and integrated way, and to establish a means to prioritise or guide decisions so as to optimise the use of the land, and to resolve competition or conflicts relating to land use change."

The Scottish Borders Council and Aberdeenshire Council were chosen to host the pilots, which concluded in March 2015. They were given a specification to follow by Scottish Government, outlining a three stage process for production of a pilot regional land use framework:

- 1. Baseline mapping
- 2. Constraints and assumptions
- 3. Framework production

The specification also set a series of requirements and expectations, whilst leaving flexibility for the local authorities to adapt their approach to local constraints and conditions. Thus, both took slightly different approaches to the project brief, resulting in different end products. However, valuable lessons were learned from both pilots, which are discussed in brief below. Scottish Government commissioned a <u>review</u> of how well the pilot projects delivered against the brief provided which is also discussed.

3.1.1 Scottish Borders Council

Scottish Borders worked in partnership with Tweed Forum to develop a draft <u>Regional Land Use</u> <u>Framework</u>, three <u>mapping reports</u> and an online <u>mapping tool</u>. The Borders Regional Land Use Framework allows different policy choices to be investigated to identify interactions between land uses, opportunities for delivery of multiple benefits and highlights potential conflicts and trade-offs. The online mapping tool allows a variety of maps to be interrogated and is designed to help decision makers make informed choices about land use in the Borders. It can also be used by individual organisations to inform their work.

The Scottish Borders Council led the project management through an existing member of staff working on a part-time basis. Tweed Forum coordinated a thorough programme of stakeholder engagement during development of the framework, including seeking views on which data and land uses to consider, validation of data, systems, processes and mapped outputs as well as carrying out a public consultation on the draft framework. The partnership approach and the engagement programme were considered an integral part of the process. The partners are now identifying ways to take the framework, or elements of it, through to delivery.

3.1.2 Aberdeenshire Council

Aberdeenshire made the decision not to produce an over-arching land use framework due to resource constraints. However, they did produce an online <u>interactive mapping tool</u> in partnership with James Hutton Institute, a report outlining the <u>land use change, issues and opportunities</u> for Aberdeenshire and a <u>final report</u>, tying all of it together.

The online tool allows users to explore how land use might change under six key policy themes, identifying areas that may be appropriate for change and where changes have potential to provide wider benefits. This tool primarily looks through the lens of suitability for woodland expansion so may not be as widely applicable as the Scottish Borders tool. However, Aberdeenshire Council is already looking at how it might inform delivery of forestry planting targets within the region.

Aberdeenshire appointed one part-time and one full-time member of staff to deliver the pilot, with GIS support from James Hutton Institute to develop the tool. Aberdeenshire took a much more targeted approach to their stakeholder engagement, primarily due to resource constraints, and focused their engagement efforts on a core group. This approach drew some criticism from stakeholders who would have liked to see wider involvement and the council recognised that the pilot would have benefited from wider engagement if resources had allowed.

3.2 National Planning Framework

The National Planning Framework is currently delivered through strategic development plans and local development plans. Scottish Government is now proposing to remove the requirements for strategic development plans in favour of more proactive regional partnership working. They aim to introduce new duties to support this, including: a duty to work together to address nationally and regionally significant spatial planning and development issues; a duty to undertake joint evidence gathering including on delivery of cross-boundary infrastructure requirements; and a duty to contribute to the preparation and implementation of a National Planning Framework Delivery Programme⁷³. This will facilitate a more coordinated regional partnership approach to built development, mirroring the marine planning partnership approach. This approach does not currently exist for wider land uses but production of regional land use plans, coordinated with urban and marine planning, would allow a strategic approach to be taken across all land and sea in Scotland.

3.3 National Park Plans

Scotland has two national parks, designated under the National Parks (Scotland) Act 2000, with the following aims: to conserve and enhance the natural and cultural heritage of the area; to promote sustainable use of the natural resources of the area; to promote understanding and enjoyment (including enjoyment in the form of recreation) of the special qualities of the area by the public and; to promote sustainable economic and social development of the area's communities. Both parks have national park authorities which are funded by Scottish Government, report to Scottish Ministers and are responsible for writing and implementing park plans. The park plans set out priorities and targets for delivery of national park aims, reviewed in five year cycles. In producing the plans, national park authorities address a wide range of land use prioritises within the parks, bring together key interest groups as partners and consult widely to obtain consensus on land use and wider issues.

Loch Lomond and Trossachs National Park was established in 2002. The Loch Lomond and the Trossachs Plan is currently being refreshed⁷⁴. The draft Plan outlines priority actions for conservation, visitor experience and rural development and identifies the partners and stakeholders with a role in delivering these actions. Emphasis is placed on better integration of land and water management and a strong partnership approach across public, private and community owned areas. The Plan proposes to take the initiative on progressing one of the policies identified in the LUS2 by facilitating the establishment of new Regional Land Use Partnerships. These will operate at the catchment scale to bring people together to deliver better land stewardship.

The Cairngorms National Park was established in 2003. The Cairngorms National Park Partnership Plan⁷⁵ is referred to as a regional land use framework for the Park, which covers 452,800ha. It was refreshed in 2017 after extensive public consultation on nine key issues concerning conservation, visitor experience and rural development. The park has a strong history of collaboration and partnership working, which has not only helped lever external funding but has also promoted and enabled management of land use change.

As delivery of the LUS2 progresses, valuable lessons could be learned from both national parks on identifying land use priorities, engaging and securing buy-in and facilitating positive land use change.

3.4 National Ecological Network

The second National Planning Framework (2009)⁷⁶ proposed that the creation of national ecological networks (NEN) could significantly contribute to biodiversity and landscape enhancement and increase resilience to climate change. Scotland's 2020 Challenge for Biodiversity⁷⁷ expanded on this, describing a NEN as "a way of characterising the nature of Scotland, laying importance on how its different parts relate to each other in ways that best support biodiversity and provide the many benefits to people". National Planning Framework 3 further commits to implementing the Scottish Biodiversity Strategy "including completing the suite of protected places and improving their connectivity through a national ecological network centred on these sites."⁷⁸. Since then, Scottish Natural Heritage has been charged with producing a NEN for Scotland but, as yet, no deadlines have been set for its production. A NEN, with well managed protected areas at the core and supported by wider countryside measures, would provide the environmental focus to aid integration, alignment and enhancement for nature considerations in policies, proposals⁷⁹. As such, it would be a key component of a RLUF, and funding, ensuring that environmental, social and economic benefits are maximised from land use.

4 Shared learning

SELINK organised a workshop on the 6th June 2015 at Battleby Conference Centre, Perth, to identify key lessons learned during development of a regional land use framework. In efforts to represent different scales of land use planning, presentations were invited on the Aberdeenshire land use pilot, Cairngorms National Park Plan, the Carse of Stirling Ecosystem Services project and the Lunan Water Catchment Project. The workshop investigated approaches and challenges associated with spatial mapping, working at different spatial scales, stakeholder engagement and securing delivery. Outcomes under each of these headings are summarised below.

4.1 Spatial mapping Habitat, land use and ecosystem services mapping, or "opportunity mapping", was considered an important component of the land use pilots and other projects. Participants agreed that it aided identification of issues, regional priorities, stakeholders and decision makers and data gaps to be filled. Spatial models make it possible to investigate potential delivery of ecosystem services from different land uses and to develop scenarios depending on land use priorities, landscape and scale (national, regional, local). Participants noted that it would be useful if more data were made available through Scottish Environment Web (SEWeb), along with information on data sources, resolution, quality and how up to date they are. This would make it easier to take a consistent approach to land use mapping, ensuring that outputs are adaptable and repeatable in other regions or catchments.

Some barriers were identified to development of comprehensive land use maps. Poor quality or incomplete spatial datasets and variability in availability of regional and local data can prove challenging. Participants also noted that we don't fully understand all of the consequences of land use interventions on the ground, so research is required to identify the interventions which will contribute most towards sustainable development. Some participants suggested that landowners can be wary of maps, particularly if the go to field level.

4.2 Spatial scales: Workshop participants considered the direction and investment required from Scottish Government would have most impact if considered at multiple scales and discussed national, regional and local challenges and opportunities:

- 1. <u>National level:</u> Participants considered the LUS an important document for identifying national land use priorities, providing a national framework for coordination of different sectoral land use drivers and targeting investment of public money. In order to do this, it was felt that Scottish Government should make clear their commitment to full delivery of the LUS and demonstrate leadership on land use decisions in Scotland. Lack of cross-departmental working and high level buy-in, limited resources and poor integration with the planning system were raised as potential barriers to progress. It was considered challenging to translate high level strategy targets into action on the ground without regional and local plans to plug the divide between top-down and bottom-up. Thus, the LUS must provide a clear framework for regional plans and the mandate for their development.
- 2. <u>Regional:</u> Regional plans were promoted as a vital step in consolidating national targets with regional priorities and the group recognised that valuable lessons had been learned by both regional land use pilots. Both pilots were led by local authorities and it could be that local authorities would be best placed to deliver further RLUFs. However, participants recognised

that local authorities are limited by resources. The pilots were both fully funded and it is unlikely that other local authorities could replicate the approach without similar financial support. Local authority boundaries do not match ecological boundaries or catchments but if the approach was rolled out in all regions, and if regions cooperated, then all ecological units would be covered. Participants thought that regional plans should be reviewed in five year cycles, in line with LUS review.

3. Local: Participants agreed that regional priorities would have to be delivered at a local level, with buy-in from communities and landowners/managers. This would require identifying who would lead at the local level. Community councils were considered to have limited influence but could be an important contact point. Some flagged that resistance to change can build once the conversation turns to specific land use change in specific areas so facilitation will be especially important at this stage.

4.3 Stakeholder engagement: Participants considered six key steps to be important for

successful engagement:

- 1. Identifying the right stakeholders: Stakeholder events often have the same people in the room and extra effort/resource is required to reach other key stakeholders. Power mapping and decision mapping were identified as important tools to identify decision makers, at a national level (eg. ARPID, SEPA, Forestry Commission Scotland, SNH) and at a regional level (eg. regional stakeholder forums, local authorities, regional advisory groups).
- 2. <u>Opening a dialogue</u>: This was recognised as a challenge, particularly with audiences who may not be aware of the Land Use Strategy or its Principles. Therefore, awareness raising and selling the wide ranging social, economic and environmental benefits of the Strategy will be an important step in getting people to engage.
- 3. Connecting people to landscapes: As a high level, national document, the Land Use Strategy does not currently communicate the local relevance of more strategic land use. In order to strengthen the connection of people with the land, we need to develop locally relevant stories and examples, shaping communications around local issues such as water management.
- 4. Empowerment: Communities may need support to feel empowered to have a say in land use decisions. If no forum currently exists for community engagement then one will need to be set up. The key is to build trust by being clear about the role that communities can play and the influence they can have.
- 5. <u>Facilitation</u>: Independent facilitation can be the key to successful stakeholder engagement. It can be resource intensive and some regions may need to build facilitator capacity from scratch so adequate, long term funding will be essential. Other regions may be able to work in partnership with others who have facilitation capacity.
- 6. Legacy planning: in order to secure long term support and maintain a legacy, it is essential to embed knowledge and responsibilities within communities, both communities of place and communities of interest. This could be secured by encouraging local people to access, use and contribute to open access data, for example on SEWeb; by creating opportunities to share information and outputs of land use projects as widely as possible; by capturing and sharing success stories and lessons learned ; and by communicating in layman's terms. This is likely to rely on a well respected individual or community group providing leadership.

4.4 Securing delivery: Securing delivery of land use change may be the most challenging, but vital, element of a strategic land use framework. It was noted that the Aberdeenshire pilot never set out to take the project through to delivery. It aimed to develop a tool and scope the process. In one way, this made it easier to talk to landowners because they didn't see the work as a threat. However, this put some others off engaging as they didn't feel they had time to engage with a theoretical process. Delivery of land use change requires landowner and manager buy-in and workshop participants identified three key elements in securing this:

- <u>Advice:</u> There is currently no free advisory service for landowners and managers, other than the services provided by NGOs, despite the importance of advice in securing positive change. Landowners are not always aware of the range of mechanisms, incentives and support available to them. Although they understand their own land better than anyone else, they may not be aware of complex land use interactions at a landscape scale, nor understand the role they could play in delivering more sustainable land use outside their land holdings. Such an advisory service could also highlight the multiple benefits that sustainable land management can have for the landowner too, for example, through reducing soil erosion or more cost effective nutrient management
- 2. <u>Regulation:</u> Regulation, when effectively enforced, can secure improvements in land management. However, enforcement is expensive and monitoring is not always adequately funded to secure compliance. Policy makers must do more to clearly communicate evidence of the links between land use practices and their impacts and facilitate efforts to fully embed a culture of responsible land use within the farming community.
- 3. <u>Funding:</u> Long term funding schemes are required to secure and maintain sustainable land use. Incentives, or compensation for income foregone, may be required to initiate and sustain change. The Common Agricultural Policy, delivered through the Scottish Rural Development Programme in Scotland is currently the largest source of funding for delivering environmental outcomes. However, the fund is not explicitly directed at paying for ecosystem services delivery. Increasing understanding of the benefits of ecosystem services and the relationship between land use and ecosystem service delivery will aid better targeting of public funds. However, in some cases, it may be more cost effective to purchase land for the purposes of sustainable development, rather than make long term annual payments. These options and the costs and benefits associated with them must be explored in greater detail.

5 Conclusions

Scotland has potential to be world-leading on multi-benefit, sustainable land use. Land is a valuable asset but conflicting ambitions and goals regarding land use mean that a strategic approach is required to minimise trade-offs and maximise benefits. This concept is not new and, through various work streams, Scottish Government has already built a strong foundation upon which strategical land use frameworks can be built and delivered. The expertise exists to carry forward the valuable lessons that have already been learned through planning, the regional pilots and other projects. Furthermore, the Scottish Land Use Strategy, with adequate political support and funding, has the potential to drive and secure sustainable land use in Scotland, delivering benefits for the environment, society and the economy and informing better targeting of public money. However, this high level national strategy would need to be delivered at a regional and local level, taking account of regional priorities and contexts, to secure buy-in and long term embedding of the LUS Principles.

6 Recommendations

- 1. Further support Aberdeenshire Council to develop their pilot work into a Regional Land Use Framework and take this to delivery.
- 2. Formalise Tweed Forum's role as a regional partnership and provide funding and support to take their Regional Land Use Framework through to delivery.
- 3. Commit to further role out of Regional Land Use Frameworks across Scotland, ensuring that lead partners are adequately resourced and supported.
- 4. Continue to build upon and improve the quality and availability of spatial habitat, land use and ecosystem services data available on SEWeb, and provide guidance on land use mapping to ensure a consistent approach is taken to development of land use frameworks.
- 5. Guidance, and a framework for decision making on land use at a national level, must come from the LUS but this must be coupled with a regional and local approach to delivery which takes account of specific conflicts, pressures and solutions.
- 6. Regional Land Use Partnerships should be identified, set up and given adequate statutory recognition to lead on stakeholder engagement and other key components of regional framework production.
- All advice, regulations and incentives which influence land use should be better aligned to facilitate delivery of sustainable land use, as promoted by the Land Use Strategy and the Land Rights and Responsibilities Statement.

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