



Ulster University Natural Capital Assessment and Accounts: Combined Report

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Executive Summary

Project Overview

Natural Capital Solutions was commissioned by Ulster University to conduct natural capital assessments and accounts of its portfolio of sites across Northern Ireland (excluding Belfast), and to develop natural capital enhancement plans for each. These plans contribute to the University's commitments to become both nature positive and net zero.

Why should Ulster University become Nature Positive?

Global biodiversity is declining due to pressures such as land use change, pollution, resource exploitation, and invasive species. As ecosystems degrade, they lose resilience and their ability to regulate natural systems, driving interconnected crises of biodiversity loss and climate change. Addressing these challenges requires embracing **nature-based solutions**, which restore ecosystem health, enhance biodiversity, sequester carbon, mitigate climate risks like flooding, and deliver wider human and cultural benefits. For Ulster University, adopting a **Nature Positive** approach is both a responsibility and an opportunity for the following reasons:

- **Nature Responsibility:** Ulster University has a moral obligation to contribute to the global goal of becoming nature positive by 2030.
- **Institutional commitment:** The University has made a Nature Positive Pledge through the Nature Positive Universities Alliance which committing to biodiversity baselining, target setting, and annual progress reporting.
- **Regulatory Compliance:** Aligning with the Kunming-Montreal Global Biodiversity Framework will ensure the university is ready for future nature-related requirements and reporting.
- **Asset Management:** A natural capital account will help identify, value, and manage the University's natural assets and their net benefits.
- **Resilience and Adaptation:** Integrating nature-smart planning and investing in nature-based solutions will strengthen the University's climate resilience and long-term sustainability.

Project Scope

Previous reports:

- Establish a baseline assessment of the University's natural assets (natural footprint baseline – habitats, ecology, soils, farmland)
- Propose a natural capital enhancement plan for each site (action plan to improve natural footprint and ecosystem service provision)
- Quantify and value the benefits (ecosystem services) provided by the natural assets (baseline and enhancement plan)
- Create a natural capital account as a pragmatic and realistic approach to accounting for the environment within the University's estate (decision-making processes & securing funding)

In this report, we bring together these individual assessments to provide a holistic picture of the University's natural capital assets, to show how ecosystem service benefits and associated monetary value compares between the different sites, and to highlight how proposed enhancements at some sites can mitigate impacts and limitations at others.

Key habitat enhancement proposal and recommendations

Coleraine

- **Key proposal:** Establish a transitional approach to a less intensive farming system on the agricultural land, with an option to remove agricultural use entirely and open the space for public access.
- **Summary of other proposals:** Extensive woodland enhancement, convert lower use amenity grassland to semi-natural grassland, targeted roadside habitats to mitigate noise and air pollution, and riparian habitats to enhance water flow and quality regulation.

Knocktarna

- **Key proposal:** Enhance existing woodland primarily through removal of invasive species.
- **Summary of other proposals:** Create areas of diverse meadow to enhance existing grassland and parkland, enhance semi-natural grassland.

Jordanstown

- **Key proposal:** Convert the farmland into a large area of native broadleaved woodland, with a publicly accessible path bordered by wildflower strips through the woodland.
- **Summary of other proposals:** Expand and enhance existing woodland, and plant wildflower strips on existing amenity grassland.

Derry~Londonderry

- **Key proposal:** Maximise opportunities to create and enhance habitats alongside the proposed developments, while protecting as many existing trees and habitats as possible from future loss.
- **Summary of other proposals:** Expand and connect existing woodland parcels, remove invasive species, plant wildflower strips on existing amenity grassland, and create smaller areas of diverse habitats including scrub and parkland.

Summary of Findings

Habitats

Combining the effects of the four proposed enhancement plans gives a clear pattern of change: where possible, heavily disturbed habitats with relatively low ecosystem service value (e.g. improved (agricultural) and amenity grassland), as well as non-native woodlands, are converted to habitats with higher ecosystem service provision and/or greater support for native biodiversity, such as broadleaved woodland and semi-natural grassland. This is achieved while maintaining areas of amenity grassland for recreational use and allowing for the proposed developments at the Derry~Londonderry campus.

Ecosystem Service Provision

Provision of all the measured ecosystem services increases at both Coleraine and Jordanstown with the enhancement plans, except for food production which decreases. At Knocktarna and Derry~Londonderry, the potential to increase ecosystem service provision is more limited: at Knocktarna, extensive woodland cover means provision is already high; at Derry~Londonderry, opportunities are constrained by the large—and expanding—area of buildings and infrastructure. Given these limitations, and the significant constraints on nature at the Belfast site. **There is significant potential for the University to advance its commitments to nature through the opportunities available at its Coleraine and Jordanstown sites.**

Monetary Value of Ecosystem Services (present value over 50 years, £, 000's)

Service	Baseline	Enhancement Plan
Net carbon balance	-384	7,480
Agricultural production	233	47
Air quality regulation	2,350	2,300
Noise regulation by woodland	592	720
Timber/woodfuel production	334	410
Water flow regulation by woodland	285	315
Water quality regulation by woodland	139	216
Recreation	5,180	12,600
Human health benefits from nature	3,170	9,800
Amenity*	21,700	21,700
TOTAL	33,600	55,600

- Net carbon balance goes from negative (net emissions) to positive (net sequestration), reflecting a key contribution towards the University's Net Zero ambitions.
- Cultural services (recreation, health, and amenity) provide the greatest values of all the services, highlighting the importance of ensuring natural areas are accessible to the public.
- Total present value of all (measured) ecosystem service benefits over 50 years increases from £33.6 million to £55.6 million

Natural Capital Balance Sheet

	PV over 50 years (£2025, 000's)		£ change (£2025, 000's)	% change
	Baseline	Scenario		
Assets:				
Natural capital benefits	33,580	55,624	22,044	66%
Farmland rental income	567	55	-512	-90%
Gross asset value (benefits)	34,147	55,679	21,531	63%
Liabilities:				
Capital costs	0	370	370	n/a
Maintenance costs	13,655	13,177	-478	-4%
Total liabilities (costs)	13,655	13,546	-109	-1%
Totals				
Net present value	20,492	42,133	21,640	106%
Benefit-Cost ratio	2.5	4.1	n/a	64%

- Maintenance costs include fixed costs (employees) and variable costs associated with site management (fencing, hedgerow maintenance etc).
- Net present value increases by 106% from £20.4 million to £42.1 million.
- Benefit-to-cost ratio increases from 2.5 to 4.1, meaning every £ spent delivers £4.10 in benefits.

Conclusions

- The proposed enhancement plans deliver a net uplift in all services except for food production.
- The overall net carbon balance goes from net emissions to significant net sequestration.
- The proposed enhancements at Coleraine and Jordanstown present important opportunities to deliver the desired uplift in ecosystem service provision and biodiversity; these opportunities must be maximised to offset the limitations at the Derry~Londonderry and Belfast sites.
- Overall, the plans represent a cost-effective investment, delivering greater benefits both directly to the University and to wider society, while decreasing the total costs of implementation and maintenance.

Contents

Executive Summary	2
Contents.....	6
1. Introduction	7
Project overview	7
Why?	7
What is the natural capital and ecosystem services framework?	8
2. Coleraine.....	9
Summary.....	9
Concise recommendations	9
Implementation costs	9
Proposed Enhancement Plan.....	10
3. Knocktarna	12
Summary.....	12
Recommendations.....	12
Implementation costs	12
4. Jordanstown	13
Summary.....	13
Concise recommendations	13
Implementation costs	13
Proposed Enhancement Plan.....	15
5. Derry~Londonderry	Error! Bookmark not defined.
Summary.....	16
Concise recommendations	16
Implementation costs	16
Proposed Enhancement Plan.....	17
6. Comparison.....	19
Natural Capital Assets.....	19
Ecosystem Services	22
Physical and Monetary Flows	24
Natural Capital Account and Cost-Benefit Analysis	29
7. Conclusions and Next Steps.....	31
Conclusions.....	31
Next Steps.....	32

1. Introduction

Project overview

Natural Capital Solutions was commissioned by Ulster University to conduct natural capital assessments of its portfolio of sites across Northern Ireland, and to develop and propose natural capital enhancement plans for each site. We have now completed individual assessments of four of the University's sites – Coleraine, Jordanstown, Knockarna, and Derry~Londonderry. The Belfast site's more compact greenspace means that a similar assessment would have limited applicability.

In this report, we bring together these individual assessments to provide a holistic picture of the University's natural capital assets, to show how ecosystem service benefits and associated monetary value compares between the different sites, and to highlight how proposed enhancements at some sites can mitigate impacts and limitations at others.

The first sections of the report present a summary of each site and the proposed enhancement plans, followed by a comparison and interpretation of the results side-by-side. For further detail of any individual results, reasoning, or methodology, please refer to the individual report of the relevant site.

Why?

Nature is declining around the world because of the demands we are placing on our natural systems through land use change, pollution, natural resource use and exploitation, and invasive species. As natural ecosystems become degraded and less biodiverse, they also become less resilient and less able to regulate Earth's natural systems, leading to the interlinked crises of biodiversity loss and climate change facing the modern world.

As such, embracing natural solutions is the most effective way to tackle these multiple crises together. Creating and restoring healthy natural ecosystems supports biodiversity while also locking up carbon, helping to adapt to climate change such as by reducing flood risk, and providing other benefits to humans such as air purification and cultural experience.

A Nature Positive approach is important for Ulster University due to a multitude of compelling reasons, including:

- **Nature Responsibility:** As a responsible institution, Ulster University has a moral obligation to contribute to the global goal for nature - to become nature positive by 2030.
- **Institutional commitment:** Ulster University has made a Nature Positive Pledge through the Nature Positive Universities Alliance which commits the university to start a nature positive journey, incorporating a biodiversity baseline, targets, actions, and annual reporting.
- **Regulatory Compliance:** Anticipating and complying with future nature requirements from the Kunming-Montreal Global Biodiversity Framework 2050 vision and 2030 mission will ensure the university remains aligned to nature requirements and evolving nature reporting.
- **Asset Management:** A natural capital account and balance sheet can identify the natural assets that provide benefits to the university and others, and the costs of maintaining the assets.
- **Resilience and Adaptation:** Governments and organisations are being encouraged to better integrate nature-smart planning and practices into systems and to invest in nature-based solutions, using data from natural capital accounting.

What is the natural capital and ecosystem services framework?

Natural Capital is defined as:

“...elements of nature that directly or indirectly produce value or benefits to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions” (Natural Capital Committee 2014¹).

These benefits – referred to as ecosystem services – include provisioning services (e.g. food and timber production), regulating services (e.g. flood and climate regulation), and cultural services (e.g. aesthetic value and recreational opportunities). Some different types of ecosystem service are shown in Figure 1.

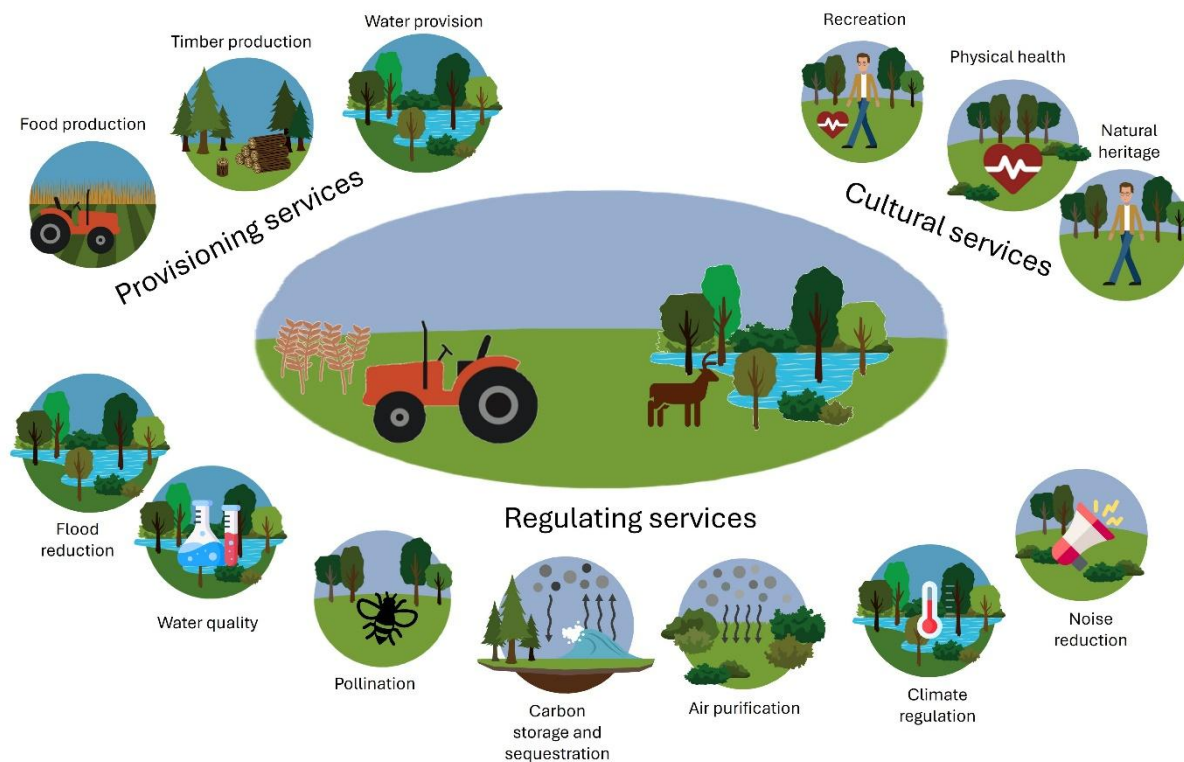


Figure 1. Ecosystem services provided by the natural environment, some of which are valued in this report.

Ulster University recognises that natural capital has become a standard analytical approach to thinking about nature. It has gained traction because it offers a balanced focus on natural assets in ecological terms, assessing their quantity, condition, sustainability, and the social and economic benefits that derive from those assets.

By understanding how a business makes use of natural capital assets, decisions can be taken to better manage them and provide the added value to the University institution, its students, staff, the public and society. Assessing natural capital in combination with financial, environmental, and socio-economic information will reveal the benefits and value of nature to the University, as well as the valuation of the University’s positive and negative impacts upon it.

¹ Natural Capital Committee 2014. Towards a Framework for Defining and Measuring Changes in Natural Capital. Working Paper 1, Natural Capital Committee.

2. Coleraine

Summary

The Coleraine campus is a 115.5 ha site consisting of a mix of amenity grassland, improved grassland for agriculture, built-up areas and infrastructure, and moderate areas of semi-natural habitats including woodland, parkland, and semi-natural grassland. For a detailed assessment of the site's natural capital assets and the benefits that flow from them, please refer to the individual report. Key aspects of the assessment are detailed in the comparison section (Section 6).

The proposed enhancement plan at Coleraine integrates extensive woodland enhancement, targeted roadside habitats to mitigate noise and air pollution, and riparian habitats to enhance water flow and quality regulation, alongside a phased shift to nature-friendly farming practices.

Concise proposal and recommendations

- Improve condition of existing woodland through removing non-native trees and planting native ones, removing invasive species, and adding log piles.
- Plant new woodland, particularly along roads.
- Establish a transitional approach to a less intensive farming system, with an option to remove agricultural use entirely and open the space for public access.
- Identify amenity grassland with low use and convert to semi-natural grassland.
- Manage existing hedgerows sensitively via a reduced cutting regime, and plant new hedgerows.
- Expand areas of scrub where practical to provide important habitat.
- Plant strategically along waterways to improve water quality and reduce flood risk.
- Retain heavily used amenity grassland to maintain its function.

Implementation costs

Table 1 shows the costs associated with the proposed enhancement plan. For further detail, please refer to Section 13 of the Coleraine and Knocktarna report. Average capital costs come to around £4,600/ha across the 52 ha of proposed land use change. The woodland restoration costs are approximate; the specific interventions advised at this site will likely have much lower maintenance costs than used in these estimates. **Woodland creation and maintenance grants are available to cover most of these costs.**

Table 1. Capital and annual maintenance costs of the proposed enhancement plan at Coleraine. Costs are approximate; detailed methodology is available in the individual report for Coleraine and Knocktarna.

Habitat	Units	nr	Capital costs		Annual maintenance costs	
			£/unit	Total £	£/unit/year	£/year
Woodland creation	ha	10.1	6,500	65,650	248	2,500
Woodland restoration	ha	17.1	6,500	111,150	248	4,232
Silvopasture creation	ha	6.1	2,400	14,640	175	1,068
Scrub enhancement	ha	2.0	250	500	75	149
Grassland enhancement	ha	14.7	700	10,290	98	1,433
Wildflower margins	ha	0.8	0	0	1,265	1,012
Riparian buffer creation	ha	0.6	1,700	1,020	25	15
Hedgerow creation	M	2,103	17	35,751	0.1	210
Hedgerow maintenance		4,713	0	0	0.1	471
Total	-			239,001		11,090

Proposed Enhancement Plan

Core changes

1. Woodland planting along Portstewart Road. This will particularly benefit regulation of air and noise pollution and flood risk, along with most other services.
2. Woodland planting along Cromore Road. Benefits as above; additionally particular benefit to biodiversity by linking existing woodland areas.
3. Riparian wetland planting along the stream at the south of the site. Key area for improving water quality.
4. Riparian woodland planting along the stream at the south of the site. Key area for improving water quality and also expands existing woodland areas.
5. Woodland enhancement – invasive species removal, introduction of dead wood and an eventual full species transition back to native trees. Focus on areas that are currently assessed to be in poor condition. The remaining woodlands should be enhanced in the medium term (5-10 years).
6. Open habitat areas –specific areas to be identified by UU based on where use is not too heavy, using a transitional approach and allowing heavily used amenity grasslands to remain. The sports pitches have been excluded as we have assumed that their current use will remain.
7. Scrub areas close to the river should either be allowed to regenerate naturally into woodland, or the process can be sped up through selective tree planting.
8. Establish phased approach to creating a nature parkland along the riverbank on currently farmed land next to River Bann (next page).
9. Woodland planting in small patches to increase habitat diversity, including field margins and corners and within hedgerows.
10. Creation of a 10m riparian buffer along waterways, in line with Environmental Farming Scheme guidelines. Targeted planting here will

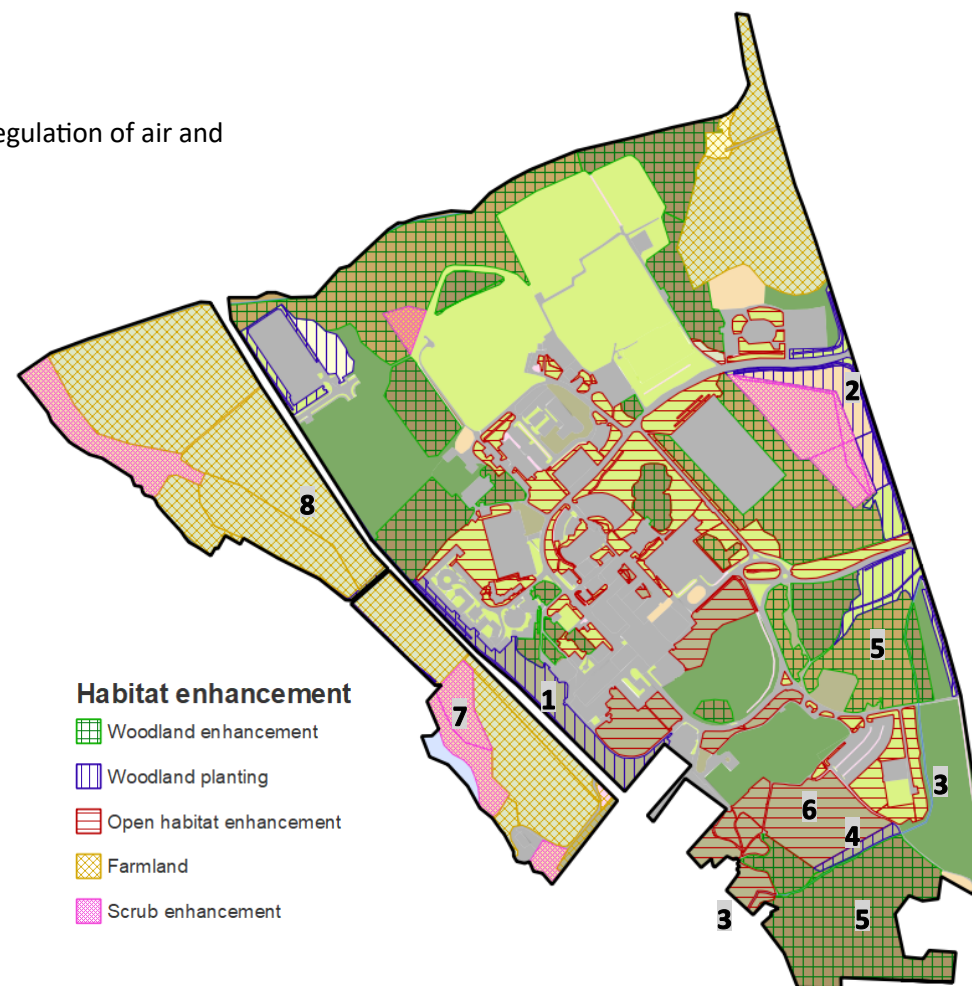


Figure 2. Enhancement plan map of the Coleraine site showing the core changes. Specific enhancements on the farmland are shown in subsequent figures.

improve water quality and flow, reducing any flooding risk and decreasing run-off of any farming inputs.

11. Hedgerow planting along Cromore Road, enhancement of existing hedgerows along Portstewart Road, and further hedgerow planting and management identified by Ulster University.

Short term changes on farmland:

12. Wildflower margin planting acts as a key habitat for biodiversity.
13. In the short term, planting clover in grassland where possible increases biodiversity and soil quality through nitrogen-fixing. It is still possible to use this mix for silage for the anaerobic digester.

Long-term changes on farmland:

14. Scrub expansion along borders of pre-existing scrub areas. Key area for biodiversity and for improving water flow regulation.

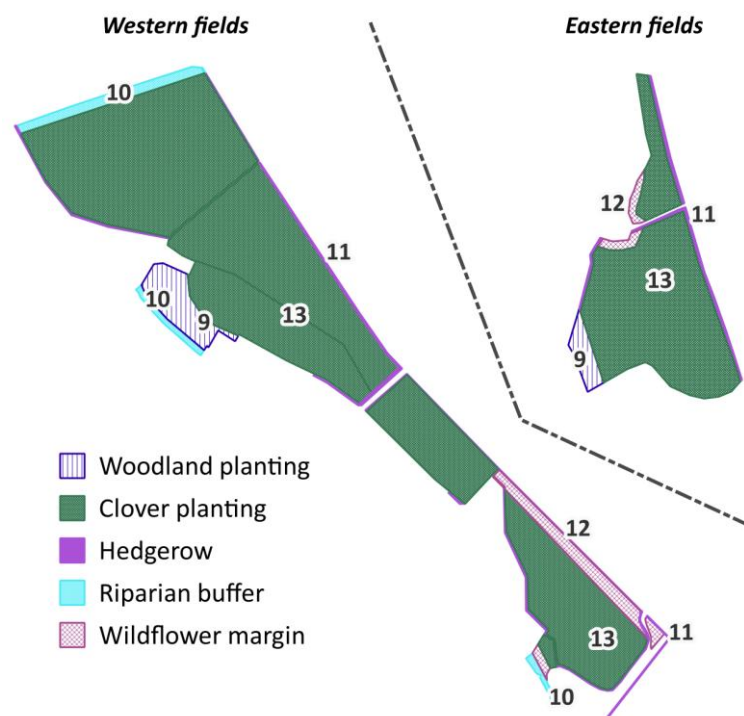


Figure 3. Short-term enhancement plan map for the Coleraine farmland

15. A longer-term ambition of semi-natural grassland creation in place of the improved grassland as key areas for biodiversity (in conjunction with below).
16. Create some silvo-pastoral land near existing woodland to allow spatial transition from woodland into grassland. The grassland beneath can be allowed to form a long flowering meadow or other semi-natural grassland as above, if appropriate.

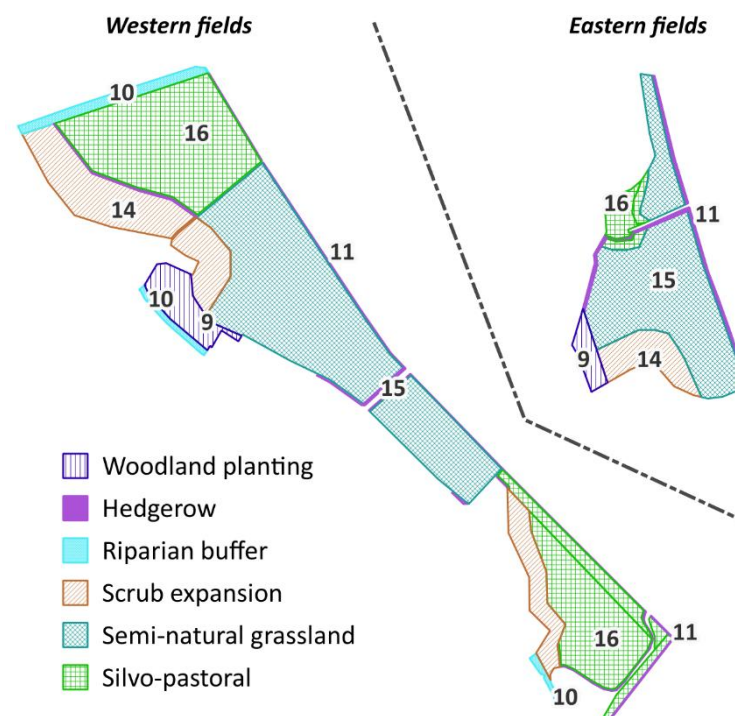


Figure 4. Longer-term enhancement plan map for the Coleraine farmland

3. Knocktarna

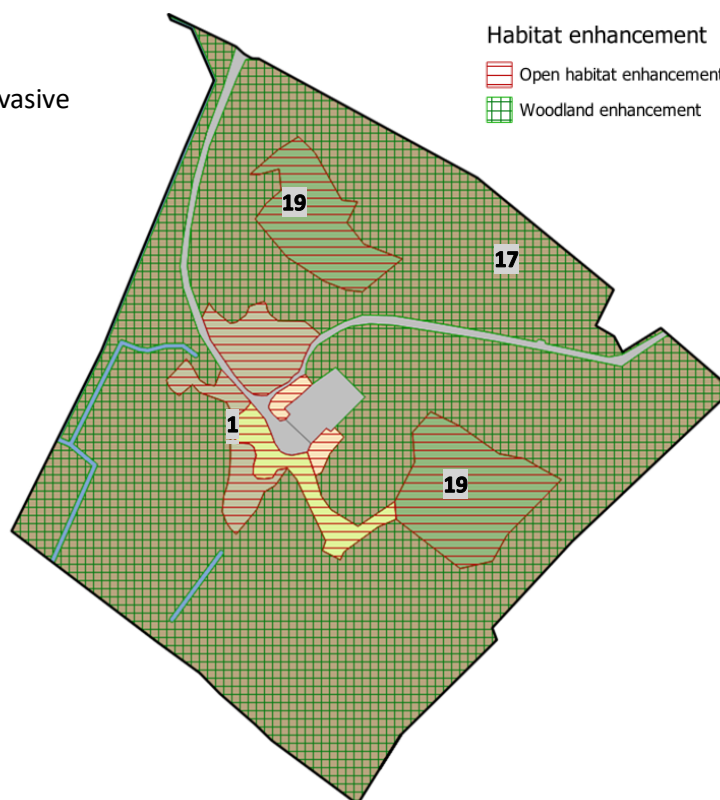
Summary

The Knocktarna site is a 10.1 ha and currently used as an events/conference venue and consisting of 79% broadleaved woodland. For a detailed assessment of the site's natural capital assets and the benefits that flow from them, please refer to the individual report. Key aspects of the assessment are detailed in the comparison section (Section 6).

The key story of the enhancement plan at Knocktarna is enhancement of the existing habitats to improve resilience and boost support of native biodiversity.

Recommendations

17. Woodland enhancement – removal of invasive species, with an emphasis on laurel.
18. Enhance parkland areas – increase structural diversity of the grassland by creating sections of meadow of various heights through a varied mowing regime.
19. Semi-natural grassland enhancement – creating a long flowering meadow which is cut once or twice a year.



Implementation costs

Table 2 shows the costs associated with the proposed enhancement plan. The woodland at Knocktarna is well established and generally in good condition. Recommended interventions – particularly removal of invasive species – would require further specialist guidance to provide realistic cost estimates but are likely to greatly enhance native biodiversity at relatively low cost. For further detail, please refer to Section 13 of the Coleraine and Knocktarna report.

Table 2. Capital and annual maintenance costs of the proposed enhancement plan at Knocktarna. Costs are approximate; detailed methodology is available in the report for Coleraine and Knocktarna. Woodland enhancement costs depend on the required work but are likely to be low at this site.

Habitat	Units	nr	Capital costs		Annual maintenance costs	
			£/unit	Total £	£/unit/year	£/year
Woodland enhancement	ha	8	Unknown	Low	Unknown	low
Grassland enhancement	ha	1.5	700	1,050	98	147
Total	-	-	-	1,050	-	147

4. Jordanstown

Summary

The Jordanstown campus is a 42.9 ha site split between the sports facilities (sports pitches, buildings, and infrastructure) and adjacent farmland (improved grassland), with some smaller areas of broadleaved woodland. For a detailed assessment of the site's natural capital assets and the benefits that flow from them, please refer to the individual report. Key aspects of the assessment are detailed in the comparison section (Section 6).

The key story of the proposed enhancement plan at Jordanstown is the significant boost to biodiversity and ecosystem service provision associated with converting the current farmland into a publicly accessible natural woodland.

Concise recommendations

- **Key proposal:** Convert the farmland into a large area of native broadleaved woodland, with a publicly accessible path bordered by wildflower strips through the woodland. This change is the main contributor to the increase in benefits associated with the proposed enhancement plan.
- Creation of wildflower strips and parcels around the borders of the sports pitches on the parts of the amenity grassland with low use.
- Expansion of the existing broadleaved woodland around the car park.
- Continue to manage existing hedgerows sensitively, avoiding use of fertilisers and pesticides and controlling invasive species.
- Improve condition of existing woodland through targeted removal of invasives such as rhododendron and cherry laurel, retain deadwood to provide additional habitat and resources, and transition coniferous areas to native broadleaf species.

Implementation costs

Table 1 shows the costs associated with the proposed enhancement plan. For further detail, please refer to Table 6 in the Jordanstown report. Average capital costs come to around £5,300/ha across the 20 ha of proposed land use change. The woodland restoration costs are approximate; the specific interventions advised at this site will likely have much lower maintenance costs than used in these estimates. **Woodland creation and maintenance grants are available to cover most of these costs.**

Table 3. Capital and annual maintenance costs of the proposed enhancement plan at Jordanstown. Costs are

Habitat	Units	nr	Capital costs		Annual maintenance costs	
			£/unit	Total £	£/unit/year	£/year
Campus						
Woodland creation	ha	0.2	6,500	1,300	248	50
Woodland restoration	ha	3.9	3,250	12,675	248	967
Grassland enhancement	ha	1.8	700	1,260	98	176
Hedgerow maintenance	m	387	0	0	0.1	40
Farmland						
Woodland creation	ha	13.5	6,500	87,750	248	3,348
Grassland enhancement	ha	3.7	700	2,590	98	363
Total	-	-	-	105,575	-	4,944

approximate; detailed methodology is available in the individual report for Jordanstown.

Proposed Enhancement Plan

1. Enhancement of existing broadleaved woodland parcels – all existing woodland areas would benefit from the enhancements, notably retention of deadwood and control of invasive species
2. Grassland enhancements – creation of strips and parcels of semi-natural grassland with pollinator-friendly planting around the sports pitches and car park
3. Hedgerow enhancement – existing hedgerows in the campus area to be enhanced with less intensive management practices and removal of invasive species
4. Transition coniferous woodland area with planting of native species
5. Expansion of the existing broadleaved woodland around the car park. This was indicated by the opportunity mapping to benefit air and water quality.
6. Creation of broadleaved woodland on the current farmland. This was indicated by the opportunity mapping as a key area to enhance air purification, reduce flood risk, and improve water quality. This area was also highlighted in the ecology assessment as a key area to enhance biodiversity at the site. A woodland area of this size will also contribute significantly to the provision of other ecosystem services at the site including carbon sequestration and storage, and noise regulation.
7. Creation of a path through the new woodland, with a transition zone of semi-natural grassland to the woodland. This is crucial for allowing public access through the site, which will enhance health and wellbeing benefits. Pollinator-friendly planting along the grassland borders will also increase support for native flora and fauna by supporting pollinators and creating an edge habitat.



5. Derry~Londonderry

Summary

The Derry~Londonderry campus is a 25.6 ha site in the heart of Derry-Londonderry and comprises three main areas: the main campus, the Duncreggan student village, and the Foyle sports fields. The site consists predominantly of built-up areas and amenity grassland, with smaller areas of woodland and hedgerows. For a detailed assessment of the site's natural capital assets and the benefits that flow from them, please refer to the individual report. Key aspects of the assessment are detailed in the comparison section (Section 6).

The key story of the proposed enhancement plan at Derry~Londonderry is that ecosystem service provision and associated value can be maintained despite the planned increase in built-up areas resulting from new University buildings.

Concise proposal and recommendations

- Woodland planting, mainly focused on the Duncreggan student village but also including smaller areas of the main campus, especially where smaller woodland areas can be joined up.
- Enhancing the condition of existing woodlands by removing invasive species, retaining deadwood where safe, and supporting the development of a healthy understory of native vegetation.
- Enhancement of open habitats, including conversion of amenity grassland to semi-natural grassland, and encouragement of pollinators and biodiversity.
- Enhancement of existing hedgerows, which are already mostly in good condition but could be improved further by filling in gaps and removing invasive species.
- Other small areas of habitat creation around the University's development plans, including parkland areas in the main campus, scrubland and grassland around the planned student accommodation at the Duncreggan student village, and additional tree and hedgerow planting where possible, particularly along borders with roads to provide air and noise pollution regulation.

Implementation costs

Table 4 shows the costs associated with the proposed enhancement plan. For further detail, please refer to Tables 7-9 in the Derry~Londonderry report. Average capital costs come to around £3,000/ha across the 8 ha of proposed land use change. The woodland restoration costs are approximate; the specific interventions advised at this site will likely have much lower maintenance costs than used in these estimates. Woodland creation and maintenance grants are available to cover most of these costs.

Table 4. Capital and annual maintenance costs of the proposed enhancement plan at Derry~Londonderry. Costs are

Habitat	Units	nr	Capital costs		Annual maintenance costs	
			£/unit	Total £	£/unit/year	£/year
Woodland creation	ha	1.6	6,500	10,400	248	397
Woodland restoration	ha	3	3,250	9,750	248	744
Parkland creation	ha	0.4	2,000	800	148	59
Scrub creation	ha	0.2	250	50	75	15
Grassland enhancement	ha	0.5	700	350	98	49
Hedgerow creation	m	150	17	2,550	0.1	15
Hedgerow enhancement	m	600	0	0	0.1	60
Total	-	-	-	23,900	-	1,339

approximate; detailed methodology is available in the individual report for Derry~Londonderry.

Proposed Enhancement Plan

Sports pitches

1. New sports campus developments.
2. Small area of native broadleaf tree and hedgerow planting around the edge of the sports fields.
3. Enhancement of existing hedge/trees by removing invasive species including giant hogweed and Japanese knotweed.
4. Enhancement of the existing hedgerow, filling in gaps with additional planting of native species.

Duncreggan student village

5. Four new university buildings with some surrounding sealed surfaces and areas of semi-natural grassland, or other urban planting.
6. Enhancement of smaller areas of amenity grassland to semi-natural grassland with pollinator-friendly native species planting.
7. Tree planting on the existing amenity grassland to create a small connected broadleaved woodland area.
8. Pollinator-friendly planting and reduced management intensity of amenity grassland where possible, such as small strips or parcels of semi-natural grassland around sports pitches (not indicated on the map).
9. Tree planting around the field margins along the road. These will be particularly effective as noise and air pollution barriers between the campus and the adjacent road.
10. Enhancement of existing broadleaved woodland – retain deadwood where safe, control invasive species such as rhododendron, and foster a healthy native understory by protecting the area from weedkillers.
11. Areas of amenity grassland around the University buildings, for heavier recreational use.
12. Enhance and expand the existing broadleaved woodland around the new developments, connecting this with the other existing woodland area. This will significantly improve support for biodiversity and provision of ecosystem services. Also consider creating a dynamic edge habitat with scrubland adjacent to the woodland to increase native biodiversity support.



13. New hedgerow planting following the same advice as for hedgerow enhancements.
14. Creation of new scrub transitional zone or 'edge habitat' along the new woodland. Can be created through natural regeneration.

Main campus

15. Small area of tree planting on the existing amenity grassland.
16. Enhancement of smaller amenity grassland areas into more natural habitat with pollinator-friendly native species.
17. New campus building proposal with small areas of amenity grassland.
18. Enhancement and joining up – with additional native tree species planting – of existing woodland areas, particularly focusing on removal of invasive species such as rhododendron.
19. Creation of a new parkland area according to the artist's impression with paths, amenity grassland, semi-natural grassland, and tree planting.
20. Development of the currently unused area into mostly sealed surface with a row of trees.
21. New terraced area as per artist's impression, consisting of areas of trees and amenity grassland. The exact design should be adapted to retain as many of the existing trees as possible.
22. Enhancement of existing broadleaved woodland – retain deadwood where safe, control invasive species such as rhododendron, and foster a healthy native understory by protecting the area from weedkillers.



6. Comparison

Natural Capital Assets

Figure 5 indicates the main changes in habitat cover associated with the proposed enhancement plans across all four sites. The greatest change in habitat cover is the increase in broadleaved woodland, rising from 29 to 67 ha in total. Similar in magnitude is the decrease in area of improved grassland, falling from 37.6 to 0.9 ha. Other significant changes are the 22.4 ha increase in semi-natural grassland, the 15.2 ha decrease in amenity grassland, the 11 ha decrease in other woodland, and the 3.1 ha increase in built-up areas (occurring solely at Derry~Londonderry). Combining the changes across all sites clarifies the overall effect of the proposed enhancement plans: where possible, heavily disturbed habitats with relatively low ecosystem service value (e.g. improved and amenity grassland), as well as non-native woodlands, are converted to habitats with higher ecosystem service provision and/or greater support for native biodiversity, such as broadleaved woodland and semi-natural grassland.

Table 5 shows the full asset registers for each site and the summed totals, and these are visually represented in Figure 6.

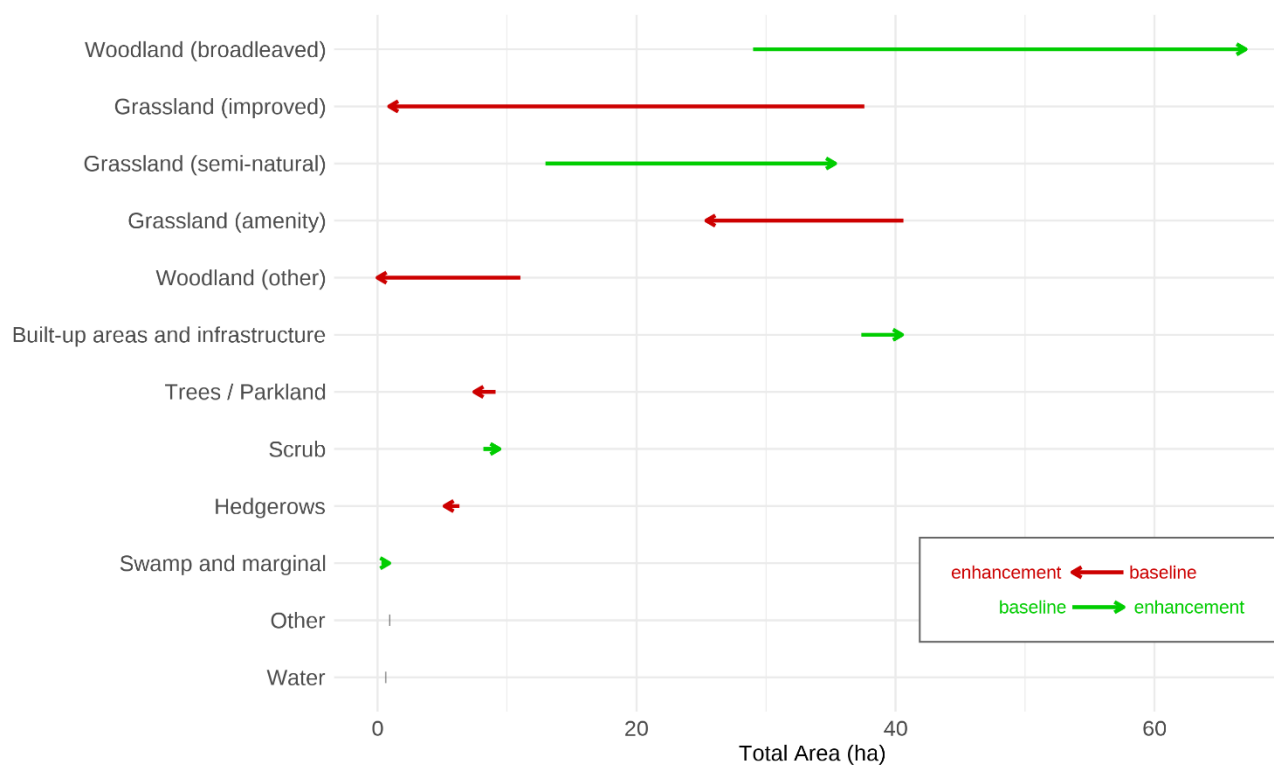


Figure 5. Summary of habitat changes across the combined area of all four of the University sites. Green arrows indicate increases in that habitat cover from baseline to enhancement plan, while red arrows indicate decreases

Table 5. Asset register of all four of the University sites showing broad habitat cover at baseline and under the proposed enhancement plans, and the change in cover of each habitat type at each site. Total areas and changes are also shown. Figures are shown to 1 decimal place; any discrepancies are due to rounding.

Habitat	Coleraine			Jordanstown			Knocktarna			Derry~Londonderry			Total		
	Baseline	Enhancement	Change	Baseline	Enhancement	Change	Baseline	Enhancement	Change	Baseline	Enhancement	Change	Baseline	Enhancement	Change
Built-up areas and infrastructure	19.5	19.5	0	8.6	8.6	0	0.4	0.4	0	8.9	12.0	3.1	37.4	40.5	3.1
Grassland (amenity)	21.3	12.3	-9.0	10.1	8.2	-2.0	0.2	0	-0.2	9.0	4.9	-4.1	40.6	25.4	-15.2
Grassland (improved)	20.8	0.9	-19.9	16.8	0	-16.8	0	0	0	0	0	0	37.6	0.9	-36.7
Grassland (semi-natural)	11.0	27.0	16.0	1.1	6.6	5.6	0.9	1.1	0.2	0	0.6	0.6	13.0	35.3	22.4
Hedgerows	1.2	2.1	0.9	2.2	0.8	-1.5	0	0	0	2.9	2.3	-0.6	6.3	5.2	-1.1
Other	0.9	0.1	-0.8	0	0.8	0.8	0	0	0	0	0	0	0.9	0.9	0
Scrub	7.1	8.8	1.7	0	0	0	0.1	0.1	0	1.0	0.5	-0.5	8.2	9.4	1.2
Swamp and marginal	0.3	0.9	0.6	0	0	0	0	0	0	0	0	0	0.3	0.9	0.6
Trees / Parkland	8.4	6.4	-2.0	0	0	0	0.4	0.4	0	0.3	0.7	0.4	9.1	7.5	-1.6
Water	0.4	0.4	0.0	0.1	0.1	0	0.1	0.1	0	0	0	0	0.6	0.6	0
Woodland (broadleaved)	13.6	36.8	23.2	3.9	17.7	13.8	8.0	8.0	0	3.5	4.5	1.0	29.0	67.0	38.0
Woodland (other)	11.0	0	-11.0	0	0	0	0	0	0	0	0	0	11.0	0	-11.0

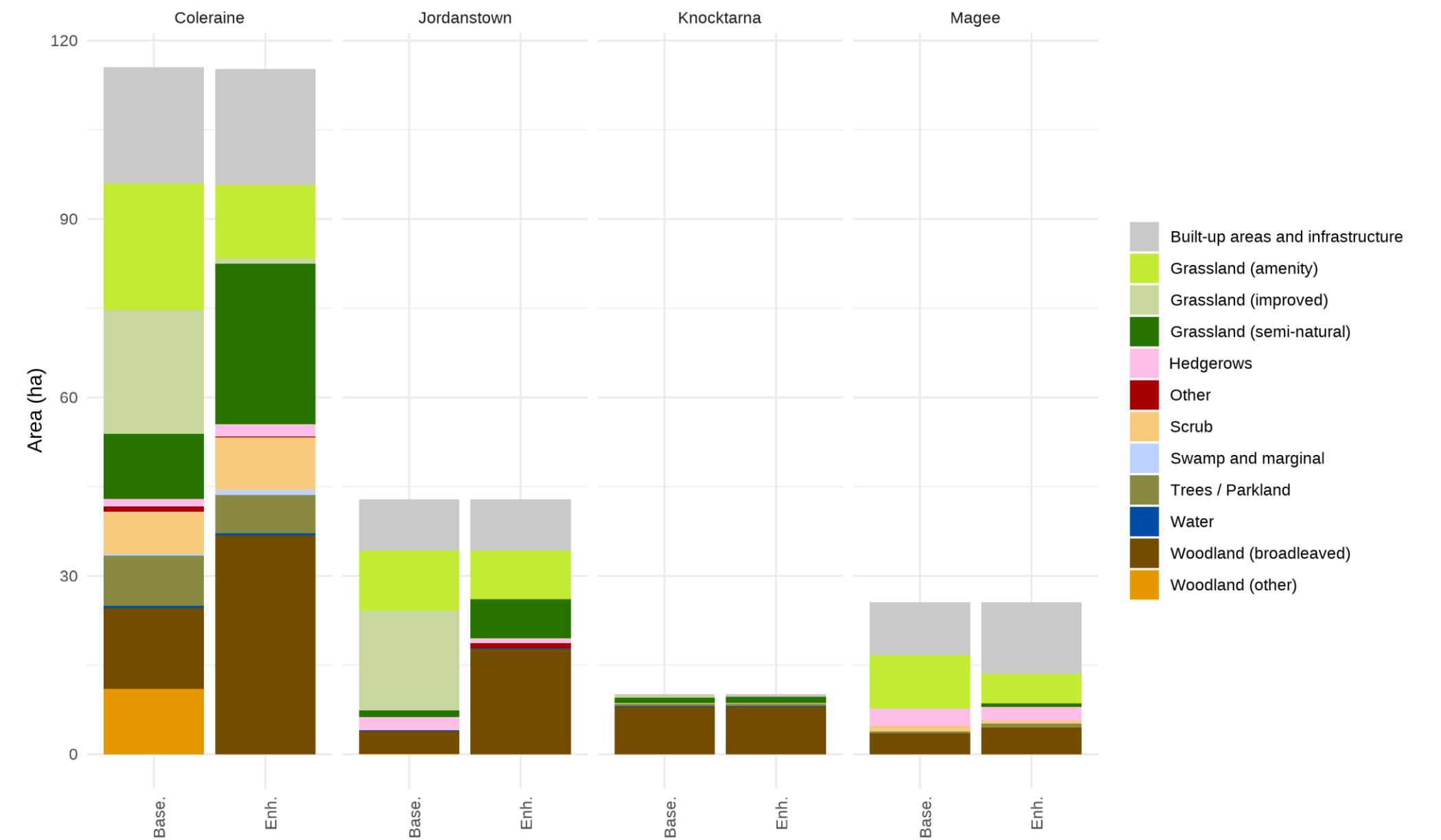


Figure 6. Stacked bar chart showing habitat composition of each site at baseline and under the enhancement plan.

Ecosystem Services

Figure 6 shows the change in ecosystem service scores for each site, while Figure 7 shows the actual scores for the sites at baseline and with the proposed enhancement plan. Comparing the changes at the four sites side-by-side highlights the key patterns associated with the enhancement plans. The major changes in ecosystem service provision are concentrated at Jordanstown, in line with the more extensive proposed habitat changes at the site including conversion of a large portion of the site from agriculture to accessible woodland. This leads to the increases in many of the ecosystem services (Figure 6, orange-yellow) at the expense of food production capacity (Figure 2, dark purple). A similar, albeit more modest², pattern of changes is seen at Coleraine, which also involves proposal to convert farmland to more natural habitats with higher ecosystem service provision.

Conversely, very little change in ecosystem service provision is seen at Knocktarna and Derry~Londonderry. This was expected at Knocktarna due to the enhancement plan only proposing minor changes to the existing habitats. At Derry~Londonderry, however, there are some significant changes in habitat cover, including a 3.1 ha increase in built-up areas (see Table 5). The notable exceptions to this pattern are the modest decreases to water flow regulation and carbon storage as a result of the increased area of sealed surfaces. It is clear, however, that these decreases are more than offset by the increases seen at other sites, particularly at Jordanstown.

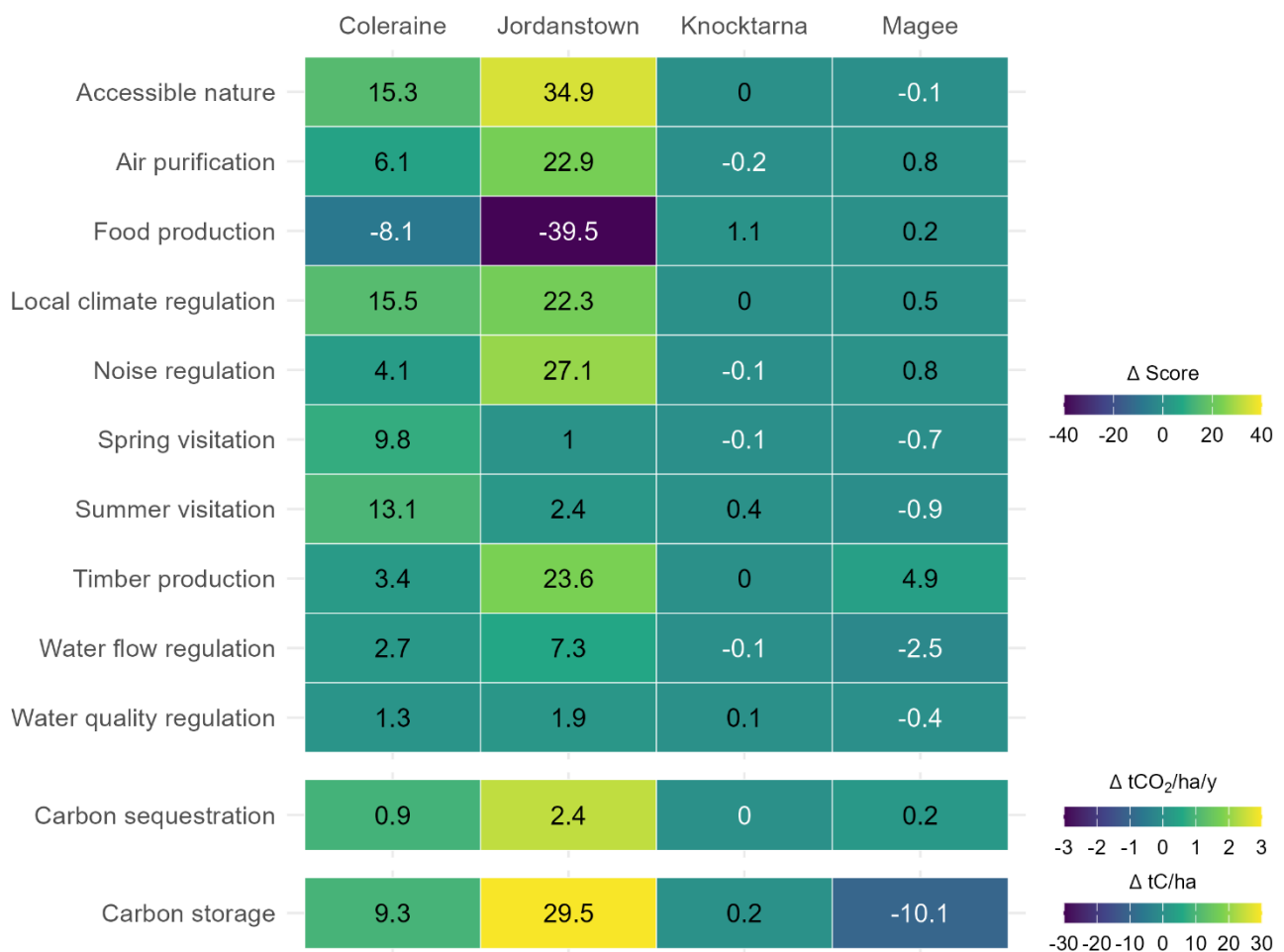


Figure 7. Heatmap showing the change in ecosystem service provision from the baseline to the enhancement plan for each site.

² Note that these scores are relative, so 'more modest' changes at Coleraine may in fact represent higher total provision than at Jordanstown; physical flows are discussed in the next section of the report.

It is also helpful to review the actual ecosystem service scores across the four sites (Figure 8). This reveals a number of important patterns across the University's portfolio. Ecosystem service provision is already relatively high across the board at Knocktarna, with the exception of food production and accessible nature, thanks to the large proportion of the site made up by woodland and parkland. This explains the minimal changes made in the enhancement plans and reflected in Figure 7, as only minor improvements can be made. This contrasts with Jordanstown, where ecosystem service provision in the baseline is particularly low – except for water regulation services – providing significant room for improvement. As such, extensive changes are recommended in the enhancement plan. A similar pattern of generally low provision is seen at Derry~Londonderry, although this results not from intensive land uses (improved and amenity grasslands) but from buildings and sealed surfaces, meaning potential for improvement here is limited.

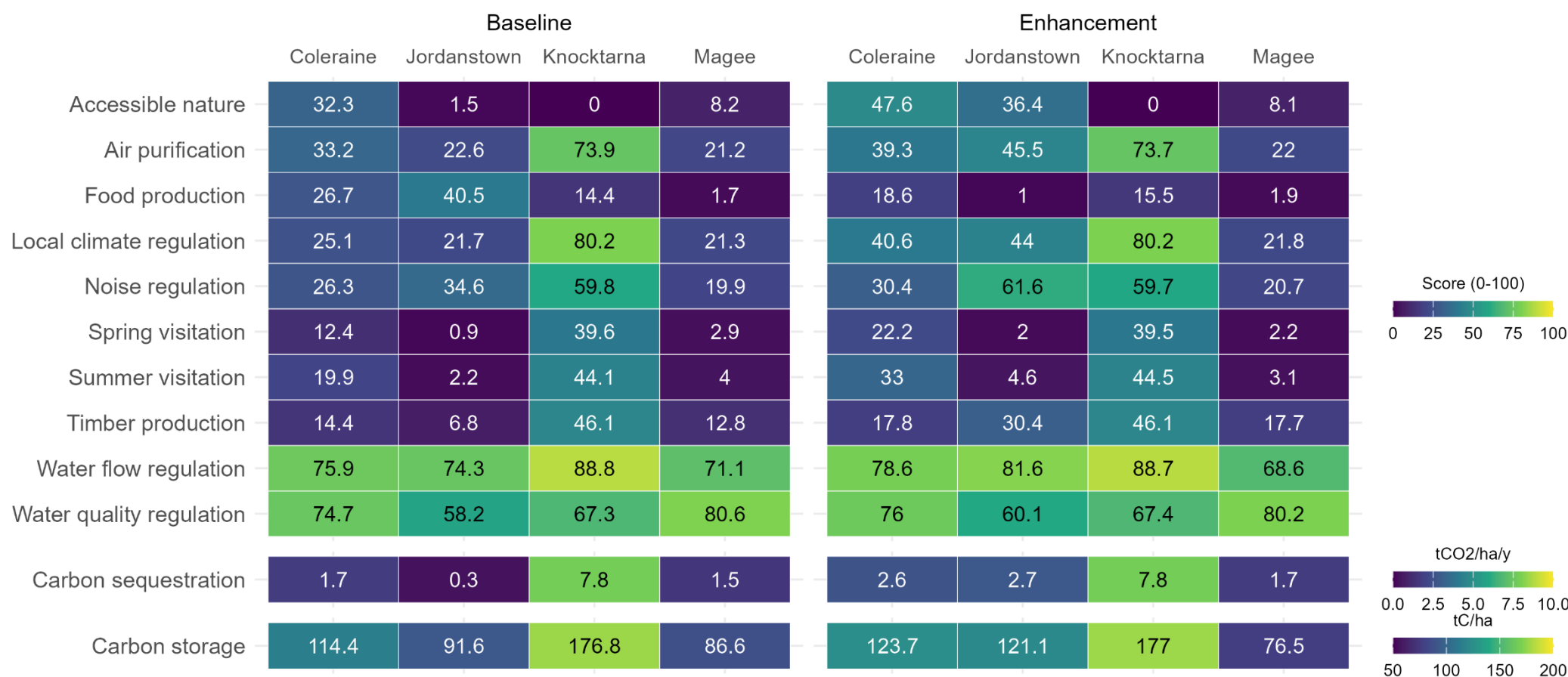


Figure 8. Heatmap showing ecosystem service scores of all four sites in the baseline and under the enhancement plan. Note that all services are scores on a normalised 0-100 scale except for carbon storage and sequestration which are scored in biophysical units.

Physical and Monetary Flows

To compare the change in the flow of ecosystem service benefits from baseline to the enhancement plan scenario, the present value (PV)³ provides the most realistic comparison. Certain habitats take time to develop (e.g. woodland), so the benefits that flow from them may also not be delivered immediately. Using present value allows this gradual accrual of benefits from new habitats to be modelled and incorporated into the value over a 50-year period. For more information and methodological details please refer to the technical appendices in the individual reports.

The pattern of changes shown in Figure 9 is similar to that seen in the ecosystem service scores: the greatest changes are seen at Jordanstown followed by Coleraine, with smaller changes at Derry~Londonderry and almost no change at Knockarna. The proposed enhancement plan makes Jordanstown the most valuable site in terms of ecosystem service benefits, increasing by a PV of £16.2 million to an overall PV of £18.3 million, which is mainly driven by increases in the net carbon balance and cultural services (recreation and health). The same drivers lead to an increase of £5.8 million at Coleraine, although here the net carbon balance is the main contributor, with the largest portion (PV £3.2 million) coming from the reduction in agricultural emissions. Here it must be noted that different methodologies were used to calculate the value of the cultural services at Jordanstown and Coleraine. At Jordanstown, we used the ORVal tool to estimate the increase in visitor numbers associated with the new woodland site base on value transfer from equivalent sites in England and Wales, while at Coleraine we increased the baseline visitor number estimates by the proportion of land that would become publicly accessible, as the changes here were difficult to model more accurately. As such, the estimates for the Jordanstown enhancement plan are likely truer reflections of the recreation and health values, although this means that the *change* is inflated, because the baseline is already an underestimate. For Coleraine, both the true values and the change are likely to be underestimates.

The total value of the benefits provided by the natural assets across all four sites increases by a present value of £22.1 million over 50 years, from £11.9 million in the baseline to £33.9 million with the proposed enhancement plans⁴. The service with the greatest change across all four sites is the net carbon balance, which increases by 812 tCO₂/y from a net source of greenhouse gas emissions (39 tCO₂/y emissions) to a net carbon sink (772 tCO₂/y sequestration). This represents an increase in present value of £7.9 million, delivering nearly £300,000 in annual value. The services that provide the greatest absolute value under the proposed enhancement plans are recreation and health, providing present values of £12.6 million and £9.8 million respectively. For a full breakdown of the annual physical and monetary flows please refer to T⁵.

³ Present value (PV) represents the current value of the benefits delivered over a 50-year period, discounted according to the UK Green Book (HM Treasury, 2022) guidance. PV is used in financial decision-making to reflect the opportunity cost of capital and the fact that £1 today is worth more than £1 in the future.

⁴ Amenity value is included separately, because the value for Jordanstown (£5.9 million) was calculated before a large part of the land was sold off, meaning the amenity value estimate is based on trees that are no longer in the University site. Despite this, the magnitude of the estimates underlines the importance of trees outside of woodlands in such sites.

⁵ Note that the monetary values quoted for Coleraine and Knockarna are slightly different compared to the original report as we have updated all prices to £2025, so that results are fully comparable across sites. In addition, we have made some changes to how we present the annual monetary values (Table 6) and now present these as the average annual value over 50 years without any discounting, as this is a fairer reflection of annual value given that for a number of ecosystem services it will change considerably over the time period.

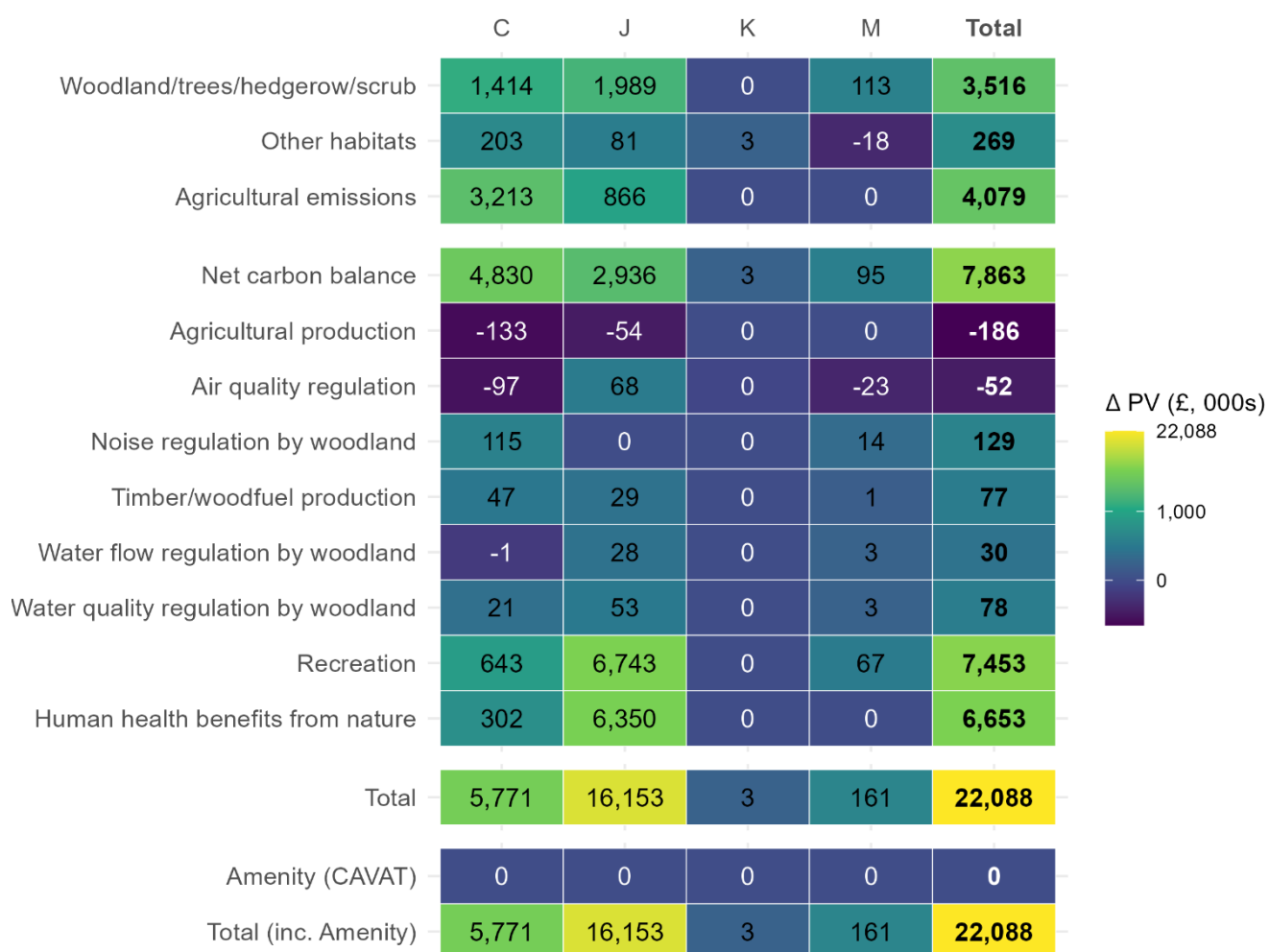


Figure 9. Heatmap showing the changes in present value from baseline to enhancement plan. Increases in agricultural emissions values represent emissions reductions. Figures are shown as 000s and rounded to the nearest whole number; any discrepancies are due to rounding. Sites are represented by their initials.

Table 6. Annual physical flows of ecosystem services across the four sites at baseline and under the enhancement plan scenario, with total provision and total changes across all four sites also shown.

Ecosystem service	Coleraine		Jordanstown		Knocktarna		Derry~Londonderry		Total		
	Baseline	Enhancement	Baseline	Enhancement	Baseline	Enhancement	Baseline	Enhancement	Baseline	Enhancement	Change
Wooded habitats	228	381	47.0	247	53.8	53.8	64.4	75.6	393	757	364
Other habitats	18.9	40.8	3.2	11.4	1.4	1.7	3.5	1.7	27.0	55.5	28.6
Agricultural emissions	-373	-40.3	-86.0	0.0	0.0	0.0	0.0	0.0	-459	-40.3	419
Net carbon balance (tCO ₂ e/yr)	-127	381	-35.8	258	55.2	55.5	67.8	77.2	-39.4	772	812
Agricultural production (ha)	20.8	16.7	17.4	0.0	0.0	0.0	0.0	0.0	38.2	16.7	-21.5
Air quality regulation (kgPM _{2.5})	557	527	112	148	109	109	105	97.5	883	882	-1.0
Noise regulation by woodland (ha)	23.8	36.2	0.0	0.0	0.0	0.0	3.5	4.5	27.3	40.7	13.4
Timber/woodfuel production (m ³)	175	192	30.9	64.5	38.9	38.9	26.0	27.7	270	323.2	52.9
Water flow regulation by woodland (m ³)	13,300	13,700	2,110	4,750	3,670	3,670	1,960	2,240	21,100	24,400	3,300
Water quality regulation by woodland (ha)	23.8	36.2	3.9	17.7	5.6	5.6	3.5	4.5	36.8	64.0	27.2
Recreation (visits)	24,700	29,600	16,700	116,000	0	0	8,200	8,200	49,600	154,000	104,000
Human health benefits from nature (QALY)	2.48	2.97	1.67	11.7	0.0	0.0	0.82	0.82	4.97	15.5	10.5

Table 7. Annual monetary flows of ecosystem service benefits across the four sites at baseline and under the enhancement plan scenario, with totals for each site and across all four sites also shown. Amenity value is included separately to allow for a more honest comparison between sites, because the figure for Jordanstown represents the value of the trees on the land that has now been sold off. * the figure for Jordanstown is shown to highlight the significant value associated with trees more broadly but is not included in the totals.

Ecosystem service	Coleraine		Jordanstown		Knocktarna		Derry~Londonderry		Total		
	Baseline	Enhancement	Baseline	Enhancement	Baseline	Enhancement	Baseline	Enhancement	Baseline	Enhancement	Change
Wooded habitats	69,200	144,300	14,300	104,100	16,300	16,300	19,500	25,700	119,300	290,400	171,000
Other habitats	5,700	16,400	1,000	4,700	400	500	1,100	700	8,200	22,300	14,100
Agricultural emissions	-113,000	14,200	-26,100	0	0	0	0	0	-139,500	-14,200	153,732,0
Net carbon balance	-38,500	146,400	-10,900	108,900	16,800	16,800	20,600	26,300	-12,000	298,400	310,400
Agricultural production (net margin)	7,300	1,900	2,200	0	0	0	0	0	9,400	1,900	-7,500
Air quality regulation	39,800	37,700	8,000	10,600	7,800	7,800	9,300	8,600	64,900	64,700	-200
Noise regulation by woodland	20,900	27,300	0	0	0	0	3,100	3,700	24,000	31,000	7,000
Timber/woodfuel production	8,100	10,600	1,700	3,600	2,200	2,200	1,500	1,600	13,500	18,000	4,500
Water flow regulation by woodland	7,300	7,500	1,200	2,600	2,000	2,000	1,100	1,200	11,500	13,400	1,800
Water quality regulation by woodland	3,100	4,200	1,200	3,400	900	900	400	500	5,600	8,900	3,300
Recreation	143,300	171,700	40,500	341,600	0	0	25,700	28,500	209,600	541,800	332,200
Human health benefits from nature	43,600	52,200	29,400	204,600	0	0	14,500	14,500	87,400	271,300	183,900
TOTAL	234,900	459,500	73,300	675,400	29,600	29,700	76,100	84,800	414,000	1,249,000	835,400
Amenity	247,300	247,300	249,000*	249,000*	167,800	167,800	466,000	466,000	881,200	881,200	0
TOTAL (INC. AMENITY)	482,000	707,000	323,000	925,000	197,000	198,000	542,000	551,000	1,295,000	2,130,000	835,400

Table 8. Present values over 50 years of ecosystem service benefits across the four sites at baseline and under the enhancement plan scenario, with totals for each site and across all four sites also shown. Figures are shown as 000's and rounded to the nearest whole number; any discrepancies are due to rounding.

* the figure for Jordanstown is shown to highlight the significant value associated with trees more broadly but is not included in the totals.

Ecosystem service	Coleraine		Jordanstown		Knocktarna		Derry~Londonderry		Total		
	Baseline	Enhancement	Baseline	Enhancement	Baseline	Enhancement	Baseline	Enhancement	Baseline	Enhancement	Change
Wooded habitats	2,290	3,710	473	2,460	541	541	661	774	3,970	7,490	3,520
Other habitats	190	393	32	114	14	17	35	17	272	540	269
Agricultural emissions	-3,760	-547	-866	0	0	0	0	0	-4,630	-547	4,080
Net carbon balance	-1,280	3,550	-361	2,580	556	559	696	791	-384	7,480	7,860
Agricultural production (net margin)	179	47	54	0	0	0	0	0	233	47	-186
Air quality regulation	1,440	1,350	290	358	282	282	337	314	2,350	2,300	-52
Noise regulation by woodland	516	631	0	0	0	0	76	90	592	720	129
Timber/woodfuel production	201	248	43	71	54	54	36	37	334	410	77
Water flow regulation by woodland	180	179	29	57	49	49	27	30	285	315	30
Water quality regulation by woodland	76	97	31	84	23	23	9	12	139	216	78
Recreation	3,540	4,180	1,000	7,740	0	0	635	703	5,180	12,600	7,450
Human health benefits from nature	1,580	1,880	1,060	7,420	0	0	524	524	3,170	9,800	6,650
TOTAL	6,440	12,170	2,150	18,300	963	966	2,340	2,500	11,900	33,900	22,000
Amenity	6,050	6,050	5,910*	5,910*	4,100	4,100	11,500	11,500	21,700	21,700	0
TOTAL (INC. AMENITY)	12,500	18,200	8,060	24,200	5,070	5,070	13,900	14,000	33,600	55,600	22,000

Natural Capital Account and Cost-Benefit Analysis

A natural capital account measures and values the natural capital assets of an area, based on the flow of ecosystem services and associated benefits from those assets. The benefits are then compared to the costs (capital and operational expenditure) in the form of a balance sheet, that is, the value of the benefits derived from the natural capital assets are compared to the costs of maintaining those assets. Valuations are referred to as ‘asset values’ and the maintenance requirements as ‘liabilities,’ following standard accounting terminology. For further detail on the methodology, please refer to the individual reports for each site.

For the purpose of this analysis, we have assumed that all capital costs will occur in year 1, although in reality costs may be spread over a few years⁶. In addition, capital costs associated with habitat creation are likely to be covered by grants, such as woodland creation grants.

Table 9 shows the combined natural capital balance sheet across the four sites (‘portfolio’). The total value of the natural capital assets of the site is quantified and reported along with the total liabilities (maintenance costs) in present value terms discounted over 50 years. This results in a net value for the natural capital assets for the portfolio.

The baseline portfolio has a gross asset value of £34.1 million, with Coleraine and Derry~Londonderry delivering the highest benefits (£12.4 million and £13.9 million respectively). Jordanstown has the lowest natural capital benefits (£2.2 million), although this is affected by the exclusion of amenity value at this site (see previous section), which was calculated to deliver an additional £5.9 million in benefits. The total liabilities of the baseline are made up only by the maintenance costs, which are estimated at £13.7 million over 50 years. This gives a net present value of the baseline portfolio of £20.4 million over 50 years, which translates to a benefit-cost ratio of 2.5, meaning every £ spent on maintenance delivers £2.50 in benefits.

Under the proposed enhancement plan, the gross asset value increases by 63% to £55.7 million. This is due to the increases in natural capital benefits delivered by the proposed enhancement plans at all sites, but especially at Jordanstown, where the benefits vastly outweigh the loss of farm rental income. The capital costs associated with the proposed enhancement plans are estimated at £370,000, of which 65% occurs at Coleraine and 29% at Jordanstown. **The proposed enhancement plans decreases total maintenance costs across the portfolio by 4% to £13.2 million. Notably, Jordanstown has significantly lower maintenance costs than Coleraine or Derry~Londonderry but delivers higher natural capital benefits, highlighting the cost-effectiveness of the interventions here. The total liabilities under the enhancement plan come to £13.5 million over 50 years, giving a net present value of £42.1 million, a 106% increase from the baseline. This translates to an increase in the benefit-cost ratio to 4.1, meaning every £ spent across the portfolio on maintenance of natural assets delivers £4.10 in benefits.**

⁶ This is done in part to aid comparisons across sites, but note that in the Coleraine and Knockarna report, the capital costs are spread over a few years, so the PV figure expressed in the natural capital balance sheet in that report is slightly lower.

Table 9. Combined natural capital balance sheet for the baseline and enhancement plan. Figures are shown in 2025 prices (£2025), presented in thousands of pounds (000's), and rounded to the nearest whole number. All monetary values are present values over 50 years. Any discrepancies are due to rounding.

* Coleraine and Knockarna maintenance costs were calculated together so have been included under 'Coleraine'

		PV over 50 years (£2025, 000's)		£ change	% change
		Baseline	Enhancement		
ASSETS					
Natural Capital Benefits	Coleraine	12,487	18,214	5,727	46%
	Knocktarna	5,067	5,070	3	0%
	Jordanstown	2,150	18,304	16,153	751%
	Derry~Londonderry	13,876	14,037	161	1%
	Total	33,580	55,624	22,044	66%
Farmland rental income	Coleraine	212	0	-212	-100%
	Jordanstown	355	55	-300	-85%
Gross asset value (benefits)		34,147	55,679	21,531	63%
LIABILITIES					
Capital costs	Coleraine	0	239	239	n/a
	Knocktarna	0	1	1	n/a
	Jordanstown	0	106	106	n/a
	Derry~Londonderry	0	24	24	n/a
	Total	0	370	370	n/a
Maintenance costs	Coleraine*	7,408	7,371	-37	0%
	Knocktarna*	0	0	0	0%
	Jordanstown	1,309	1,401	93	7%
	Derry~Londonderry	4,939	4,404	-534	-11%
	Total	13,655	13,177	-478	-4%
Total liabilities (costs)		13,655	13,546	-109	-1%
TOTALS					
NET PRESENT VALUE		20,492	42,133	21,640	106%
BENEFIT-COST RATIO		2.5	4.1	n/a	64%

7. Conclusions and Next Steps

Conclusions

This report has brought together the key findings from the individual natural capital assessments of Ulster University's sites: Coleraine, Knockarna, Jordanstown, and Derry~Londonderry. Also contained within the portfolio is the University's Belfast site; owing to its extremely urban nature and lack of greenspace, a natural capital assessment was not conducted, but the site will be considered where possible in the following conclusions.

The current portfolio of sites is dominated by heavily modified habitats that provide limited ecosystem service benefits: built-up areas, amenity grassland, and agriculture. Under the proposed enhancement plan, this changes significantly, with large areas of improved and amenity grassland replaced with more natural and ecologically valuable habitats such as broadleaved woodland (which becomes the single largest habitat type across the four sites) and semi-natural grassland. These changes focus on the larger sites of Coleraine and Jordanstown, while also allowing for an increase in built-up areas at Derry~Londonderry, associated with planned new University buildings.

The headline result of these changes is a significant increase in ecosystem service provision and value across the portfolio. In particular, the conversion of the Jordanstown farmland to an accessible woodland increases the provision of all measured ecosystem services except for food production. This results in Jordanstown going from the least to the most valuable site in terms of natural capital benefits, which are estimated at £18.3 million over 50 years under the enhancement plan, an increase of £16.2 million from the baseline. There are also large increases in provision at Coleraine under the enhancement plan, with present value over 50 years increasing by £5.8 million to £18.2 million.

Another key story of the enhancement plan is the transition of the portfolio from a net source of carbon emissions (39 tCO₂/y net emissions) to a net carbon sink (772 tCO₂/y net sequestration). The biggest contributor to this change is the reduction in agricultural emissions at Coleraine, of which the majority are methane emissions from the use of an anaerobic digester. Avoiding these agricultural emissions, combined with increasing sequestration, mainly by planting new woodland here and at Jordanstown, delivers a present value of £7.5 million over 50 years.

Compiling a portfolio-wide natural capital account provides a more realistic and decision-useful evaluation of the cost-effectiveness of the combined proposed enhancement plan. While the proposed changes require some capital investment, this is minimal in comparison to the value of the benefits delivered. Furthermore, we have estimated that *the costs of maintaining the University's natural assets will in fact decrease in the enhancement plan as much of the 'enhancement' involves a reduction in management intensity.* As a result, **the net present value of the University's natural assets increases by 106% from £20.4 million to £42.1 million.** This increases the benefit-cost ratio from 2.5 to 4.1, meaning every £ spent on maintenance would deliver £4.10 in benefits. Utilising widely available sources of funding for habitat creation and maintenance, such as woodland creation grants, would decrease the capital and maintenance costs borne by the University, further increasing the benefit-cost ratio for the institution.

The clearest pattern within this report is the significant opportunities presented by the Coleraine and Jordanstown sites, and the limitations at the other sites. The potential at Knockarna is limited because ecosystem service provision is already high – owing to the high woodland cover – which highlights the importance of the site within the portfolio. The Derry~Londonderry and Belfast sites are limited by their location in urban areas, which constrains space for nature. This is particularly pertinent in Derry~Londonderry where the

University is planning further development, which makes protection of the remaining natural spaces even more important. If the University is to make progress towards its commitments to nature – as outlined in the introduction to this report – it must maximise the opportunities presented by its Coleraine and Jordanstown sites.

Next Steps

In this combined report, as well as the previous site-specific reports, we have presented comprehensive, realistic, and cost-effective enhancement plans for the University's sites that would make significant progress towards meeting its commitments to nature. These plans have been informed by ecologists as well as our own modelling of ecosystem service provision and opportunities, meaning that their implementation would provide benefits for nature and for people – both for the University and also for wider society. The next steps require the University to realise these potential benefits by developing an implementation plan, particularly focusing on which proposed measures can be undertaken and over what timeframe. Most of the habitat enhancement recommendations have the potential to be implemented immediately, provided the proposals are endorsed by the institution,

requiring only minor changes to current management and often simply reduced management intensity. Habitat creation should be phased in over a number of years according to practicality and the University's other requirements.

Funding:

As part of the decision making over the proposed habitat enhancement plans, the University will need to look in detail at rationale for endorsing, funding opportunities available and to commit resources for implementation. There are a number of funding options available to pay or contribute towards the costs of the proposals set out here. It is beyond the scope of the current project to look not these in detail, but in brief:

- Woodland creation and maintenance grants are available to help pay for the cost of woodland creation, enhancement, and maintenance.
- Some measures such as reducing the frequency of mowing and the input of fertilizers, may result in a cost saving, although it is important to bear in mind that new machinery may be required in some cases.

If required, the cost and benefits can be re-calculated based on the actual plans to be taken forward and with more details of precise costs and funding available.

Consider interactive tools to track changes:

If the University plans to make significant changes to the habitat enhancement plans, such as changing the habitats or only implementing certain priority measures, an interactive mapping tool should be considered. This is an interactive format where the user can input habitat changes, and the ecosystem services are automatically calculated. It would allow any enhancements to have their benefits immediately quantified.

Related to the above, it would be possible to set up a live natural capital accounting system to record changes to natural capital benefits as they are implemented. This would enable annual reporting, whereby changes implemented would be inputted into the system, which would recalculate the change in ecosystem services and values, to track how values changed over time. This could be used both as a natural capital reporting tool, tracking change over time, and as a tool to assess options for changes before they were implemented. An interactive spreadsheet or mapping tool such as this could be built using the approaches developed here but would require additional resources to set up.