Scottish Borders Council Pilot Land Use Strategy

Strategic Environmental Assessment:

Environmental Report

October 2014

Contents

Non-Technical Summary

The Pilot LUS Framework and the SEA

I. The SEA for the Pilot LUS Framework has been an iterative process which has been developed in conjunction with the various stages of the Pilot LUS framework programme. This Environmental Report has been informed by a baseline mapping exercise and a Scoping Report, including comments from the three Consultation Authorities. It is also noted that given the pilot status of the LUS framework, that there has been a fluid situation in terms of the methodology and finalised product.

II. The aim is to pilot a mechanism which considers existing and future land uses in a collective and integrated way, with a view to optimising the use of the land, and to establish a mechanism to prioritise or guide decisions about possible competing or conflicting uses. The objective is to produce a regional land use framework in each pilot area, which will facilitate the delivery of policies, strategies and objectives in relation to integrated land use by providing a framework to guide decisions about land use. A key part of this is to develop a mapping tool which can help identify areas of constraint and areas where multiple benefits map arise, allowing users to consider how land use decisions may affect different opportunities.

III. The Pilot LUS Framework identifies eight land use opportunities through an expert rule base and existing environmental knowledge (both from within the steering group and from stakeholder consultation). These are:

- Reduction of flood risk and overland flow;
- Water quality improvements;
- Increased timber/woodland provision;
- Increased biodiversity enhancements;
- Increased food production;
- Increased soil carbon storage
- Increased renewable energy (wind) provision; and
- Increased recreation provision.

IV. It is then considered that renewable energy and increased recreation provision are already effectively covered by existing work and that further work should be concentrated on the remaining six opportunities

V. Following further steering group and stakeholder engagement, as well as work within this Environmental Report (causal chain assessment and key policy drivers work) these six opportunities are narrowed down to three significant land use scenarios; two interactions are seen as constraints and one as bring multiple benefits. They are bulleted below:

- a constraint between increased provision of services for Semi-natural/native woodland, Soil Carbon Storage, Biodiversity enhancements, Water quality enhancements and Flood and overland flow reduction, and impacts on food production;

- a constraint between Semi-natural/native woodland, Soil Carbon Storage, Biodiversity enhancements, Water quality enhancements and Flood and overland flow reduction and commercial timber production; and

- an opportunity for multiple benefits resulting from those same opportunities without food production and commercial timber production

Relevant Environmental Considerations

VI. A detailed baseline mapping report was presented with the Scoping Report for the Pilot LUS SEA and this report (and maps) is also included at Appendix 1 of the Environmental Report. In addition to this consideration has been given to the Borders environment, at a regional level, in line with the requirements of Schedule 3 of the Environmental Assessment (Scotland) Act 2005.

VII. As a result the context of the Pilot LUS is discussed in terms of relevant policies, plans and strategies, the current state of the environment, the environmental characteristics of the area, the known environmental problems and the likely evolution of the environment without the assumed implementation of the Pilot LUS.

VIII. As the Pilot LUS is a regional document it is considered that discussion of the state of the environment, the environmental characteristics of the area and known environmental problems could be a lengthy and complex task. As a result the eight identified opportunities have been the focus where possible, so as to remain as relevant as possible.

Relevant Policies, Plans and Strategies

IX. It is broadly considered that the eight opportunities are in line with the aims and objectives of their respective key national policy driver. This has been established through Table 5 Relevant Opportunities and Key Policy Drivers Assessment (p27). The table also identifies from the key national policy drivers SEA documents what the possible positive negative and positive effects of these documents are and this is used to help identify significant interactions and multiple benefits. In addition Appendix 2 considered all relevant PPS and this was updated following Scoping Report comments from the Consultation Authorities.

Current State of the Environment

X. It is considered a summary table to highlight the information within this section for each opportunity is the most appropriate way to present the information in a non-technical way.

Table 1: Current State of the Environment Summary	
Opportunity	Information
Timber/woodland expansion	- Average woodland size is 30ha, equating to 18.5% of Borders land area - Majority of forested areas in Western part of the Borders and characterised by upland commercial conifer plantations - Proportion of ancient and semi-natural woodland is very small only 1.4% of

Flood risk and overland flow	- Almost all main settlements and many smaller settlements are in Potential Vulnerable Areas - SEPA flood risk maps cannot be used in the SEA - Natural Flood Management (NFM) examples exist in a few locations in the Borders. Flood Protection Schemes are being introduced and these include further NFM measures. Tweed Forum is doing further NFM work
Water quality	- Solway Tweed River Basin Management Plan (RBMP) shows majority of waters are either good or moderate condition. The Eye Water (in the National RBMP) is the only SEPA priority catchment but it is likely this will change with new RBMPs (2015-2020) - For groundwater status Solway Tweed RBMP shows 60 water bodies in good condition and 13 in poor condition. Eye Water is also in poor condition - For ecological status there is little disparity between the overall stuats of surface water and the ecological status. The chemical status is generally excellent. The Eye Water ecological potential is moderate.
Biodiversity	- The Borders has a high quality natural environment: there are 9 Special Areas of Conservation, 5 Special Protection Areas, 96 Sites of Special Scientific Interest and 2 National Nature Reserves - There are also a number of Local Biodiversity Sites and other important species and habitats (Borders Notable Species and Borders Habitats of Conservation Concern
Soil Carbon	- The Borders has areas of deep peat soils that have a depth of 0.5m or greater concentrated on the central Southern Uplands; Ettrick Valley hills; Tweedsmuir Hills and smaller areas in the Moorfoot Hills and Lammermuirs
Agriculture	- The Borders has category 4, 5 and 6 soils present and these may be used for grazing - 85% of Borders land is agricultural with sheep grazing particularly prevalent in the upland areas and with rich areable areas in eastern Roxburghshire and the Merse
Recreation	- There are numerous recreational opportunities for residents and visitors. In particular core paths, promoted paths and long distance paths, and Scotland's Great trails examples allow sustainable transport access - There are more formal recreational opportunities to the west of the region i.e. Glentress mountain-biking - Cultural Heritage sites are also evident such as designed landscapes, castles/houses; these range in importance i.e. from national to local
Renewable Energy	- The Borders currently has 19 consented windfarms over 5MW in capacity and another 11 pending consideration. For smaller projects, there are 79 projects either developed or with consent and another 14 pending decision

Environmental Characteristics of the Likely Affected Areas and Existing Environmental Problems or Relevant Objectives

XI. Again a table is considered the most effective way to summarise this information in a non technical way:

Table 2: Summary of Likely Affected Areas and Existing Environmental Problems or Relevant Objectives	
Opportunity	Information
Timber/woodland expansion	- There was a national planting target of 10,000 hectares (ha) to meet a target of 100 million trees by 2015 - The Low Carbon Scotland Report states a target of 15,000ha per year
Flood risk and overland flow	- NFM continues to expand in the Borders. As this happens it may mean that areas of food production are taken out of 'supply'
Water quality	- Measures to assist diffuse pollution control may take some food production land out of 'supply'
Biodiversity	- Any environmental issues are seen to be when conflict arises with other land use opportunities, particularly food production and some planting on carbon rich soils
Soil Carbon	- Measures to improve carbon storage may reduce productivity of the land or require reduced stocking levels in livestock areas.
Agriculture	- Clear environmental problems are associated with crop planting and livestock grazing. - In the Borders diffuse pollution is a particular problem - There are more fundamental issues associated with increased land cover due to food production
Recreation	- There is potential for disturbance from recreational access (i.e. people disturbing species or damaging habitat). This is countered by the greater knowledge people gain from visiting these areas - Formal recreation brings the potential for greater impacts, including emissions from motorised access or construction
Renewable Energy	- There is a careful balance to be considered between the benefits of renewable energy schemes and their more regional or localised effects. The regulatory system helps to mitigate impacts.

Likely evolution of the environment without the implementation of the Pilot LUS

XII. The Pilot LUS is not intended to be 'implemented' in terms of legislative or policy requirements. It is also not intended to be prescriptive, instead it is seen as educative or a guide to assist land use decision makers.

XIII. It can be seen as the first steps towards a more formal approach to identifying how the potential from the land can be optimised in terms of multiple benefits delivered by ecosystems.

XIV. The work produced also provides information to create a better understanding of the Borders environment and the potential it has. Without this work there would likely be a significant loss in terms of opportunities missed to further the greater understanding of the ecosystems of the Borders and their potential to provide services to society. There would not be the development of education and knowledge. Finally there would not be the

Significant Effects on the Environment

XV. The sum of the environmental assessment, which is detailed within the main body of the Environmental Report, is to identify two constraint interactions and one multiple benefit interaction, these are bulleted below:

- a constraint between increased provision of services for Semi-natural/native woodland, Soil Carbon Storage, Biodiversity enhancements, Water quality enhancements and Flood and overland flow reduction, and impacts on food production;

- a constraint between Semi-natural/native woodland, Soil Carbon Storage, Biodiversity enhancements, Water quality enhancements and Flood and overland flow reduction and commercial timber production; and

- an opportunity for multiple benefits resulting from those same opportunities without food production and commercial timber production

Other Schedule 3 Requirements (Provisions 7, 8, 9, 10 of Schedule 3 of the Act)

XVI. In consideration of these requirements it is critical to note that the Pilot LUS Framework will only be used as an educative tool for information. In itself it will not bring significant environmental effects 'on the ground'.

XVII. However, to help provide a more complete environmental consideration of the two types of constraint interaction some mitigation measures are detailed. For both of these interactions the measures are associated with changes of practices that are evident in both agriculture and commercial forestry.

XVIII. A strategic level monitoring framework is also included this largely relates to operations that already occur but there are a couple of additional measures that it is considered would bring value (i.e. the extent of NFM areas). It is also the case that monitoring of other factors such as water quality, flood risk, soil carbon storage etc. is important in this context because it allows progress in terms of increasing the societal benefits of the land to be recorded, in turn, allowing for more targeted future land use strategy work (should this occur).

1 Introduction

SEA Process

Requirement for SEA

1.1 The Pilot Land Use Strategy (LUS) SEA is a requirement of the EC SEA Directive (2001/42/EC) and the Environmental Assessment (Scotland) Act 2005. In Scotland SEA is a requirement for all public plans, programmes and strategies (PPS) which may have a significant effect on the environment.

1.2 To meet the requirements of the Act 2005 there is a process to examine the significant effects on the environment. It has previously been concluded that SEA was required because the Pilot LUS was considered to apply to the Act in that it would not be exempt under Section 4(3) or 6(1)(a) of the Act 2005; it was a 'Qualifying Plan' because, although not specifically required by legislative, regulatory or administrative provision, it was prepared for town and country planning or land use (and would influence other related processes such as forestry and water management); and it did not relate to a small area or a minor modification to any existing SEA.

1.3 Following the decision on the requirement for SEA there are a number of formal steps that are usually undertaken to ensure compliance with the requirements of the Act 2005. These steps are a Scoping Report; environmental assessment, in the form of an Environmental Report; main consultation; post-adoption statement; and subsequent monitoring.

Scoping Report

1.4 A Scoping Report was completed in January 2014 and was subject to the required 35 day consultation with the Consultation Authorities (Historic Scotland, Scottish Environment Protection Authority (SEPA) and Scottish Natural Heritage (SNH)). The Scoping Report set the context of the Pilot LUS relating it to the national LUS work undertaken, and also a potential role to complement other environmentally focussed projects.

1.5 The main role of the Scoping Report was to introduce the components of this Environmental Report, which is the environmental assessment of the Pilot LUS. A summary of relevant PPS, summary of environmental characteristics of the Borders, consideration of scoping, alternatives and the approach to assessment (methodology) and consultation dates for the Environmental Report, were therefore included.

1.6 Responses to the Scoping Report were received from each Consultation Authority and these have been summarised and a response provided at Appendix 3.

1.7 An overall difficulty in producing the Scoping Report was that the Pilot LUS was still evolving during drafting and therefore assumptions had to be made, particularly with regard to alternatives and the approach to assessment (methodology), because it was not known how the project would progress. As a result the Consultation Authorities could only respond on the

Timeline and Consultation on the Environmental Report

1.8 Within the Scoping Report a timeline was included and given the changes proposed to both the Pilot LUS and SEA processes this has been updated, below:

Table 1: Pilot LUS Framework and SEA Timeline		
Pilot LUS Framework	**SEA**	**Time**
Stage 1: Baseline mapping - *Resource/asset mapping* - *Policy mapping*	Baseline mapping Policy mapping	Complete
	Scoping Report	Complete
	Consultation Authority comments	Complete
Issues Report - Policy drivers and potential gaps/conflicts	Environmental Report drafting	June-Sept 2014
Informal/targeted stakeholder consultation		
Production of framework	Environmental Report complete	Oct 2014
Formal consultation (12 week period)		
Final framework	Post adoption statement	Feb 2015

2 The Pilot LUS Framework

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2.1 The final 'product' of the Borders Land Use Strategy Pilot is to produce a framework which will guide decisions about land use change in the Borders so as to better deliver policy objectives, reduce land use conflicts and maximise complementarities across the spectrum of land use work.

2.2 It is hoped this work can then inform other plans and strategies such as Flood Risk Management Programmes, future Local Development Plans, or regional low carbon strategies. In addition to this the framework may also influence individual decisions, for example on SRDP in relation to both land management and land use change.

2.3 The framework seeks to recognise the drivers of change which will influence land use and related decision making in the Borders. To this end the preparatory stages of the Pilot LUS have completed a policy mapping exercise to identify policies, plans and strategies (PPS) drivers that affect land use in the Borders and where there is the potential for constraints in the aims and objectives of these PPS. This is considered useful to help reduce conflict and maximise complementarities in future Borders land use work. The Policy Mapping work forms part of the Framework but is also a component of the SEA process in that it also examines the relevant PPS, which is a requirement of Schedule 3 of the 2005 Act. Further detail on this work is included at page 26-27 of the Environmental Report and at Annex 1: Scottish Borders Pilot LUS Framework Report.

2.4 Alongside relevant PPS it is also considered that external market issues are a significant factor, the framework cannot influence this itself but it can be a tool to help decision makers in the Borders economy. A wide ranging stakeholder and consultation exercise has been ongoing through the stages of the Pilot LUS, to raise awareness of the purpose of the Pilot and what it will mean for respective Borders communities and businesses.

Structure of the Framework

2.5 It is expected that the final framework will include an on-line tool that provides a spatial expression of both areas of opportunity, where multiple benefits can be maximised, and areas where there may be constraints in land uses in terms of the delivery of the full functions of particular ecosystem services.

2.6 The tool will be accompanied by a clear explanation of the evidence that is relevant to assessing issues such as cumulative impact, economic impact on other land uses, social impacts on communities etc.

2.7 At the time of writing the precise nature of the framework is emerging and there is potential for change, particularly once the full formal consultation is complete.

The Pilot LUS and the SEA- steps taken

2.8 The Scoping Report included a baseline mapping report (also Appendix 1 of the Environmental Report) and this was also the first stage of the Pilot LUS framework. The baseline mapping was essentially the stock of the environment in the Borders. The baseline was examined by the Steering Group and through stakeholder engagement and this led to the identification of 8 opportunities for the Pilot LUS to focus on as the work progressed.

2.9 In turn, the SEA also uses these 8 opportunities to focus on, thus ensuring there is iteration between the Pilot LUS and the SEA. The 8 opportunities are listed below

- Reduction of flood risk and overland flow;
- Water quality improvements;
- Increased timber/woodland provision;
- Increased biodiversity enhancements;
- Increased food production;
- Increased soil carbon storage
- Increased renewable energy (wind) provision; and
- Increased recreation provision.

2.10 Following identification of these 8 opportunities it was decided at the Steering Group that detailed consideration of renewable energy and recreation provision was unnecessary because of the volume of work already available and ongoing in separate processes (for example the wind energy spatial strategy is being updated as part of the Local Development Plan process). However, the SEA does include these opportunities, so as to ensure compliance with consideration of cumulative effects.

2.11 The next stage of the Pilot LUS was therefore to identify a series of indicative 'Opportunity Maps' seen as being most likely to be the subject of change. To decide upon this the steering group and stakeholder consultation was used to highlight where potentially significant changes in land use might be expected in response to climate change or other policy changes. In addition causal chain assessment in this Environmental Report was also used. As a result an almost cyclical process occurred where the causal chain analysis verified possible environmental effects but also changed in line with what was fed back from the steering group and stakeholder work.

2.12 The causal chain assessments examined the 6 opportunities in terms of their possible environmental effects when a high priority, mixed land use or low priority scenario was used for each opportunity in terms of future land use. It was considered this was necessary to examine the full range of possibilities of each opportunity on land use in the Borders and, as a result, to help further identification of where multiple benefits or constraints on land use could occur.

2.13 As a result indicative 'opportunity maps' are produced aligned to the other 6 opportunities originally identified.

2.14 The SEA then examines the relevant national policy for each of the opportunities mapped in a policy mapping exercise. This gives the opportunity to further the knowledge on what significant effects may be expected from changes to these land uses in line with national policy direction. Again there was potential to feed back this information into the opportunity maps as a form of validation.

2.15 The causal chain assessment findings and the policy mapping work were then discussed in combination using proformas. In doing this it was considered that there could be a degree of validation in that the assessment was not significantly different from the respective SEA for each key policy driver. In addition it was considered that the discussion arising from the two assessments could raise issues that the Pilot LUS Framework could examine or incorporate in the later stages of the work.

2.16 To ensure assessment of the opportunity maps and to provide a complete assessment of the Pilot LUS work it was necessary to look at the opportunities identified against each other. This was in line with the Pilot LUS work which identifies opportunity for multiple benefits and for potential challenges. As a result Appendix 4 examined the opportunities against each other, with the overall findings that there was possibility for a multitude of effects but that only two interactions brought significant adverse environmental effects and that one combination brought potential for multiple benefits. This work dovetailed with the opinion of the steering group and stakeholder engagement.

2.17 The flowchart (p14) provides a graphic demonstration of the work undertaken to date.

Influences between the SEA and Pilot LUS Framework

2.18 It is considered completion of the Pilot LUS Framework and this Environmental Report has been a new experience for Scottish Borders Council. It is important to state that there has been almost constant change in the production of both respective documents but crucially that there has also been constant dialogue between those drafting each part.

2.19 The SEA Guidance (Scottish Government 2013) states that SEA has an advisory role to play and that the SEA should add value to a plan. It is considered, for the reasons below that this has occurred, although it is also contended that as this work is a Pilot, it has perhaps occurred informally over any 'traditional' defined process. However, it is judged that production of the Pilot LUS Framework and the Environmental Report can be allowed this informal approach as this has been new work to those involved, particularly the use of an ecosystems approach.

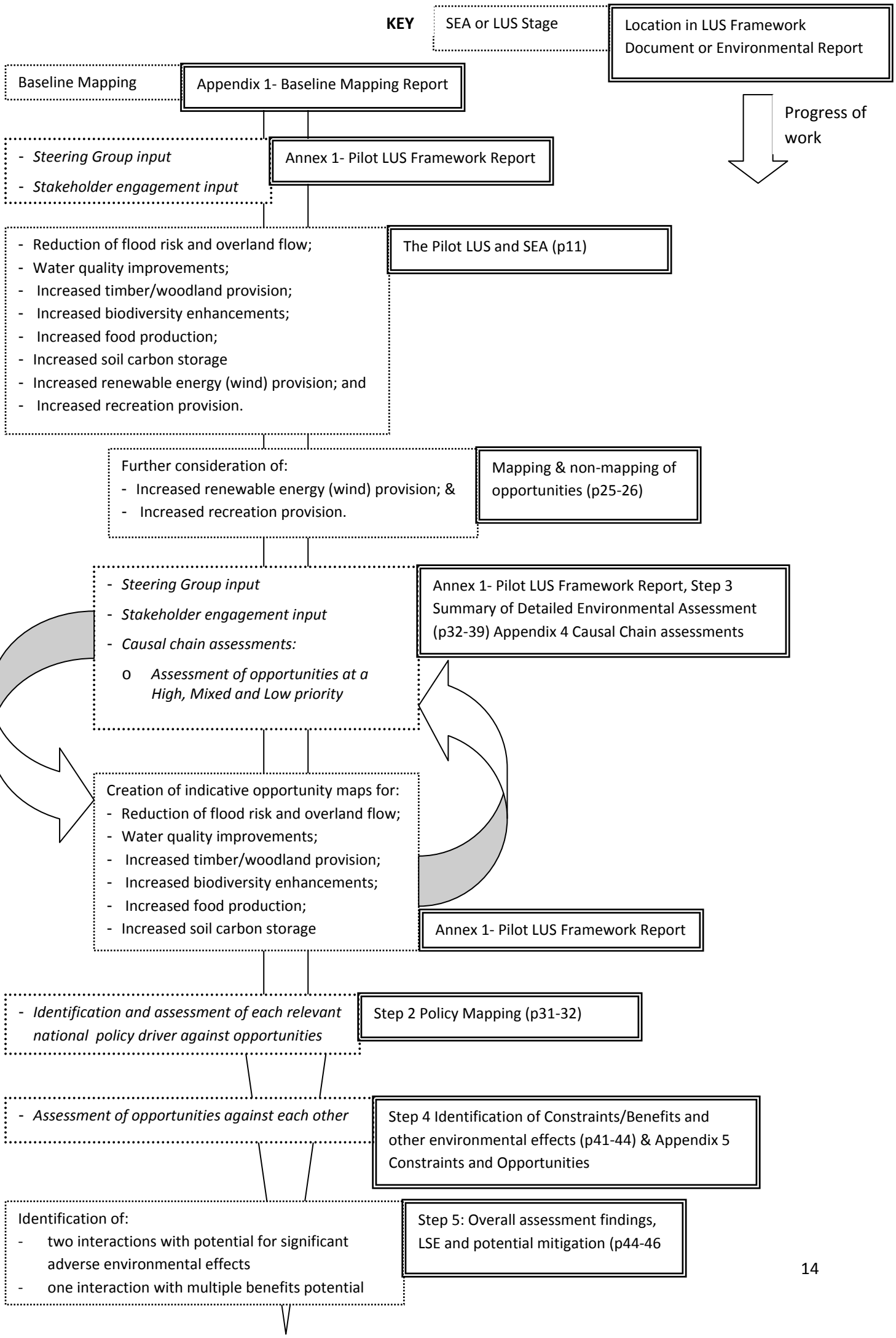
2.20 The Pilot LUS Framework and the SEA could be argued to blur, at a basic level both documents are analysing Borders land use. However, it is important for the SEA to be an "honest interpretation of the likely environmental effects" (Scottish Government 2013: 6). In this case it is considered that despite the similarities the SEA does stand alone and bolsters the Pilot LUS Framework as a result.

2.21 Production of the Pilot LUS framework has involved extensive steering group and external stakeholder input. One point of this work is that it has involved large amounts of detailed environmental knowledge being put forward. The overall task has therefore been to disseminate this information into what is significant and what is not and how the Pilot LUS Framework will present this information in a proportionate way. What the SEA has done is formed part of a cyclical process in terms of the knowledge coming from the steering group and stakeholder input, where the SEA has examined each suggestion and provided the environmental effects independently of the steering group but has provided opinion back and, in turn, has received further iterations of work as it has progressed.

2.22 This has been achieved through the production of the causal chain assessment which identifies positive and negative effects on land use from the opportunities but also identifies where there is considered to be significance. This information has then bolstered similar work within the Pilot LUS steering group and external stakeholder consultation.

2.23 In addition the SEA has formed an integral part of the policy mapping which has influenced the key drivers identified in the Pilot LUS Framework. This has been done by examining a number of Policies, Plans and Strategies (PPS) and their respective SEA assessments and then analysing their findings against the assessment of the opportunities identified in the Pilot LUS. In doing this there is validation which checks that the later stages of the Pilot LUS, where potential benefits and constraints are examined, are in line with national policy drivers.

2.24 In examining the potential for mitigation and monitoring the SEA helps the Pilot LUS Framework consider the future options for the work that has been produced in terms of factors to consider in any future review.


KEY
SEA or LUS Stage
Location in LUS Framework Document or Environmental Report
Baseline Mapping
Appendix 1- Baseline Mapping Report
Progress of work
- Steering Group input
- Stakeholder engagement input
Annex 1- Pilot LUS Framework Report
- Reduction of flood risk and overland flow;
- Water quality improvements;
- Increased timber/woodland provision;
- Increased biodiversity enhancements;
- Increased food production;
- Increased soil carbon storage
- Increased renewable energy (wind) provision; and
- Increased recreation provision.
The Pilot LUS and SEA (p11)
Further consideration of:
- Increased renewable energy (wind) provision; &
- Increased recreation provision.
Mapping & non-mapping of opportunities (p25-26)
- Steering Group input
- Stakeholder engagement input
- Causal chain assessments:
o Assessment of opportunities at a High, Mixed and Low priority
Annex 1- Pilot LUS Framework Report, Step 3 Summary of Detailed Environmental Assessment (p32-39) Appendix 4 Causal Chain assessments
Creation of indicative opportunity maps for:
- Reduction of flood risk and overland flow;
- Water quality improvements;
- Increased timber/woodland provision;
- Increased biodiversity enhancements;
- Increased food production;
- Increased soil carbon storage
Annex 1- Pilot LUS Framework Report
- Identification and assessment of each relevant national policy driver against opportunities
Step 2 Policy Mapping (p31-32)
- Assessment of opportunities against each other
Step 4 Identification of Constraints/Benefits and other environmental effects (p41-44) & Appendix 5 Constraints and Opportunities
Identification of:
- two interactions with potential for significant adverse environmental effects
- one interaction with multiple benefits potential
Step 5: Overall assessment findings, LSE and potential mitigation (p44-46

3 Relevant Environmental Considerations

3.1 This section examines the following requirements of Schedule 3 of the 2005 Act:

- relationship with relevant policies, plans and strategies;
- current state of the environment;
- the environmental characteristics of the areas likely to be significantly affected;
- existing environmental problems (particularly on protected European Sites);
- environmental protection objectives relevant and how taken into account; and
- the likely evolution of the environment without the implementation of the Pilot LUS.

Relationship with relevant policies, plans and strategies

3.2 As a part of Stage 1 of the Pilot LUS a policy mapping exercise was undertaken, this identified a number of local plan policies and certain other relevant policies against ecosystem services and SEA topics. In addition, within the Scoping Report, relevant PPS were identified with a short summary of the purpose of the PPS as related to the Pilot LUS.

3.3 Since this time the relevant PPS work has been built upon to form a key component of both the Pilot LUS and the associated SEA. The relevant PPS have been updated following Consultation Authority comments and to reflect the time that has passed (for example Scottish Planning Policy and the National Planning Framework have been revised since the Scoping Report). In addition, to help identify possible constraints between land uses, an exercise has been undertaken to show which key policy drivers are constrained by each other. To achieve this, the respective SEA assessment for each PPS was recorded against the nine SEA topics (and in turn the relevant ecosystem services) the list of PPS was then narrowed down to the key policy drivers that affect the relevant opportunities that have been identified; for example the Scottish Forestry Strategy was seen as the key driver for the Woodland/timber provision opportunity.

3.4 The result is a spreadsheet (Appendix 4/Sheet: 'Key policy drivers neg effects') which shows 6 key policies and is highlighted red where a possible negative effect is identified in their respective SEA (where available).

3.5 One issue is that SEA for respective PPS documents have been completed following different methods, the assessment therefore may have had to be aggregated to fit the SEA topics, however every attempt has been made to use the most accurate representation (i.e. by using a preferred alternative, or showing mixed results). In addition, not every document has an SEA, particularly legislation, and in this instance, a basic assessment has been made following examination of the respective document. Overall the methodology is a reasonable and proportionate response to the aim to identify conflicts or gaps in policy direction for the land use opportunities identified.

3.6 The findings of the policy mapping spreadsheet are considered to inform the overall assessment of the Pilot LUS and they are discussed in detail at pages 26-27 of the Environmental Report and Annex 1 (Scottish Borders Pilot LUS Framework Report p15, p20-22)

Current State of the Environment

3.7 It is considered most appropriate to examine the current state of the environment for the relevant land use opportunities that have been identified. This information therefore provides context to the baseline mapping report at Appendix 1:

- **Timber/woodland expansion**

3.8 The Scottish Borders Woodland Strategy states that at a baseline date in 1995 it was estimated that there was 2750 individual woodland blocks (greater than 2ha) in the Borders. The average woodland size in the Borders is 30ha and this cover equates to 18.5% of the total Borders land area.

3.9 The majority of forested areas are found to the western sector of the region, bounded to the east by the A7 trunk road to Hawick and thereafter by the A6088 road to Carter Bar. The prevalent forest character is large, upland commercial conifer plantations, which can be subdivided into:

Central Southern Uplands

- the forests of the Tweed Valley and Peeblesshire stretching towards the Region's north west boundary;
- the Craik forest and major forest blocks bounded by the Ettrick and Teviot rivers which extend westward from Selkirk and Hawick towards the regional boundary

Cheviot Hills

- the Eskdalemuir forest complex; and
- the forests of Wauchope and Newcastleton adjoining Kielder forest along the Region's southernmost boundaries

3.10 Tweed lowlands forestry in the eastern part of the Borders is characterised by many scattered, small scale woodlands within a matrix of agricultural land. These stretch from the Cheviots in the South, across The Merse, to the Lammermuir Hills in the north.

3.11 The proportion of ancient and semi-natural woodland is very small, estimated to be only 1.4% of total woodland area or 0.26% of total Borders land cover; this compares unfavourably with other parts of Scotland. It is stated that these fragments are associated with steep slopes along watercourses but that they do have an intrinsically high biodiversity value. The Woodland Strategy also notes the importance of species rich hedgerows which account for 20% of the Scottish resource of this type of 'woodland' (Scottish Borders Woodland Strategy 2005: 16).

- **Flood Risk and Overland Flow**

3.12 The recent SEPA National Flood Risk Assessments show that almost all of the main settlements in the Borders are in "Potential Vulnerable Areas" to flooding (with Duns the exception), in addition many other smaller settlements are located in such areas. Flood risk mapping also shows that flood risk brings the potential to adversely affect environmental, and community and economic assets across the Borders. SEPA is producing the national Flood Risk Management Strategy. The Council, as lead authority, is responsible for producing Local Flood Risk Management Plans under the Flood Risk Management (Scotland) Act 2009. These plans will be consistent with the Flood Risk Management Strategy and are currently under development (first cycle of plans 2015-2021).

3.13 The maps referred to are not available for use within the SEA but they can be accessed on-line at: http://map.sepa.org.uk/floodmap/map.htm

3.14 There are examples of Natural Flood Management (NFM) already existing in the Borders, particularly at Crookston Farm, north east of Galashiels and Eddleston Water.

3.15 Flood risk is also being tackled through Flood Protection Schemes for certain settlements in the Borders (Galashiels, Hawick and Selkirk). As a part of this work, and in line with the Flood Risk Management Act, NFM measures are programmed for Hawick and Selkirk. At Galashiels there is already extensive NFM work (see Crookston Farm at paragraph 3.14) and NFM measures for blanket bog restoration and riparian woodland have been put in place in the Ettrick and Yarrow catchments, these works are the result of biodiversity offset schemes.

3.16 Tweed Forum has also been implementing NFM works within the Eddleston water catchment (remeandering and riparian woodland), Borthwick water (demonstration sites) and Bowmont water catchment.

- **Water Quality**

3.17 The Solway Tweed River Basin Management Plan provides a section on the current condition of the water environment, with a classification process from high to poor- and groundwater as good or poor. Table 2 below summaries the Overall status of surface waters in the Solway Tweed District[1]:

Table 3 Overall status of surface waters in the Solway Tweed District				
Status	**Rivers**	**Lochs/lakes**	**Estuaries**	**Coastal Waters**

[1] The river basin management plan for the Solway Tweed river basin district 2009-2015, chapter 1 state of the water environment (p6)

High/maximum	5	0	5	0
Good	230	7	5	7
Moderate	203	20	1	1
Poor	65	4	0	0
Bad	23	4	0	0
Total	526	35	11	8

3.18 Table 3 shows that for waters in the Solway Tweed river basin district the majority are either in good or moderate condition.

3.19 The Eye Water is included in the Scotland RBMP, within this document it is stated that the overall status of surface water within the Eye Water catchment is moderate (2008: 12). The Eye Water is currently the only SEPA priority catchment in the Borders. It is likely that other catchments within the Solway-Tweed RBMP will be priority catchments within the next cycle of RBMPs (2015-2020) but at the time of writing this is unknown.

3.20 In terms of groundwater status, the Solway Tweed River Basin District identifies that 60 water bodies are in good condition and 13 are in poor condition[2] . The poor condition groundwater affects the Borders around the south east of the region. It is also the case that the groundwater within the Eye catchment is in poor condition[3]

3.21 In terms of the ecological status of surface water bodies the Solway Tweed RBMP shows that there is little disparity between the overall status of surface water and the ecological status (2008:9). The chemical status is generally excellent (2008:9). In terms of the ecological potential of surface water bodies, this applies to artificial or heavily modified water bodies. These are water bodies that have been substantially changed in character as a result of physical alterations or those that could not be restored to good ecological status without significant adverse impacts on the wider environment or on activities dependent on the alterations (i.e. flood protection etc.). Table 3 below shows the ecological potential of heavily modified and artificial surface water bodies[4]:

[2] The river basin management plan for the Solway Tweed river basin district 2009-2015, chapter 1 state of the water environment (p8)

[3] River Basin Management Plan for the Scotland river basin district 2009-2015 (p15)

[4] The river basin management plan for the Solway Tweed river basin district 2009-2015, chapter 1 state of the water environment (p13)

Table 4: Ecological potential of surface water bodies Solway Tweed District						
Ecological Potential Class	**Rivers**	**Lochs/lakes**	**Estuaries**	**Coastal Waters**	**Artificial (Canals)**	**Artificial (Others)**
Good or better	15	4	0	0	0	6
Moderate or worse	42	12	1	0	0	0
Total	57	16	1	0	0	6

3.22 The table shows that there is good ecological potential in a minority of the rivers and lochs but all of the Artificial (Others) show good potential.

3.23 For the Eye catchment the ecological potential is classified as moderate[5]

- **Biodiversity**

3.24 The Borders has a high quality natural environment and this is shown through the number of international, national and local designations. There are 9 Special Areas of Conservation (including 3 Ramsar sites), 5 Special Protection Areas, 96 Sites of Special Scientific Interest and 2 National Nature Reserves. These are shown on http://www.scotborders.gov.uk/downloads/file/4166/policy_maps_0-5.

3.25 In addition to this there are also a number of Local Biodiversity Sites (listed in the Biodiversity Supplementary Planning Guidance). The Phase 1 habitat survey (derived from aerial imagery) estimated 25,393ha blanket bog (5.36% Scottish Borders region); 16,359ha Fens, Marsh, Swamp and reed bed (3.47%); 42,989ha upland heath (9.07ha); 38,981ha acid grassland (8.22ha); and 3753ha neutral grassland (0.8ha)

3.26 The Borders also has a number of Notable Species and Habitats of Conservation Concern and more information on the respective features of these categories can be found within the Council's Biodiversity SPG and Local Biodiversity Action Plan.

- **Soil Carbon**

3.27 The Borders has areas of deep peat soils that have a depth of 0.5m or greater; these are concentrated around the central southern uplands (Wauchope Forest, Newcastleton Forest etc.); the hills above the Ettrick Valley; areas of the Tweedsmuir Hills; and more limited parts of the Moorfoot Hills and the Lammermuirs. In addition, there are category 4, 5 and 6 soils present

[5] River Basin Management Plan for the Scotland river basin district 2009-2015 (p17)

in the Borders which are considered to store significant amounts of carbon; these soils are more widespread (through small fragmented areas) they are also in broadly similar areas to the areas of soil with greater peat depth.

- **Agriculture (livestock and crop opportunities)**

3.28 As stated above the Borders has class 4, 5 and 6 soils present which may be used for grazing. In fact 85% of the land in the Scottish Borders is agricultural (Grassland and Enclosed Farmland in Scottish Borders: 2) with sheep grazing particularly prevalent in the upland areas, to rich arable areas of eastern Roxburghshire and the Merse (i.e. the Prime Quality Agricultural Land areas).The majority of agricultural processes will take place on better quality soils (classes 1, 2 and 3.1) or prime quality agricultural land. In the Borders the extent of this type of land is a broad area covering the Tweed Lowlands and the Merse, from Jedburgh and Earlston right to the Berwickshire coast line (with some small fragmented areas in close proximity).

- **Recreation**

3.29 The Borders has numerous existing recreational options for both residents and visitors to the region. In particular there is an extensive network of core paths for walking, cycling and horse riding, a programme of promoted paths around towns, long distance paths (Southern Upland Way, Borders Abbey way and St Cuthberts way) and Scotland's Great Trails. There are also a number of water access points.

3.30 Recreation is a critical selling point for the quality of life for Borders residents, with a high quality natural environment accessible from the "doorstep" of many residents. There is also a cultural significance to recreational access, with the respective Common Ridings for settlements, now marked each year in the summer months.

3.31 To the west of the region there is more formal recreation with associated visitor infrastructure. The area between Peebles and Cardrona has a multi-use path (or MUP), the Glentress Mountain Biking Centre and a zip wire attraction. This area is a major Scottish Visitor attraction.

3.32 Cultural heritage attractions are also evident throughout the Borders and there are designed landscapes, castles/houses with associated grounds, and numerous other types of assets. At a strategic level these assets range from nationally significant to locally significant. In addition, many assets remain undisturbed or suspected in certain locations.

- **Renewable Energy**

3.33 Land use in the Borders has changed in response to Government targets on renewable electricity generation, with on shore wind generation being the main driver. The Borders currently has 19 consented wind farms over 5MW (with one at appeal) and another 11 pending a decision. In addition there have been 18 further projects either refused or withdrawn from the planning process.

3.34 In terms of wind turbines with a generation capacity below 5MW there are currently 79 projects either developed or with consent (with two at appeal and one at screening) and another 14 pending decision. In addition 79 projects have either been refused or withdrawn.

3.35 Wind farms and small groups or individual turbines are located throughout the Borders, although there is a definite concentration to the north and east of the region. Particularly in terms of the small groups of turbines of varying height. The Landscape and Visual Guidance for Single and Groups of 2 or 3 Wind Turbines in Berwickshire identifies a typology for these groups of turbines ranging from small (20-35m height to blade tip), small/medium (35-50m), medium (50-80m) to large (80m plus) (2013: 18).

3.36 As stated under Woodland/Timber the Borders has a significant forestry resource and this is pertinent to the Renewable Energy section because of the potential for trees to contribute wood to the Biomass sector, as well as for construction and other associated processes. The current scale of biomass production in the Borders is hard to quantify; however it is certainly the case that wood is being exported to meet demand outwith the region. It is also considered that this demand is likely to grow (as discussed at the Environmental Characteristics section below).

Environmental Characteristics of the Likely Affected Areas and Existing Environmental Problems or Relevant Objectives

3.37 The Environmental Report has already examined the current state of the environment in terms of the eight opportunities that have been identified and it is considered that this examination covers the environmental characteristics of the likely affected areas, particularly because the Pilot LUS Framework is a region wide document and so only a strategic level examination is reasonable.

3.38 In addition, the policy mapping exercise has examined the relevant PPS, where relevant environmental objectives are detailed.

3.39 It is therefore judged that this section should examine the environmental problems that have been identified for the eight opportunities. As a result, each opportunity is listed below, with a discussion of identified environmental problems or objectives:

- **Woodland/Timber**

3.40 The Scottish Forestry Strategy states that the Forestry Commission would like to see Scotland's woodlands increase from 17.1% to about 25% and that they believe this to be a feasible target (Scottish Forestry Strategy 2006: 10). This aspiration is now revised to a planting target of 10,000ha originally set to meet a target of 100 million trees by 2015, although in the context of this Environmental Report the aspiration to continue to increase afforestation to 15,000ha per year (Low Carbon Scotland Report: Meeting the Emission Reduction Targets 2010-2022: Report on Policies and Proposals: para 7.4) is considered more relevant.

3.41 The Scottish Borders Woodland Strategy has a target to deliver the national target at a regional level. Environmental issues that might arise in achieving opportunity areas include loss of land available for food production, increased sedimentation, diffuse pollution arising from forestry activities and loss of biodiversity associated with open habitats.

- **Flood risk and overland flow**

3.42 As stated at paragraphs 3.14-3.16, in the Borders NFM measures have been implemented in recent years and projects are continuing. Where areas are planted they are no longer available for food production. Re-wetted areas and changes to land use in the flood plain (increased roughness, seasonal flooding) may also lead to a loss of productivity for food production.

- **Water quality**

3.43 Measures to assist diffuse pollution control, although small scale, would take some land out of food production, for example through buffer strips, increased planting of field edges and water margins and measures to control livestock access to water.

- **Soil Carbon Storage**

3.44 Measures to improve carbon storage (in soil and vegetation) may reduce productivity of the land or require reduced stocking levels in livestock areas. They may also require land to be protected from tree planting or renewable energy installations; particularly on areas of carbon rich soils.

- **Food Production**

3.45 There are clear environmental problems associated with crop planting and livestock grazing and these are well documented. In the Borders diffuse pollution as a result of agricultural processes is a particular problem, as shown in water quality assessments. In addition there are more fundamental issues associated with increased land cover due to food production; in particular loss of habitat and woodland, increased soil erosion and flood risk, and increased carbon emissions. Given the farming heritage of the Borders these more fundamental issues are considered to be significant in terms of land use environmental problems.

- **Biodiversity Enhancement**

3.46 Generally biodiversity enhancement is a positive environmental factor. Any environmental issues associated are likely to be through conflict with other land use opportunities, particularly food production. It is considered that dependent on what biodiversity enhancement is being promoted there may be trade off with other environment improvements, for example planting on carbon rich soils.

- **Renewable Energy**

3.47 There are a large number of renewable energy schemes in the Borders, with on shore wind the significant issue, and there is a defined process before they are installed. Environmental Impact Assessments for certain schemes are designed to ensure any constraints identified are either not significant or can be adequately mitigated.

3.48 Despite the checks in place there is always an element of trade-off, especially given the scale of on shore wind farms. There is also the potential for change introduced by other schemes (such as small scale hydro, development of biomass). It is therefore a careful consideration for the Borders as to the degree which renewable energy schemes, as well as the environmental benefits they bring (carbon emissions savings etc.), should be accepted where there are trade-offs in terms of other land uses.

3.49 Another consideration is the development of biodiversity offsets; there are examples of schemes where additional environmental benefits have been developed in alternative locations after planning consent has been given. Again, the trade-off issue is important to consider here.

- **Recreation**

3.50 Environmental issues associated with recreation are essentially related to non-motorised access. The Borders has a number of core paths and other easily accessible areas, there is potential for environmental damage or disturbance of species from these paths, although the significance of this is hard to judge. It is also considered that where there is access there is also an educative and knowledge building exercise which can result in greater environmental protection.

3.51 The Borders also has more formal recreational opportunities (such as Glentress mountain biking) and these bring the potential for larger scale impacts. However, generally these attractions rely on the environment they are set in to attract visitors and there is also the regulatory framework in terms of dealing with applications and policies to help mitigate potential impacts. Emissions from increased visitor numbers arriving by cars are an overall issue that the Borders should be aware of but again the significance is hard to gauge.

Likely evolution of the environment without the implementation of the Pilot LUS

3.52 The Pilot LUS is not intended to be 'implemented' in terms of a legislative or a policy requirement and it is also not intended to be prescriptive, instead it is seen as educative or a guide to assist land use decision makers.

3.53 However, the revised Scottish Planning Policy identifies the need to have regard to the principles of the Land Use Strategy. In this respect the Pilot LUS may be seen as the first steps towards a more formal approach to identifying how the potential from the land can be optimised in terms of multiple benefits delivered by ecosystems.

3.54 In addition the work that has been undertaken to develop the Pilot LUS; including the stock or baseline mapping, the stakeholder consultation, the identification of constraints and opportunities and the final on-line mapping tool have resulted in significant work to better understand the Borders environment and the potential it has. In addition the awareness and understanding of those who take land use decisions has also been increased and partnerships have been created which, in the future, may prove valuable to further more formal work.

3.55 Without this work it is considered that there would likely be a significant loss in terms of opportunities missed to further the greater understanding of the ecosystems of the Borders and their potential to provide services to society. In addition there would not be the development of education and knowledge that the development process of the Pilot LUS has provided nor that the on-line mapping tool can provide. Any synergy that has been created between the different relevant land use management partners would be lost as would the capacity to better launch a more formal Land Use Strategy.

3.56 Finally without the Pilot LUS the opportunity to better influence future supplementary guidance planning documents; grant funding applications; or developer contributions would be lost and this could lead to less effective projects in terms of gaining multiple benefits from respective Borders ecosystems.

4 Environmental Assessment

Environmental Objectives

4.1 Within the Scoping Report comments from the Consultation Authorities (Appendix 3) the issue of the lack of planned SEA objectives was raised. At the time of writing of the Scoping Report the structure of the Pilot LUS was unclear and as a result the methodology for the Environmental Report was based upon the best information available.

4.2 Since this time the Pilot LUS has developed and more information has become available, this has meant the approach to the Environmental Report has had to change as well. In terms of the issue of SEA objectives there is a debate over whether they are necessary within the continued SEA process.

4.3 The Pilot LUS is not intended to be prescriptive, instead it is designed to inform policy makers, land use stakeholders and others of the potential to realise multiple land use benefits. There will be no promotion of one land use over another and no direction given to change any particular land use.

4.4 In addition, the Pilot LUS concentrates on eight land use scenarios based on opportunities arising from key policy drivers and these fit directly with certain SEA topics, however their fit with other topics is less direct and so the merit of identified environmental objectives across the spectrum of SEA topics is questioned. Added to this is the fact that the Policy Mapping exercise has been informed by the respective aims and objectives of key policy drivers and therefore environmental objectives are already considered to a degree. In fact, the Policy Mapping exercise considers a further dimension to these aims and objectives by identifying where there are constraints between them at a holistic level across the identified opportunities.

4.5 On balance it is considered that a set of overarching environmental objectives are not necessary for the SEA because of the fact that the Pilot LUS is not intended to actually prescribe any land use action itself, instead it is to be a guide to inform those that will take land use decisions. With that in mind it is considered that stating environmental objectives would be incongruous to this. In addition, at a strategic level the Pilot LUS is intended to guide better utilisation of the benefits of Borders land use for the overall environment and instead of assessing against specific environmental objectives, it is more important to look at constraints and opportunities differing land uses bring.

Environmental Assessment Methodology

- **Mapping and Non-Mapping of Identified Opportunities**

4.6 Overall the environmental assessment undertaken has concentrated around the eight scenarios identified within the Pilot LUS.

4.7 Of these 8 opportunities 6 have been mapped to show opportunity areas within the Pilot LUS and this work can be seen at Annex 1. The other two opportunities, Renewable Energy and Recreation are discussed below.

4.8 In terms of renewable energy, there is already work that has been carried out by Scottish Borders Council (SBC) in terms of opportunity for wind energy development with the Spatial Strategy within the Wind Energy Supplementary Planning Guidance (SPG), as well as background documents to the new Proposed Local Development Plan (LDP) which look at landscape capacity and the landscape impacts of small groups of turbines in the Berwickshire area. In addition, since the Pilot LUS process began the new Scottish Planning Policy (SPP) was produced and this changed the position regarding constraints to be shown on spatial strategies. SBC are therefore amending their spatial strategy to respond to the new SPP and the spatial framework will be shown as an opportunity map.

4.9 The Wind Energy SPG and the Proposed Local Development Plan have both been through the SEA process and when the Wind Energy SPG is updated a SEA (update) will be required. However, to meet an assessment requirement within this document, it is considered appropriate to summarise the findings of the Wind Energy SPG SEA within a matrix below and then to consider the potential cumulative and synergistic effects of the Renewable Energy opportunity alongside the other identified opportunities.

4.10 The Pilot LUS work has established that identification of recreation opportunities does not bring significant merit due to the wide ranging nature (opportunities can be found on most land) and land use requirements that recreation falls under. Opportunities will be considered under the review of the Core Path Plan in due course. The stock or baseline map (Appendix 1) shows numerous different types of recreation asset in the Borders that already exist and it is not considered that an environmental assessment of these brings added value to the Pilot LUS and SEA processes. However, recreational access does bring the potential for significant environmental effects and so it is built into the other opportunities where appropriate. As a result recreation is assessed in terms of added opportunity and it can also be assessed in terms of cumulative or synergistic effects.

- **Environmental Assessment Steps 1- Causal Chain Assessment**

4.11 The main part of the environmental assessment has been the assessment of the six scenarios that have opportunity maps within the Pilot LUS. This has been completed following a causal chain assessment (Appendix 4) and a summary table for each opportunity which examines the results from the causal chain assessment.

4.12 The causal chain assessment examines three land use scenarios for each opportunity. The purpose of doing this was to explore the environmental implications of the respective opportunities on land use in the Borders, which in turn could help inform where multiple benefits or constraints from opportunities could be identified in the Pilot LUS Framework. The three scenarios were based upon:

  - a prioritisation of the respective land use opportunity;
  - the respective land use opportunity as part of a mixed land use strategy; and

- a low priority treatment of the respective land use opportunity

4.13 The chains follow a structure which can be summarised as (moving from left to right):

Opportunity → Land Use Scenario XXX → Significant land use effects → SEA topics → Ecosystem services

4.14 At the 'significant land use effects' part of the chain there is an assessment provided on what the perceived effect is in terms of its impact on the Borders environment, the scale used is shown below:

xx- significantly negative
x- negative
0- neutral
?- unknown
+- positive
++- significantly positive

4.15 These effects are then translated to the SEA topics and ecosystem services through the chain by showing positive effects on the subservices (in black text) and the negative effects (in red text).

4.16 It is important to recognise that SEA topics and ecosystem services are assumed to be integrated, so where positive and negative effects are identified they are related to both a SEA topic and one of the four types of ecosystem service. The table below shows the integrated relationship:

Table 5: SEA Topics and Ecosystem Services	
SEA Topics	**Link to ecosystem services**
Air	Climate regulation Atmospheric CO_2 production
Biodiversity, flora & fauna	Awareness & appreciation of natural environment Agricultural goods, fibre, fuel, freshwater Soil quality, water quality, pollination, disease and pests, natural hazard regulation Photosynthesis, habitat, river processes, water cycling, nutrient cycling, atmospheric CO_2 production, biomass production, distinctive wild species
Soil	Patterns and forms of settlements Agricultural goods, fibre, fuel, freshwater Soil quality, natural hazard regulation, carbon storage, water quality, erosion Soil formation, nutrient cycling, water cycling, biomass production, atmospheric CO_2 production
Water	Patterns and forms of settlements, sense of place, tradition, awareness and appreciation of natural environment, awareness and appreciation of historic environment, societal identity Agricultural goods, fibre, fuel, freshwater Soil quality, water quality, natural hazard regulation, erosion

KEY to Ecosystem Subservices

CULTURAL

PROVISIONING

REGULATING

SUPPORTING

	Habitat, river processes, water cycling, nutrient cycling
Climatic Factors	Patterns and forms of settlements, sense of place, tradition, awareness and appreciation of natural environment, awareness and appreciation of historic environment Agricultural goods, fibre, fuel, freshwater Climate regulation, natural hazard regulation, disease & pest regulation, soil quality, pollination, carbon storage, erosion Distinctive wild species, biodiversity, biomass production, atmospheric CO_2 production, water cycling, river processes, habitat
Landscape & townscape	Patterns and forms of settlements, sense of place, tradition, awareness and appreciation of natural environment, awareness and appreciation of historic environment, societal identity Agricultural goods, fibre, fuel, Habitat, river processes,
Cultural Heritage	Patterns and forms of settlements, sense of place, tradition, awareness and appreciation of historic environment, societal identity
Population & human health	Patterns and forms of settlements, sense of place, tradition, awareness and appreciation of natural environment, awareness and appreciation of historic environment, societal identity Agricultural goods, fibre, fuel, freshwater Climate regulation, natural hazard regulation, disease & pest regulation, soil quality,

	water quality, pollination, erosion Biomass production, atmospheric CO_2 production, water cycling, river processes,
Material Assets	Patterns and forms of settlements Agricultural goods, fibre, fuel, freshwater Climate regulation, natural hazard regulation, soil quality, water quality, erosion Biodiversity, biomass production, atmospheric CO_2 production, water cycling, river processes, habitat

Findings from Causal Chain Assessments

4.17 The most important finding from the causal chain assessments was that it was only the high priority scenario for each opportunity that was considered to bring relevant findings for the rest of the Pilot LUS process. This was because there was the least uncertainty as the effects of prioritising an opportunity could largely be established without the unknown of how other land uses would either affect the respective opportunity or how the respective opportunity would affect other land uses.

4.18 Overall the chains also showed that for the opportunities of 'Reduce risk of flooding and overland flow', 'Increased Biodiversity Enhancements', 'Increased Soil Carbon Storage' and 'Water Quality Improvements' that there were generally a series of significant positive or positive effects on the Soil, Water, Climatic Factors and Biodiversity, flora and fauna SEA topics. In addition, there were positive effects on associated regulating, supporting and provisioning ecosystem services. To varying degrees, the same opportunities brought negative effects on more human driven land uses, this was expressed in the chains through effects on SEA topics for Population and human health, Material Assets and Cultural Heritage, and in turn on the Provisioning and Cultural ecosystem services.

4.19 The 'Increased Timber/Woodland Provision' chain introduced a mix of impacts with positives associated with the details in paragraph 4.18 but also converse negative effects when the commercial timber element was assessed. It was also found that the commercial timber element meant that there were more positive effects on human driven land uses, such as on Material Assets, Population and Human Health. A balance was identified between the permanence of semi-natural woodland and the opportunity for commercial timber to contribute to biomass as an alternative to fossil fuel use.

4.20 Food production as a priority raised the possibility of significant positive or positive effects on human driven SEA topics and ecosystem services particularly on Provisioning and Cultural ecosystems, associated with the tradition and economic impact of agriculture and livestock rearing. However, conversely there were significant negative or negative impacts on more 'environmental' land uses, such as semi-natural habitat, carbon storage potential and the knock on effects on SEA topics such as Biodiversity, flora and fauna, Water, Soil and Climatic Factors.

4.21 More detail on the assessment findings is found in the proformas on pages 32-40.

- **Environmental Assessment Steps 2: Policy Mapping**

4.22 To inform the Pilot LUS and the 'relevant plans, programmes and strategies' section of the Environmental Report (p 10-11) a policy mapping exercise was undertaken. This exercise resulted in the identification of key policy drivers for each of the six mapped opportunities. It was considered important to represent the environmental effects of these policy drivers; to do this their respective SEA assessments were examined.

4.23 Wherever possible the table results have not been amended from the relevant assessment within the respective policy driver SEA because the point of the task was not to reassess the documents only to show their potential negative effects which may affect land use decisions in the Borders. However, in some instances the results have had to be aggregated to fit the SEA

4.24 It should also be stated that where a negative effect has been identified in Table 5 it indicates the possible environmental effects at a strategic level and there remains a degree of uncertainty across the results, particularly when applied to a regional level.

4.25 The purpose of Table 5 in the context of the overall environmental assessment of the Pilot LUS is to combine the results presented with the effects identified in the Causal chain assessment to provide a better overall picture of how land use might be affected by each of the respective opportunities identified. Therefore in the summary of assessment for each of the opportunities below, the actual detail of the negative effect identified for the key policy driver is explained in the context of the wider environmental assessment.

4.26 Table 6 is shown below:

Table 6: Respective Opportunities & Key Policy Drivers Assessment										
		SEA Topics	**KEY** **-** - Significant negative; - negative; 0- neutral; ?- unknown; + positive; ++ significantly positive Negative Effect Identified							
Opportunity	**Key policy driver**	AIR	BIODIVERSITY	CLIMATIC FACTORS	CULTURAL HERITAGE	LANDSCAPE & TOWNSCAPE	MATERIAL ASSETS	POPULATION & HEALTH	SOIL	WATER
Timber/Woodland	The Scottish Forestry Strategy (2006)	-/0	?/+	-/++	0	-/+	+	++	?/+	?/+
Food	Scotland Rural Development Programme 2014-2020: Final Proposals	-/0	-/+	-/+	0	-/+	0	0	-/+	+
Soil Carbon	Climate Change Act & Scottish Climate Change Adaptation Programme	+	-/+	++	-/+	-/+	++	++	+	++
Biodiversity	Scottish Biodiversity Strategy 2020 Challenge for Scotland's Biodiversity 2013	0	++	+	-/+	-/+	-	-/+	++	+
Flood Risk	Flood Risk (Scotland) Management Act (2009)	0	-/++	++	+	0	-/++	++	+	-/++
Water quality	WEWS (Scotland) Act 2003; CARS 2005; Scotland RBMP & Solway Tweed RBMP	0	-/++	-/+	-/+	0	-/+	-/+	0	+

- **Environmental Assessment Step 3: Summary of detailed assessment combined with policy mapping**

4.27 The summary of detailed assessment has the objective of bringing together a summary of the Causal chain assessments for the six opportunities that had alternative scenarios applied to them, a summary of the SEA for the Scottish Borders Wind Energy SPG (to introduce the Renewable Energy opportunity into the assessment), a summary of the SEA for the Scottish Borders Core Paths Plan (to bring recreation into the assessment) and the policy mapping work.

4.28 The purpose of combining the two assessment elements was to verify that the subsequent approach to the opportunities, the identification of any multiple benefits or constraints, was in line with the national policy objectives. In addition, by discussing the two assessment elements it was possible to examine potential for further land use factors that became apparent to influence the Pilot LUS Framework work on identification of any multiple benefits or constraints potential.

4.29 It was considered that the proformas should only present a summary of the priority scenario used in the causal chain assessment. This was because the mixed land use strategy scenario and the low priority scenario introduced too much uncertainty in their findings. With the high priority scenario it was clear what the dominant land use would be and therefore more certain as to the effects expected.

4.30 In addition it was considered that in the later stages of the assessment, where opportunities were to be assessed against each other to try to find constraints and multiple benefit potential, it only made sense to use the high priority scenario because to use other scenarios, along with their uncertainty, would become too complex and the findings would therefore not bring value.

4.31 The combined findings are discussed below:

Proforma 1: Timber/Woodland Provision
<u>Causal Chain: Prioritise benefits of timber/woodland provision</u> The assessment results for the chain show that there would be a mix of effects although predominantly these would be positive; there is a divergence in effects due to the difference commercial timber and woodland planted for conservation or restoration purposes. The former brings more negative effects, for example if forest design is not actively considered in planting, if there is erosion and run-off associated with felling and planting, there are potential impacts on water quality and biodiversity and due to the need to access and then transport the product. However, there are positives from commercial timber production due to the possibility of wood being used to generate heat (and electricity) and to displace fossil fuel heating sources, and by the fact that trees will absorb carbon and provide habitat. Semi-natural or native woodland planting for conservation or restoration is seen to bring more permanent positive effects, through carbon storage, soil formation, habitat provisioning, helping to avoid increased erosion and flood risk, and in terms of processes such as water cycling, nutrient cycling, climate regulation and photosynthesis. Negative effects are identified

dependant on location, if woodland replaced certain land uses, such as peat land and species rich grassland certain species would suffer or there may be an adverse cultural effect if farmland was replaced, due to the farming heritage of the Borders and impacts on archaeological sites.

Recreational access brings economic benefits but also the potential for adverse effects due to access disturbing species or causing destruction of habitat. The design of planting also brings mixed effects, if this is done in line with relevant guidelines then there should be better consideration of the landscape and cultural heritage assets bringing a positive effect but if the converse occurs then the opposite effect would be expected.

Key policy driver: Scottish Forestry Strategy

The findings of the SEA undertaken for the strategy are based around three outcomes. Outcome one is associated with improved health and wellbeing of communities, positive effects are found for biodiversity, landscape and population and human health. These effects relate to implementation of the Scottish Biodiversity Strategy, halting the loss of biodiversity and increasing awareness and understanding of the natural environment. Minor negative effects are identified associated with timber expansion.

Outcome two is associated with competitive and innovative businesses contributing to the growth of the Scottish economy, positive effects are found for population and human health (significant), climate and material assets. These effects relate to the contribution to wood fuel and sustainable construction, and the related benefits these factors bring.

Outcome three is associated with a high quality, robust and adaptable environment; significant positive effects are identified for biodiversity, water and soil. These effects are associated with a forestry playing a supporting role in a mixed land use approach, with carbon sequestration being a major factor. Negative effects are identified which relate to the impact of a lack of wood contribution to fuel and heat generation and the impacts of rapid carbon sequestration on landscape and biodiversity.

Overall assessment/findings for timber/woodland provision

It is considered that the two assessments are broadly similar with the potential for significant positive impacts from carbon sequestration and wood fuel highlighted in both. There is also identification of the negative side of timber for commercial purposes. The Causal chains do not bring out the risk of rapid carbon sequestration and this is something the Pilot LUS and SEA could consider further.

Overall it is considered that increased woodland/timber provision brings positive effects on the Borders environment, particularly for semi-natural/non-native species planting.

Proforma 2: Reduce risk of flooding and overland flow

Causal Chain: Prioritise flood and overland flow reduction

The chain for this scenario identifies a number of significantly positive or positive effects. These

relate to increased biodiversity and carbon storage potential and their associated effects on the Biodiversity, Climatic Factors and Soil SEA topics. In addition there is also potential for significant positive effects from hydrology/drainage changes, this would be for a number of SEA topics. It is also considered that local economic benefits would result.

One negative effect is associated with the use of land for water storage or changes to river courses etc. which might replace land which is either productive for agriculture or wood fuel, or would adversely affect a certain species or habitat.

Overall it is considered that flood and overland flow reduction is one area where multiple benefits are highly likely; the reasons for this vary from increased soil quality and decreased soil erosion, improved biodiversity and water quality to better production from agricultural land and increased security for the population and their property.

Key policy driver: Flood Risk (Scotland) Management Act 2009

The Act does not have a SEA and so the main implications of the Act on the respective SEA topics have been examined.

The Act introduces a number of provisions related to flood risk management plans, responsibilities for SEPA, Scottish Water and Scottish Borders Council, and flood protection schemes.

Overall significantly positive or positive effects are expected due to the requirements of the Act, this is similar to the assessment for the priority scenario above; the Act seeks to reduce the impact of flooding and so positive effects can be expected on biodiversity, soil quality, climate regulation and the water environment. In addition there are socio-economic benefits in terms of protection of productive land, property, human health and cultural heritage assets.

As a trade-off it is considered likely that where construction would be necessary to implement flood risk work there is potential for adverse effects on biodiversity, material assets, cultural heritage and the water environment. However, the significance of this cannot be assessed at this level.

Overall assessment/findings for reduce risk of flooding and overland flow

It is considered that the priority brings the potential for multiple environmental benefits. Interestingly the benefits transcend the environmental versus socio-economic factors that are evident in assessments for other opportunities. It is also considered that the Causal chain assessment fits with the requirements of the Flood Risk Management (Scotland) Act.

If a land use strategy was built around flood risk and overland flow reduction then there would need to be consideration of the impacts of changes to the water environment on certain species and habitats, and for land uses, such as timber or agricultural land. These land uses may depend on efforts to reduce flood risk in the face of future climate change to maintain productivity levels

Proforma 3: Soil Carbon Storage

Causal Chain: Prioritise increased soil carbon storage

The chain shows that for this land use scenario there are a range of effects across all of the SEA topics; predominantly the effects are positive although competing land uses raise the possibility of negative effects.

Significantly positive and positive effects identified are associated with reduced greenhouse gas emissions, decreased flood risk and run off, protection of cultural heritage assets and increased biodiversity and semi-natural woodland cover potential. There are positive impacts on the soil and water environment both in terms of regulation and supporting ecosystem services. In addition, it is considered there are related biodiversity benefits in terms of habitat provisioning and distinctive species. Less disturbance of the soil resource brings protection for undiscovered cultural heritage assets.

Negative effects focus on the socio-economic land use; greater protection of the soil resource for carbon storage may mean less potential for agricultural use for crops or timber, this would adversely affect the provisioning ecosystem services. In addition, it is considered that the Borders has a heritage in farming and it has shaped the landscape and the economy, a shift away from this would have adverse effects in terms of cultural services such as tradition and sense of place.

Key policy driver: Climate Change Act and Scottish Climate Change Adaptation Programme (SCAP)

The SCAP is a requirement of Section 53 of the Climate Change Act. The SCAP SEA found that positive effects could be expected for the population and human health, soil, water, air, cultural heritage, biodiversity and material assets SEA topics. These were associated with measures to increase understanding of relevant issues associated with climate change; to increase the resilience to forestry, agriculture and fishing sectors; and to alleviate flooding.

Possible negative effects identified were on the landscape, biodiversity and cultural heritage SEA topics. These were associated with uncertain effects arising from flood risk measures.

Overall assessment/findings

It is considered that the SCAP SEA raises positive impacts which are also identified within the Pilot LUS priority causal chain, particularly resilience of forestry and alleviation of flooding. It is noted however that resilience to agriculture is treated more favourably than in the Causal chain assessments and this may be down to the assessment of sustainable agriculture practices.

The impacts of agricultural processes are key to the soil carbon storage land use opportunity. Crops or grazing make up a large percentage of Borders land cover and there is a direct

constraint between this land cover use and efforts to promote greater carbon storage.

Proforma 4: Biodiversity enhancement

Causal Chain: Prioritise biodiversity enhancements

The priority chain shows that significantly positive effects could be expected particularly for the air, biodiversity, climatic and soil SEA topics. These positive effects are associated with the carbon storage potential of habitat provision, the benefits to species and extent of habitat. In addition there would be significant benefits expected in terms of ecosystem sub-services such as photosynthesis, nutrient cycling, soil formation (supporting) and climate regulation, soil quality, pollination (regulating).

Possible negative effects are also identified, for example if biodiversity was prioritised there may be net losses of land for agricultural production which would have adverse effects on population and human health and cultural heritage, in terms of food and timber provision and societal identity, tradition and sense of place. There is also a risk that certain peat soils may be replaced with planting to encourage greater biodiversity.

Key policy driver: Nature Conservation (Scotland) Act

A key component of the Act is the Scottish Biodiversity Strategy and so the SEA for this document has been examined. The SEA presents 4 possible scenarios and it has been judged that the 'deep ecology' findings should be used here. This is because it best represents the promotion of biodiversity opportunity. The SEA is undertaken using an ecosystems approach, and so the findings are represented by ecosystem services and sub services.

Aside from an evident significant positive effect on the Biodiversity SEA topic (habitats provision, distinctive wild species); positive effects are also found on the soil resource (soil formation, nutrient cycling, soil quality, erosion) and on the climate (carbon storage). More mixed effects are expected on material assets (impacts on coastal defences and hard engineering v soft engineering approaches) and on cultural services, such as heritage and aesthetic values, for example impacts on land management activities, sense of place and health benefits.

Overall assessment/findings

It is considered that provision of biodiversity enhancements as a land use change has a constraint in the form of provisioning for agricultural goods and timber, along with the cultural heritage benefits these services provide.

It is also important to note the consideration that agriculture as a land use may depend to a degree on the ecosystem services biodiversity provision provides to help mitigate or adapt to climate change.

Proforma 5: Food Production

Causal Chain: Prioritise agricultural land provision

The assessment shows that there are significant positive effects expected in terms of the population and human health SEA topic because of the economic potential and the potential for increased agricultural products or fuel. In addition a positive effect is expected on cultural heritage as this approach allows for maintenance and the increase of agriculture in the Borders which is a traditional land use and is integral to the cultural ecosystem services of sense of place and tradition. There would also be a positive effect for the Material Assets topic, as the growth of biomass crops would help to displace fossil fuel use and local food production reduces transport emissions.

Negative effects would be expected in terms of the constraint expected on land uses which would promote biodiversity or carbon storage and therefore the Biodiversity and Climatic Factors would experience negative effects. In addition a negative effect could be expected on the Material Assets SEA topic due to the increased need for water and access to transport goods (especially exporting out of the Borders). Finally it would be expected the pressure on the soil and water environments in terms of soil erosion, nutrient cycling, water quality and soil quality would increase and as a result negative impacts on these SEA topics would also be expected.

Key policy driver: Scotland Rural Development Programme 2014-2020: Final Proposals (SRDP)

The relevant Pilot LUS scenario focuses on the food production element of the SRDP (i.e. Pillar 1) and as a result the environmental effects associated with this element are represented here by examining the findings of Casual Chain 1 of the SRDP SEA, 'LFASS and Food Quality Schemes'.

The results of the assessment of the above 'LFASS and Food Quality Schemes' find that there would be mixed effects on biodiversity associated with either less grazing pressure (positive) or more intensive/extensive land management (negative). In terms of Soil mixed effects are expected associated with the land management proposed, where less active land management is prevalent this is seen as a positive, however where it is more intensive it is expected to bring pressure on soils (negative). Due to the standards and practices associated under food quality schemes it is expected diffuse pollution would be reduced, in addition increased farm efficiency would result in less pressure on water resources; both of these factors would bring positives on the Water SEA topic. Mixed effects are expected in terms of Climatic factors, this is associated with erosion risk and loss of soil carbon but standards and practices of food quality schemes reducing GHG emissions from holdings. In terms of the landscape there is a balance between retention and protection of diverse habitat mosaics improving landscape character and more intensive/extensive land management resulting in the loss of landscape character; again this means mixed effects are possible.

Overall assessment/findings

The priority Causal chain shows a significant constraint with the other opportunities discussed, this illustrates the constraint between the socio-economic land use and the promotion of more environmental benefits. Increased food production, at a basic level, does not bring the potential for multiple land use benefits, although it is clearly critical for the population and economy of the Borders.

The SRDP SEA for the 'LFASS/Food Quality Schemes' presents a mixed assessment in terms of positives and negatives, particularly finding positive effects for the water environment. However overall in terms of a constraint of land use from food production it is considered there is broad agreement between the two assessments

It is considered that certain opportunities such as Flood and overland flow reduction and Water Quality improvements bring changes that would positively impact on Increased Food Production, such as increased resilience to climate change from reduced flood risk, or increase in yields due to improved water flow.

Proforma 6: Water Quality

Causal Chain: Prioritise increasing water quality

Generally the Causal chain identifies positive or significantly positive effects from the scenario. Aside from the Air SEA topic, there are positive effects on all of the other topics. These effects relate to less sedimentation in the water, better drinking water, natural flood management opportunities and increased biodiversity potential. In turn this means positive effects which are environmentally beneficial including climate regulation, soil quality and natural hazard regulation (regulating); erosion, habitat provisioning, nutrient cycling and river processes (supporting); and for fibre, fuel and freshwater (provisioning); and recreation, and awareness and experience of the natural environment and the Borders landscape (cultural).

There is the possibility of a converse negative effect on food, fibre and fuel (provision) due to the possibility of storage areas for natural flood management being located on agricultural land. In addition recreational access brings the potential for negative effects on Soil and Biodiversity due to disturbance of habitat (including soils) and species.

Key policy driver: The River Basin Management Plan for the Scotland River Basin District 2009-2015 and the Solway Tweed River Basin Management Plan (RBMP)

Two SEA documents were produced for the respective RBMPs although the assessment findings are similar.

The SEAs find significantly positive or positive effects on the Soil, Biodiversity and Water SEA topics. The effects are related to addressing diffuse/point source pollution, dealing with non-native water species, better abstraction controls and morphology improvements. In addition

there are also positive effects on the Population and Human Health SEA topic, due to pollution reduction because of the impact on bathing and drinking water, and the Climatic Factors and Material Assets SEA topics, due to sustainable flood management and greater efficiency in water usage.

Conversely negative effects were also identified in terms of transfer of impacts (Biodiversity and Water); possible changes in water supply output (Population and Human Health); increased energy consumption and greenhouse gas emissions (Climatic Factors); and increased waste production (Material Assets).

Overall assessment/findings

Prioritising increasing water quality is assessed as bringing the possibility of significant positive or positive effects across the spectrum of SEA topics/ecosystem services. In addition, the two chain assessments also show that positive effects would impact across environmental issues and more human issues, which shows the potential for multiple benefits.

When judged against the Key Policy Driver(s) environmental assessments it is considered there are common findings in terms of positive effects related to biodiversity, bathing/drinking water and reduction of pollution. In terms of negative effects the Pilot LUS should be aware of the findings of the RBMP SEA, which include: transfer of impacts from one area to another, changes in water supply output and the potential for increased greenhouse gas emissions. However, it is not possible to assess the significance of these potential negatives as the required level of detail is not available in the Pilot LUS.

Proforma 7: Renewable Energy

Key policy driver: Wind Energy SPG

The Wind Energy SPG SEA focuses the assessment on the protective nature of the policies, D4 of the Consolidated Local Plan, the detail of the SPG itself, and the spatial strategy document produced. Overall the findings are positive for topics Biodiversity, Population and Human Health, Soil, Material Assets, Cultural Heritage, Water and Landscape. Essentially the positive effects relate to the provision for either protection of Borders assets or mitigation of any negative effects which could arise from applications.

Overall assessment/findings

At the time of writing the position on wind energy from a policy perspective is likely to change, possibly to a significant degree. The new Scottish Planning Policy puts forward an approach to spatial strategies that reduces the number of constraints that can be considered and this may mean that the distillation of local planning policy cannot protect the Borders environment from adverse effects of wind farm development as effectively. In particular there may be increased risks in terms of the landscape, cultural heritage assets and local biodiversity assets because of the removal of these assets from constraint status in spatial strategies.

It should be noted that as the work is being undertaken there may be upcoming environmental assessment and so no judgements should be made until this occurs.

Proforma 8: Recreation

Key policy driver: Core Paths Plan

The Core Paths Plan (2003) was subject to a SEA that helped inform both the draft and finalised strategies and this is considered to be an appropriate key driver, as recreational access is considered to bring potentially significant environmental effects. Mixed effects were identified in the assessment, particularly for the Biodiversity and Landscape SEA topics; in addition there was a degree of uncertainty over the Cultural Heritage topic. The negative impacts essentially related to the possibility of new paths and their impacts on existing habitats, heritage assets or landscape features, or the effects of too many people accessing paths and causing harm.

Conversely it was also found that there would be positives effects and that where these were anticipated on the SEA topics listed above; they would outweigh the negative effects identified. Positive effects were expected related to increased awareness and education on natural and cultural assets and a desire to protect the landscape being accessed. In addition, in terms of the Material Assets SEA topic, it was expected that integrating green space and access routes would bring positive effects. Finally there were obvious positive effects in terms of the Population and Human Health topic, relating to health (mental and physical) benefits, education, awareness and societal identity.

Overall assessment/findings

Recreation in terms of a positive and a negative effect has been built into the relevant opportunities assessment chains and the reasons for doing this are closely related to the positive and negative effects identified above. It is considered that the relationship between the education/awareness benefits outweighing the risk of damage from over access or access to sensitive sites is not as fully drawn out in the chain assessment and this should be borne in mind for overall consideration.

The SESplan Strategic Development Plan and the Proposed Local Development Plan (LDP) both seek to exploit the benefits of green networks and it is encouraging to see that the fundamentals of this approach are identified as a positive in the Core Paths Plan SEA from 2003. This work is to be fully articulated in Supplementary Guidance once the LDP is approved.

- **Environmental Assessment Step 4: Identification of Constraints/Benefits and other environmental effects**

4.32 The Proformas, casual chain assessments and the representations of the key policy drivers result in a series of possible positive and negative effects from the individual opportunities considered in detail.

4.33 The final stage of the environmental assessment is therefore to examine the individual opportunities and their environmental effects in terms of their impacts on other opportunities. In doing this it is possible to show where there are constraints between opportunities and also the possibility of multiple benefits.

Methodology for identification of constraints/benefits and other environmental effects

4.34 Appendix 4 is a spreadsheet ('ID of constraint and opportunity') that details the eight opportunities cross referenced to show where there is either a constraint (highlighted in red) in terms of a significant negative interaction or potential conflict in land use; a significant benefit (highlighted in green) in terms of a significant positive interaction; or in amber, where it is considered there would be minor mixed constraint(s) or benefit(s), or conflicts in land use which are not considered to be significant i.e. which were not subsequently mapped for constraints or multiple benefits in producing the Pilot LUS Framework.

4.35 The 'ID of constraint and opportunity' Sheet aligns with the key interactions and multiple benefits work contained within the Pilot LUS framework, which was developed concurrently. The Sheet provides a text summary of the key consideration that result in either a red, amber or green classification. In addition the environmental effects of the interactions between the opportunities are shown and this allows the environmental assessment component to be shown i.e. effects on SEA topics and ecosystem subservices.

Constraints and Benefits Findings

4.36 In the context of the Pilot LUS it is considered that where there are significant interactions identified for multiple benefits (i.e. green boxes in Appendix 4) and where there are significant negative interactions or potential constraints in land use (i.e. red boxes), this is where the assessment should concentrate. As a result, below, the benefits and constraints that are considered to be significant to the assessment are detailed but there is also justification of the findings considered to be non-significant land use constraints (i.e. amber boxes) as well.

Multiple-benefits (green boxes)

4.37 An inter-relationship identified that has the potential for multiple benefits is between the opportunities Water Quality Improvements, Flood and Overland Flow Reduction, Biodiversity Enhancement and Soil Carbon Storage. It is considered there is little constraint between these land usages and that this is because of their close associations; for example Flood and Overland Flow reduction land use effects positively impact on water quality due to less sedimentation entering the water environment, in turn this provides better habitat for species and increases potential for soil carbon storage, as there is less soil disturbance and greater planting (important for further soil formation.

4.38 A further dimension to this multiple benefit relationship is in the Timber/Woodland Provision opportunity; however this is more complex due to differing types of woodland planting. The benefits are only seen in terms of increased semi-natural/native species planting, due to their permanence and their potential to contribute to natural flood management, soil formation and habitat provision.

Constraints (red boxes)

4.39 The significant constraint identified is associated with an increase in provision of key ecosystem services and impacts on food production. Food production is shown to have a negative interaction and constraint in terms of land use with other opportunities: Timber/Woodland Provision, Flood and overland flow reduction, Water quality improvements and Soil carbon storage.

4.40 Aside from the fact that increasing food production would, in some instances, require land that could be used to exploit the significant benefit relationship identified. It would also bring negative environmental effects, as shown on Sheet 5. These would be associated with adverse impacts on soil erosion and quality, water quality and cycling, habitat provision, distinctive wild species, natural hazard management and climatic factors such as adapting to climate change or mitigating increased flood risk.

Mixed- constraints or benefits considered to be non-significant (amber boxes)

4.41 The majority of the amber findings are associated with the mix of impacts that timber/wood provision brings on the other opportunities. As summarised at paragraph 4.34 above. In addition to this there is also a constraint identified with renewable energy provision, this is linked to the fact that both forestry and on shore wind generation (particularly wind farms) are found in similar upland areas.

4.42 Renewable energy also constrains increased soil carbon storage; in that upland areas have areas of soil with carbon storage potential or areas of deep peat soil. In addition, there may also be a constraint with habitat provision, although the regulatory process does tackle this through the EIA process. In addition there is a negative constraint interaction between on shore wind provision and recreational access, particularly in terms of the visual impacts of turbines on core paths and other popular walking routes.

4.43 Aside from with Renewable Energy (wind) it is not considered that recreation provision brings significant constraint or mixed benefits because recreation in the Borders can occur around all of the other land use opportunities and is not in competition. This is not to say there are not environmental effects from recreation but that is a different matter and is tackled in the relevant proforma at page 41.

4.44 Overall these issues discussed are not considered to be significant because they do not give rise to any issues that would significantly harm the environment nor provide multiple benefits. It is also considered that there is a greater possibility of co-existence than with the Benefit or Constraint inter-relationships.

Cumulative and synergistic effects and interrelationships

4.45 In terms of the three types of inter-relationship identified it is only considered that cumulative or synergistic effects are possible for the opportunities Water Quality Improvements, Flood and Overland Flow Reduction, Biodiversity Enhancement and Soil Carbon Storage. In this instance it is considered cumulative effects as detailed below would be possible:

- Binding of soil and water storage reduces flood risk
- Planting and leaf litter helps increase soil quality
- Planting and leaf litter helps increase soil quality which in turn increases carbon storage potential

- **Environmental Assessment Step 5: Overall assessment findings, LSE and potential mitigation**

4.46 It is considered that the relationships identified above, in the final part of the environmental assessment, for Constraints and Benefits can be further explored through Table 7 (below). The purpose of the table is to present the overall assessment findings more clearly including the likely significant environmental effects:

Table 7: Presentation of overall assessment findings and likely significant effects	
Interaction 1	Soil Carbon Storage-Biodiversity Enhancement - Water Quality Improvement- Reduction of flood risk and overland flow and their impacts on food production
Interaction Status	Constraint
LSE	SEA Topics: Soil, Biodiversity, Water Quality, Climatic (all +/++); Material Assets, Cultural Heritage and Population and Human Health (-/+) Ecosystem sub-services: soil quality, erosion, natural hazard management, nutrient cycling, water quality, habitat provision, distinctive wild species (all +/++), tradition, societal identity, food, fibre (all -)
Interaction 2	Soil Carbon Storage-Biodiversity Enhancement - Water Quality Improvement- Reduction of flood risk and overland flow and their impacts on food production- semi native woodland and their impacts on timber provision
Interaction Status	Constraint
LSE	SEA Topics: Soil, Biodiversity, Water Quality, Climatic (all +/++); Material Assets and Population and Human Health (-/+) Ecosystem sub-services: soil quality, erosion, natural hazard management, nutrient cycling, water quality, habitat provision, distinctive wild species (all +/++), food, fibre (both -)

Interaction 3	Increased Woodland Provision-Water Quality Improvements-Flood and Overland Flow Reduction-Soil Carbon Storage-Biodiversity Enhancement
Interaction Status	Multiple benefits
LSE	SEA topics: Air, Water, Soil, Biodiversity, Climatic, Material Assets (all + or ++ overall) Ecosystem subservices: Water cycling, water quality, soil quality, nutrient cycling, erosion, natural hazard management, habitat, distinctive wild species (all positive)

4.47 Schedule 3 of the Act 2005 states that consideration of mitigation should take place. For the LUS SEA it is considered that any discussion is, like the Pilot LUS Framework outputs, only for information. This is because the Pilot LUS Framework is only for information and has no legislative or regulatory grounding.

4.48 However, in terms of Interaction 1 it is considered that existing sustainable agriculture practices would help to mitigate some of the negative impacts from food production that are identified, such measures would include:

- Measures to preserve water and soil quality in agriculture practices
- Managed use of fertilisers and water
- Greater planting and diversity of planting on field edges
- Greater protection of hedgerows and their biodiversity value
- Food Quality Scheme (as a part of CAP/SRDP) requirement

4.49 In terms of Interaction 2, a similar employment of sustainable commercial forestry practices would help to mitigate negative impacts, these measures could include:

- Increased usage of Forest Management Plans or similar processes
- Promote increased mix of planting, with increases in native species
- Increased use of Low Impact Silvicultural Systems (LISS)
- Consideration of restructuring felling.

4.50 Mitigation is not considered for Interaction 3 because of its potential to deliver multiple benefits.

Environmental Enhancements

4.51 Overall it is considered that the Pilot LUS Framework, through the multiple benefits opportunity maps (contained within Annex 1) provide for the potential for environmental enhancement. This is because these maps show where it is considered land use in the Borders could be optimised to deliver multiple benefits that would have a significant positive impact on various parts of the Borders environment as detailed under Interaction 3.

5 Monitoring

5.1 The Pilot LUS is to be articulated in the form of a framework which will be an on-line mapping tool where the significant constraint and multiple benefit opportunity layers can be compared against each other by turning them on and off. This allows the specific land areas where constraint and multiple benefit opportunities are and can help inform land use decision making as a result.

5.2 Although the Land Use Strategy is a requirement of the Climate Change (Scotland) Act 2009 and the new Scottish Planning Policy has regard of the principles of LUS; there is currently no obligation for public bodies to produce a regional framework. As a result the Council will not formally adopt the Pilot LUS and it will be used for information and this could make monitoring challenging.

5.3 However, there is monitoring of certain environmental factors that directly relate to both the constraint and multiple benefit inter-relationships identified and it is considered this ongoing monitoring would directly influence any iteration of the Pilot LUS that may occur in the future, as it would show the state of the environment and any changes that have occurred. Where known this monitoring is detailed below at Table 8:

Table 8 Relevant Monitoring Applicable to Significant Inter-relationships

Relevant Environmental Factor	Monitoring Undertaken	Responsible Authority
Water quality	- Surface water status - Groundwater status - Ecological potential - Chemical status - Ecological status	SEPA (RBMP updates)
Flood risk and overland flow	- Potential vulnerable area extent - Fluvial and coastal flooding extent - Surface water flooding extent	SEPA (Flood risk maps)
	- Natural Flood Management area extent	Scottish Borders Council (SBC)
Biodiversity enhancement	- Site condition monitoring	SNH

	- Number/extent of Borders Notable Species and Habitats of Conservation Concern	SBC /The Wildlife Information Centre
Soil Carbon Storage	- Extent of carbon rich and deep peat soils	JHI/ SNH
Timber/woodland provision	- Extent of native species - Extent of ancient and semi-natural woodland - Extent of commercial timber planting	Forestry Commission Scotland
Food production	Agricultural statistics	Scottish Government

6 Conclusions

6.1 The development of the Pilot LUS framework has been a challenging task in terms of the nature of the work carried out to reach the main consultation stage. A large amount of information has been processed and there have been numerous discussions of the intricacies of the Borders environment and the inter-relationships the ecosystems present have.

6.2 In turn there have been related challenges in completing this Environmental Report. In particular the fact that the Pilot LUS is not a prescriptive document has meant that a more informative and integrated SEA has resulted over a SEA that provides assessment against objectives and suggests mitigation to overcome negative effects identified. In addition, the methodology has also differed in that the policy mapping, and associated identification of relevant PPS, has played a greater role in the SEA than is perhaps 'traditional'. The relevant PPS and their objectives have been linked into the assessment to help show the relationship between policy direction and land use impacts. Finally the causal chain assessment has meant a complex appraisal of the impacts of different alternatives on different land use implications on different SEA topics and ecosystem services/sub-services.

6.3 Having completed these various steps it is considered that there is a greater appreciation of the Borders environment and potential of the various ecosystem services it provides. In particular, the SEA has shown the potential environmental effects of various interactions and two significant factors have emerged.

6.4 A multiple-benefit interaction between semi-natural/native woodland planting, water quality improvements, biodiversity enhancement, soil carbon storage and reduction of flood risk and overland flow, is considered to have little inherent constraint between the different land use priorities that would be required. It also brings significant positive and positive effects across the SEA topic and ecosystem service/sub-service spectrum, as well as across an identified gap between socio-economic factors and environmentally driven factors. Improvements in water quality and reduction of flood risk/overland flow are benefits that positively impact on almost all SEA topics. In addition, soil carbon storage, increased woodland and biodiversity enhancements, as well as reduction of flood risk bring significant potential to help mitigate or adapt to climate change in the Borders.

6.5 This multiple-benefit interaction is then shown to be different when commercial timber is considered rather than semi-natural/native woodland planting. There are obvious benefits to planting trees but it was important to recognise the differing demands that commercial timber production brings in terms of environmental impacts when compared to semi-natural/native woodland planting. In particular, commercial timber production brings more potential for negative effects.

6.6 A significant constraint identified which is food production with the inter-relationship identified above. Increased food production brings significant positive effects on the Population and Human Health and Cultural Heritage topics, as well as a mix of positive and negative effects on the Material Assets topic. The positive effects are associated with the economic, provisioning and tradition/identity factors associated with the Borders history of farming. However, there is a clear constraint with promotion of increased food production in terms of its impact on other

elements of the environment, particularly to do with the soil, water and biodiversity and semi-natural/native species planting.

6.7 The constraint interactions are areas where it is anticipated increased joint-up working is needed, to help mitigate the impacts of climate change and to then in turn help keep land as productive as possible. Mitigation measures are introduced but it is considered that for the purposes of this document the opportunity and constraint mapping are the prime purpose of the Pilot LUS and that they should allow for the facilitation of further work in terms of local authority planning policy, local catchment partnerships, grant funding including SRDP, developer contributions and land management work.

Table 3: Ecosystem Services and links to SEA topics	
SEA Topics	Link to ecosystem services
Biodiversity, flora & fauna	agricultural goods, fibre, fuel, freshwater, distinctive wild species soil quality, water quality, pollination, disease and pests, natural hazard regulation photosynthesis, habitat, river processes, water cycling, nutrient cycling, atmospheric CO_2 production, biomass production awareness & appreciation of natural environment
Soil	agricultural goods, fibre, fuel, freshwater soil quality, natural hazard regulation, carbon storage erosion, soil formation, nutrient cycling, water cycling, biomass production patterns & forms of settlements
Water	agricultural goods, fuel, freshwater, distinctive wild species soil quality, water quality, natural hazard regulation habitat, river processes, water cycling, nutrient cycling, erosion patterns & forms of settlements, sense of place, tradition, awareness & appreciation of natural environment, societal identity & pride
Climatic Factors	agricultural goods, fibre, fuel, freshwater, distinctive wild species climate regulation, natural hazard regulation, disease & pest regulation, soil

Key

Provisioning

Regulating

Supporting

Cultural

	quality, pollination, carbon storage biodiversity, biomass production, atmospheric CO_2 production, erosion, water cycling, river processes, habitat patterns & forms of settlements, awareness & appreciation of historic environment, awareness & appreciation of natural environment
Landscape & townscape	food, fibre, fuel river processes, habitat recreation, patterns & forms of settlements, awareness & appreciation of historic environment, awareness & appreciation of natural environment, sense of place, tradition, societal identity & pride
Cultural Heritage	recreation, patterns & forms of settlements, awareness & appreciation of historic environment, sense of place, tradition, societal identity & pride
Population & human health	food, fibre, fuel, freshwater knowledge, recreation, patterns & forms of settlements, awareness & appreciation of historic environment, awareness & appreciation of natural environment, sense of place, tradition, societal identity & pride
Material Assets	food, fibre, fuel, freshwater climate regulation, natural hazard regulation, water quality river processes

Relevant policy, programme and strategy drivers		• **Impact on SEA Topics**								
Drivers National	Drivers Local	Air	Biodiversity, flora & fauna	Climatic Factors	Cultural Heritage	Landscape & Townscape	Material Assets	Population & Human Health	Soil	Water
• Climate Change (Scotland) Act 2009 • Scottish Climate Change Adaptation Programme	• Local Development Plan (proposed) (incl SPG) • Scottish Borders Low Carbon Economic Strategy • Scottish Borders Woodland Strategy • Pilot LUS	+	-	++	-	-	++	++	+/-	++
Commentary The Climate Change Act 2009 is legislation requiring a reduction in Scotland's emissions of the basket of 6 Kyoto Protocol greenhouse gases (GHG) by 42% by 2020 and 80% by 2050 compared to 1990/95 baseline. The targets are set annually for emissions at least 12 years in advance. The Scottish Climate Change Adaptation Programme details the Scottish Minister's objectives, policies and proposals to tackle the climate change impacts to Scotland from the UK Climate Change Risk Assessment as required by Section 53 of the Climate Change (Scotland) Act 2009. This includes an overarching aim "To increase the resilience of Scotland's people, environment, and economy to the impacts of a changing climate" and related outcomes which look at the natural environment, resilient infrastructure and buildings and resilient communities. The Environmental Report for the Adaptation Programme looks at three themes Natural Environment, Buildings and Infrastructure Networks and a Climate Ready Society. Within these themes key policies are examined and their overall effects on the SEA topics are assessed. This assessment has been transposed into the Impact on SEA Topics columns above (the actual Environmental Report can be found here: http://www.scotland.gov.uk/Resource/0042/00426535.pdf										
• National Planning Framework 3	• Local Development Plan (proposed) (incl SPG)	+	+/-	++	+/-	+	+	+/-	-	-

Commentary The assessment in the NPF 3 part of the Environmental Report focuses on the national developments, of relevance to the Borders are the national cycling and walking network and the high speed rail to London link; the assessment for the SEA topics therefore reflects the discussion within the NPF3/SPP ER, which can be found here: http://www.scotland.gov.uk/Resource/0042/00421079.pdf										
• Land Use Strategy Scotland	• Pilot LUS • Local Biodiversity Action Plan • Local Development Plan (proposed) (incl SPG) • Scottish Borders Woodland Strategy • Tweed Wetland Strategy 2010	+	+/-	+	+	+/-	+	+	+/-	0
Commentary The objectives of the National LUS are: "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; and Urban and rural communities better connected to the land, with more people enjoying the land and positively influencing land use. The objectives are to be achieved through 10 principles for sustainable land use and 13 proposals to focus action. The principles centre on achieving multiple benefits for land, land use decisions informed by an understanding of ecosystems, sympathetic landscape management and people contributing to land use decisions. The Environmental Report (ER) for the LUS assesses the document through answering a number of questions targeted at establishing how the components of the LUS work together cumulatively, as a result there is not a traditional ranking of the effects. However, a summary of the effects discussed in the ER is presented above, although it is important to note that there is a degree of uncertainty due to the nature of the LUS and the possibility for numerous scenarios dependent on what land use direction was taken. The full LUS ER can be accessed here: http://www.scotland.gov.uk/Resource/Doc/326458/0105186.pdf									
• Scottish Planning Policy	• Local Development Plan (proposed) (incl SG/SPG)	0/+	+/0/-	+	+/0/-	+/0/-	+/0	+	+/0/-	+/0

Commentary The new Scottish Planning Policy (SPP) states in the planning outcomes that "Planning improves quality of life by helping to create well-designed sustainable places for Scotland's people; Planning Protects and enhances Scotland's built and natural environments; and Planning supports sustainable economic growth and the transition to a low carbon economy". The SPP part of the Environmental Report assesses cross cutting policies on sustainable economic growth; placemaking; engagement; sustainable development; and climate change. In addition key objectives are assessed, those relevant to the LUS pilot are location of new development/spatial strategies; rural development; valuing the historic environment; natural resources; improving green infrastructure; movement; delivering heat and electricity; and reducing flood risk. An attempt has been made to summarise the overall thrust of these objectives and cross cutting policies to give a picture of the impacts on the SEA topics. The full ER can be accessed here: http://www.scotland.gov.uk/Resource/0042/00421079.pdf										
• Nature Conservation (Scotland) Act 2004	• Pilot LUS • Local Biodiversity Action Plan • Local Development Plan (proposed) (incl SPG) • Scottish Borders Woodland Strategy • Tweed Wetland Strategy 2010	+	++	++	+/0	+	+/-	+	+	+
Commentary The Act places duties on public bodies in relation to the conservation of biodiversity, increases protection for Sites of Special Scientific Interest (SSSI), amends legislation on Nature Conservation Orders, provides for Land Management Orders for SSSIs and associated land, strengthens wildlife enforcement legislation, and requires the preparation of a Scottish Fossil Code. The Act does not have a SEA but the implications of the policy are assessed in terms of the SEA topics and ecosystem services above.										

• Scotland's Biodiversity: It's in your hands 2004 & 2020 Challenge for Scotland's Biodiversity 2013	• Pilot LUS • Local Biodiversity Action Plan • Local Development Plan (proposed) (incl SPG) • Scottish Borders Woodland Strategy • Tweed Catchment Management Plan • Tweed Wetland Strategy 2010	0	++	+	-/+	-/+	-	-/+	++	+
Commentary The Pilot LUS corresponds to and seeks to achieve the aims of protecting and restoring biodiversity and supporting healthier ecosystems; connecting people with the natural world for health and wellbeing; and maximising benefits of a diverse natural environment and the services it provides. The SEA for the 2020 Challenge assess the impacts on ecosystem services by looking at four scenarios, two strategic and two delivery; utilitarian and deep ecology, and species and site focus and a balance of wider area delivery and species and site focus respectively. The above rankings focus on the deep ecology findings as these are considered the most relevant to the Pilot LUS opportunity of biodiversity promotion; the full SEA can be accessed here: http://www.scotland.gov.uk/Topics/Environment/environmental-assessment/sea/SEAG									
• The Scotland Act 1998 (River Tweed) Order 2006	• Pilot LUS • Local Biodiversity Action Plan • Tweed Catchment Management Plan • Tweed Wetland Strategy 2010	0	++	++	++	0	0/-	+	+	++

Commentary The River Tweed Commission is charged with preservation & increase of salmon, sea trout, trout & other freshwater fish. The Pilot LUS should be complimentary and assist this work. No SEA was undertaken for the Order and so the implications are assessed against the SEA topics and ecosystem services.										
• The Scottish Forestry Strategy (2006) (and associated SEA)	• Scottish Borders Woodland Strategy	-/0	+/?	++/-	+/-	+/-	+	++	+/?	+/?
Commentary The Pilot LUS has direct connections to the outcome of the Forestry Strategy to help towards a "high quality, robust and adaptable environment". The SEA for the Forestry Strategy examined certain policy scenarios that the Strategy could realistically result in, with the weighting for each one examined against the others. These policy scenarios were assessed against the SEA topics and the above analysis is an aggregate of the findings. Again this could be broken down into more detail later in the assessment if necessary.										
• Tweed Wetland Strategy 2010	• Pilot LUS • Local Biodiversity Action Plan • Tweed Catchment Management Plan • The Scotland Act 1998 (River Tweed) Order 2006	0	++	++	+	+	0/-	+	+	++
Commentary The strategy has broad aims related to protection, enhancement of wetland habitats; promotion of habitat connectivity; identification of threats; and supporting sustainable land use. The Pilot LUS should assist in work towards these aims. The assessment is done against the aims and objectives of the document and so is a high level ranking of possible effects, there is no detailed Environmental Report to refer to.										

• A Low Carbon Economic Strategy for Scotland • Low Carbon Scotland: Meeting the Emissions Reductions Targets 2010-2022 Report on Policies and Proposals	• Local Development Plan (proposed) (incl SPG) • Scottish Borders Low Carbon Economic Strategy • Scottish Borders Woodland Strategy • Pilot LUS	+	+	+	0	0	0	+	0	0
Commentary The Low Carbon Economic Strategy for Scotland has relevant objectives on reducing the need for travel, widening travel choices, development and uptake of emerging technologies and setting a policy and regulatory framework. The assessment refers to the Environmental Report (ER) on the Report on Proposals and Policies, which provides the most detailed assessment of the effects of the impacts of the Low Carbon Scotland policy aims; however it is only focussed on transport related issues, with other topics covered by a summary of other relevant SEA that have been undertaken, therefore the assessment above concentrates on the transport findings. The ER can be accessed here: http://www.scotland.gov.uk/Topics/Environment/environmental-assessment/sea/SEAG									
• Biomass Action Programme for Scotland 2007	• Local Development Plan (proposed) (incl SPG) • Scottish Borders Low Carbon Economic Strategy • Scottish Borders Woodland Strategy • Pilot LUS	0/-	+/-	+/0/-	0	0/-	+	0	0/-	0/-
Commentary The aims of the document are to provide a focus for a strategic coordinated approach to developing biomass for energy production across the heat, electricity and transport sectors; to identify roles and responsibilities for government, industry and public stakeholders to develop a vibrant bioenergy industry in Scotland; and to identify future actions and gaps. There is no specific SEA although there is a chapter on environmental impacts and this has been used to inform the assessment above.										

• Flood Risk (Scotland) Management Act 2009	• Draft Flood Risk Management Plan	0	++	++	+	0	++	++	+	++
Commentary Sets national policy- requirement to take flood risk into account. Does not have a SEA and so the assessment is based upon the impacts the legislation brings on the SEA topics and ecosystem services.										
• Water Environment and Water Services (Scotland) Act 2003 (Designation of Scotland River Basin District) Order 2003 • Water Environment (Controlled Activities) (Scotland) Regulations 2005 • Scotland River Basin Management Plan and Solway Tweed River Basin Management Plan	• Local Development Plan (proposed) (incl SPG) • Pilot LUS • Tweed Catchment Management Plan	0	++/-	+/-	0	0	+/-	+/-	+	++/-
Commentary The Act and the Regulations give Ministers regulatory powers over water activities in order to protect, improve and promote sustainable use of Scotland's water environment. The two RBMPs are the documents that state the targets and aims for the protection and improvement of Scotland's water environment. The key target is to improve the proportion of water courses in good condition. In the Borders the Tweed is subject to a separate RBMP to the rest of Scotland and thus the Pilot LUS must take account of the objectives of both documents. The Tweed Catchment Management Plan has a series of strategic aims with regards to water quality, water resources, habitats and species, riverworks and flood management. The Pilot LUS should aim to assist in work towards these aims. In terms of environmental assessment, the rankings above have been informed by the SEA for the two RBMP documents; the assessment undertaken finds the same environmental effects are possible for both documents and this has been translated into the rankings above. The full SEAs can be accessed here: http://www.scotland.gov.uk/Topics/Environment/environmental-assessment/sea/SEAG									

• Planning Scotland's Seas- Scotland's National Marine Plan Consultation Draft	• Local Development Plan (proposed) (incl SPG)	0	++	+	+	0	+	+	0	+
Commentary The Pilot LUS should be aware of the vision of this document for the marine environment: "clean, healthy, safe, productive and biologically diverse oceans and seas, managed to meet the long term needs of nature & people". The document has been assessed through a sustainability appraisal and the findings of this document are represented in the assessment rankings above.										
• Scottish Water, Water Resource Plan (2008)	• Local Development Plan (proposed) (incl SPG)	0	+/-	+/-	?	-/- -	+/-	+	0/-	++/-
Commentary Sets Scottish Water's plan to ensure a safe supply of drinking water to 2032. One of the key challenges is to adapt to pressures on water resources due to climate change and environmental constraints. The Pilot LUS could contribute to work to meet this challenge. The relevant part of the SEA assesses alternative levels of service and the effects of a range of strategic options to meet Scottish Water's proposed level of service. The full SEA is available here: http://www.scotland.gov.uk/Topics/Environment/environmental-assessment/sea/SEAG										
• The State of Scotland's Soils Report (2011)	• Local Development Plan (proposed) (incl SPG) • Pilot LUS	+	+	+	0	0	0/?	+	++	+
Commentary The document examines actions arising from the Scottish Soils Framework (2009). It aims to contribute wider understanding that soils are a vital part of our economy, environment and heritage, to be safeguarded for existing & future generations. Also considers threats to soil function, loss of organic matter, sealing, contamination, change in soil biodiversity, erosion and landslides, compaction and emerging issues. Considered that the work will help to deal with issues in terms of policy integration, tackling lack of systematic Scottish soils data and understanding soil management. The document does not have an SEA and so the assessment above is based upon the content of the report.										

• Scottish Soils Framework	• Local Development Plan (proposed) (incl SPG) • Pilot LUS	0	+	+	0/?	0/?	+	+	++	+
Commentary The purpose of the framework is to ensure more sustainable management of the soil resource. It identifies 13 outcomes of threats to the soil resource and provides action to tackle these outcomes. The Pilot LUS should be aware of these threats and assist in tackling them in line with the actions where appropriate. There is no SEA for the Framework and so the assessment above is based upon the perceived effects on the SEA topics/ecosystem services of the actions to tackle the 13 outcomes.										
• A Forward Strategy for Scotland's Agriculture: Next Steps (2006)	• Local Development Plan (proposed) (incl SPG) • Pilot LUS • Scottish Borders Low Carbon Economic Strategy	0	+/-	+/-	-	-	-	+	+/-	-
Commentary Sets a vision for a prosperous and sustainable farming industry to benefit all the people of Scotland. This should be focused on production of food, helping rural communities prosper, protection and enhancement of the environment, contributing to key objectives on animal health and welfare and human health and well being, and embracing market opportunities. Many of the parts of this vision concern the work of the Draft LUS. The Environmental Report follows a matrix assessment of the strategic goals, aims and actions of the Strategy, an aggregate assessment is provided in the rankings above. The full SEA can be viewed here: http://www.scotland.gov.uk/Topics/Environment/environmental-assessment/sea/SEAG										
• Scottish Historic Environment Policy (SHEP) (2011) • Scotland's Historic Environment, Our Place in Time (2014)	• Local Development Plan (proposed) (incl SPG) • Pilot LUS	N/A	N/A	+	0/+	0/+	0/+	0	N/A	N/A

Commentary The documents set national policy on archaeology and the historic environment. The Our Place in Time document sets out a vision detailing how the historic environment will be carefully managed to deliver real and increasing benefits to Scotland's people and supports collective working to achieve integrated and collaborative approaches to land management. The SHEP was most recently updated in December 2011, to take account of marine historic environment policy and legislation, and provisions of the Historic Environment (Amendment) Scotland Act 2011. The Pilot LUS should not seek to impact upon the historic environment and should promote the vision of the SHEP where appropriate- through realising the full potential of the historic environment as a resource; to protect and manage the resource in a sustainable way; and to understand fully the aspects of the historic environment, and their condition and inter-relationships. The most detailed environmental assessment available is the SEA on the Historic Environment Strategy for Scotland (which is considered a pre-cursor to 'Our Place in Time'). The findings of the environmental report for this document are aggregated above.										
• European Landscape Convention (2000)	• Local Development Plan (proposed) (incl SPG)	0	0	0	+/0	++	0	+	0	0
Commentary The document requires protection and enhancement of landscapes. There is no SEA for the document and so the assessment above is based upon the implications of the text of the Convention on the SEA topics/ecosystem services.										
• Our Rural Future (2011)	• Local Development Plan (proposed) (incl SPG) • Pilot LUS • Scottish Borders Low Carbon Economic Strategy	+/?/-	?/-	+/-	?	?/-	+/?/-	++	?/-	0
Commentary The document states the Scottish Government's vision for the future of rural Scotland. A number of priorities are examined, one of which is Land Use. Within this it is stated that 'better partnership working to co-ordinate and agree on land use purpose and priorities' is important. It is considered the Pilot LUS directly links to this priority. Other parts of the document focus on improving rural healthcare, access to fuel, access to broadband, community renewable energy development, community ownership and local business development. There is no SEA for the document and so the rankings above are based on the effects possible from the content of the document.										

• Scotland Rural Development Programme (SRDP) 2014-2020 Stage 2: Final Proposals	• Local Development Plan (proposed) (incl SPG) • Pilot LUS • Scottish Borders Low Carbon Economic Strategy	0	+/-	+/-	0	+/-	0	0	+/-	+

Commentary

Discusses the rural development strategy and the strategic context for SRDP. Priorities are identified as- supporting business viability, protecting and improving the natural environment, addressing the impact of climate change and supporting rural communities. A budget of £1.326 billion is allocated to help achieve these priorities. It is noted that support for the historic environment and animal welfare and management are to be taken forward via other means. The relevant supported scheme is - farming/land management in less favoured areas; this is explicitly linked to the Pilot LUS opportunity of food production. This part of the SRDP is represented in the assessment findings of the SRDP SEA above.

The full assessment can be viewed here: http://www.scotland.gov.uk/Topics/Environment/environmental-assessment/sea/SEAG

Scottish Borders Council Pilot Land Use Strategy

Appendix 3 Summary of Responses to Scoping Report

Strategic Environmental Assessment: Environmental Report

Respondent	Summary of Response	Council Response
SEPA	*General Comments* - If you would find it useful, we would welcome the opportunity of attending a meeting to discuss the contents of this scoping report or the preparation of the ER	The process of achieving a draft framework for the Pilot LUS has proven to be a complex task and there have been almost constant changes which have impacted on the production of the SEA. Although a meet would have been desirable, unfortunately this has not been possible given these changes and time constraints to complete the project.
	Detailed Comments *Summary of Relevant Plans, Programmes and Strategies* - Note that there is reference to 'old' version of legislation and therefore recommend an update to the PPS information i.e. reference to Flood Risk (Scotland) Management Act 2009 should replace Flood Risk Management Bill and the National Marine Plan Consultation (2010) should be updated to the 2013 version - Would welcome the addition of the 2011 State of Scotland's Soil Report in the list of PPS - There are other sources of information at www.seaguidance.org.uk (particulary for Air); www.soils-scotland.gov.uk; www.sccip.org.uk; www.sniffer.org.uk/project-search-results.aspx?searchterm=UKCC02;	The Summary of the PPS information can be updated *Action: Update the summary information to show the Flood Risk Management Act 2009; National Marine Plan Consultation (2013) and the State of Scotland's Soil Report 2011* The additional sources of information can be referenced as appropriate in the relevant PPS section of the Environmental Report
	Detailed Comments	

	Environmental Topics Being Scoped Out: Air - Suggest to scope in Air for the reasons a) strategy is a pilot & as such it may be useful considering all aspects of the environment; b) long term monitoring carried out by SBC has shown that the concentrations of NO_2 along the High Street in Galashiels are close to annual mean air quality objective and EU limit value; c) the LUS for Scotland has air scoped in the assessment	- Air has been scoped in as a SEA topic
	- Section 'Climatic Factors' does not appear to recognise that road traffic is the 2nd fastest growing source of greenhouse gas emissions in Scotland. Car dependency is on the increase, as more residential properties are built in the rural communities	- As the work has progressed increased motorised transport has been recognised as having effects associated with commercial timber operations and recreational access. As the document is at a strategic level and is not prescriptive, possible environmental effects from these sources can only be recognised.
	- Local air quality and greenhouse gas emissions are inextricably linked and there may be cases where measures to address one problem could undermine an action that has been introduced to address another. Defra & the devolved administrations have produced a document that highlights that benefits integrating policies aimed at improving air quality and reducing greenhouse gas emissions. Air pollution: Action in a Changing Climate (2010) states *"Local authorities have an important role to play in delivering improvements to air quality and in combating climate change. Both arise from broadly the same sources and will therefore benefit from many of the same measures"* *Environmental Topics Being Scoped Out: Material Assets*	- Effects on air quality and also effects of greenhouse gas emissions are flagged up by the assessment of the Pilot LUS. As the document is at a strategic level and is not prescriptive, possible environmental effects from these sources can only be recognised.

	- Agree that there is uncertainty over evaluation at the Scoping Report stage; suggest taking the opportunity of considering material assets in the assessment in order to address this uncertainty. As this is a pilot it would be useful - Would welcome reference to waste under material assets. There are some aspects of waste management which may be relevant for the LUS, in particular the consideration of waste management licensing exemptions which involve the spreading of waste on land. In addition different land use may generate different waste and therefore these should be assessed in order to determine their significance. There may be cumulative, secondary or synergistic effects associated to material assets. Further info in relation to waste is available at the SEPA website	- As the work has progressed and the content has become more clear it has been considered that material assets should be screened in - Although material assets has been screened in, waste has not arisen as a significant issue that would result from the opportunities or constraints for land use that have been considered.
	<u>Detailed Comments</u> *Alternatives and Intended Approach to Assessment in the Environmental Report* - In general are content to with the proposal to treat opportunities and constraints maps as alternatives with the understanding that they will all be assessed at ER stage - Note that no SEA objectives have been proposed, although we presume that the ecosystems approach will serve a similar purpose. Would welcome clarification of this in the ER	- Noted. - The position regarding SEA objectives has been discussed at paragraphs 4.1-4.5 (p20) of the Environmental Report

	- Please remember that the ER should include…the likely evolution of the environment without the implementation of the LUS	- This section has been included in the Environmental Report at paragraphs 3.52-3.56 (p18/19)
	- Would be useful if this table could be updated to incorporate Air (as we have requested this to be scoped in). In addition we would welcome reference to waste related ecosystem services under material assets	- These issues are dealt with at pages 3 and 4 above.
	- Although explanation was provided and a key was added to Figure 1: 'example of chain analysis assessment', we found that the explanation of the methodology difficult to follow. We therefore welcome the proposal of adding narrative explaining the finding in addition to presenting the different 'chains' that are produced for each opportunity and constraint	- Efforts have been made to clarify the approach to the casual chain analysis at paragraphs 4.11-4.16 (p20-21)
	- We would welcome the identification as part of the environmental assessment of a clear chain of mitigation or enhancement measures	- The purpose of the Pilot LUS Framework is not to be prescriptive and is instead to illustrate where multiple benefits for land use could be achieved. It is considered that the enhancement measures are the multiple benefits that are identified. Mitigation measures are introduced in paragraphs 4.42-4.45 (p39-42) of the Environmental Report.
	- Changes to the Pilot LUS itself are the clearest form of mitigation. We would like the ER to make it clear how carrying out SEA informed the Strategy which is being consulted upon at the same time	- It is considered that the most suitable place for this discussion is at the Post-adoption stage.
	- Where the mitigation proposed does not relate to	- It is considered this information is presented at the

	- Although not specifically required at this stage, monitoring is a requirement of the Act and early consideration should be given to a monitoring approach particularly in the choice of indicators. It would be helpful if the ER included a description of the measures envisaged to monitor the significant effects of the plan	- Please see the response above.
	<u>Detailed Comments</u> *Consultation dates for the Environmental Report* - State that they would prefer if the consultation period was longer than the minimum required, to allow for further consideration and discussion of significant issues -	- The consultation period is proposed to be 8 weeks, which is a two week extension to that originally proposed. It should be noted that the Pilot LUS will not be formally adopted by the Council but is for information.
	<u>Detailed Comments</u> *Appendices- Appendix 3- Stage 1 Report Baseline Spatial Mapping* - Note that for soil the only information available is related to carbon rich soils. We would like to point out that more	- Greater soils information has been incorporated into both the Pilot LUS (i.e. the mapping work) and the

	www.soils-scotland.gov.uk - In the water quality regulation map there is reference to water quality rather than the quality of the water environment. Welcome the reference to the ecological status and the status of the water environment. In addition to information on water quality and the traditional water chemistry measurements, the Water Framework Directive requires the use of tools which assess the impact of other aspects of the environment's quality, including water quantity (changes to levels and flows), the forms and processes which affect the structure/shape of our waters (morphology) and the impact of non-native species	Environmental Report (for example at the relevant PPS section) - The quality of the water environment and water quality are considered to mean the same thing. However, the terminology has been updated in the Environmental Report. - Information on the Water Framework Directive is noted.
SNH	*Scope of assessment and level of detail* - state that the assessment will need to address as many actual or potential 'trade-offs' against SEA topics as is possible. Given the fact that there is little steer on the nature and extent of the decision making approach to resolving trade-off conflicts, it will be difficult to assess longer term overall environmental impacts. Are satisfied that the key objective of achieving a framework for more integrated rural land-use will allow for greater focus of positive environmental outcomes in a more balanced and spatially targeted mechanism overall	- Efforts to consider as many actual or potential trade offs have been made through the casual chain analysis. However, it has then been necessary to decide which of these are significant and the result of this is the 3 key interaction scenarios that are identified at paragraphs 4.42-4.45 (pages 39-41) of the Environmental Report.
	Consultation period for the environmental report - Consider that 8-12 weeks would be more appropriate	- The consultation period will be 8 weeks. It should be noted that the Pilot LUS will not be formally adopted by the Council but is for information.

	Table 1 Catchment approach, significant effects and decision on scoping- SEA topics (p7-12)	
	- Impacts discussed under Landscape and Townscape include those which relate more to flooding than they do to landscape. We recommend that this section is reviewed and the assessment in the Environmental Report should consider impacts relevant to landscape including nationally protected landscapes, locally protected landscapes, land use change that contributes positively to an attractive & diverse landscape.	- This point has been taken on board and the effects under Landscape and Townscape now relate better to the landscape.
	- Note indecision on scoping Material Assets. Given that the issues discussed here (flood risk) are also addressed to greater or lesser extent under Water, Landscape and Townscape (notwithstanding comments above), Cultural Heritage and Climatic Factors, could the context in this topic perhaps be included elsewhere? Provided justification was given this topic could be scoped out.	- As the work progressed it was considered appropriate to screen in the SEA topics Material Assets.
	- Table 3- the colour coding is confusing. In the previous scoping section, green and red are used to indicate positive and negative impacts respectively. Primes the reader for the same colours to be used in Table 3 for two of the four service types and despite the key this becomes confusing. Addition of blue and purple to represent the other services compounds this.	- The colour coding has been reviewed and is considered to be clearer now.
	- Above effect is compounded in the chain analysis (Fig 1) where values and service type are combined. Use of casual chain analysis is overly complex as an	- The points on the casual chain analysis were considered and, although it was decided to keep the causal chain approach, it is hoped that the information

	- With reference to Appendix 3 (Stage 1 Report: Baseline and Spatial Mapping), we note there are issues with the representation of value rankings for some services e.g. Biodiversity and nature conservation where the interpretation of the resource is questionable in some areas. However, it is appreciated that mapping work is on-going and that refinements are likely to be made. The assessment should consider the implications for impacts arising from mapping errors or incorrect representation of existing biodiversity value or its resilience	- A number of changes have been made to the mapping approach as the project has progressed but further scope for comment on maps presented can be made when the Pilot LUS Framework is at consultation.
Historic Scotland	*Scope of assessment and level of detail* - State it will be important for the assessment to demonstrate in broad terms a good understanding of how potential for loss of and/or damage to or opportunities for enhancement of the historic environment arising from the objectives and projects that will be brought forward in the draft strategy. Will be particularly relevant when considering the potential trade off or conflicts that may arise as a result of the ecosystems approach that is being used - It would be helpful in the ER to clearly describe any changes made to the strategy as a result of the	- It is judged that the historic environment has been assessed effectively in the consideration of the opportunities. It should be noted that the Pilot LUS Framework is only for information. - It is considered that this information is better presented in the Post Adoption stage.

	Consultation period for the environmental report - Content with a 6 week period however would prefer longer if at all possible	- The consultation period will be 8 weeks. It should be noted that the Pilot LUS will not be formally adopted by the Council but is for information.
	Detailed Comments- Relationship with other PPS - Please note the following changes: ➢ An emerging SPP is expected to be published in June ➢ SHEP was most recently updated in December 2011, to take account of the marine historic environment policy, the provisions of the Marine (Scotland) Act 2010, & the provisions of the Historic Environment (Amendment) (Scotland) Act 2011 ➢ Managing Change in the Historic Environment Guidance Notes. The notes explain how to apply the policies contained within the SHEP ➢ **Most relevant is the Scotland's Historic Environment, *Our Place in Time,*** which was published yesterday. Sets out a clear vision, detailing how our historic environment will be carefully managed to deliver real & increasing benefits to Scotland's people. Will also support all parts of the historic environment sector to work collectively to enable the sector to reach its full	- The following changes are welcomed. The Our Place in Time document has been used in Appendix 2 Policy Drivers.

	Baseline Information - Battlefield sites should be added to the Historic and Archaeological Significance maps in the mapping section	- The battlefield sites are incorporated as a part of the Scheduled sites in the mapping.
	Environmental Topics being scoped out - Agree with findings. Add that there is potential for direct negative impacts on cultural heritage assets through certain land use management practices	- Noted.
	Intended approach to the assessment - Figure 1- there is potential for confusion in colour scheme between the ecosystem services and column 3 boxes for potential effects. Could a 'symbol' key be used here instead e.g. +,-,+/-,0 (neutral) & ? (uncertain). Note and welcome the narrative form to explain the findings will accompany each 'chain' - Helpful to the assessment if each of the SEA topics also included list of all the SEA objectives/criteria. Will allow for environmental considerations that are relevant to the Strategy for each SEA topic to be taken into account in the assessment and allow for significant environmental effects to be identified as well as potential links, conflicts, trade-offs or opportunities arising from the ecosystems approach, to be explored. Will also ensure more comprehensive & distinct analysis of how each SEA topic	- The colour coding has been reviewed and is considered to be clearer now. - The 'symbol' key has been used as suggested in the casual chain assessments - The position regarding SEA objectives has been discussed at paragraphs 4.1-4.5 (p20) of the Environmental Report.

	- The cultural heritage section in Table 3 should also include local places and historic & archaeological significance as the key cultural ecosystem services that links to the Cultural Heritage SEA topic - For information the SEA for the emerging SRDP 2014-2020 utilised an ecosystems services/casual chain analysis approach and examined similar issues	- Noted.
	Monitoring - Note the scoping report does not discuss if a monitoring framework will be developed to monitor the performance of the stategy once it is adopted. While monitoring information is not normally provided until post-adoption stage, it is useful if the ER could outline further information about your proposed monitoring strategy and for this reason we would encourage that a monitoring framework is integrated into the environmental assessment. Indicators chosen for the historic environment should reflect both the actions to be taken within the strategy and the potential impacts identified in the course of the SEA	- A Monitoring section is included (Chapter 5, p 42/43). It must be remembered that the purpose of the Pilot LUS Framework is not prescriptive and therefore content provided is only for information.

Reduce risk of flooding & overland flow

- Prioritise flood & overland flow reduction
  - ++/+/- Increased biodiversity potential
  - ++/+ Increased carbon storage potential
  - ++/- Hydrology/drainage changes
  - ++/+ Local Economic Benefits
- Flood and overland flow reduction as part of a mixed land use strategy
  - ++/+/?/- Increased biodiversity potential
  - ++/+/? Increased carbon storage potential
  - ++/+/?/- Hydrology/drainage changes
  - ++/+/? Local Economic Benefits
- Flood and overland flow reduction as a low priority
  - ?/- Increased biodiversity potential
  - - Increased carbon storage potential
  - -/-- Hydrology/drainage changes
  - ?/-/-- Local Economic Benefits

Biodiversity, flora & fauna
Climatic Factors
Soil
Water
Material Assets
Landscape & townscape
Cultural Heritage
Population & human health

REGULATING	Climate regulation, soil quality, carbon storage, natural hazard regulation	
SUPPORTING	Erosion; habitat provisioning; biodiversity; nutrient cycling; water cycling; soil formation; river processes, distinctive wild species	habitat provisioning; biodiversity; distinctive wild species
PROVISIONING	Fibre, fuel	Fibre, fuel, agricultural goods
CULTURAL	Patterns and forms of settlements; aesthetic experience of heritage assets;	

REGULATING	Climate regulation, soil quality, carbon storage, natural hazard regulation	
SUPPORTING	Erosion; habitat provisioning; biodiversity; nutrient cycling; water cycling; soil formation; river processes	habitat provisioning; biodiversity; distinctive wild species
PROVISIONING	Distinctive wild species, fibre, fuel	Fibre, fuel
CULTURAL	Patterns and forms of settlements; aesthetic experience of heritage assets;	

REGULATING	Climate regulation, soil quality, carbon storage, natural hazard regulation	
SUPPORTING	Erosion; habitat provisioning; biodiversity; nutrient cycling; water cycling; soil formation; river processes	
PROVISIONING	fibre, fuel	Fibre, fuel, distinctive wild species
CULTURAL	Patterns and forms of settlements; aesthetic experience of heritage assets;	

Biodiversity Enhancement

- Prioritise biodiversity enhancements
  - ++/- Carbon storage potential
  - ++/- Increased extent of semi-natural habitat networks or independent blocks
  - ++/- Improvement of degraded semi-natural habitat
  - ++/- Change of vegetation to semi-natural system
  - ++/-/-- Change of heavily managed land
- Biodiversity enhancements as part of a mixed land use strategy
  - +/?/ Carbon storage potential
  - +/? Increased extent of semi-natural habitat networks or independent blocks
  - +/? Improvement of degraded semi-natural habitat
  - +/?/- Change of vegetation to semi-natural system
  - +/?/- Change of heavily managed land
- Biodiversity multiple benefits as a low priority
  - +/- Carbon storage potential
  - -/-- Increased extent of semi-natural habitat networks or independent blocks
  - - Improvement of degraded semi-natural habitat
  - +/-It is Change of vegetation to semi-natural system
  - +/- Change of heavily managed land

Air
Cultural Heritage
Landscape & townscape
Biodiversity, flora & fauna
Climatic Factors
Soil
Population & human health
Material Assets

CULTURAL: Awareness of natural environment; awareness of historic environment; sense of place — Sense of place; tradition; societal identity

SUPPORTING: Photosynthesis, habitat, nutrient cycling; erosion; soil formation

REGULATING: Climate regulation, soil quality, carbon storage, natural hazard regulation; pollination, disease & pest regulation — Soil quality

PROVISIONING: Distinctive wild species, fibre, fuel — Agricultural goods; fibre; fuel

CULTURAL: Awareness of natural environment; awareness of historic environment; sense of place — Sense of place; tradition; societal identity

SUPPORTING: Photosynthesis, habitat, nutrient cycling; erosion; soil formation

REGULATING: Climate regulation, soil quality, carbon storage, natural hazard regulation; pollination, disease & pest regulation

PROVISIONING: Distinctive wild species, fibre, fuel — Agricultural goods; fibre; fuel

CULTURAL: Sense of place; societal identity; tradition — Awareness of natural environment; awareness of historic environment; sense of place

SUPPORTING: Photosynthesis, habitat, nutrient cycling; erosion; soil formation

REGULATING: Soil quality — Soil quality; pollination; disease & pest regulation; Natural hazard regulation; carbon storage; climate regulation

PROVISIONING: Agricultural goods, fibre, fuel — Distinctive wild species

Soil Carbon

- Prioritise increased soil carbon storage
  - ++ Reduction in greenhouse gas emissions
  - \+ Decrease of flood risk and run off
  - +/- Increase in semi natural woodland cover
  - \+ Increased biodiversity potential
  - +/- - Less agricultural potential/food production
  - \+ Protection of cultural heritage assets
- Increased soil carbon storage as part of a mixed land use strategy
  - +/? Reduction in greenhouse gas emissions
  - +/? Decrease of flood risk and run off
  - +/? Increase in semi natural woodland cover
  - +/? Increased biodiversity potential
  - +/? Protection of cultural heritage assets
- Soil carbon storage as a low priority
  - -/-- No reduction in greenhouse gas emissions
  - \- No decrease of flood risk and run off
  - \- No increase in semi natural woodland cover
  - \- No increased biodiversity potential
  - \- No increased protection of cultural heritage
  - +/- More agricultural potential/food production

Air
Climatic Factors
Soil
Water
Biodiversity, flora & fauna
Material Assets
Population & human health
Landscape & townscape
Cultural Heritage

SUPPORTING — Habitat, nutrient cycling, atmospheric CO_2 production, erosion, soil formation, water cycling, river processes, distinctive wild species

REGULATING — Soil quality, natural hazard regulation, carbon storage, water quality, pollination

PROVISIONING — Freshwater — Agricultural goods, fibre, fuel

CULTURAL — Awareness of historic environment — Sense of place, tradition, societal identity

SUPPORTING — Habitat, nutrient cycling, atmospheric CO_2 production, erosion, soil formation, water cycling, river processes

REGULATING — Soil quality, natural hazard regulation, carbon storage, water quality, pollination

PROVISIONING — Freshwater, distinctive wild species

CULTURAL — Awareness of historic environment

SUPPORTING — Biomass production — Habitat, nutrient cycling, atmospheric CO_2 production, erosion, soil formation, water cycling, river processes, distinctive wild species

REGULATING — Pollination — Soil quality, natural hazard regulation, carbon storage, water quality,

PROVISIONING — Agricultural goods, fibre, fuel — Freshwater

CULTURAL — Sense of place, tradition, societal identity — Awareness of historic environment

Timber/ Woodland Provision

- Prioritise benefits of timber/woodland provision
  - +/- Greater variety forest design
  - +/0/- Local Economic Benefits
  - ++/+/- Increased biodiversity potential
  - ++/+ Increased carbon storage potential
  - +/- Hydrology/drainage changes
  - -/-- Increased traffic/access development
- Benefits of timber/ woodland provision as part of a mixed land use strategy
  - +/- Greater variety forest design
  - +/0/- Local Economic Benefits
  - ++/+/- Increased biodiversity potential
  - \+ Increased carbon storage potential
  - +/- Hydrology/drainage changes
  - \- Increased traffic/access development
- Timber/woodland Provision as a low priority
  - \- Lack of change in forest design
  - +/?/- No increased economic benefits
  - +/?/- No increased biodiversity potential
  - ?/-/-- No increased carbon storage potential
  - +/?/- No hydrology/drainage changes
  - \+ No increased traffic/access development

Landscape & townscape
Cultural Heritage
Population & Human health
Biodiversity, flora & fauna
Soil
Climatic Factors
Air
Water

CULTURAL
- Aesthetic experience of landscape; aesthetic experience of heritage assets; recreation; awareness of natural environment
- Aesthetic experience of heritage assets;

PROVISIONING
- fibre, fuel
- fibre, fuel

REGULATING
- Climate regulation, soil quality, seed dispersal, carbon storage, disease & pest regulation, pollination, erosion
- Climate regulation; natural hazard regulation; soil quality, erosion

SUPPORTING
- Habitat provisioning, atmospheric O_2 production, photosynthesis, biodiversity, nutrient cycling; water cycling, soil formation, distinctive wild species
- Habitat provisioning, biodiversity, soil formation, distinctive wild species

CULTURAL
- Aesthetic experience of landscape; aesthetic experience of heritage assets; recreation; awareness of natural environment
- Aesthetic experience of heritage assets;

PROVISIONING
- fibre, fuel

REGULATING
- Climate regulation, soil quality, seed dispersal, carbon storage, disease & pest regulation, pollination, erosion

SUPPORTING
- Habitat provisioning, atmospheric O_2 production, photosynthesis, biodiversity, nutrient cycling; water cycling, soil formation, distinctive wild species

CULTURAL
- Aesthetic experience of landscape; aesthetic experience of heritage assets;
- Aesthetic experience of heritage assets; recreation; awareness of natural environment

PROVISIONING
- fibre, fuel
- fibre, fuel

REGULATING
- Climate regulation, pollination, erosion
- Climate regulation; natural hazard regulation; soil quality, erosion

SUPPORTING
- Habitat provisioning, atmospheric O_2 production, photosynthesis, biodiversity, nutrient cycling; water cycling, soil formation, distinctive wild species

Food Production

- Prioritise agricultural land provision
  - ++/+/- Economic benefits
  - -/-- Less coverage semi-natural habitat
  - +/- Greater crop coverage
  - +/-/-- Increased grazing land coverage
  - 0/-/- - Less carbon storage potential
- Agricultural land provision as part of a mixed land use strategy
  - +/?/- Economic benefits
  - ?/- Less coverage semi-natural habitat
  - +/?/- Greater crop coverage
  - +/?/- Increased grazing land coverage
  - ?/- Less carbon storage potential
- Agricultural land provision as a low priority
  - +/- Less economic benefits
  - +/- More coverage semi-natural habitat
  - +/- Less crop coverage
  - +/- Less grazing land coverage
  - ++/+ Increased carbon storage potential

Population & human health
Biodiversity, flora & fauna
Cultural Heritage
Climatic Factors
Soil
Water
Material Assets
Landscape & townscape

CULTURAL: Sense of place; societal identity; tradition | Recreation; awareness of natural environment

PROVISIONING: fibre, fuel

REGULATING: Pollination | Water quality, natural hazard regulation, carbon storage, disease & pest regulation, erosion, soil quality

SUPPORTING: Photosynthesis, habitat, nutrient cycling, water cycling, biomass production, distinctive wild species

CULTURAL: Sense of place; societal identity; tradition, recreation, awareness of natural environment

PROVISIONING: fibre, fuel

REGULATING: Pollination | Erosion, soil quality

SUPPORTING

CULTURAL: Recreation, awareness of natural environment | Sense of place; societal identity; tradition

PROVISIONING: fibre, fuel | fibre, fuel

REGULATING: Water quality, natural hazard regulation, carbon storage, disease & pest regulation, erosion, soil quality

SUPPORTING: Photosynthesis, habitat, nutrient cycling, water cycling, biomass production, distinctive wild species

Water Quality

Prioritise increasing water quality

- ++ Less sedimentation/pollution
- +/- Economic benefits
- ++/+ Better drinking/bathing water
- +/- Natural Flood Management opportunity
- ++/+ Increased biodiversity potential

Increase water quality as part of a mixed land use strategy

- +/?/- Less sedimentation/pollution
- ++/+/?/- Economic benefits
- +/? Better drinking/bathing water
- +/? Natural Flood Management opportunity
- +/? Increased biodiversity potential

Water quality increase as a low priority

- -/-- More sedimentation/pollution
- - Economic benefits
- -/-- Better drinking/bathing water
- - Natural Flood Management opportunity
- - Increased biodiversity potential

- Soil
- Population & human health
- Material Assets
- Water
- Climatic Factors
- Cultural Heritage
- Landscape & townscape
- Biodiversity, flora & fauna

REGULATING	Climate regulation, soil quality, carbon storage, natural hazard regulation, water quality	
SUPPORTING	Erosion; habitat provisioning; biodiversity; nutrient cycling; water cycling; soil formation; river processes	
PROVISIONING	Fibre, fuel, freshwater	Fibre, fuel
CULTURAL	Recreation, awareness of natural environment, aesthetic experience of landscape; aesthetic experience of heritage assets	Recreation

REGULATING	Climate regulation, soil quality, carbon storage, natural hazard regulation, water quality	Soil quality, water quality
SUPPORTING	Erosion, habitat provisioning, biodiversity, nutrient cycling, water cycling, soil formation, river processes	Erosion, habitat provisioning, biodiversity, nutrient cycling, water cycling,
PROVISIONING	Fibre, fuel, freshwater	
CULTURAL	Recreation, awareness of natural Environment, aesthetic experience of landscape; aesthetic experience of heritage assets	Recreation

REGULATING	Climate regulation, soil quality, carbon storage, natural hazard regulation, water quality	
SUPPORTING	Erosion, habitat provisioning, biodiversity, nutrient cycling, water cycling, soil formation, river processes	
PROVISIONING	Fibre, fuel, freshwater	
CULTURAL	Recreation, awareness of natural Environment, aesthetic experience of landscape; aesthetic experience of heritage assets	

Identification of Constraints and Opportunities

Key

Neutral or no constraints/ benefits	Constraints	Non-significant land use constraints or benefits/constraints not to be mapped	Benefits

	Food production	**Timber/ woodland provision**	**Renewable Energy (Wind)**	**Flood/overland flow reduction**	**Water quality**	**Soil Carbon Storage**	**Recreation**	**Biodiversity**
Food production		There is a theoretical constraint from competition of land use but it is considered unlikely that woodland would be felled for agricultural purposes **SEA topics**: Biodiversity, Soil, Climatic, Material Assets, Cultural Heritage, Population (all ?) **Ecosystem subservices**: tradition, societal identity, food, fibre , soil quality, erosion, water quality, water cycling, habitat, distinctive wild species (all ?)		There is a constraint as food production land use competes with NFM measures. Food production also causes flood risk & overland flow **SEA topic:** Soil-; Water - -; Material Assets -/+; Population & health -/+ **Ecosystem subservices**: food, fibre, fuel (all +), natural hazard management, water quality, erosion, soil quality, habitat, distinctive wild species (all -)	Although contested by the SRDP SEA it is judged that food production causes run off of pollutants (point source and diffuse pollution) **SEA topic:** Soil -; Water - -; Population & health -/+; **Ecosystem subservices**: tradition, societal identity, food, fibre (all +), water cycling, water quality, soil quality, erosion, habitat, distinctive wild species (all -)	It is hard to gauge the significance of food production and soil carbon storage as competing land uses. Peat soils in the Borders are not on PQAL **SEA topic**: Soil, Material assets, Population & health, Water & Biodiversity (all ?) **Ecosystem subservices**: tradition, societal identity, food, fibre, soil quality, erosion, water quality, water cycling, habitat, distinctive wild species (all ?)		Food production brings a direct constraint as it competes with land for biodiversity enhancement. **SEA topic**: Biodiversity -; Material Assets +; Population & Health +; cultural +; **Ecosystem subservices**: food, fibre, fuel, tradition, societal identity (all +), distinctive wild species, habitat (both -)
Timber/ woodland provision	Timber/woodland provision brings a land use constraint with food production **SEA topics**: Biodiversity, Climatic (both +), Soil (+/), Material Assets, Cultural Heritage, Population (all -) **Ecosystem subservices**: tradition, societal identity, food (all -), fibre (+/-) , soil quality, erosion, water quality, water cycling, habitat, distinctive wild species (all +)		Timber/woodland provision may conflict with wind energy development **SEA topics:** material assets -/+; climatic +; landscape -/+; **Ecosystem subservices**: , fuel (+), climate regulation (0)	Tree planting can bind soil and store excess water, bringing increased protection from flood events. However, felling can bring the opposite effect. **SEA topic**: Water -/+; Soil -/+; Climatic -/+; Population & health -/+; Material assets +; **Ecosystem subservices**: nutrient cycling, erosion, water cycling; natural hazard management, fuel, habitat, distinctive wild species (all -/+)	Timber/wood provision can help to bind soil and store excess water thus preventing excess run off which can affect water quality. A constraint is felling, which can bring run off and soil erosion, which can increase sediment in water courses adversely affecting water quality. **SEA topic**: Material Assets +; Water -/+; Soil -/+; **Ecosystem subservices**: nutrient cycling, erosion, water cycling, water quality (all +/-), fuel, fibre (both +)	Planting of trees brings opportunity for leaf litter etc. which is critical for soil formation and in turn increased carbon storage. Planting also binds soil preventing erosion and run off reducing disturbance. Tree felling brings a constraint as it disturb soils and can release carbon. **SEA topic**: Soil -/+; Climatic -/+; Air -/+ **Ecosystem subservices**: nutrient cycling, erosion (both -/+)	Increased woodland planting gives potential for further enjoyment of the resource. Timber planting may provide minor constraints but overall benefits are expected. **SEA topic:** Population & health; biodiversity (-/+) **Ecosystem subservices**: awareness of natural environment (++)	Although felling may destroy habitat it is considered that there will always be a rolling stock, if not further habitat provision by increased planting. Therefore benefits due to habitat provision outweigh any constraint. **SEA topic**: Biodiversity +/++; Material Assets (-/+), **Ecosystem subservices:** habitat, distinctive wild species (both +/++), Fibre. Fuel (both -/+)
Renewable Energy (Wind)		In terms of onshore turbines there is a constraint as they require land that could be used for tree planting. **SEA topic**: material assets -/+; climatic 0; landscape -/+; **Ecosystem subservices**: fuel, climate regulation (both -/+)		Land for wind turbines may be located where re-wetting could occur for NFM. Offsets help achieve NFM on alternative sites. SEA topic: material assets -/+; climatic -/+; landscape -/+; water -; biodiversity -; soil - Ecosystem subservices: , fuel (+), climate regulation (0), natural hazard management, water cycling, habitat, distinctive wild species (all -)	Wind turbine development brings potential for adverse water quality impacts. Although developer contributions and the regulatory system can mitigate/avoid these. **SEA topic**: material assets, climatic (both +); water -; biodiversity -; soil -; **Ecosystem subservices**: fuel, climate regulation (both +), natural hazard management, water cycling, habitat, distinctive wild species (all -)	There may be risk to certain carbon rich soils from onshore wind turbines. However planning policy provides specifc protection **SEA topic:** Material assets, Climatic (both +); Soil -/? **Ecosystem subservices:** fuel, climate regulation (both +), nutrient cycling, erosion (both -/?)	On shore turbines may adveresely affect the enjoyment of core paths and long distance routes in the Borders. Developer contributions bring potential to improve paths/routes. **SEA topic**: Population & health; Cultural heritage, Landscape (all -/?) **Ecosystem subservices**: societal identity, sense of place, awareness of historic environment (-/?), fuel, climate regulation (both +)	There is a constraint in terms of onshore turbines potentially disturbing habitat or competing with habitat provision. However policy and contributions can result in increased provision. **SEA topic**: Climatic +; Material Assets +; Biodiversity -/+ **Ecosystem subservices**: climate regulation, habitat, distinctive wild species
Flood/overland flow reduction	NFM measures and other flood avoidance schemes, such as field margin planting use land for food production bringing a distinct land use constraint **SEA topic**: Soil +; Water ++; Material Assets -/+; Population & health -/+; **Ecosystem subservices**: food, fibre, fuel (all -), natural hazard management, water quality, erosion, soil quality, habitat, distinctive wild species (all +)	A constraint is that land which could be used for planting may need to be used as storage for flood water. However, it is considered NFM involves a woodland planting component and therefore there is a degree of compatibility in land uses **SEA topic:** Water +; Soil -/+; Climatic -/+; Population & health -/+; Material assets -/+; **Ecosystem subservices:** nutrient cycling, erosion, water cycling; natural hazard management, fuel, habitat, distinctive wild species (all -/+)	Land where NFM measures could be located may compete with land for wind turbines **SEA topics**: Material Assets -/+; Climatic -/+; Landscape -/+; Water +; Biodiversity +; Soil +; **Ecosystem subservices**: , fuel (-), climate regulation (0), natural hazard management, water cycling, habitat, distinctive wild species (all +)		Reduction of flood and overland flow directly impacts on improving water quality by decreasing sedimentation and potential for pollutants entering the water environment. Multiple benefits would be expected. **SEA topic:** water ++; soil ++; population & health ++; material assets +; climatic ++; cultural +; **Ecosystem subservices**: water cycling, natural hazard management, erosion, soil quality, water quality (all ++)	Flood water storage could bring a constraint on certain soil types. However, the benefits of less soil disturbance and erosion/run-off to assist in flood/flow reduction are considered to outweigh any constraint. **SEA topic**: Soil ++; Water ++; material assets +; **Ecosystem subservices**: nutrient cycling, erosion, soil quality, water quality, water cycling (all ++)		Habitat provision from increased planting or flood storage areas means there are benefits to both opportunities. **SEA topic**: Biodiversity ++; Water ++; Soil ++; **Ecosystem subservices**: habitat, distinctive wild species, water quality, natural hazard management, erosion, soil quality (all ++)
Water quality	Measures to improve water quality are likely to compete with food provision in terms of land use. SEA topic: Soil +; Water ++; Population & health -/+; Ecosystem subservices: tradition, societal identity, food, fibre (all -), water cycling, water quality, soil quality, erosion, habitat, distinctive wild species (all +/++)	Woodland planting is likely to be a component of water quality improvements and there are multiple benefits as a result. These measures may compete with timber production. **SEA topic:** Water ++; Soil ++; Material Assets -; **Ecosystem subservices**: nutrient cycling, erosion, water cycling, water quality (all +/-), fuel, fibre (both -)	Measures for large scale water quality improvements could compete with land for wind turbines. The significance of this is unknown. **SEA topic**: Water, Soil, Climatic, Material Assets (all ?) **Ecosystem subservices**: nutrient cycling, erosion, water cycling, water quality, fuel, climate regulation (all ?)	directly impacts on improving water quality by decreasing sedimentation and potential for pollutants entering the water environment. Multiple benefits would be expected. **SEA topic**: water ++; soil ++; population & health ++; material assets +; climatic ++; cultural +; **Ecosystem subservices**: water cycling, natural hazard management, erosion, water quality, soil quality (all ++)		Less soil disturbance helps carbon storage potential and means less erosion and run off which directly impacts on improving water quality therefore bringing multiple benefits. **SEA topics**: Soil ++; Water ++; material assets +; **Ecosystem subservices:** nutrient cycling, erosion, water quality, water cycling, soil quality (all ++)		Improving water quality brings increased habitat provision potential, due to required planting, and will help distinctive species. These factors bring multiple benefits. **SEA topic:** Biodiversity ++; Water ++; Soil ++ **Ecosystem subservices**: habitat, distinctive wild species, water quality, nutrient cycling, soil quality (all ++)

Key

Neutral or no constraints/ benefits	Constraints	Non-significant land use constraints or benefits/constraints not to be mapped	Benefits

Soil Carbon Storage	Soil carbon storage measures and increased food production are considered to be constrained as competing priorities **SEA topics**: Soil, Material assets, Population & health, Water & Biodiversity (all ?) **Ecosystem subservices**: tradition, societal identity, food, fibre, soil quality, erosion, water quality, water cycling, habitat, distinctive wild species, climate regulation (all ?)	Planting of trees brings opportunity for leaf litter etc. which is critical for soil formation and in turn increased carbon storage. Planting also binds soil preventing erosion and run off reducing disturbance. Tree felling brings a constraint as it disturb soils and can release carbon. **SEA topics**: Soil +; climatic -/+; Air +; Material Assets -; Population and Health -; Biodiversity -/+ **Ecosystem subservices**: nutrient cycling, erosion, soil quality (all +) atmospheric CO2, climate regulation (both -/+), Fibre, Fuel (-)	Carbon rich soils are offered significant protection from onshore wind turbines in the new SPP. This constrains land available for on shore turbines. **SEA topics**: Soil +; climatic -/+; Air -/+; Material Assets -; Population and Health -; Biodiversity + **Ecosystem subservices**: nutrient cycling, erosion, soil quality (all +) atmospheric CO2, climate regulation (both -/+)	Less soil disturbance and erosion/run-off to assist in flood/flow reduction are considered to offer multiple benefits. **SEA topics**: Soil +; Water ++; material assets +; **Ecosystem subservices**: nutrient cycling, erosion, climate regulation, water quality, water cycling, natural hazard management (all +)	Less soil disturbance helps carbon storage potential and means less erosion and run off which directly impacts on improving water quality therefore bringing multiple benefits. **SEA topics**: Soil ++; Water ++; Material Assets + **Ecosystem subservices**: nutrient cycling, erosion, climate regulation, water quality, water cycling (all +)			There are multiple benefits in terms of nutrient cycling between the two opportunities. **SEA topics**: Soil ++; Biodiversity -/++; Climatic ++ **Ecosystem subservices**: soil quality, habitat, distinctive wild species (all /+), climate regulation (++)
Recreation		Increased large scale recreation (as at Glentress) may limit the amount of land for native/timber planting . However overall it is considered the recreation is enhanced by a forest setting and so planting will occur. **SEA topic**: Population & health (++); Biodiversity (-/+) **Ecosystem subservices**: awareness of natural environment (++), fibre, fuel (-)	curtail on shore wind turbine development in certain locations. However the regulatory system deals with this potential constraint. **SEA topic**: Population & health; Cultural heritage, Landscape (all +); Material Assets, Climate (both -) **Ecosystem subservices:** societal identity, sense of place, awareness of historic environment (+), fuel, climate regulation (both -)			Increased awareness and education can help to preserve soil quality and provide multiple benefits. However there is a risk of erosion from increased recreational access. **SEA topic:** Soil -/+; **Ecosystem subservices**: erosion (-/+)		Increased awareness and education can help to conserve biodiversity. There is a risk of disturbance from increased recreational access. **SEA topics**: Biodiversity -/+; Population & health +; **Ecosystem subservices:** habitat, distinctive wild species (both -/+), natural environment awareness (++)
Biodiversity	Biodiversity enhancement measures directly compete with land for food production. **SEA topic:** Biodiversity ++; Material Assets -; Population & Health -; cultural -; **Ecosystem subservices**: food, fibre, fuel, tradition, societal identity (all -), distinctive wild species, habitat (both +)	Multiple benefits are expected from biodiversity enhancements and woodland planting. Land for timber would also be seen to bring some benefits, although not as permanent. SEA topic: Biodiversity ++; Material Assets (-/+), Ecosystem subservices: habitat, distinctive wild species (both ++), Fibre. Fuel (both -/+)	There is a constraint in terms of onshore turbines competing with habitat provision. However policy and offsets can result in increased provision. **SEA topic:** Climatic -/+; Material Assets-; Biodiversity ++ **Ecosystem subservices**: climate regulation (-/+), habitat, distinctive wild species (++)	Habitat provision from increased planting or flood storage areas means there are multiple benefits for both opportunities. **SEA topic**: Biodiversity ++; Water ++; Soil ++; **Ecosystem subservices**: habitat, distinctive wild species, water quality, natural hazard management, erosion, soil quality (all ++)	Improving habitat provision potential, due to required planting, brings multiple benefits **SEA topic**: Biodiversity ++; Water ++; Soil ++ **Ecosystem subservices**: habitat, distinctive wild species, water quality, nutrient cycling, soil quality (all ++)	A constraint is the potential for planting on certain carbon rich soils. However there are overall multiple benefits in terms of nutrient cycling between the opportunities which outweigh the constraint **SEA topics**: Soil +; Biodiversity ++; Climatic + **Ecosystem subservices**: soil quality, climate regulation (+) habitat, distinctive wild species (all ++)	Increased biodiversity provision may curtail some recreational potential but this is not considered to be significant. **SEA topic:** Biodiversity +; Population & health -/+; **Ecosystem subservices:** habitat, distinctive wild species (both +), natural environment awareness (+)	