Scottish & Southern Electricity Networks

RIIO ED2 Engineering Justification Paper (EJP)

Nature Based Solutions for Carbon

Investment Reference No: 447_ENV_NATURAL_CAPITAL

Contents

Table of Figures

Table of Tables

Scottish & Southern Electricity Networks

Investment Summary Table

The table below provides a high level summary of the key information relevant to this Engineering Justification Paper (EJP) for Nature based Solution (NbS) carbon removal and reduction.

Investment Summary Table

Name of Scheme/Programme	Nature based Solutions (NbS) for Carbon removal and reduction • Creation/Reforestation of Woodland across Scotland (1200has) • Creation/Reforestation of Woodland across England (866has); and • Restoration of peatland each (600has x 2) across Scotland and England.					
Primary Investment Driver	The primary investment driver is carbon reduction with biodiversity net gain and wider environmental benefits. • CO_2 removal and reductions via woodland creation and peatland restoration to support our Net Zero target across our business operations for Scope 1 and Scope 2.. In order to achieve this, a reduction of 260,000tCO_2 needs to be achieved by 2043. • Biodiversity enhancements to deliver Biodiversity Net Gain • Wider societal and other environmental benefits delivered					
Scheme reference/ mechanism or category	447/ENV/NATURAL_CAPITAL					
Output references/type	Output type – PCD Business Plan Output S7					
Cost	• **SHEPD**: £12,468,465 • **SEPD**: £13,158,337					
Delivery Year	Project to be delivered over the period of RIIO-ED2 with benefits for carbon, biodiversity and ecosystem services mapped over the ED2 period but also over a 45 Year period and 100-year period.					
Reporting Table	Business Plan Data Tables • CV22 - Environmental Reporting					
Outputs included in RIIO ED1 Business Plan	N/A					
Spend apportionment	RIIO ED2 Spend (£m) (costs include the green book discount rate)					
	2024	**2025**	**2026**	**2027**	**2028**	**Total**
SHEPD	£7.62m	£1.28m	£1.23m	£1.19m	£1.15m	£12.47m
SEPD	£9.41m	£0.98m	£0.95m	£0.92m	£0.89m	£13.16m

Executive Summary

The primary driver for this investment is to deliver our credible net zero. Alongside credible Science Based Targets you need some form of carbon removal – we believe the most credible way to do this is through nature-based solutions.

Our proposed investment for carbon removal and reduction using Nature-based Solutions (NbS) (Option 2) will deliver potential carbon removals and reductions to help us achieve this credible net zero target, and also provide vast biodiversity benefits at the same time. This level of investment will achieve a sequestration rate of at least 260,000t CO_2 by 2043, meaning that alongside our own Science Based Targets for carbon reduction, with this investment, we would achieve our net zero in line with current UK legislation and potentially before.

Because the carbon sequestration potential in Nature-based Solutions increases rapidly over time (i.e., progression after 10 – 15 years) this investment has the potential to total 855,225 carbon units (t CO_2e) over 45 years and 1,354,869 carbon units over 100 years. That is over 1.3 million carbon units over a 100-year period. Moreover, there is also the potential to deliver 4,674 Biodiversity Units and to deliver a wide range of wider environmental benefits including the survival of culturally significant rare species, air quality improvements, flood prevention, water quality improvements, enhanced health and wellbeing and general adaptation and mitigation for climate change.

Analysis has been produced for the Scottish Hydro Electric Power Distribution Plc (SHEPD) licensed area and the Southern Electric Power Distribution Plc (SEPD) licensed area. Woodland creation costs are generally higher in England than in Scotland, however broadleaved woodland sequesters a greater amount of carbon and therefore the Cost Benefit Analysis (CBA) Benefit Cost Ratio (BCR) is still positive.

Carbon benefits

When monetising carbon only (using the carbon values in the Ofgem CBA) the Benefit Cost Ratio[1] ranges from 2.64 for peatland to 8.32 for woodland in England, 6.13 in Scotland and an overall BCR for the total of 6.27 over 45 years (see Table - A).

Table - A: CBA summary for 45-year period using carbon values only (monetised carbon values, costs and benefits include the green book discount rate)

Intervention	Region	Area (ha)	Cost	Carbon units (tCO2e)	Carbon valuation	Benefit cost ratio
Woodland	SHEPD	1200	£13,420,900	315,237	£82,204,786	6.13
	SEPD	866	£13,149,416	457,400	£109,447,826	8.32
Peatland	SHEPD	600	£3,447,846	41,294	£9,117,842	2.64
	SEPD	600	£3,447,846	41,294	£9,117,842	2.64
Totals	All	**3266**	**£33,466,008**	**855,225**	**£209,888,296**	**6.27**

The rate of carbon sequestration by woodland is low whilst the woodland establishes, with the rate increasing over time as the woodland matures. The rate of sequestration declines as the trees reach maturity but retains a

[1] Benefit cost ratio refers to the value of the benefit divided by the cost. A number greater than one indicates that the benefits are greater than the costs. A number less than one indicates that the costs are greater than the benefits. This is separate and additional information to the Ofgem CBA assessment.

steady state until tree death. As such, the BCR significantly improves after 45 years compared to 5 years (see Table - A and Table - B). This is driven by higher initial capital costs and lower initial rates of carbon sequestration. So this is an investment for the future.

Table - B: CBA summary for 5-year period using carbon values only (CBA carbon trading values, costs and benefits include the green book discount rate)

Intervention	Region	Area (ha)	Cost	Carbon units (tCO2e)	Carbon valuation	Benefit cost ratio
Woodland	SHEPD	1200	£9,966,926	3,654	£185,214	0.02
	SEPD	866	£10,656,798	2,511	£127,284	0.01
Peatland	SHEPD	600	£2,501,539	3,671	£186,035	0.07
	SEPD	600	£2,501,539	3,671	£186,035	0.07
Totals	**All**	**3266**	**£25,626,802**	**13,507**	**£684,567**	**0.03**

The monetised benefit values and the BCR for the potential benefits for woodland creation/reforestation and peatland restoration in SHEPD licensed area and SEPD licensed area are presented in the tables below. It is expected that the proposed interventions will deliver a removal and reduction of 13,507 tCO_2e after 5 years but this rises to 855,225 tCO_2e after 45 years and then 1,354,869 after 100 years.

Wider Benefits

The woodland creation and peatland restoration also have wider ecosystem service and natural capital benefits that can be quantified. When monetising the wider environmental benefits only (i.e. excluding carbon), the BCR ranges between 2.70 for woodland in England and 5.36 for peatland after 5 years (see Table - C). The BCR values for wider environmental benefits are similar after 5 years. This high BCR is driven by the statutory body approved approach of claiming Biodiversity Units once initial habitat creation works have taken place whereas the carbon units are pending their actual removal and reduction. Not all environmental benefits have been monetised, for example the avoidance of extinction for culturally significant and endemic species is priceless. Additional monetisation of the schemes could be undertaken at the detailed design stage using more scheme specific data which would likely increase the benefit values. Approximately 4,674 Biodiversity Units could be used to offset SSEN's operational impacts and will help to contribute towards the target of achieving biodiversity net gain from 2025. Consultation with statutory bodies will be required to confirm when the units can be declared. Recalculation of units is will be carried at the detailed design of schemes.

Table - C: Summary benefit cost ratio table for 5-year ED2 period using Biodiversity and wider environmental benefits (costs and benefits include the green book discount rate)

Intervention	Region	Area (ha)	Cost	Biodiversity Units	Biodiversity valuation	ES/WTP	Total	BCR*
Woodland	SHEPD	1200	£9,966,926	1,272	£35,616,000	£2,012,938	£37,628,938	3.78
	SEPD	866	£10,656,798	918	£25,702,880	£3,084,658	£28,787,538	2.70
Peatland	SHEPD	600	£2,501,539	1,242	£12,720,000	£689,746	£13,409,746	5.36
	SEPD	600	£2,501,539	1,242	£12,720,000	£689,746	£13,409,746	5.36
Totals	**All**	**3266**	£25,626,802	4,674	£86,758,880	£6,477,090	£93,235,970	3.64

*The high BCR is driven by the assumed approach of claiming all biodiversity units once initial habitat works have been carried out.

The scheme could deliver a potential **4,674** biodiversity units that if SSEN were required to purchase to offset development or operational activities, could cost SSEN nearly **£87m**[2] and are likely to more than offset their operational commitments. Some of the wider environmental benefits (i.e. excluding carbon and biodiversity) were monetised which provided a value of over £33m after 45 years (see Table - D), which as previously discussed is likely to be an underestimate as not all benefits were monetised, including the power to prevent extinction for some of our most culturally significant species. A range of stakeholders have been engaged to ensure that there are a suite of intervention opportunities to provide confidence in benefit delivery. In addition to the required 5 and 45-year period, annual costs were estimated across a 100-year period (see Appendix 1 Cost breakdown) as it is likely that these habitats will be managed in reality beyond 45 years.

Table - D: Summary benefit cost ratio table for 45-year period using Biodiversity and wider environmental benefits (costs and benefits include the green book discount rate)

Intervention	Region	Area (ha)	Cost	Biodiversity Units	Biodiversity valuation	ES/WTP	Total	BCR
Woodland	SHEPD	1200	£13,420,900	1,272	£35,616,000	£10,471,717	£46,087,717	3.43
	SEPD	866	£13,149,416	918	£25,702,880	£16,047,026	£41,749,906	3.18
Peatland	SHEPD	600	£3,447,846	1,242	£12,720,000	£3,588,203	£16,308,203	4.73
	SEPD	600	£3,447,846	1,242	£12,720,000	£3,588,203	£16,308,203	4.73
Totals	**All**	**3266**	**£33,466008**	**4,674**	**£86,758,880**	**£33,695,149**	**£120,454,029**	**3.6**

The costs for areas in the tables above for woodland in Scotland and England and peatland in both areas are presented in Table - E below. These include capital and operational costs. These interventions present excellent value for money and will significantly contribute to the sustainability of SSEN operations. This is supported by long term outputs from the CBA.

Table - E: Summary costs across a 100-year period for habitat creation and restoration (costs and benefits include the green book discount rate)

Cost/Intervention	Cost 0-5 years	Cost 6-45 years	Cost 46-100 years	Total 45 years	Total 100 years
SHEPD woodland (1200ha)	£10,876,257	£2,544,643	£484,469	£13,420,900	£13,905,368
SHEPD peatland (600ha)	£2,703,613	£744,234	£193,787	£3,447,846	£3,641,634
SEPD woodland (866ha)	£11,313,032	£1,836,384	£349,625	£13,149,416	£13,499,041
SEPD Peatland (600ha)	£2,703,613	£744,234	£193,787	£3,447,846	£3,641,634

Another option, Option 1, was considered in which Carbon Units were directly purchased on the carbon trading market. However, this option has significant disadvantages and challenges:

[2] Details of how ecosystem services (including biodiversity) were monetised is presented in section 5.1.

- Carbon Unit availability
  - the majority of Carbon Units available in the UK are Pending Issuance Units (PUIs), these are units that are available over a 100-year period. To obtain 260,000 Carbon Units that are instantly declarable, that is removal and reductions within a 5-year period, are extremely difficult to secure at a UK wide scale.
  - This market is not as legitimate as we would like it to be and was not a supported option with our stakeholders at all.
- Wider benefits
  - It would provide no declarable Biodiversity Units nor wider environmental benefits to customers (e.g. flood prevention or recreation), unlike the natural capital approach.
- Benefit/cost ratio
  - The return on investment would be lower than for the natural capital approach, even when only the carbon units were considered and no other ecosystem service benefits (i.e. 1.35 for option 1 relative to 6.27 for option 2 (after 45 years with only monetised carbon included)).

Recommendation

Due to the significant wider benefits and long-term carbon returns on investment, it is recommended that option 2 is progressed ahead of option 1.

1 Introduction

Section 1 of this Engineering Justification Paper (EJP) introduces the approach to assessing the feasibility of Nature-based Solutions (NbS) to support the delivery of SSEN's evidence-based targets within our Environmental Action Plan, primarily carbon removal and reduction but also enhanced biodiversity and wider environmental benefits. It provides background information for this RIIO-ED2 investment proposal and explains the importance of carbon and biodiversity for SSEN operations, customers and the communities in across our Scottish Hydro Electric Power Distribution PLC (SHEPD) licensed area and our Southern Electric Power Distribution PLC (SEPD) licensed area.

Sections 2 and 3 set out how the chosen RIIO-ED2 investment strategy has been informed through our carbon and wider environmental benefits valuation and stakeholder engagement activities. To establish the cost and volumes associated with this investment plan, the EJP provides the drivers for investment and benefits from the various options of the EJP.

Section 4 provides a summary of the corresponding intervention options which can be deployed as a solution to these condition related investment drivers.

Section 5 provides a detailed analysis, then describes the cost and volumes arising from the preferred intervention options as supported by the Cost Benefit Analysis (CBA) results which complements this EJP.

Section 6 provides an overview of potential risks to delivery and mitigations proposed.

Appendices provide greater detail of the cost benefit calculations.

Why us? Our network is needed to enable the strategic delivery of net zero – we need it as a society. We need to disturb the nature to build and operate our network and we have a responsibility to mitigate against that disturbance. If not us, then who?

1.1 Background Information

This EJP examines the options for NbS to support SSEN with carbon removals and reduction as well as achieving operational Biodiversity Net Gain (BNG). These activities will also deliver wider environmental benefits comprising additional ecosystem services and enhanced natural capital assets, some of which have been qualified, quantified and/or monetised. The options considered in detail involve financing woodland creation and peatland restoration with co delivery partners. These NbS will act as carbon sinks, sequestering carbon and reducing carbon in the atmosphere - supporting SSEN's ambitious Science Based Targets (SBTs) and the delivery of SSEN's Environmental Action Plan (EAP). Why us? Our network is needed to enable the strategic delivery of net zero – we need it as a society. We need to disturb the nature to build and operate our network and we have a responsibility to mitigate against that disturbance. If not us, then who?

1.2 Drivers and Targets

This EJP is intended to inform the proposed capital expenditure (Capex) and Operational expenditure (Opex) interventions for SSEN's carbon and biodiversity targets during RIIO-ED2. The benefit of NbS is that it can achieve the primary target of carbon reduction with the secondary target of biodiversity enhancement and the delivery of wider consequential environmental benefits, that our stakeholders are asking for. The terrestrial opportunities with the potential to deliver the largest and most reliable carbon reduction benefits are related to the investment in woodland creation and peatland restoration across

SHEPD and SEPD. Further details on these and the benefits are presented in Sections 3 and 5 and Appendix 2 Stakeholder Engagement Opportunity Stage Summary.

1.2.1 Primary Investment Driver and Targets – Carbon reduction

The latest report by the Intergovernmental Panel on Climate Change (IPCC)[3] provides new estimates of the chances of crossing the global warming level of 1.5°C in the next decade, and finds that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions (GHGs), limiting warming to close to 1.5°C or even 2°C will be beyond reach.

Ofgem have introduced a requirement for Distribution Network Operators (DNOs) to submit an EAP which has minimum requirements which need to be met to ensure DNOs contribute to decarbonising the energy system and reduce the impact of network activity on the environment.

The reduction of carbon emissions is a minimum requirement of the EAP. SSEN's EAP includes SBTs which help meet SSEN's registered commitment with the Science Based Targets Initiative (SBTi).

SSEN are the first UK DNO to set SBTs that align with a 1.5-degree trajectory. In the longer-term SSEN aims to achieve net-zero emissions. Currently, SSEN have set shorter-term targets to help them accomplish this. SSEN's SBTs have been accredited by the SBTi and are outlined below:

- 55% reduction in Scope 1 and 2 emissions by 2033.
  35% of SSEN's supply chain spend committed to SBTs by 2026.

In addition, through this EJP we propose that by 2028 to have nurtured afforestation ready to provide carbon sequestration from year 5 and which will mature to provide potential carbon sequestration rates of approximately 40,000 tCO_2 by end of ED3.

The primary investment driver for this EJP is carbon dioxide (CO_2) removal and reduction. This will support SSEN's ambitious SBTs set out in the EAP. Based on an assessment of the ability of habitats to sequester or reduce carbon, the maturity of the data available, the capacity for available land and expertise to deliver, the two terrestrial habitats with the greatest carbon potential for carbon reduction ability are woodland creation (removal) and peatland restoration (reduction) resulting in a net loss of CO_2 from the atmosphere.

- **Woodland**: To deliver on the Scottish Government's Draft Climate Change Plan[4] there are ambitious woodland creation targets which are rising from 12,000 hectares a year to **18,000 hectares a year by 2024/25**[5]. Scotland's forests and woodlands play an important role in tackling climate change by removing around 9.5 million tonnes of harmful CO_2 emissions each year. In England, the government plans to plant approximately **7,000 hectares of woodland per year** by the end of May 2024[6].
- **Peatland:** Peatland restoration is a key part of the Scottish Government's goal of achieving net zero in Scotland by 2045 with a plan to **restore 250,000ha of Scottish peatland by 2030**[7]. In

[3] https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/
[4] https://www.gov.scot/publications/draft-climate-change-plan-draft-third-report-policies-proposals-2017/
[5] https://forestry.gov.scot/news-releases/positive-progress-on-tree-planting
[6] https://www.gov.uk/government/news/tree-planting-rates-to-treble-by-end-of-this-parliament
[7] https://www.gov.scot/news/peatland-restoration-fund-tackles-global-climate-crisis/

England, the government have committed to securing peatland carbon stores to meet their 2050 net zero contribution and **restore 35,000ha of England's peatlands by 2025**[8].

1.2.2 Secondary Investment Drivers - Biodiversity

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) produced a report stating that "*The overwhelming evidence of the IPBES Global Assessment, from a wide range of different fields of knowledge, presents an ominous picture……The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide*."[9]

On 14 June 2021, the government in England committed to delivering a "nature positive future[10]" in its response to the Treasury-sponsored Dasgupta Review on the Economics of Biodiversity. After introducing a new legally binding target for species abundance for 2030 in the Environment Bill, it is to table a new amendment that expands the biodiversity net gain requirement to all new nationally significant infrastructure projects. Scotland has failed to meet international targets on biodiversity including those on extinctions[11]. Habitat loss, invasive non-native species and climate change are all a major threat to native species such as red squirrel, wild cat, Atlantic salmon, the capercaillie and the freshwater pearl mussel. The Scottish government plan to publish a new Biodiversity Strategy after The Convention on Biological Diversity (CoP10), scheduled to conclude in May 2022[12] to address these changes and in support of their Climate Change Plan "Securing a Green Recovery on a Path to Net Zero[13].

SSEN have responded to Ofgem's requirements by committing to:

- achieve biodiversity 'No Net Loss' on any new projects starting from 2023 and biodiversity net gain on all projects gaining consent from 2025;
- invest significantly to create a long-term solution to ensure a credible net zero and biodiversity net gain is a reality by investing in targeted biodiversity and natural capital projects

The creation of woodland and restoration of degraded peatland has the potential to improve biodiversity. These projects have the potential to deliver biodiversity units, as measured through Natural England's Biodiversity Metric 3.0[14] (BM 3.0) however this particular metric undervalues peatland restoration and planting of woodland on sites previously wooded. Which is one of the reasons why Scottish Government hasn't accepted it yet. That said however even using this metric you can see the benefit.

- **Woodland** – Woodland covers 13.2% of the UK land surface[15]. Tree planting; in appropriate areas, is one of the best means to enhance biodiversity. The UK is one of the least wooded parts of Europe. Only the Netherlands at 10.8per cent and Denmark at 11.8per cent are equal or lower than the UK as a whole (excluding microstates)[16]. Native pinewoods, or Caledonian pinewoods, are Scotland's most iconic woodlands, providing a critical habitat for a wide range of species. The native pinewoods of Scotland are the westernmost extension of the boreal forest, the conifer-

[8] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1010786/england-peat-action-plan.pdf
[9] https://ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_en.pdf
[10] https://www.gov.uk/government/news/government-commits-to-nature-positive-future-in-response-to-dasgupta-review
[11] https://www.nature.scot/scotlands-biodiversity-progress-2020-aichi-targets-conserving-genetic-diversity-development-national
[12] https://www.gov.scot/publications/scottish-biodiversity-strategy-post-2020-statement-intent/pages/6/
[13] https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/
[14] http://publications.naturalengland.org.uk/publication/6049804846366720
[15] https://www.woodlandtrust.org.uk/state-of-uk-woods-and-trees/
[16] https://www.parliament.uk/globalassets/documents/documents/upload/wtd10.pdf

dominated forest that occurs all around the northern hemisphere and supports endangered and culturally significant species such as Scottish wild cats, red squirrel and birds such as capercaillie, black grouse and Britain's only endemic species of bird, the Scottish crossbill as well as a range of rare fungi, lichens, mosses and vascular plants and invertebrates.

- **Peatland** – Peatlands are carbon-rich wetlands which occupy 3% of the global land surface and 12% of UK land area[17]. While peatland biodiversity may be generally poor overall, it supports a large proportion of highly adapted species[18]. Peatland species are highly specialised and adapted to thriving in waterlogged, acidic and nutrient-poor conditions. This includes, rare wading birds such as dunlin, the threatened golden plover and hen harrier, rare plants like the insect-eating sundew, a huge range of mosses including sphagnums and invertebrates (up to 30 times higher in number than vertebrates) such as the jumping spider discovered for the first time in 2018[19].

1.3 Timing of the investment

We need to act now to enable us to meet our obligations and targets aligned with UK and global commitments. Habitat creation will take time to establish. In addition, driven by BNG and net zero targets the market value for land for carbon reduction and biodiversity offsetting is increasing and suitable land available is decreasing.

Forestry and Land Scotland's (FLS) proposal to restore former coalfields in Central Belt and Ayrshire[20] is likely to be closely linked to the non-traded price of carbon, which is forecasted to increase. Woodland creation is also already being looked at by large corporates (e.g. Shell, Npower), if this trend continues it could reduce the pool of available projects. Increased costs are also predicted as carbon prices rise and the need for biodiversity offsetting increases. During the new phase of European Union European Trading System (EU ETS), the carbon price is forecasted to rise substantially[21]. The UK has now introduced a UK ETS and UK prices are expected to increase 36% between 2020 and 2050[22]. Biodiversity Units are already being traded due to the predicted requirement for biodiversity net gain in the upcoming environment bill. This demand is expected to increase once the aforementioned bill is passed (expected to be early 2022). Due to the limited availability of land suitable for biodiversity improvements and stakeholders capable of carrying them out, the prices of Biodiversity Units are expected to increase.

Peatland restoration may be a less competitive market, with fewer organisations pursuing this. However, there are more limited opportunities, relative to woodland planting, as restoration can only occur where there is existing peat.

There is an inherent lag between project initiation and the delivery of significant benefits in the natural capital approach. For woodland, this is due to the decades that it takes for the trees to mature and start delivering significant benefits (e.g. significant levels of carbon sequestration starts to occur around a decade after trees are planted). For peatland habitats, it takes time for the interventions to result in the peat recovering from a carbon source to carbon sink (for example, the time taken to re-waterlog the

[17] https://www.ceh.ac.uk/sites/default/files/Peatland%20factsheet.pdf
[18] https://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/Review%203%20Peatland%20Biodiversity.pdf
[19] https://www.cheshire-live.co.uk/news/chester-cheshire-news/rare-spider-discovered-cheshire-wildlife-15041556
[20] https://forestryandland.gov.scot/news-releases/plan-to-re-green-coal-sites-takes-another-leap-forward
[21] https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/revision-phase-4-2021-2030_en
[22] https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation

ground). Due to this lag, it is important to begin such projects as soon as possible, to minimise the time before consumers benefit from the benefits. Delays will increase the burden on the consumer due to the predicted increases in the costs of natural capital solutions and the lost potential benefits from starting at a later point.

If SSEN wish to engage in woodland creation at scale, opportunities are limited, supporting the need to start the work as soon as possible. An alternative is that SSEN purchase carbon credits on the open market. This option is explored in sections 4 and 5, but was found to deliver significantly fewer benefits at a worse benefit/cost ratio to the natural capital approach.

The aim at the end of ED2 will be investment in projects and/or land acquisitions that aim to reduce CO_2 levels in the atmosphere. It is essential these projects are delivered as soon as possible as there will be penalties for delaying.

2 Stakeholder Engagement

2.1 SSEN Network Customer Engagement

In preparation of SSEN's RIIO-ED2 business plan, several stakeholder engagements exercises have been undertaken to better understand what will be important to SSEN's network customers during RIIO-ED2 and to ensure the views of stakeholders are reflected in the cost and volumes proposed.

In total there were 193 attendees with a range of representation from customers, utility companies, developers, environmental representatives, charities and town councils. A summary of the key feedback that was gathered from the stakeholder engagement exercises is presented in Table 1 and below.

Table 1: Stakeholder events

Stakeholder Event	Date	Relevant Topics	Attending
Distribution Annual Workshop North	24th September 2020 1 October 2020	Sustainability – helping the UK meet its net zero emissions targets Maintaining a reliable and resilient network for the future	84
Distribution Annual Workshop South	23rd September 2020 30th September 2020	Sustainability – helping the UK meet its net zero emissions targets Maintaining a reliable and resilient network for the future	109

Subject 1: SSEN's Sustainability Strategy and Net Zero Targets

Stakeholder Feedback: In both Scotland and England, stakeholders wanted SSEN to be as ambitious as possible with its sustainability strategy and net zero targets. This was reflected in the electronic voting, where 93% opted for either 'accelerating net zero' or 'achieving net zero'. In both licence areas during the 18 discussions, option 4 (accelerate net zero) was advocated as the stretch; or ideal, target and option 3 (achieve net zero) was seen as potentially the more realistic goal. Delegates felt that strong leadership was lacking from central government in this area and urged SSEN to step up, work together with other DNOs and LEPs, and forge the way. Affordability was raised as an issue however, with many calling for transparency in terms of how this level of ambition would affect consumer bills.

Given stakeholder desire to not only achieve but accelerate Net Zero, SSEN's ambitions to offset emissions from some projects through tree planting will help to achieve these targets.

Subject 2: SSEN's Environmental Action Plan

Stakeholder Feedback: During the electronic voting, stakeholders were asked how ambitious SSEN should be with regards to each area of its EAP. Stakeholders wanted the company to be more ambitious across all environmental areas, with even the lowest-ranking area receiving a score of 3.75 out of 5 (Figure 1). As can be seen, stakeholders ranked biodiversity and natural capital higher than, for example reducing SF6 (sulphur hexafluoride) use, emphasising the importance of these topics to stakeholders.

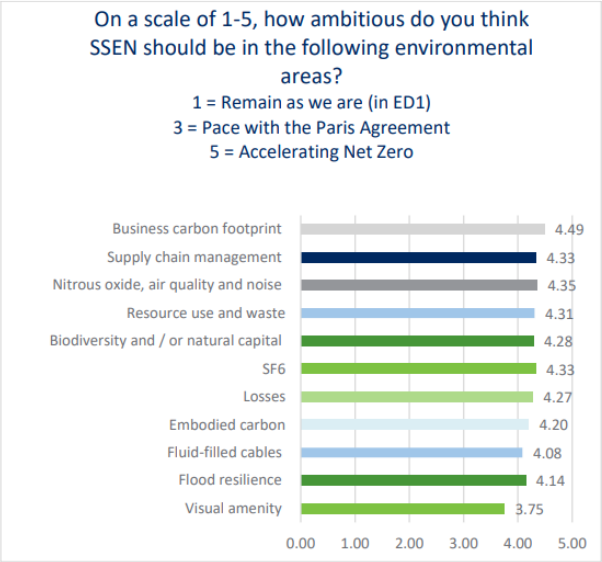

Figure 1 Biodiversity and Natural Capital ranked 5th out of 11 environmental areas.

Our stakeholders told us how much they have come to value natural open spaces, especially throughout Covid where they offered a place to escape and also to meet friends and family – they have now become even more critical to wellbeing.

SSEN are also piloting an innovative app (IRYS) to engage further with stakeholder opinions, results are predicted to be collated by the end of 2021. Further information is provided in Appendix 3 Pilot Stakeholder Engagement App.

2.2 Stakeholder Opportunity Engagement

Slightly different approaches were taken for the SHEPD and SEPD regions. Opportunities in Scotland tend to offer larger areas of land owned and/or managed by fewer individuals than in England. For Scotland, two major stakeholders with known opportunities, a wide range of mature stakeholder engagement in the target locations, as well the required experience and expertise, were contacted. These stakeholders: [redacted], were able to provide information on multiple potential opportunities for the preferred habitats in the SHEPD.

In England, wider engagement was undertaken. As of 10/11/2021 a total of 57 stakeholders have been contacted, that is 12 major wildlife/nature charities (CH), one private landowner (PL), 38 local planning

authorities (LPAs), three offsetting providers (OPs), and three statutory bodies (SBs) (see Table 2). Further wider stakeholder commentary on NbS is presented in Section 3.CBA.

Table 2: Stakeholders engaged for project opportunities

Stakeholder	Type	Stakeholder	Type
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	CH	[redacted]	LPA
[redacted]	PL	[redacted]	LPA
[redacted]	LPA	[redacted]	LPA
[redacted]	LPA	[redacted]	LPA
[redacted]	LPA	[redacted]	LPA
[redacted]	LPA	[redacted]	LPA
[redacted]	LPA	[redacted]	LPA
[redacted]	LPA	[redacted]	LPA
[redacted]	LPA	[redacted]	LPA
[redacted]	LPA	[redacted]	LPA
[redacted]	LPA	[redacted]	OP
[redacted]	LPA	[redacted]	OP
[redacted]	LPA	[redacted]	OP
[redacted]	LPA	[redacted]	SB
[redacted]	LPA	[redacted]	SB
[redacted]	LPA	[redacted]	SB

Differing levels of responses were received from the various stakeholders, ranging from no response to the contact email and subsequent follow ups to active engagement in developing a proposal presented in Table 3.

Table 3: Stakeholder responses

Stakeholder Response	
Stakeholders contacted	57
Responses received	14
Meetings held	10
Projects being developed	8

For the stakeholders that did not respond further attempts at contact have been made and engagement will continue to explore potential engagement activities with SSEN.

3 Natural Capital and Ecosystem Services Benefits

3.1 The Natural Capital Approach

While the delivery of carbon reductions via NbS has uncertainty factors (discussed in Section 6) there are a range of wider environmental benefits that can be delivered. Namely the enhancement of natural capital and delivery of multiple ecosystem services. It is largely agreed that well designed NbS can make an important contribution to reaching net-zero emissions, if combined with dramatic cuts in GHGs (e.g., by burning less fossil fuel)[23]. Natural capital can be defined as the "world's stocks of natural assets which include geology, soil, air, water and all living things"[24]. It is these natural capital assets that deliver a flow of significant benefits, often called ecosystem services, which make human life possible.

Ecosystem services are defined by the Common International Classification of Ecosystem Services[25] (CICES) as:

- **Provisioning services:** food, fresh water, wood, medicinal products etc.
- **Regulatory and maintenance services:** purification of air and water, climate regulation, pollination, carbon sequestration, natural pest control etc.; and
- **Social and cultural services:** tourism and recreation, cultural heritage, and educational opportunities and a sense of wellbeing.

Historically, negative impacts of development on the environment have been a source of reputational risk, more recently however, attention is focusing on how ecosystems provide critical benefits that improve quality of life and benefits to business. The recognition of the importance natural capital has increased with the introduction of natural capital accounting and initiatives that attempt to make environmental benefits more visible. This has also increased the perception and understanding of the range of environmental risks. Figure 2 shows the relationship between, biodiversity, ecosystems and value.

[23] https://www.naturebasedsolutionsinitiative.org/news/on-the-misuse-of-nature-based-carbon-offsets/
[24] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909202/ncc-terminology.pdf
[25] https://cices.eu/

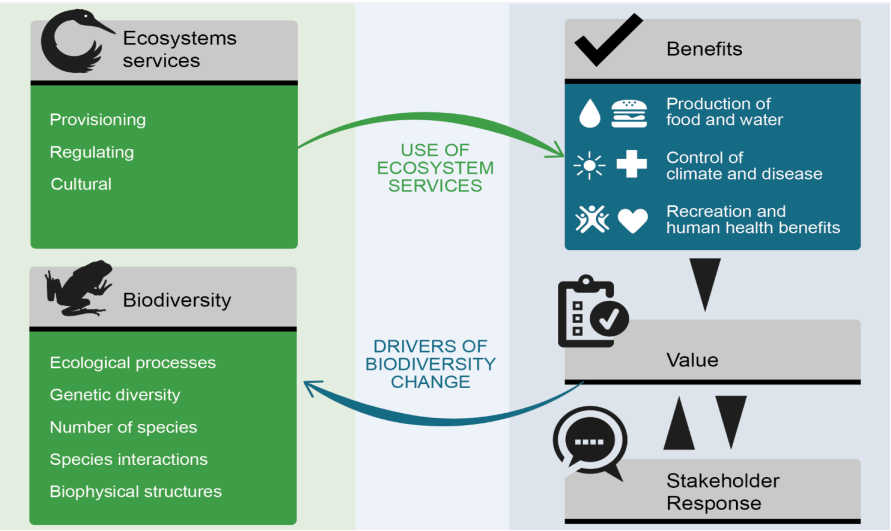

Figure 2 The benefits approach (from Business and Biodiversity Risk JNCC[26])

NatureScot joined with the Convention of Scottish Local Authorities (COSLA), The Improvement Service, and the Sustainable Scotland Network to publish a briefing for Elected Members on NbS[27] (see Figure 3). The briefing aims to raise awareness amongst councillors of the potential to harness nature in addressing a wide range of local shared socio-economic outcomes through actions in which local authorities can play a significant role. It lists the high-level outcomes as:

- Adapting to the impacts of climate change
- Reducing carbon emissions and storing carbon safely
- Preventing the loss of biodiversity and protecting our natural capital
- Improving health and wellbeing and reducing health inequalities
- Building stronger and more resilient communities
- Nurturing our young people
- Supporting a Green Recovery and Just Transition

[26] Biodiversity Risk - Integrating Business and Biodiversity in the Tertiary Sector 2018 https://hub.jncc.gov.uk/assets/7cac352f-1b21-420e-9e0a-c0860f4da556

[27] https://www.improvementservice.org.uk/news/july-2021/local-government-briefing-demonstrates-power-of-nature-based-solutions

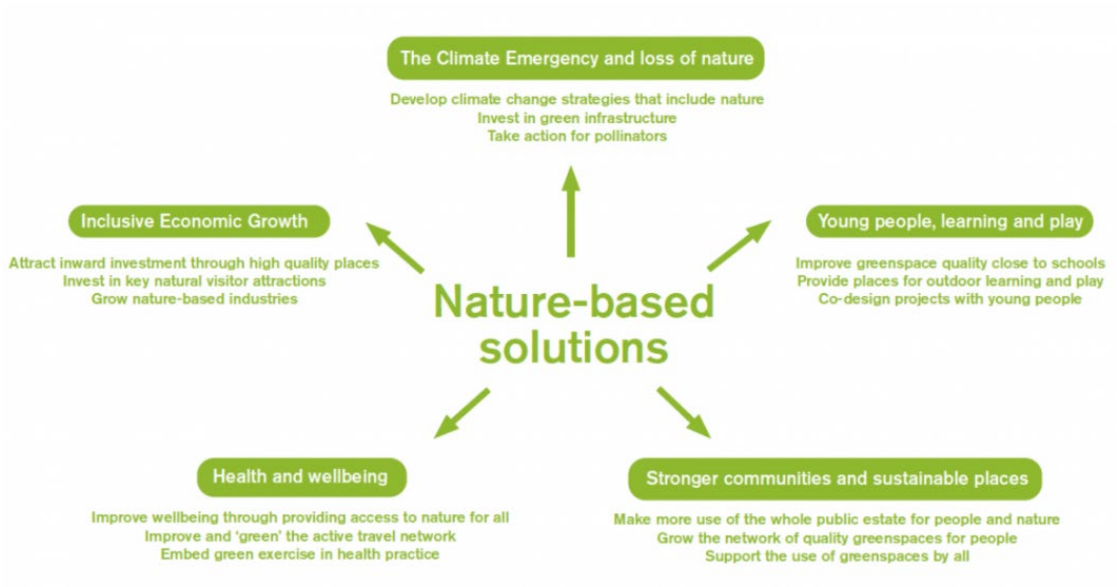

Figure 3: High level benefits of Nature-based Solutions

The scope of potential benefits covers a range of environmental, economic and social aspects, which includes but is not limited to:

- Inequality reduction (income, health, access to services,)
- Increased economic activity (employment)
- Increased human capital (upskilling labour)
- Increased productivity
- Decreased health expenditure
- Increased innovation (fostering long term economic growth)
- Decreased operating costs for individuals and organisations
- Community cohesion
- Increased health outcomes (physical and mental health)
- Decreased risks (life, injury, and asset value loss)
- Flood attenuation
- Improvement in water quality
- Climate adaptation
- Noise reduction
- Visual screening
- Improvement in air quality
- Reduction in soil erosion
- Increased amenity/aesthetic value
- Provision of education

3.2 NbS benefit quantification overview

There are a number of means of quantifying benefits which are explored further in sections 3.3 and 3.4. Following a sensitivity analysis of potential assessment mechanisms the following sources were chosen for quantification and monetisation:

- **The Office of National Statistics (ONS)** provides national accounts separated for Scotland, N. Ireland, England and Wales for a range of ecosystem services, where possible ONS data were used[28].
- **Woodland Carbon Code** provides an accredited quantification of declarable carbon
- **Peatland Carbon Code** provides an accredited quantification of declarable carbon
- **Willingness to Pay** a bespoke survey result was used
- **Government advice** on valuation of GHG values[29]
- **Ofgem** CBA carbon values

The government guidance on Enabling a Natural Capital Approach (ENCA)[30] has also been followed.

There is an emerging market for Biodiversity Units (BUs). Natural England's Biodiversity Metric 3.0 is being used to calculate the units required to deliver the soon to be mandatory 10% Biodiversity Net Gain for new developments in England. This in turn has resulted in a trading market for BUs. While Scotland has not yet adopted NE's BNG metric and model, it has been used as a proxy for measurement in England and Scotland. Latest industry figures for the market value of biodiversity have been used for monetisation in our wider assessment beyond the ED2 CBA template.

3.3 Monetised benefits basis

3.3.1 Woodland

3.3.1.1 Carbon

Carbon – trees sequester carbon as they grow. This process continues throughout the lifespan of the woodland. The rate at which trees sequester carbon make them the primary choice for NbS to carbon capture. The sequestration of carbon is a key driver of this approach. The quantification of carbon was derived from the Woodland Carbon Code model and the monetisation of carbon was carried out using the monetised carbon values within the Ofgem CBA tool (The BEIS central traded carbon values until 2029 (inclusive)[31] and the central non-traded values within the DECC guidance after this point[32]).

3.3.1.2 Wider benefits

Biodiversity – Tree planting, in appropriate areas, is one of the best means to enhance biodiversity. This is especially true in areas of lesser quality agricultural land, with very low levels of baseline biodiversity. This is reflected within BM 3.0, with woodland habitat typically scoring highly in distinctiveness (a measure of inter-habitat quality/biodiversity). The BUs (as measured using BM 3.0) were monetised using the range of costs of BUs currently found in the marketplace.

The following benefits were monetised using data from the Office for National Statistics.

[28] https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/woodlandnaturalcapitalaccountsuk/ecosystemservicesforenglandscotlandwalesandnorthernireland2020

[29] https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation

[30] https://www.gov.uk/guidance/enabling-a-natural-capital-approach-enca

[31] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/794186/2018-short-term-traded-carbon-values-for-appraisal-purposes.pdf

[32] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48108/1_20100120165619_e____carbonvaluesbeyond2050.pdf

Pollution removal – trees have been found to improve air quality through their absorption of polluting gasses into stomata and suspended particulate matter suspending on leaves. "Forested areas have the ability to trap up to 50% of localised particulate matter" – Maher et al (2013)[33]" There are clear public health benefits associated with reduced air pollution, leading to reduced public health costs.

Flood prevention – trees are known to reduce flood flows. This is due in part to the increased water absorption of trees, along with increased hydraulic roughness of woodland habitats. Studies at Pont Bren in Wales found soil-infiltration rates were up to 60 times higher under young native woodland than heavily grazed pasture[34]. Reduced flood flows have clear public good benefit, along with savings in damages costs.

Urban woodland cooling – woodlands can cool urban environments, through a combination of shading and evapotranspiration. This cooling effect can lead to productivity benefits and reduced requirement for artificial cooling (measured for England only)[35] due to the difference in urban densification between England and Scotland.

Noise reduction – woodland acts as a barrier to noise, especially road traffic noise. This reduced disturbance increases sleep quality and reduced annoyance. A study by Ow and Ghosh (2017) demonstrated that on average, vegetative barriers (moderate to dense) were able to reduce traffic noise by 9–11 dB. A 10m depth of trees was found to be the upper threshold for effective noise attenuation. The results showed that the traffic noise was reduced by 50%[36]. Quantifiable health benefits are associated with this.

Recreation – Hundreds of millions of visits are taken to woodland in the UK each year. This recreational resource has a clear financial benefit for local economies

3.3.2 Peatland

3.3.2.1 Carbon

Carbon – the plant matter 'trapped' in healthy peatland does not decompose due to the anaerobic conditions. This lack of decomposition means the carbon is not released and remains within the peatland. However, the anaerobic conditions are not maintained in degraded peatland. This allows plant matter to decompose and release carbon. Restoration of peatland reverses this process and restores the anaerobic conditions that keep carbon trapped within the peatland (or restores the conditions in which new peat actively forms, actively storing more carbon). The quantification of carbon was carried out using the Peatland Carbon Code values and the monetisation of carbon was carried out using the monetised carbon values within the CBA tool (see Table 6).

3.3.2.2 Wider benefits

Biodiversity – Peatlands are important for biodiversity, supporting a unique assemblage of wildlife. They therefore support an important component of the biodiversity within the UK. Many rare species of flora and fauna can be found in healthy peatland habitats (such as round-leaved sundew, cotton grass, curlew and golden plover). However, degraded peatland supports significantly less biodiversity due to the loss of

[33] https://www.researchgate.net/publication/258442913_Impact_of_Roadside_Tree_Lines_on_Indoor_Concentrations_of_Traffic-Derived_Particulate_Matter

[34] Carroll ZL, Bird SB, Emmett BA, Reynolds B, Sinclair FL (2004) "Can tree shelterbelts on agricultural land reduce flood risk". Soil Use and Management, 20, pp. 357-359

[35] https://www.forestresearch.gov.uk/documents/7125/FCRN037.pdf

[36] Ow, L. and Ghosh, S. (2017). Urban cities and road traffic noise: Reduction through vegetation. Applied Acoustics, 120, pp.15-20

unique character. For example, peatland that is significantly dried and/or used for arable crops supports a much less diverse and rare assemblage of species. The BUs (as measures using BM 3.0) were monetised using the range of costs of BUs currently found in the marketplace.

ONS data for peatland were limited to recreation and grants provided for science (other than extracted peat value), therefore a different approach was used.

Willingness to pay – In a report published in the Journal of Environmental Economics and Policy 'The economics of peatland restoration' it was acknowledged that there is a lack of comprehensive valuation encompassing the relevant public benefits of peatland restoration, leaving policy makers with little guidance with respect to the economic efficiency of restoring this climate-critical ecosystem. To estimate the non-market benefits of peatland restoration they used a choice experiment study in Scotland, these are experiments are designed to remove inherent biases and find the true stakeholder perception of value. In this study 91% of respondents (n = 1,795 respondents) selected a restoration option at least once while 9% always chose the 'no restoration' option[37]. Assuming high peat concentration, the shift from poor to good condition peatland was valued at around £246/ha/year. The shift from intermediate to good condition peatland was valued as between £127 and £414/ha/year. These values correspond to the average willingness-to-pay of the sample population for this particular level of restoration per year and until 2030. It is therefore an estimated monetary value of the benefits of this level of restoration.

Any willingness to pay work should be used as an indication of priorities and evidence that this type of investment is supported.

3.4 Non-monetised benefits

There are many benefits to woodland creation and peatland restoration that could theoretically be monetised, but would require an extensive amount of primary research (i.e. such work has not been carried delivering readily transferable data). However, these benefits nonetheless provide value. These are detailed in below.

3.4.1 Woodland

Pest control – woodland can help control pests (especially in an agricultural context). This is largely due to the habitat that woodland provides for the 'natural enemies' of pests.

Pollination – through the provision of a range of habitats, woodland can support pollinators.

Water quality – woodland can have water quality benefits, for example through reduced agricultural diffuse pollution and reduced surface water run-off from agricultural land. The benefits of this are difficult to quantify but will be greatest when woodland lies between agricultural land and watercourses. A buffer of 12m or greater riparian buffer strip delivering the maximum protection.[38]

Crafting– timber produce has not been quantified but appropriate management of woodland includes rotational cutting to maintain habitat diversity and light levels. This increases the structural diversity and encourages the development of a more diverse assemblage of ground flora. A portion of the wood would be left as deadwood, but a portion could be used for local artisans for crafting. We will also investigate the possibility of this resource being used for our own use.

[37] https://www.tandfonline.com/doi/full/10.1080/21606544.2018.1434562

[38] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/928121/3D_buffer_strips___designed_to_deliver_more_for_the_environment_-_report.pdf

Well-being – research has found clear physical and mental health benefits to woodland. This includes the provision of space to exercise outdoors, along with providing a calm and relaxing environment. Dadvand et al. (2012) find that higher surrounding greenness is associated with increases in weight and head size at birth of around 44g and 2mm respectively. Donovan et al (2011) find that a 10 per cent increase in tree cover within 50m of a house reduces the number of small-for-gestational-age births by 1.42 per 1000 births[39]. Access to woodland also significantly improves mental health[40].

Aesthetic value – woodland forms a key part of the visual beauty of the landscape in many areas and can increase house prices. The average added value per house with urban broadleaved woodland visible from the building is around £7500, and the added average value per house with broadleaved woodland visible from commuting routes is £6500 (Garrod, 2002). Adjusting for GDP growth since 2002, those values are around £11,000 and around £9,500 respectively in 2013.

Education – woodland provides opportunities to learn in and about nature as is evidenced by the success of Forest Schools in the UK[41].

Culturally significant species – there are culturally significant species under threat whose survival is priceless, such as the Scottish wild cat, red squirrel, capercaillie, hawfinch, nightingale and 1 in 6 of our woodland flowers are threatened with extinction.

3.4.2 Peatland

Water quality – Peatlands in upland areas play a significant role in the supply and the quality of drinking water. The deep peats intercept and retain a range of atmospheric pollutants, including nitrogen, sulphur and heavy metals, providing less contamination in drinking waters. The removal of peat sediment and dissolved organic carbon represents a large cost in water treatment for water utilities for water draining from degraded peatlands.

Water supply – Peatlands are the headwaters for some of England's major water supply catchments that supply drinking water reservoirs across the uplands. Water derived from functioning peatlands is naturally of very high quality, being relatively pure due to limited human impacts, low weathering rates and widespread overland flow.[42]

Flood hazard regulation – There is some evidence that natural and restored peatlands provide reduced downstream flood risks compared to damaged peatlands[43]. However, the connection between peatland and flooding is an unclear one requiring further research.

Culturally significant species – there are culturally significant species under threat whose survival is priceless such as the large heath butterfly, Argent and Sable moth, golden plover, curlew, the carnivorous sundew, numerous rare mosses like the golden bog moss sphagnum.

Recreation - Peatland areas provide recreation opportunities for many people. The expenditure on recreational visits between 2009 and 2017 ranged between £124.1 million and £284.1 million. With an estimated 2,962,622ha of peatland habitat present in the UK, this equates to approximately £69 per ha with an estimated 24p per ha for educational grants. As this was not comparable data, data sets were

[39] https://www.woodlandtrust.org.uk/media/1732/economic-benefits-of-woodland.pdf
[40] https://www.mentalhealth.org.uk/campaigns/thriving-with-nature/guide
[41] https://forestschoolassociation.org/what-is-forest-school/
[42] https://www.theccc.org.uk/wp-content/uploads/2013/07/ASC-2013-Chap4_singles_2.pdf
[43] https://www.theccc.org.uk/wp-content/uploads/2013/07/ASC-2013-Chap4_singles_2.pdf

used from a bespoke survey designed for the peatland restoration user guide (i.e. willingness-to-pay, above).

4 Summary of Options Considered

This section of the report sets out the investment options that are considered for removal of carbon to support SSEN's SBTs within the EAP of a 55% reduction by 2033 for Scope 1 and Scope 2, and a net zero target of 2045v at the latest. As described below, a holistic approach is taken to ensure the investment option chose is the most advantageous and represents the best value for money for network customers and wider society.

There were two options considered for investment. The first option (Option 1) which represents the 'do minimal approach', involves the purchasing of carbon units[44] from existing marketplaces to offset SSEN's carbon emissions. The second option (Option 2), involves a natural capital based approach in which carbon (among other ecosystem service benefits) will be sequestered over time, leading to the acquisition of carbon units.

4.1 Option 1 – Purchasing Carbon Units

The first option explored involved the purchase of Carbon Units from existing markets. This represents a 'do-minimal' approach. This has the potential advantage of delivering carbon units immediately - units are available for sale now, rather than having to wait for trees to mature and sequester significant amounts of carbon.

Due to the relative infancy of the market for Carbon Units, there are a much greater number of opportunities to purchase 'future units' (Pending Issuance Units (PIU) – a promise to deliver units in the future) than units that are available now (Woodland Carbon Units (WCU) – schemes where carbon has been sequestered)[45.]. For example, there are 1,448,000 PIUs available to purchase in the UK land carbon registry, but only 800 WCUs. In order to hit the target of 260,000 tCO_2 by 2043, 260,000 carbon units would need to be purchased by 2043.

Therefore, this option will have the following disadvantages. There are not enough Nature-based Solution Carbon Units available in the UK. So, the likelihood is that we would need to look internationally in a market that often has immature governance and that may lack transparency, for example the risks of inappropriate afforestation with non-native monocultures and displacement of locals who rely on the existing land use for their subsistence and livelihoods. This would not deliver any wider ecosystem services benefits nor improve customers surrounding natural capital. Nor would this option deliver SSEN's Biodiversity Units which will be required in the near future to deliver targets (which would be required to be within our operational areas). The Environment Act 2021 is now in force and states that any new project must deliver a 10% biodiversity net gain – on projects that meet the criteria in England, and there is a strong likelihood that these will become a legislative as well as regulatory requirement in the near future for operational as well as capital works in both Scotland and England. It is also likely that this 10% targeted will be stretched. This would result in an additional financial burden to offset biodiversity losses. Even units delivered via technological advancements or energy reduction are unlikely to be in any way locationally related to the catchment area of SSEN's customers. As such, the BCR will be poorer. So, in

[44] One carbon unit is 1 tonne of CO_2 or CO_2 equivalent.
[45] Further detail regarding 'future units' (e.g. WCU) and units available now (e.g. PIU) can be found at this link: https://www.woodlandcarboncode.org.uk/buy-carbon/what-are-woodland-carbon-units

summary Option 1 will not deliver Biodiversity Units, or ecosystem service benefits and natural capital improvements to SSEN customers.

4.2 Option 2 – Natural Capital Approach

A natural capital approach has the potential to deliver significant benefits (presented in the CBA section, 5). Through habitat creation and improvements, a host of natural capital and ecosystem service benefits can be achieved, in addition to those associated with carbon. These include biodiversity (as measured though Biodiversity Units), recreation, flood mitigation etc. Further, these benefits will be delivered throughout the lifespan of the project. For example, woodland will continue to sequester carbon throughout its lifespan. This can lead to the accrual of significant benefits over the medium (approx. 15 years+) to long (approx. 30 years+) term. Over 1.3million tonnes of CO_2 reduction would be delivered by the NbS over 100 years. This leads to the benefits far outstripping those delivered by Option 1.

A range of stakeholders and potentially interested parties were contacted in the SHEPD and SEPD operational areas. Support was found in both areas and potential investment opportunities were explored. Stakeholders are at a range of different maturities with regards to project development. Sufficient interest was received from stakeholders that there is a likely to be a degree of redundancy. This will ensure that benefits can still be delivered should certain opportunities not come to fruition.

4.2.1 Summary of Opportunities

This section provides a high-level summary of the opportunities provided by the four preferred delivery partners that have been carried across to CBA. From the stakeholder liaison to date, we have selected the below preferred delivery partners for Option 2 to provide a Natural Capital Approach for carbon removal and reduction:

[redacted]

Engaging with the above preferred stakeholders to deliver the desired carbon reduction for Option 2 includes creation and restoration of 1200ha of woodland in Scotland, 866ha in England and 600ha of peatland creation and restoration in both Scotland and England. The advantages and disadvantages of the four preferred delivery partners to provide a Natural Capital Approach for Option 2 are outlined in Table 4. However, there are also opportunities for a portfolio approach or the potential to created and restore wetland habitats, although there is currently no certified scheme for wetland creation and less certainty around the delivery of carbon sequestration.

Table 4: Preferred delivery partners

Stakeholder/ Location	Intervention	Opportunity	Advantages	Disadvantages
[redacted]	Woodland and peatland	Are engaging with multiple landowners throughout the National Park. Opportunities with large estates a least one large estate with the potential to deliver in the region of 1200ha of woodland and 600ha of peatland restoration. Also potential for Wildcat habitat creation, riparian woodland creation and a suite of management opportunities (for example deer).	Has existing mature relationships with a large number of landowners so there is potential to utilise this engagement to achieve landscape scale benefits. Single stakeholder managing multiple landowners. There is the potential to deliver a large quanta of habitat creation/restoration in collaboration with this stakeholder. Culturally significant habitat restoration on areas of land that were previously ancient woodland.	Existing schemes that SSEN join into will already have drivers and designs that may reduce the potential for SSEN to tailor a project for their goals.
[redacted]	Woodland	Are engaging with landowners across 1000's of hectares across Scotland. There is an opportunity to collaborate with them on their large re-wilding projects. Their schemes span 1000's of hectares and have a woodland focus. Have launched a project to rewild half a million hectares of the Scottish Highlands for Glen Affric.	Are already engaging with a diverse group of 20 landowners covering at least 25% of the total area and six organisations are already on board. Potential to utilise this engagement to achieve landscape scale benefits. Single stakeholder managing multiple landowners. There is the potential to deliver a large quanta of habitat creation/restoration in collaboration with this stakeholder. Culturally significant habitat restoration on	Have existing goals and drivers, so there will be reduced potential for SSEN to tailor the project to their goals. There will be a focus on natural regeneration in some areas which could lower overall carbon sequestration.

Stakeholder/ Location	Intervention	Opportunity	Advantages	Disadvantages
			areas of land that were previously ancient woodland. Have a live marketing project online to attract landowner.	
[redacted]	Woodland, peatland and wetlands	No specific projects, opportunity would take a portfolio approach within an area of land totalling 2,500ha (the opportunity would cover a subset of this area).	Have access to large areas of land. Have a specific organisational interest in both woodland and peatland. Have a dedicated Net Zero 2050 habitat creation and restoration program.	Requires additional engagement to formulate plans and designs.
[redacted]	Woodland, floodplain grassland and a 120ha salt marsh restoration project	Three discrete projects. First is a 13ha arable reversion mosaic scheme split into two sites, one being entirely woodland and the other being wetland and wood pasture. The second is a project to restore 120ha of saltmarsh on reclaimed farmland and reconnect it to the adjacent NNR, National Park, Ramsar Site, SSSI and SAC. The third is associated with a large 600ha+ estate with no specific plans that could be tailored to meet SSEN's woodland creation needs.	Have access to a very large portfolio of landowners who own very large amounts of land. proactive and timely engagement. The scale of the second project and the habitat involved would make it of national significance for biodiversity. Saltmarsh has a high carbon sequestration rate. Third opportunity allows for a lot of freedom in design and SSEN control	No specific designs or plan yet in the pipeline Salt marsh restoration is a less mature form of habitat restoration with greater costs and risks involved and no accredited carbon scheme.

Additional potential opportunities provided by other stakeholders are provided in Appendix 2 Stakeholder Engagement Opportunity Stage Summary. Engagement with these stakeholders will continue to provide an element of resilience and may be able to support SSEN's wider targets around social engagement and wellbeing.

5 Cost Benefit Analysis

An evaluation of the two options was carried out to evaluate the costs and benefits using the information within the Ofgem CBA tool. The first step of this evaluation assessed the cost of Options 1 and 2 against the value of the carbon benefits delivered (valued using the carbon values within the Ofgem CBA). Option 2 also included an assessment of the wider benefits (additional ecosystem services, such as biodiversity). Option 1 includes no such wider benefits, so this second step was not carried out. Initially, the costs of both options are explored, followed by the benefits, followed by the cost benefit analysis.

5.1 Option 1 - Purchasing carbon units

The market for carbon units is an emerging one and as such there is much variation in the prices of carbon units which are presented in Table 5.

Table 5: Carbon unit cost estimates

Source	Carbon unit price estimate	Notes
Woodland Carbon code[46]	£7 and £20 per PIU	A similar range estimated for the smaller WCU market.
Gold Standard[47]	Minimum of £12 per unit	N/A
Financial Times[48]	£45-£50	This represents a peak in May 2021.
Median estimate	£30	N/A

Based upon current Carbon Unit prices, it is estimated that the cost per unit will be approximately £30. Due to the large number of units targeted (260,000), small variations in the estimated cost per unit will have a large impact on the overall cost. A £30 per unit cost would result in a total cost of £7,800,000.

The key benefit of this option is the immediate acquisition of 260,000 Carbon Units. However, there are no additional wider benefits, for example, Biodiversity Units or monetisable ecosystem services and natural capital enhancements for customers. Furthermore, the 260,000 unit quanta represents the entirety of units delivered, with no further units delivered over time as habitats mature (in contrast to Option 2).

5.2 Option 2 – Natural Capital Approach

This section of the report describes the cost and benefits associated with NbS through peatland and woodland restoration. Although Option 1 can deliver Carbon Units very rapidly, it delivers significantly fewer than option 2 in the long term. Furthermore, Option 2 also delivers a range of wider biodiversity and societal benefits. This includes Biodiversity Units, the maintenance of culturally significant species and

[46] https://www.woodlandcarboncode.org.uk/buy-carbon/what-are-woodland-carbon-units
[47] https://www.goldstandard.org/blog-item/carbon-pricing-what-carbon-credit-worth
[48] https://www.ft.com/content/56e02d3d-8c31-4937-be50-60d4bf9342f7

increased ecosystem services, such as flood resilience and recreation value, which will be of greater value to customers.

Cost benefit Analysis (CBA) were carried out initially just using the carbon values used in the Ofgem CBA process. Subsequently, CBA were carried out including the wider benefits. The details of these assessments are presented below. As opportunities are at relatively early stages, a CBA has been undertaken on the likely options. Further detailed cost consultancy would be required to implement the proposed interventions. The costs used in the CBA include sufficient buffering to accommodate specific costs associated with delivery that cannot be foreseen at this early stage.

5.2.1 Benefit Analysis Methodology

In order to assess the benefits, it was first necessary to quantify and monetise the benefits discussed in Section 3.3. The sources used to carry out this exercise are presented in Table 6 and Table 7. These data sets were used to predict the quantity and value of benefits throughout a 100-year period, with values assessed at 5, 45 and 100 years. Detail on the monetisation methods are presented below.

5.2.1.1 Carbon values

Firstly, the carbon benefits of this option were assessed, using the carbon values within the Ofgem CBA. The data sources used to quantify and monetise the carbon are shown in Table 6.

Table 6: Data sources used to quantify and monetise carbon

Applicable to	Data sources	Details
Woodland	Quantification via the Woodland Carbon Code	The Woodland Carbon Code[49] calculators were used to predict the quantity of carbon sequestered by Caledonian and mixed broadleaved woodland to represent Scotland and England respectively throughout a 100-year period and values were assessed at 45 and 100 years. See example in Figure 4.
Peatland	Quantification via the Peatland Carbon Code	Data from the Peatland Code[50] calculators were used to predict carbon emission reduction resulting from peatland restoration throughout the 100-year period and values were assessed at 45 and 100 years.
Woodland and Peatland	Monetisation via carbon values as presented in the Ofgem CBA tool	These values of carbon set out in the Ofgem CBA tool were also used. For the first 30 years, these are based upon the central traded BEIS values. After the 30-year point, the central non-traded values in the Department of Energy & Climate Change 'Guidance on estimating carbon values beyond 2050: an interim approach'[51] were used.

5.2.1.2 Wider benefits

Secondly, the wider benefits of this option were assessed. The data sources used to quantify and monetise the carbon are presented in Table 7. The monetisation of carbon was calculated using the range of carbon values presented within the Ofgem CBA tool (i.e. for the first 30 years, these are based upon

[49] https://woodlandcarboncode.org.uk/
[50] https://carbonstoreuk.com/the-carbon-codes/peatland-carbon-code/
[51] https://www.gov.uk/government/publications/guidance-on-estimating-carbon-values-beyond-2050-an-interim-approach

the central traded BEIS values, after the 30-year point, the central non-traded values in the Department of Energy & Climate Change 'Guidance on estimating carbon values beyond 2050'[52] were applied).

Table 7: Data sources used to quantify and monetise wider ecosystem service benefits

Ecosystem service	Applicable to	Data sources	Details
Biodiversity	Woodland and Peatland	Quantification using Biodiversity Metric 3.0	The Biodiversity Metric 3.0 was used to quantify the change in biodiversity value. The calculations are indicative of the unit uplift achievable from woodland planting and peatland restoration. The precise unit changes will vary depending upon the baseline habitats present and the specific nature of target habitats. The BM 3.0 is not considered to fully capture the value of replanting woodland in Scotland on the sites of former woodland, nor of peatland restoration. If Scotland specific metrics are developed, the unit uplift may increase.
	Woodland and Peatland	Monetisation based upon experience of the biodiversity unit market.	Due to the expected requirement for biodiversity net gain in the upcoming environment, there is a growing market for biodiversity units. Typically, these are being sold by environmental charities (such as wildlife trusts), local councils and private businesses. At present, there is great variation in the prices of biodiversity units. This is driven by a number of factors including uncertainty regarding future management costs, uncertainty around risk 'ownership' and variation in resources. Environmental charities are typically selling units at the lower end of the spectrum (due to in-house expertise and volunteer resource), whereas private businesses tend to be selling units at the higher end of the spectrum (due to requirement to make money). Councils tend to sit between the two. Experience with engaging with a range of stakeholders was used to estimate the likely cost/value of woodland and peatland biodiversity units. Woodland and peatland units were estimated to cost approximately £28,000 and £20,000, respectively. The higher woodland costs are driven by the increased management required.
Pollution removal	Woodland	ONS data	The value of pollution removal was quantified through the amounts of pollutants removed by trees. This was then monetised by estimating the saved healthcare costs associated with this removal.
Flood prevention	Woodland	ONS data	The ONS estimated the value of woodland in flood regulation by evaluating the costs of flood water storage solutions in areas where no woodland was present.

[52] https://www.gov.uk/government/publications/guidance-on-estimating-carbon-values-beyond-2050-an-interim-approach

Ecosystem service	Applicable to	Data sources	Details
Urban woodland cooling	Woodland	ONS data	The cooling effect of woodland was valued through the estimated cost savings from air conditioning and the benefit from improved labour productivity.
Noise reduction	Woodland	ONS data	Vegetation acts as a buffer against noise pollution, in particular road traffic noise. Noise pollution causes adverse health outcomes through lack of sleep and annoyance. This was quantified by estimating the number of buildings that benefited from noise reduction. This was then monetised by estimating the saving in avoided loss of quality adjusted years associated with adverse health outcomes.
Willingness to pay	Peatland	Glenk and Martin-Ortega (2018)[53]	The survey estimated how much the public are willing to pay to restore areas of peatland.

5.2.2 Monetised benefit results

These data sets were then applied to the opportunities likely to deliver the greatest benefit cost ratio, i.e. 1200ha woodland creation in Scotland and 866ha creation in England with 600ha restoration of peatland in Scotland and 600ha in England. The tables below show the monetisation of the benefits discussed in Section 3. The benefits values are based upon the benefits accrued over a 5 and 45-year period. Benefits are discounted as per Treasury Green Book long term investment guidance[54].

5.2.2.1 Carbon sequestration over time

Figure 4 demonstrates carbon sequestration in a 1200ha Caledonian woodland over time, showing that there is great potential for significant carbon sequestration in the medium to long term for Option 2 (this includes a 20% buffer on declarable carbon units). This results in significant financial benefits for carbon removal of this scale. Figure 5 presents the total carbon removed and reduced over time from all the NbS proposed for Option 2 with 13.5k tonnes being delivered by the end of the ED2 period in 2028 and 260k tonnes being delivered by 2043.

[53] Glenk, K., Martin-Ortega, J., 2018. The economics of peatland restoration, Journal of Environmental Economics and Policy. https://doi.org/10.1080/21606544.2018.1434562 (open access)

[54] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf

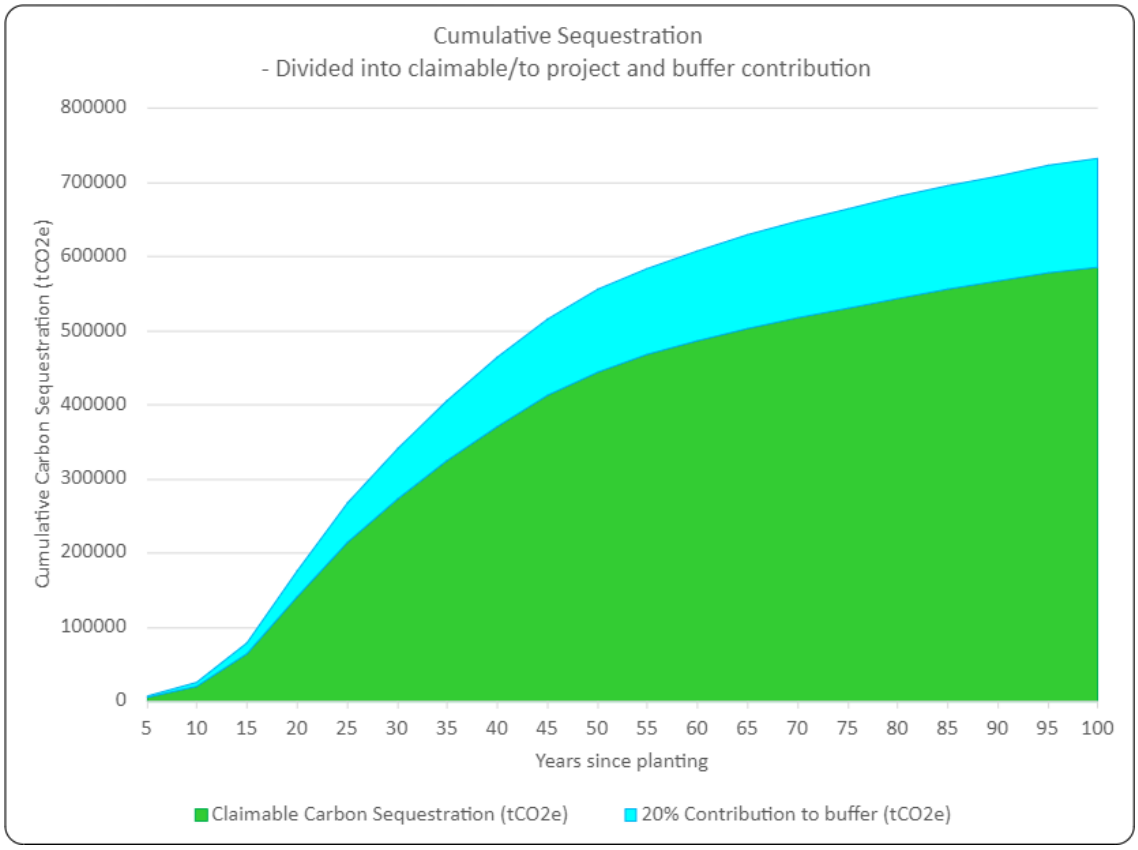

Figure 4: Example of Woodland Carbon Code declarable carbon calculated for 1200ha of Caledonian woodland

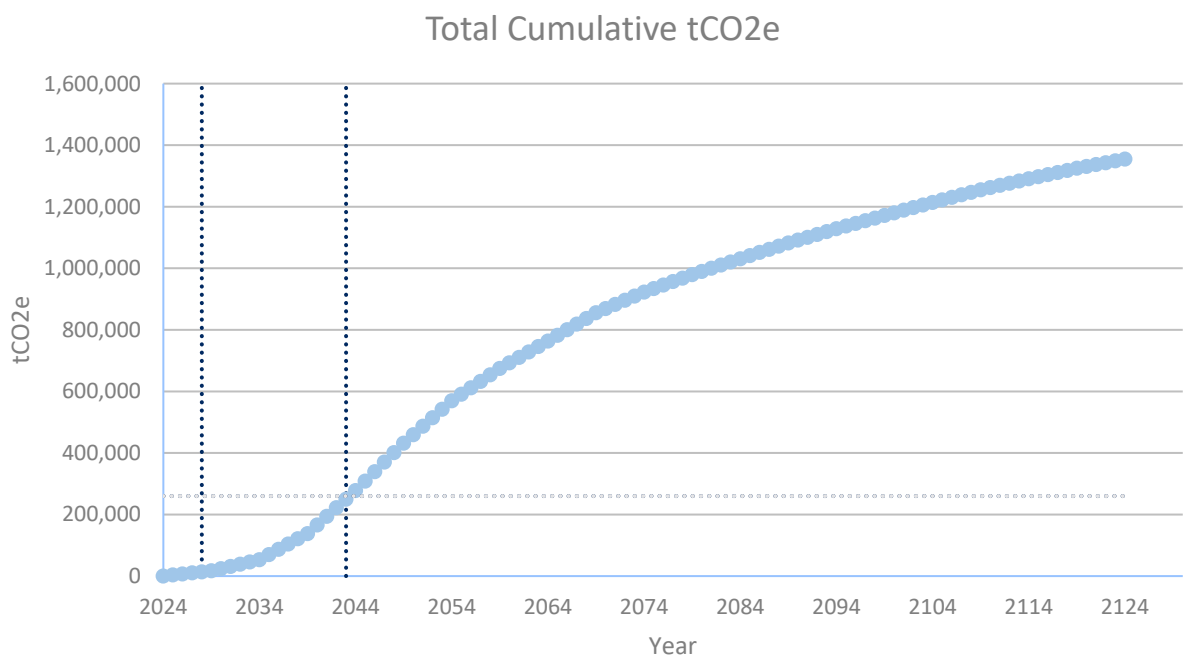

Figure 5: Total carbon reduction and removal for Option 2 over time showing 260k carbon units delivered by 2043

This is presented in Table 8, with a predicted almost 700k after 5 years and £210 million of carbon reduced by 2045.

Table 8: Benefits (but not costs) for the creation of woodland and restoration of peatland in Scotland and England after 5 years and 45 years (benefits include the green book discount rate)

Intervention and Area	Benefits after 5 years (£)	Benefits after 45 years (£)
1200ha of woodland in Scotland	£185,214	82,204,786
866ha of woodland in England	£127,284	109,447,826
600ha of peatland in Scotland	£186,035	9,117,842
600ha of peatland in England	£186,035	9,117,842
Totals	**£684,567**	**209,888,296**

5.2.2.2 Wider benefits

There are significant benefits associated with Option 2 beyond just carbon. The monetised value of these benefits are presented in Table 9 for Scottish woodland and English woodland and Table 10 for peatland.

Table 9: Benefits (but not costs) for 1200ha of Scottish woodland and 866ha of English woodland after 5 years and 45 years (benefits include the green book discount rate)

Benefit type	1200ha Scottish woodland benefits after 5 years (£)	866ha English woodland benefits after 5 years (£)	1200ha Scottish woodland benefits after 45 years (£)	866ha English woodland benefits after 45 years (£)
Ecosystem services (ONS)	2,012,938	3,084,658	10,471,717	16,047,026
Biodiversity Units*	35,616,000	25,702,880	35,616,000	25,702,880
Ecosystem services (ONS) and Biodiversity Units	**37,628,938**	**28,787,538**	**46,087,717**	**41,749,906**
Total (Carbon, Ecosystem services (ONS) and Biodiversity Units)	**37,814,152**	**28,914,822**	**128,292,503**	**151,197,732**

*Assumes biodiversity unit value of £28,000 per unit (See "Biodiversity" in Table 7)

Even without the inclusion of the monetised carbon values, there are significant biodiversity and wider benefits that total approximately **£29 million** for English woodland and **£38 million** for Scottish woodland

after 5 years. This is largely due to the ability to declare the Biodiversity Units in the first 5 years (£46 million for Scottish woodland and £42 million for English woodland (after 45 years)).

There are significant wider benefits, beyond the monetised carbon values for peatland also (See Table 10). Excluding carbon, 600ha of peatland is predicted to deliver wider benefits in the region of 13.5 million after 5 years and £16 million after 45 years. Option 2 includes a proposed 600ha of peatland restoration in Scotland and England, leading to approximately £27 million of wider benefits after 5 years and £33 million of wider environmental benefits after 45 years associated with the delivery of 1200ha of peatland.

Table 10: Benefits (but not costs) for 600ha of peatland (in Scotland or England) (benefits include the green book discount rate)

Benefit type	Scottish Peatland Benefits after 5 years (£)	English Peatland Benefits after 5 years (£)	Scottish Peatland Benefits after 45 years (£)	English Peatland Benefits after 45 years (£)
Biodiversity Unit *	12,720,000	12,720,000	12,720,000	12,720,000
Willingness to pay	689,746	689,746	3,588,203	3,588,203
WTP and Biodiversity Units	**13,409,746**	**13,409,746**	**16,308,203**	**16,308,203**
Total (Carbon, WTP and Biodiversity Units)	**13,595,781**	**13,595,781**	**25,426,045**	**25,426,045**

*Assumes Biodiversity Unit value of £20,000 per unit (see "Biodiversity" in Table 7)

5.2.3 Costing Approach

Our RIIO ED2 Business Plan costs are derived from a range of publicly available case studies. Costs can typically be broken down into initial, capital costs and ongoing operational costs. For example, the initial cost of planting trees and the ongoing costs of managing the newly created area of woodland. Details of the sources used to estimate costs are presented in the table below. The costs per hectare were estimated to cover a 100-year period, with a yearly breakdown, costs have been assessed at 5, 45 and 100-year periods for the purposes of this EJP. Table 11 presents the data sources for habitat creation costs. All costs presented are discounted using the green book discount rate[55].

Table 11: Data sources for habitat creation costs

Intervention	Data sources
Initial woodland costs data sources	https://forestry.gov.scot/publications/108-the-forestry-grant-scheme-a-guide-to-grant-options-for-woodland-creation/viewdocument/108 https://forestry.gov.scot/publications/107-the-forestry-grant-scheme-a-guide-to-grant-options-for-existing-woodland-owners/viewdocument/107 https://www.gov.uk/guidance/create-woodland-overview

[55] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf

Intervention	Data sources
	https://woodlandcarboncode.org.uk/images/PDFs/FCRN031a.pdf
Woodland management cost data sources	https://lockhart-garratt.co.uk/wp-content/uploads/2020/03/290220-Accelerating-Woodland-Creation-V1-Final-JAL.pdf
Initial peatland costs data sources	https://sefari.scot/research/the-cost-of-peatland-restoration-in-scotland
Peatland management cost data sources	https://www.camecon.com/wp-content/uploads/2021/03/The-economic-costs-benefits-of-nature-based-solutions_final-report_FINAL_V3.pdf

Table 12 shows the predicted cost breakdown per hectare for each of the intervention types across three timeframes. These costs include the Green Book discount rates[56].

Table 12: Cost breakdown for intervention types per ha including capital and operational costs (including green book discount rates)

Intervention	Cost category	Total cost years 0-5 (ED2 period)	Total cost years 0-45	Total cost years 0-100
Woodland	Low	£7,064	£9,184	£9,588
	Medium (Scotland)	£9,064	£11,184	£11,588
	High (England)	£13,064	£15,184	£15,588
Peatland	N/A*	£4,506	£5,746	£6,131

*Due to the narrow range of predicted peatland restoration costs, only one cost category was applied.

Our research indicated that the costs associated with woodland creation in Scotland are typically lower than those in England. This is due to typically greater labour and material costs in the South-East along with the savings for working at scale in Scotland. To cover potential risks associated with habitat creation medium costs of **£11,184 per ha** were therefore used for the Scottish woodland and the high costs of **£15,184 per ha** used for the English woodland. The costs for peatland did not greatly differ for operational areas and were much narrower therefore a cost for both areas of **£5,746 per ha** was used for peatland. The costs per ha include both capital and operational costs. A full breakdown of the predicted yearly costs in the longer term is presented in Appendix 1 Cost breakdown.

[56] https://www.gov.uk/government/collections/the-green-book-and-accompanying-guidance-and-documents

5.3 Cost Benefit Analysis Results

5.3.1 Option 1

The costs and benefits associated with Option 1 are the costs of the price of the Carbon Units and the benefits are those same Carbon Units. The Carbon Units are estimated to cost £30, resulting in an estimated cost of £7,800,000 for 260,000 units. Based upon the monetised carbon values, this represents a carbon value of £10,566,400, based upon delivery in 2024. This represents a BCR of 1.35.

5.3.2 Option 2

The results of the CBA indicate that reforestation/creation of 1200has woodland in SHEPD, 866has woodland in SEPD and creation of 600has of peatland each in both SHEPD and SEPD (i.e. 600 x2) are cost effective options which deliver clear benefits to network customers and consumers. The confidence of delivery of these investments is high in Scotland and medium in England due to the greater availability of land in Scotland.

As opportunities are at relatively early stages, a Cost Benefit Analysis (CBA) has been undertaken on the likely options, further detailed cost consultancy would be required to implement the interventions but the CBA includes sufficient buffering to accommodate delivery.

5.3.2.1 Carbon

A summary of the costs and monetised carbon benefits after 5 years is presented in Table 13. Without without the inclusion of wider benefits, the total BCR is very low, 0.03 as discussed previously, it takes time for significant benefits to be delivered by NbS. However, there are significant Biodiversity Unit returns after 5 years, 4,674 BUs (full breakdown of benefits are presented for 5 years in Table 19), this assumes that all of the units are claimed at the five-year point, after which no additional units could be claimed (unless greater improvements are achieved than was predicted). This model is currently operated in England. The outcome of the inclusion of wider benefits are presented in the sections below.

However, the greatest benefit of this approach is the return on investment over time, the following sections therefore highlight the additional benefits to be gained from the nature-based approach over time.

Table 13: Costs and monetised carbon benefits for woodland and peatland after 5 years (costs and benefits discounted as per the green book)

Intervention	Costs	Carbon benefits	BCR
Scottish woodland	£9,966,926	£185,214	0.02
English woodland	£10,656,798	£127,284	0.01
Scottish peatland	£2,501,539	£186,035	0.07
English peatland	£2,501,539	£186,035	0.07
Total	**£25,626,802**	**£684,567**	**0.03**

A summary of the costs and monetised carbon benefits after 45 years is presented in Table 14. Even without the inclusion of wider benefits, the total BCR is 6.27 (much greater than the 1.35 for Option 1).

Table 14: Costs and monetised carbon benefits for woodland and peatland after 45 years (costs and benefits discounted as per the green book)

Intervention	Costs	Carbon benefits	BCR
Scottish woodland	£13,420,900	£82,204,786	6.13
English woodland	£13,149,416	£109,447,826	8.32
Scottish peatland	£3,447,846	£9,117,842	2.64
English peatland	£3,447,846	£9,117,842	2.64
Total	£33,466,008	£209,888,296	6.27

A summary of the costs and monetised carbon benefits after 100 years is presented in Table 15. Even without the inclusion of wider benefits, the total BCR is 11.35 (much greater than the 1.35 for Option 1).

Table 15: Costs and monetised carbon benefits for woodland and peatland after 100 years (costs and benefits discounted as per the green book)

Intervention	Costs	Carbon benefits	BCR
Scottish woodland	£13,905,368	£161,917,675	11.64
English woodland	£13,499,041	£176,819,804	13.10
Scottish peatland	£3,641,634	£27,474,524	7.54
English peatland	£3,641,634	£27,474,524	7.54
Total	£34,687,677	£393,686,528	11.35

As can be seen in the tables above, there is potential for significant long-term benefits to be achieved if option 2 is progressed, even if only the carbon benefits are considered.

5.3.2.2 Woodland creation in Scotland using the medium cost assuming 1200ha of Woodland.

The results of the CBA for the proposed Scottish woodland creation are presented in Table 15.

Carbon CBA - The BCR when considering solely the monetisation of carbon values is **6.13** after 45 years, rising to **11.64** after 100 years. While the Ofgem valuation period is 45 years these projects are likely to run for 100 years. After 100 years the benefits are expected to outweigh the costs by a ratio in excess of **10:1.** This represents very good value, even in the absence of other ecosystem services.

The total cost of 1200ha of woodland is estimated to be **£13,420,900** over 45 years. With a monetised carbon value of **£82,204,786** the BCR of the baseline CBA of monetised carbon being **6.13** with **315,237** tCO_2e of carbon reduction after 45 years.

5.3.2.2.1 Wider benefits

Wider benefits - The wider benefits have a poorer BCR than the carbon, with values of 0.78 and 2.56 for ecosystem services and biodiversity respectively over 45 years. Combined, these benefits deliver a positive BCR (3.43). When combined with the carbon values, the BCR improves further, reaching 9.56 after 45 years. This represents an almost tenfold return on investment.

Table 16: Scottish woodland benefit/cost ratio (BCR) breakdown for 45 and 100 years (costs and benefits include the green book discount rate)

Costs and benefits	45 years				100 years			
	Total capital and operational habitat works cost £	Carbon and Biodiversity Units Delivered	Total benefit £	BCR	Total capital and operational habitat works cost £	Carbon and Biodiversity Units	Total benefit £	BCR
Carbon	13,420,900	315,237 (tCO_2e)	82,204,786	6.13	13,905,600	530,400 (tCO_2e)	161,917,675	11.64
Ecosystem service values	13,420,900	N/A	10,471,717	0.78	13,905,600	N/A	13,949,815	1.00
Biodiversity Units *	13,420,900	1,272 (BUs)	35,616,000	2.65	13,905,600	1,272 (BUs)	35,616,000	2.56
Total (carbon, ES, Biodiversity)	13,420,900	315,237 (tCO_2e) 1272 BUs	128,292,503	9.56	13,905,600	530,792 (tCO_2e) 1272 BUs	211,483,491	15.21

*Assumes biodiversity unit value of £28,000 (see "Biodiversity" in Table 7)

5.3.2.3 Woodland creation in England using the medium cost assuming 866ha of Woodland.

The results of the CBA for the proposed English woodland creation are presented in Table 16.

Carbon - Although the initial capital cost of woodland per ha in England is almost twice the cost of woodland in Scotland, the BCR of woodland in England is higher for carbon due to the greater carbon sequestration rates delivered by broadleaved trees. This leads to a BCR of 8.32 after 45 years. After 100 years the benefits are expected to outweigh the costs by a ratio in excess of 13:1. This represents very good value, even in the absence of other ecosystem services.

The total cost of 866ha of woodland is estimated to be **£13,149,416** over 45 years. With a monetised carbon value of **£109,447,826** the BCR of the baseline monetised valued carbon being **8.32** with **457,400** tCO_2e of carbon reduction after 45 years.

5.3.2.3.1 Wider benefits

Wider benefits- The wider benefits have a poorer BCR than the carbon, with values of 1.22 and 1.95 for ecosystem services and biodiversity respectively after 45 years. Combined, these benefits deliver a BCR of 3.18. When combined with the carbon values, the BCR improves further, reaching 11.50 after 45 years. This represents an over tenfold return on investment.

Table 17: English woodland benefit/cost ratio breakdown for 45 and 100 years (costs and benefits include the green book discount rate)

Costs and Benefits	45 Years				100 Years			
	Total cost (£)	Carbon and Biodiversity Units	Total benefit value (£)	BCR	Total cost (£)	Carbon and Biodiversity Units	Total benefit value (£)	BCR
Carbon (Ofgem traded values)	13,149,416	457,400 (tCO_2e)	109,447,826	8.32	13,499,041	640,548 (tCO_2e)	176,819,804	13.10
Ecosystem services (ONS)	13,149,416	N/A	16,047,026	1.22	13,499,041	N/A	21,376,918	1.58
Biodiversity Units*	13,149,416	918 (BUs)	25,702,880	1.95	13,499,041	918 (BUs)	25,702,880	1.90
Total (Carbon Ofgem, ES and Biodiversity)	13,149,416	457,400 (tCO_2e) 918 BUs	151,197,732	11.50	13,499,041	640,548 (tCO_2e) 918 BUs	223,899,601	16.59

*Assumes biodiversity unit value of £28,000 (see "Biodiversity" in Table 7)

5.3.2.4 Peatland using the medium cost assuming 600ha of peatland for England and Scotland

Peatland costs and benefits are not differentiated for England and Scotland based on case study information. The results of the CBA for the proposed peatland creation are presented in Table 17.

Carbon - The results of the CBA for the proposed peatland restoration are presented in Table 17. The BCR when considering solely the monetised carbon values is 2.64 after 45 years, rising to 7.54 after 100 years. These high returns on investment represent very good value, even in the absence of other ecosystem services.

The total cost of 600ha of peatland restoration in Scotland or England is estimated to be **£3,447,846** (x2 for England and Scotland), over 45 years. With an Ofgem traded carbon value of **£9,117,842** (x2 for England and Scotland) the BCR of the baseline CBA of Ofgem valued carbon being **2.64** with **41,294** tCO_2e (x2 for England and Scotland) of carbon reduction after 45 years.

5.3.2.4.1 Wider benefits

Wider benefits - The wider benefits have a poorer BCR than the carbon, with values of 1.04 and 3.69 for ecosystem services and biodiversity respectively after 45 years. Combined, these benefits deliver a BCR of (4.73). When combined with the carbon values, the BCR improves further, reaching 7.37 after 45 years.

Table 18: Peatland (Scottish and English) benefit/cost ratio breakdown for 45 and 100 years (costs and benefits include the green book discount rate)

Costs and Benefits	Total capital and operational habitat works cost (£)	Carbon and Biodiversity Units	Total benefit value (£)	BCR	Total capital and operational habitat works cost (£)	Carbon and Biodiversity Units	Total benefit value (£)	BCR
Carbon (Ofgem traded values)	3,447,846	41,294 (tCO2e)	9,117,842	2.64	3,641,634	91,765 (tCO2e)	27,474,524	7.54
Willingness To Pay only	3,447,846	N/A	3,588,203	1.04	3,641,634	N/A	4,779,996	1.31
Biodiversity Unit s*	3,447,846	1,242 BUs	12,720,000	3.69	3,641,634	1,242 BUs	12,720,000	3.49
Total (Carbon Ofgem, WTP and Biodiversity)	3,447,846	41,294 (tCO_2e) 1242 BUs	£25,46,045	7.37	£3,641,634	91,765 (tCO_2e) 1242 BUs	£44,974,520	12.35

*Assumes biodiversity unit value of £20,000 (see "Biodiversity" in Table 7)

5.3.3 Comparison of Options 1 and 2

A comparison of Options 1 and 2 are presented in Table 18.

Table 19: Advantages and disadvantages of options 1 and 2

Option	Advantages	Disadvantages
1	• Immediate acquisition of the Carbon Units required to meet the 260,000 tCO_2 target by 2033 (presumes availability of units) • Lower initial cost.	• No wider customer benefits • No Biodiversity Units delivered • No wider benefits, • Fewer overall Carbon Units
2	• Delivery of a suite of ecosystem services benefits to customers • Enhanced natural capital value of assets within customer range • Meets the 260,000 Carbon Unit target by 2044 • Delivery of Carbon Units throughout the lifespan of the project (1.3 million tCO_2 over 100 years) • Delivery of BUs which can be used to offset SSEN's capital and operational impacts • Delivery of additional monetisable benefits (e.g. flood prevention and recreation). • Overall climate resilience • Prevention of extinction to culturally significant and endemic species	• Higher initial costs • Takes longer to see a carbon reduction and removal return.

Option	Advantages	Disadvantages
	• Over a 100-year period, the cost per carbon unit is lower (£25.60, relative to £30 for option 1), even without factoring in other ecosystem services.	

Although Option 1 means we can claim carbon benefits sooner, the wider and long-term benefits of Option 2 are significantly greater. Option 2 delivers over 5 times the amount of carbon over the 100-year period, with a host of other ecosystem service benefits and enhanced natural capital assets that represent real value for consumers. Further, the BCR ratio of Option 1 is 1.35, whereas for Option 2 it is 11.64 after 100 years, even without the inclusion of Biodiversity Units and wider environmental benefits.

A summary of the costs and benefits after 5 years is presented in Table 13 and Table 19. As discussed without the inclusion of wider benefits, the total BCR is very low, **0.03** but there are significant Biodiversity Unit returns after 5 years, **4,674 Bus** which would otherwise be very costly to obtain. The result from incorporating wider benefits (this is a precautionary value as not all benefits have been monetised) could total **£93,920,537** in benefits after 5 years with a **BCR of 3.66** overall.

It is therefore recommended that the natural capital approach, Option 2, is the one to take forward for RIIO-ED2 investment. The details of delivery of this option is explored further in the following section.

5.4 Proposed RIIO ED2 Investment

The primary investment driver associated with this EJP is carbon removal and reduction with biodiversity net gain and wider environmental benefits delivered. A summary of the values of carbon reduction and these wider benefits after 5, 45 and 100 years are presented in Table 19, Table 20 and Table 21.

After 5 years, a total benefit value of **£684,567** for carbon reduction is achieved with a BCR value of **0.03** with a potential **13,507** t of CO_2e reduction. As discussed previously, it takes time for significant benefits to be delivered by NbS. This drives, the lower return on investment after 5 years. However, there are significant Biodiversity Unit returns after 5 years (4,674 units), this assumes that all of the units are claimed at the five-year point, after which no additional units could be claimed (unless greater improvements are achieved than was predicted). This model is currently operated in England. The result could total **£93,920,537** in benefits after 5 years delivering and overall **BCR of 3.66**.

Table 20: Summary of benefits of woodland and peatland in England and Scotland after the initial 5-year ED2 period (costs and benefits include the green book discount rate)

Costs and Benefits	Costs	Carbon units (tCO_2e)	Carbon £	BUs	Biodiversity £	Ecosystem service £/WTP	Total £	BCR
Woodland 1200ha Scotland*	£9,966,926	3,654	£185,214	1,272	£35,616,000	£2,012,938	£37,814,152	3.79
Woodland 866ha England*	£10,656,798	2,511	£127,284	918	£25,702,880	£3,084,658	£28,914,822	2.71

Peatland 600ha Scotland and England**	£2,501,539	3,671	£186,035	1,242	£12,720,000	£689,746	£13,595,781	5.43
Peatland 600ha Scotland and England**	£2,501,539	3,671	£186,035	1,242	£12,720,000	£689,746	£13,595,781	5.43
Totals	**£25,626,802**	**13,507**	**£684,567**	**4,674**	**£86,758,880**	**£6,477,090**	**£93,920,537**	**3.66**

*Assumes biodiversity unit value of £28,000 **Assumes biodiversity unit value of £20,000

After 45 years significant benefits are achieved, with a total benefit value of **£209,888,296** for carbon reduction. This results in a BCR value of **6.27** with a potential **855,225** t of CO_2e reduction. If all benefits considered are monetised this would deliver **£330,342,325** (including 4,674 Biodiversity Units). This is likely to be an under estimation of benefits as not all benefits have been monetised. Additionally it is predicted that in future costs will increase for NbS, therefore early investment is particularly attractive.

Table 21: Summary of benefits of woodland and peatland in England and Scotland after a 45 year period (costs and benefits include the green book discount rate)

Costs and Benefits	Costs	Carbon units (tCO_2e)	Carbon £	BUs	Biodiversity £	Ecosystem service value/WTP	Total value
Woodland 1200ha Scotland*	£13,420,900	315,237	£82,204,786	1,272	£35,616,000	£10,471,717	£128,292,503
Woodland 866ha England*	£13,149,416	457,400	£109,447,826	918	£25,702,880	£16,047,026	£151,197,732
Peatland 600ha Scotland and England**	£3,447,846	41,294	£9,117,842	1,242	£12,720,000	£3,588,203	£25,426,045
Peatland 600ha Scotland and England**	£3,447,846	41,294	£9,117,842	1,242	£12,720,000	£3,588,203	£25,426,045
Totals	**£33,466,008**	**855,225**	**£209,888,296**	**4,674**	**£86,758,880**	**£33,695,149**	**£330,342,325**

*Assumes biodiversity unit value of £28,000**Assumes biodiversity unit value of £20,000

At 100 years a total benefit value of **£393,686,528** for carbon reduction is achieved with a CBA BCR value of **11.35** and a potential **1,354,869** t of CO_2e. If all benefits considered are monetised this would deliver **£525,332,133** (including 4,674 BUs)**.** This is likely to be an under estimation of benefits as not all benefits have been monetised.

Table 22: Summary of benefits of woodland and peatland in England and Scotland after a 100 year period (costs and benefits include the green book discount rate)

Costs and Benefits	Costs	Carbon units (tCO_2e)	Carbon £	Biodiversity Units (BUs)	Biodiversity Value	Ecosystem service value/WTP	Total value
Woodland 1200ha Scotland*	£13,905,368	530,792	£161,917,675	1,272	£35,616,000	£13,949,815	£211,483,491
Woodland 866ha England*	£13,499,041	640,548	£176,819,804	918	£25,702,880	£21,376,918	£223,899,601
Peatland 600ha Scotland and England**	£3,641,634	91,765	£27,474,524	1,242	£12,720,000	£4,779,996	£44,974,520
Peatland 600ha Scotland and England**	£3,641,634	91,765	£27,474,524	1,242	£12,720,000	£4,779,996	£44,974,520
Totals	**£34,687,677**	**1,354,869**	**£393,686,528**	**4,674**	**£86,758,880**	**£44,886,724**	**£525,332,133**

*Assumes biodiversity unit value of £28,000 **Assumes biodiversity unit value of £20,000

6 Deliverability of Proposed Investment Options

There is risk associated with any investment strategy. This section assesses these risks and provides mitigation for the following risk profiles (expanded in Table 16):

- **Capital, operational and financial risks and opportunities** – NbS have a degree of uncertainty associated with delivery, there is potential for unforeseen events to affect costing, delivery and maintenance;
- **Legal and regulatory risks and opportunities** – there is potential for inappropriate habitat creation to impact upon existing valuable or protected habitats and species. The extent and condition of natural capital can affect the carbon reduction capacity, biodiversity values and quanta of ecosystem services benefits delivered which could cause the outputs to fall below the committed targets; and
- **Societal and reputational risks and opportunities** – these opportunities are attractive to a wide range of stakeholders and have the potential to deliver multiple benefits as previously discussed and to be supported by a wide range of delivery partners and drive high levels of customer engagement. However, this generates high expectations which if not delivered confers significant risk.

There are a number of risks and constraints set out below. SSEN have also considered mitigating actions.

Table 23: Risks and Mitigation

Risk	Type	Proposed mitigation
Escalating costs	Capital and operational financial	Nature-based solution costs are likely to rise in the future as the market demand increases and the available land decreases. Early and continued engagement with delivery partners, working with landowners to support their business plans and embedding with delivery partners will lower these costs and reduce risks. This includes early engagement with tree suppliers via delivery partners to ensure that there is adequate stock.
Benefit delivery	Capital and operational financial Legal and regulatory Societal and reputational	Work with, mature and experienced delivery partners with evidenced success. Deliver detailed design and costing by qualified and accredited suppliers to industry standard guidance such as those set out in the UK Forestry Standard (UKFS). Regular monitoring. Is recommended to course correct early in the intervention.
Force majeure (fire, disease etc)	Operational and financial	For this CBA, calculations have an inbuilt 20% buffer on carbon declaration, insurance and contingency is built into the cost budget. The spreading of the projects geographically has already been investigated with stakeholders. During detailed design there should be inclusion of a range of species with local provenance to reduce impact of disease.
PR offsetting vs emission reduction	Societal and reputational	SSEN's clear strategy via their EAP will help to ensure a focus on emission reduction and use of Nature based Solutions to

Risk	Type	Proposed mitigation
		create a buffer and deliver a suite of environmental benefits, not a sole solution. SSEN's engagement of innovative stakeholder engagement tools such as IRYS will get a rapid response and therefore regular temperature tests with customers. Reliance on delivery partners with strong track records and stakeholder engagement experience will also reduce risk.
Finite carbon absorption capabilities	Operational and financial	Continue to work on emission reduction and habitat management costs are built into budgets.
Benefit stacking	Legal and regulatory	Ensure that benefits claimed are clearly reported declaring when additionality is claimed, that is delivering carbon reduction and BNG stacked with benefits such as flood prevention which all have additional associated funding, market trading and declaration opportunities.
Inappropriate site selections	Capital and operational and financial Legal and regulatory Societal and reputational	Work with, mature, experienced and evidenced delivery partners. Continued ecologist involvement, site screening, community engagement, awareness of development plans, work with landowners/farmers, and a high level impact assessment would be required
Limited Land Availability	Operational and financial	Work with multiple partners, adopt multiple strategies, have a portfolio of opportunities, continued stakeholder engagement
Appropriateness of woodland planting	Legal and regulatory Societal and reputational	The appropriateness of sites for woodland planting will be screened as part of the design process (e.g. to prevent woodland planting on valuable habitat such as peatland, species rich grasslands or high quality agricultural land).
Stakeholder dropout	Capital and operational and financial Legal and regulatory Societal and reputational	Continued stakeholder engagement will ensure that there is a pipeline of projects, there is also the potential for new opportunities to develop including those linked to wider SSEN targets. All stakeholder details will be provided for continued SSEN engagement.

7 Conclusion

The purpose of this Engineering Justification Paper (EJP) has been to describe the overarching investment strategy that SSEN intends to take during RIIO ED2 for carbon reduction, biodiversity enhancement and wider environmental benefits to be delivered by NbS to support EAP targets including:

- **Business Outcome:** Avoids penalties to delays on targets, delivers large cost savings in Biodiversity Units and Carbon Units whilst contributing to global Sustainable Development Goals and addressing key targets that will have to be met by SSEN including SBTs, Biodiversity Net Gain and significantly contributing to carbon reduction targets through the removal of over 1.3 million tCO_2e after 100 years. This is delivered at a minimum baseline CBA estimate of 6.27 BCR when considering carbon reduction alone. Even after **5 years** the value of the BUs delivered alone is potentially worth **86 million** to us.
- **Social:** These NbS will provide local jobs, upskilling of local work force and contribute to SSEN's communities approach providing opportunities to improve health and wellbeing through recreation, tourism and education easing public health burdens, climate resilience and overall enhanced natural capital for their customers for generations. Even with only a few ecosystem service benefits monetised this delivers over almost **6.5 million** worth of ecosystem service benefits over **5 years** and £33million of ecosystem service benefits over 45 years (not measuring Carbon Unit value of Biodiversity Unit market value).
- **Environmental:** NbS could significantly contribute to the prevention of extinction of some of our most culturally significant rare and endemic habitats and species, whilst improving air and water quality, delivering climate resilience, helping to mitigate the effects of climate change, support Net-Zero targets and contribute to overall biodiversity. This helps us mitigate against the environmental impact our network has on the environment and helps with retrospective impacts over the longer term.

It is essential these activities are undertaken now to achieve the benefits in time to prevent further climate damage and before financial costs for these projects escalate due to rising carbon prices and limited availability of land and therefore projects.

Therefore, even as a short-term goal the wider benefits delivered return a BCR or 3.66 in total over 5 year and the long term investment return provides exceptional value. The total ED2 investment request is approximately **£25.6m** of which **£12.5m** is for SHEPD and **£13.2m** for SEPD.

8 Appendix 1 Cost breakdown

Table A - i: Predicted yearly per hectare costs for woodland and peatland interventions (costs discounted by green book discount rate)

Year	Years	Woodland low cost (£)	Woodland medium cost (£)	Woodland high cost (£)	Peatland cost (£)
2023	0	3000	5000	9000	2700
2024	1	870	870	870	386
2025	2	840	840	840	373
2026	3	812	812	812	361
2027	4	784	784	784	349
2028	5	758	758	758	337
2029	6	732	732	732	325
2030	7	108	108	108	59
2031	8	104	104	104	57
2032	9	101	101	101	55
2033	10	97	97	97	53
2034	11	94	94	94	51
2035	12	91	91	91	50
2036	13	88	88	88	48
2037	14	85	85	85	46
2038	15	30	30	30	24
2039	16	29	29	29	23
2040	17	28	28	28	22
2041	18	27	27	27	22
2042	19	26	26	26	21
2043	20	25	25	25	20
2044	21	24	24	24	19
2045	22	23	23	23	19
2046	23	23	23	23	18
2047	24	22	22	22	18
2048	25	21	21	21	17
2049	26	20	20	20	16
2050	27	20	20	20	16
2051	28	19	19	19	15
2052	29	18	18	18	15
2053	30	18	18	18	14
2054	31	20	20	20	16
2055	32	19	19	19	16
2056	33	19	19	19	15
2057	34	18	18	18	15
2058	35	18	18	18	14
2059	36	17	17	17	14
2060	37	17	17	17	13

Year	Years	Woodland low cost (£)	Woodland medium cost (£)	Woodland high cost (£)	Peatland cost (£)
2061	38	16	16	16	13
2062	39	16	16	16	13
2063	40	15	15	15	12
2064	41	15	15	15	12
2065	42	14	14	14	12
2066	43	14	14	14	11
2067	44	14	14	14	11
2068	45	13	13	13	11
2069	46	13	13	13	10
2070	47	12	12	12	10
2071	48	12	12	12	10
2072	49	12	12	12	9
2073	50	11	11	11	9
2074	51	11	11	11	9
2075	52	11	11	11	9
2076	53	10	10	10	8
2077	54	10	10	10	8
2078	55	10	10	10	8
2079	56	10	10	10	8
2080	57	9	9	9	7
2081	58	9	9	9	7
2082	59	9	9	9	7
2083	60	8	8	8	7
2084	61	8	8	8	7
2085	62	8	8	8	6
2086	63	8	8	8	6
2087	64	8	8	8	6
2088	65	7	7	7	6
2089	66	7	7	7	6
2090	67	7	7	7	6
2091	68	7	7	7	5
2092	69	7	7	7	5
2093	70	6	6	6	5
2094	71	6	6	6	5
2095	72	6	6	6	5
2096	73	6	6	6	5
2097	74	6	6	6	4
2098	75	5	5	5	4
2099	76	8	8	8	6
2100	77	7	7	7	6
2101	78	7	7	7	6

Year	Years	Woodland low cost (£)	Woodland medium cost (£)	Woodland high cost (£)	Peatland cost (£)
2102	79	7	7	7	6
2103	80	7	7	7	6
2104	81	7	7	7	5
2105	82	7	7	7	5
2106	83	6	6	6	5
2107	84	6	6	6	5
2108	85	6	6	6	5
2109	86	6	6	6	5
2110	87	6	6	6	5
2111	88	6	6	6	5
2112	89	6	6	6	4
2113	90	5	5	5	4
2114	91	5	5	5	4
2115	92	5	5	5	4
2116	93	5	5	5	4
2117	94	5	5	5	4
2118	95	5	5	5	4
2119	96	5	5	5	4
2120	97	5	5	5	4
2121	98	4	4	4	4
2122	99	4	4	4	3
2123	100	4	4	4	3

9 Appendix 2 Stakeholder Engagement Opportunity Stage Summary

Table A - ii: Stakeholder Engagement Opportunity Stage Summary (stage descriptions at foot of table)

Stakeholder	Intervention	Description	Stage*	Advantages	Disadvantages
Scotland					
[redacted]	Woodland and peatland	[redacted] are engaging with multiple landowners throughout the National Park. Opportunities with large estates a least one large estate with the potential to deliver in the region of 1200ha of woodland and 600ha of peatland restoration. Also potential for Wildcat habitat creation, riparian woodland creation and a suite of management opportunities (for example deer).	Stage 3	[redacted] has existing mature relationships with a large number of landowners so there is potential to utilise this engagement to achieve landscape scale benefits. Single stakeholder manging multiple landowners. There is the potential to deliver a large quanta of habitat creation/restoration in collaboration with this stakeholder. Culturally significant habitat restoration on areas of land that were previously ancient woodland.	Existing schemes that SSEN join into will already have drivers and designs that may reduce the potential for SSEN to tailor a project for their goals.
[redacted]	Woodland and peatland	[redacted] are engaging with landowners across 1000's of hectares across Scotland. There is an opportunity to collaborate with them on their large re-wilding projects. Their schemes span 1000's of hectares and have a woodland focus. Have launched a project to rewild half a million hectares of the Scottish Highlands for Glen Affric.	Stage 2	Are already engaging with a diverse group of 20 landowners covering at least 25% of the total area and six organisations are already on board. Potential to utilise this engagement to achieve landscape scale benefits. Single stakeholder manging multiple landowners. There is the potential to deliver a large quanta of habitat creation/restoration in collaboration with this stakeholder. Culturally significant habitat restoration on areas of land that were previously ancient woodland.	[redacted] have existing goals and drivers, so there will be reduced potential for SSEN to tailor the project to their goals. There will be a focus on natural regeneration in some areas which could lower overall carbon sequestration.

Stakeholder	Intervention	Description	Stage*	Advantages	Disadvantages
				Have a life marketing project online to attract landowner.	
England					
XXX	Woodland floodplain grazing meadow but also a mosaic of other habitats	Stakeholder has provided details of four projects. Two of them are discrete sites (20 and 31ha) focused on neutral grassland meadows. The other two are landscape based projects, covering 300 and 48,800ha respectively, with strategic creation and enhancement interventions of a variety of habitats (not all the target habitats) throughout their areas.	Stage 3	One entity would be able to manage multiple stakeholders. One of their opportunities is focused on a region covering a very large area 48,800ha. If even just a small percentage of this area is used for the creation of target habitats then this stakeholder could meet the SSE requirements singlehandedly.	Not all the habitats they are targeting are woodland and peatland, perhaps would be more suited as a delivery partner on other society and environmental opportunities if carbon cannot be costed easily with them.
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	N/A	Have opportunities but they are all outside the region boundaries provided by SSE.	Stage 0	N/A	N/A
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	Ponds, wet grassland, woodland	Two possible opportunities. One focused on the restoration of a degraded pond system and floodplain meadow	Stage 2	Stakeholder is experienced in the type of opportunities they are proposing.	Not all of the habitats they are targeting are woodland and peatland.

Stakeholder	Intervention	Description	Stage*	Advantages	Disadvantages
		and another on woodland enhancement.			The only woodland opportunity provided is entirely enhancement so there is little opportunity to claim carbon credits.
XXX	N/A	Turned down opportunity to be involved.	Stage 0	N/A	N/A
XXX	N/A	Are a focal point for multiple stakeholder liaison.	Stage 1	Have relationships with a large number of landowners.	The major landowners and managers they have contact with have already responded with no major opportunities therefore habitat creation is likely to be small in scale.
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	N/A	Email acknowledged and passed to relevant team shortly after sending.	Stage 1	Likely have access to very large, high-profile projects.	Have multiple global opportunities UK likely not to be their core focus.
XXX	Floodplain meadow	Renaturalising a stream to allow it to burst its banks again and restore associated floodplain meadow	Stage 3	Stakeholder is experienced in the type of opportunity they are proposing.	The target habitats are neither woodland or peatland. Very small area being targeted
XXX	N/A	Email acknowledged and passed on to relevant team shortly after sending.	Stage 1	Large number of staff of trained rangers	Much of their land is either already highly forested or biodiverse so large scale habitat creation opportunities may not be available.
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	N/A	Response pending.	Stage 0	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A

Stakeholder	Intervention	Description	Stage*	Advantages	Disadvantages
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	Woodland, wetland, grassland and open water	Scheme would be funding a large amount of habitat around a planned reservoir.	Stage 1	Relatively large site with plans already made/in production. High-profile project	Information still pending and lack of focussed stakeholder engagement.
XXX	N/A	Response pending.	N/A	N/A	N/A

Stakeholder	Intervention	Description	Stage*	Advantages	Disadvantages
XXX	N/A	Have some opportunities in parks and other public greenspace	Stage 1	Very urban area so high social benefits from enhancing public greenspace which would provide societal benefits	All potential projects likely very small and would not significantly contribute to carbon reduction but could contribute to other EAP targets.
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	Coastal grazing marsh	Restoring a 10ha area of coastal grazing marsh that degraded after being cut off from the adjacent Farlington Marshes (LNR, SSSI, SAC, SPA, and Ramsar site) by a road development.	Stage 3	Scheme effectively ready to go with a management plan, costings and team of volunteers working under council contact. Saltmarsh has a high carbon sequestration rate. High value project for local biodiversity.	Relatively small scale project.
XXX	N/A	Response pending.	N/A	N/A	N/A
XXX	N/A	No response to initial contact email.	N/A	N/A	N/A
XXX	N/A	No response to initial contact email.	N/A	N/A	N/A
XXX	N/A	Have some opportunities but will likely be of very small scale in terms of creation with greater management focus.	Stage 1	N/A	All potential projects likely very small and would not significantly contribute to carbon reduction but could contribute to other EAP targets.

Stakeholder	Intervention	Description	Stage*	Advantages	Disadvantages
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	N/A	No response to initial contact email.	N/A	N/A	N/A
[redacted]	Various but the flagship is a 120ha salt marsh restoration project	Three discrete projects. First is a 13ha arable reversion mosaic scheme split into two sites, one being entirely woodland and the other being wetland and wood pasture. The second is a project to restore 120ha of saltmarsh on reclaimed farmland and reconnect it to the adjacent NNR, National Park, Ramsar Site, SSSI and SAC. The third is associated with a large 600ha+ estate with no	Stage 3	Have access to a very large portfolio of landowners who own very large amounts of land. Offered to try and source more projects before the deadline. The scale of the second project and the habitat involved would make it of national significance for biodiversity. Saltmarsh has a high carbon sequestration rate.	Salt marsh restoration is a less mature form of habitat restoration with greater costs and risks involved and no accredited carbon scheme.

Stakeholder	Intervention	Description	Stage*	Advantages	Disadvantages
		specific plans that could be tailored to meet SSEs needs.		Third opportunity allows for a lot of freedom in design and SSE control	
XXX	N/A	No response to initial contact email.	N/A	N/A	N/A
XXX	Various but primarily wetlands and wet grassland	XXX act as a fund manager for a range of schemes totalling 220ha, including "an innovative rewilding style approach to wetland restoration".	Stage 3	One entity would be able to manage multiple stakeholders.	Wetland focus likely to have higher costs and lower certainty with regards to carbon reduction. No accredited carbon scheme.
XXX	Woodland and wetlands	No specific projects, opportunity would take a portfolio approach within an areas of land totalling 2,500ha (opportunity would cover a subset of this area).	Stage 1	Likely have access to large areas of land. Have a specific organisational interest in both woodland and peatland. Have a dedicated Net Zero 2050 habitat creation and restoration program.	Requires additional engagement.
XXX	Woodland	Have some opportunities but details are still forthcoming.	Stage 1	Likely have access to large areas of land. Have a specific organisational interest in woodland.	Requires additional engagement.
XXX	N/A	No response to initial contact email.	Stage 0	N/A	N/A

**Stage 0: no response, still being pursued*
Stage 1: Stakeholder has responded with interest and are pursuing internal stakeholders for potentially suitable projects
Stage 2: Stakeholder has responded with projects that may be suitable and are investigating supply of further information
Stage 3: The stakeholder has suitable project/s and is confident that they can deliver the required benefits although the exact project has not been determined the intervention and feasible area has been identified with sufficient information to carry out preliminary CBA

10 Appendix 3 Pilot Stakeholder Engagement App

SSEN Wildlife Restoration Project

About SSEN

Scottish and Southern Electricity Networks (SSEN) is responsible for developing, maintaining, and operating the electricity distribution networks across central southern England and north of the central belt in Scotland, and for maintaining the electricity transmission network north of the central belt in Scotland. SSEN serves over 3.8mn customers – around 3.1mn in southern England and 780,000 in the north of Scotland. As an organisation, SSEN not only has a duty to efficiently supply electricity to customers, but to also maintain and protect the environment they operate in, including by reducing carbon footprint and environmental impact.

SSEN has an ambitious Environmental Action Plan (EAP) to deliver commitments to net zero carbon emissions by 2050 and biodiversity net gain from 2025. Through collaboration with stakeholders and business teams, SSEN has developed a Sustainability Strategy that supports the delivery of the EAP and outlines environmental ambitions during the next price control period (2023-2028). This targets the eight UN Sustainability Development Goals most important to stakeholders and supports the five key ambitions of serving the public interest; the net zero transition; enhancing our local environment; inclusive service provision; and investing in people.

Sustainability commitments and pathways include the delivery of benefits such as enhancing biodiversity, increasing climate mitigation and adaptation, and improving quality of life. SSEN works to raise awareness and understanding of biodiversity, encouraging employees and communities to connect with the natural environment around them. More widely, there are calls for radical changes in how nature is valued (with reports such as the Dasgupta Review in February 2021) and how new ways to tackle the drivers of climate change and biodiversity loss are needed.

Supporting Wildlife Restoration and Habitat Improvements

[redacted] is currently providing SSEN with advice on opportunities for wildlife restoration and habitat improvements. This project seeks to set out the value that these types of opportunity can bring in SSEN's areas of operation, particularly in relation to net zero carbon emissions and biodiversity net gain. We are seeking to identify practical nature-based solutions to carbon and biodiversity offsetting and enhancement within SSEN's core operating areas in northern Scotland and southern central England.

Community Engagement – Seeking Feedback from Customers

Understanding the views of SSEN's customers in relation to how the environment is used and valued is of real importance. Accordingly, we are launching a pilot engagement programme within two of SSEN's areas – the county of Argyll and Bute in the northern Scotland license area and the county of Hampshire in SSEN's central southern England license area. Customers within these two areas are being asked to provide feedback via an online community engagement app called **'Irys'** about:

- what they currently value in their local area in terms of habitats, green space and nature
- how they currently access nature and green spaces and for what purposes
- how they would prioritise various habitat improvements and environmental benefits

The information gathered from this pilot engagement programme will be used to help inform SSEN's final Business Plan and ongoing activities relating to nature-based solutions for carbon and biodiversity offsetting and enhancements. Preliminary findings from the engagement programme will be presented at COP26 in Glasgow in November 2021.