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epa Research

# Reframe Landscape Character Assessment

Authors: Ruth Minogue, Karen Foley, Craig Bullock, Ronan Hennessy, Eilis Vaughan, Conor Norton, Pat Doherty and Laura Kearney

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Rialtas na hÉireann
Government of Ireland

# Environmental Protection Agency

The EPA is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

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**Regulation:** Implementing regulation and environmental compliance systems to deliver good environmental outcomes and target those who don't comply.

**Knowledge:** Providing high quality, targeted and timely environmental data, information and assessment to inform decision making.

**Advocacy:** Working with others to advocate for a clean, productive and well protected environment and for sustainable environmental practices.

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- Drive the implementation of best practice in regulated activities and facilities;
- Oversee local authority responsibilities for environmental protection;
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- Assess and report on public and private drinking water quality;
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## Management and Structure of the EPA

The EPA is managed by a full time Board, consisting of a Director General and five Directors. The work is carried out across five Offices:

1. Office of Environmental Sustainability
2. Office of Environmental Enforcement
3. Office of Evidence and Assessment
4. Office of Radiation Protection and Environmental Monitoring
5. Office of Communications and Corporate Services

The EPA is assisted by advisory committees who meet regularly to discuss issues of concern and provide advice to the Board.

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Lead Organisations: Minogue Environmental Consulting (MEC) Ltd, University College Dublin, Aegis Archaeology Ltd, Geoscene and Doherty Environmental Ltd and Loci Ltd.

## Identifying pressures

Landscape character assessment (LCA) is the process of describing variation in the character of the landscape and elements and identifying the features that make landscapes unique. LCA offers a means to integrate ecosystems services at scale while including character, place and cultural heritage considerations. These factors are frequently separated in assessments, resulting in a loss of opportunity for multiple benefits. The Reframe LCA project identified the absence of a coherent policy approach when it comes to LCA in Ireland. There is also a deficiency in the baseline information at national and regional scales, which makes it difficult to describe and assess landscape character and creates an inconsistent approach to landscape planning and management across scales and between authorities.

To address this challenge, Reframe LCA developed a comprehensive, step-by-step toolkit to support stakeholders, including state bodies, local authorities and community groups, in undertaking comprehensive LCAs at different scales across Ireland. The toolkit was piloted in a number of areas, including the River Shannon catchment and a smaller sub-catchment that has been subject to historical modification (e.g. drainage of wetlands, peatlands). A training module for continuing professional development that updates and refreshes the Heritage Council LCA continuing professional development course was also developed as part of the project.

## Informing policy

Landscape-scale responses are urgently needed to address national policy objectives, including those related to mitigation of and adaption to climate change, the agricultural and energy sectors, forestry and transport. These objectives interact across landscapes, and the commitments in the National Landscape Strategy 2015–2025 and the National Planning Framework require implementation and action. By looking to best practice in other countries, we can improve the implementation of LCA in Ireland. In Luxembourg for example, the Ministry of Culture has adopted an all-encompassing law that ties all strands of heritage together – archaeological, built and natural heritage, tangible and intangible – so that each can be properly accommodated and heritage capacity enhanced. Such best practice examples have been included in the toolkit and accompanying training module.

## Developing solutions

There is a need to commit to undertaking the key actions outlined in the National Landscape Strategy at national, regional and county scales. Education and awareness around landscapes and LCA are urgently required to increase capacity through all sectors. The roll-out of the LCA toolkit, support by capacity-building and training for stakeholders, would assist in bridging this gap. A consistent and holistic LCA approach at national or regional scale would provide a robust baseline to underpin the landscape considerations and assessment of key sectors that are required to address climate change and biodiversity, as well as recognise the sense of place articulated through Town Centre First policies.

**EPA RESEARCH PROGRAMME 2021–2030**

# Reframe Landscape Character Assessment

# (2021-NE-1063)

# EPA Research Report

Prepared for the Environmental Protection Agency

by

Minogue Environmental Consulting (MEC) Ltd, University College Dublin,
Aegis Archaeology Ltd, Geoscene, Doherty Environmental Ltd and Loci Ltd

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## DISCLAIMER



This report is based on research carried out/data from March 2022 to October 2023. More recent data may have become available since the research was completed.

The EPA Research Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in relation to environmental protection. These reports are intended as contributions to the necessary debate on the protection of the environment.

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# Contents

# List of Figures and Tables

## Figures



## Tables

# Executive Summary

The key objective of the Reframe Landscape Character Assessment (LCA) project is to critically review the current landscape characterisation process in Ireland and consider how it could be better adapted to contemporary spatial planning challenges. The EPA's *State of the Environment Report* (2020) identified the need for improved policy co-ordination and an overarching policy position to protect Ireland's environment into the future. Within the EPA Research 2030 call topic 2 "Protecting and Restoring our Natural Environment 2021", the following theme is identified as a specific objective: "Landscapes, catchments and ecosystems: bringing together knowledge and practice from a range of spatial scales to inform policy". Reframe LCA arose as a specific response to this call with the intention of developing a toolkit to integrate key environmental datasets into a national landscape characterisation process to support key challenges, including habitat enhancement and agri-environment schemes. Chapter 2 of this report outlines the Reframe LCA research objectives.

A multidisciplinary team was established to review international best practice with regard to landscape policy and research and the team interviewed a list of key national stakeholders in the areas of planning and landscape policy. Chapter 3 of this report sets out the research methodologies employed and the subsequent analysis of the collected material. This, following consultation with the Reframe LCA EPA steering group, led to the production of a best practice guide, *Best Practice Review and Principles for LCA Toolkit*. This document informed subsequent research around LCA approaches reflecting best practice principles. These results were subsequently tested by the research team in different geographical locations. The selected pilot case study areas represented different national landscape types in terms of agriculture, scale and anticipated forces of landscape change. Within these areas, emerging concepts related to connecting historical ecology, links with ecosystem services, the evolving use of historical geographic information systems and approaches to community consultation were trialled. A key output of the Reframe LCA project was the production of the LCA Toolkit, comprising a set of resources and a "how-to" manual – *LCA Reframe Toolkit for Undertaking Landscape Character Assessment*. This document, demonstrating methods of conducting LCAs in Ireland to exploit the best data currently available, supports LCA integration into land use planning and environmental management.

Chapter 4 of this report identifies relevant findings of the project and key recommendations are discussed in Chapter 5.

The process of researching, testing, refining and outlining a methodology for the delivery of a comprehensive LCA facilitates the reframing of landscape considerations as a key environmental component that encompasses natural and cultural ecosystem services.

# 1 Introduction

Ireland ratified the European Landscape Convention (ELC) in 2002. Nations ratifying the ELC agreed to identify their landscapes, analyse their characteristics and assess them, taking into account the values afforded to them by the population. Article 6 of the Convention requires signatories to identify the driving forces of landscape character change to inform sustainable land use strategies and policy. There is no landscape classification for Ireland that represents land cover or landscape characterisation at the national scale. A number do exist at county and regional scales. A national review was undertaken in 2009, *Landscape Character Assessment in Ireland: Update on Baseline Audit and Evaluation*, which contained eight recommendations, many of which have yet to be implemented.

Across Europe, many countries have reviewed their landscape character assessments (LCAs) in the light of enhanced digital data and the new environmental challenges and development pressures their landscapes face, including habitat and biodiversity loss, climate change and concerns about future food security.

Internationally and in Ireland, rural landscapes are under pressure to accommodate new and evolving land use demands, e.g. energy production, climate change adaptation and mitigation, rapid urbanisation and the new leisure requirements of a growing urban population. The EPA's *State of the Environment Report* (EPA, 2020) details natural capital investments for ecosystem resilience and regeneration, including the restoration of carbon-rich habitats and climate-friendly agriculture, as one of the key policy areas with the potential to create a positive economic multiplier effect, reduce carbon emissions and increase resilience.

The Irish Government's Programme for Government 2020 also states:

> Land use offers significant potential to sequester additional carbon and provide a new source of family farm income and rural economic benefit. The achievement of such improvements is not addressed in current EU policy. We shall seek to incentivise land use in the new European Green Deal and broader EU policy. We shall evaluate, before the end of 2020, whether Ireland should include wetlands in its land use inventory notified under EU regulations. Within 24 months, we will evaluate the potential for contributions towards our climate ambition from land-use improvements and set in train the development of a land-use plan, based on its findings.
>
> Department of the Taoiseach (2020)

These new and more urgent drivers of landscape change require a reconsideration of available tools. This report demonstrates methods of conducting LCAs to exploit the best available data to allow for their integration into land use planning and environmental management decision support.

# 2 Objectives

The main objective of the Reframe Landscape Character Assessment (Reframe LCA) research project is to demonstrate methods of conducting an LCA to exploit the best available data to allow for their integration into land use planning and environmental management decision support. By researching, testing, refining and delivering an LCA toolkit, the research proposes to reframe landscape considerations as key environmental components that encompass natural and cultural ecosystem services.

The specific objectives of the study at the initial stage were to:

- Research how a holistic landscape approach can inform and improve agri-environment interventions by articulating a landscape approach to ecosystem services that allows for natural and cultural heritage to plan for and monitor environmental outcomes of interventions.
- Review and develop a best practice methodology and toolkit for LCA, historical landscape characterisation (HLC) and ecosystem services. These will apply to LCAs across different scales. The research identified datasets that apply at national, regional and local scales.
- Develop scenarios to test evolving toolkits (three pilot areas at catchment, small area and coastal/ land interface).
- Complement the approach to the toolkit's development with a historical and ecological lens. The project seeks to integrate landscape time depth and chronology, historical land uses and the place-making approach in one of the pilot areas. The toolkit will be tested in one area that has been subject to significant environmental change and heavily modified.
- Strengthen stakeholder and citizen science engagement. Through the in-field piloting of the toolkits and online mapping, this objective aimed to refine the methodology for engaging with place and the landscape and for identifying past/future trends.
- Increase Ireland's capacity to characterise landscapes and expand education through pilot training with a range of professionals from different sectors, including professionals from the EPA, the Department of Agriculture, Food and the Marine and the Department of Housing, Local Government and Heritage (DHLGH), and heritage officers and local authority planners. We would seek to refresh and reactivate the Heritage Council's continuous professional development programme on LCAs as part of a resource assessment.

# 3 Methodology

The project required a number of discrete work packages and outputs. The main work packages were:

- a best practice literature review;
- interviews with key stakeholders in LCA and spatial planning;
- spatial data – analysis, review and identification of key necessary datasets;
- scenario planning – selection of pilot areas to test and refine the methodology for the LCA;
- development of LCA methodology and testing of approach in three pilot areas;
- design and delivery of pilot LCA training.

Chapter 5 of this report summarises the main findings and outputs of the research.

## 3.1 Best Practice Literature Review

The objectives of this work package were to:

- undertake a comprehensive literature review to identify the current state of knowledge regarding LCA, ecosystem services and natural capital, including agricultural land use activities;
- analyse policy and international best practice relating to LCA, ecosystem services and their application in agricultural measures, and review/identify barriers to the adoption of land management or comparable tools.

The resultant best practice report was subject to an iterative process of review by and feedback from the EPA Reframe LCA steering group, and the final report (unpublished) was structured as follows:

- Chapter 1: best practice report on LCA, HLC, integration of ecosystems services, links with natural capital and relevant case studies;
- Chapter 2: key principles for toolkit (working version) and proposed methodology;
- Chapter 3: analysis of key stages in the planning process and where an LCA is/can be applied;
- annotated bibliography and case studies (these were provided at the end of the report and key case studies of relevance were included in section 2).

At the end of each step in the literature review the research team identified key recommendations to bring forward to the next stage of the project – the development and testing of the toolkit. The Reframe LCA steering committee suggested that these key recommendations be provided in a separate appendix. This could be used as a checklist when commenting on plans and programmes under the Strategic Environmental Assessment (SEA) Directive (2001/42/EC). This has been provided in Appendix 1 of this report.

## 3.2 Best Practice Review: Summary of Key Recommendations

### *3.2.1 Data and geographic information systems recommendations*

- Scale considerations are necessary when approaching LCA at varying geographical coverages, such as regional, county, catchment or local. Data mapping and analysis of all spatial data within the assessment database should be in a common coordinate reference system. The use of the IRENET95 Irish Transverse Mercator (EPSG 2157) format, otherwise known as ITM, in accordance with open-source data available from national bodies such as Tailte Éireann, the EPA and the National Parks and Wildlife Service, and from the INSPIRE Directive (2007/2/EC), is recommended (Transport Infrastructure Ireland, 2020). Where data are available in Irish Grid TM65 (EPSG 29902) format, it is good practice to convert them to ITM.
- Use online mapping viewers/map libraries (e.g. Tailte Éireann GeoHive, Logainm historical maps, National Library collections) to access data not readily available or formatted for use on a geographic information system (GIS) platform.

### *3.2.2 Historical GISs, historical landscape characterisation and applications for landscape recommendations*

The review found that the use of GIS in LCA and HLC has increased the potential applications and spatial analysis of landscape data. Historical GISs (HGISs) can trace the long-term spatial development of certain landscape features, e.g. hedgerows, water features and built features, particularly from the 18th century onwards, using maps available from Tailte Éireann and estate maps in the context of Ireland. The potential for HLC was explored further in the toolkit and, overall, the team strongly recommended the need for the historical landscape and human influences over time to be a core stream in the LCA toolkit, written by a cultural heritage specialist.

### *3.2.3 Ecosystem services and natural capital summary and recommendations*

Ecosystem services and natural capital provide us with means to understand the functional role of ecosystems as they benefit and are valued by human beings. An appreciation of cultural ecosystem services includes socio-ecological relationships, cultural heritage and engagement with the natural world. Ecosystem service and natural capital approaches do not account overtly for built heritage and historical features, but can be combined with HLC, particularly within participatory processes. Ecosystem service and natural capital approaches can also be supplemented with LCA to identify where humans have influenced the unique character of particular landscapes through practices such as land use/agriculture.

### *3.2.4 Participation and community engagement recommendations*

Methods to understand how people interpret, name and perceive their locality present challenges in terms of validity and ethical considerations. A public participation GIS (PPGIS) approach can be extremely useful when designed and applied carefully. PPGISs can form part of the engagement approach, but should be complemented by other in-person engagement techniques.

### *3.2.5 Planning recommendations*

A review of the National Planning Framework (NPF; Department of Housing, Planning and Local Government, 2018) and policy was undertaken as part of the best practice review.[1] This identified a few key issues (discussed below), some of which are outside the scope of this research project. It was noted that, despite ratification of the ELC, there remain different views on the nature and meaning of landscape. While this is not an impediment to policy or practice, there remains a need to distinguish between landscape planning and planning for landscape as separate but related entities.

#### *Rural planning and landscape*

Rural planning is generally the larger spatial planning process within which green infrastructure (GI) and landscape planning should be integrated. This integration is uneven from place to place. Outside spatial planning, other sectors also influence the landscape, in particular the agriculture, forestry and renewable energy sectors and associated policies.

#### *Urban development, built heritage and landscape*

The importance of the urban environment for supporting biodiversity, including refuges and stepping stones for wildlife, is particularly relevant in terms of policy driving regeneration and brownfield development.

#### *LCA and planning*

The common approach to LCA has provided a useful framework for landscape planning and planning for landscape. While a hierarchy for LCA in the planning system is described, it is clear that in practice very few complete hierarchies of LCA are in place. This issue needs to be revisited along with a hierarchical approach to rural planning and GI.

The NPF (currently being updated), and the Regional Economic and Spatial Strategies all include policy objectives relating to LCA. The expert review of the NPF highlights the strategic importance of considering landscape as a key spatial planning element:

> Given that the rate of anticipated growth and development in Ireland is likely to result in

1 https://www.npf.ie (accessed 10 June 2024).

> significant change in nearly all parts of the country – both urban and rural – the Group also considered how this might affect the way we take into account landscape issues at a strategic level. Although Ireland's landscape can be seen as a significant national asset, a core consideration is the idea that nearly all our places (even the most beautiful and sensitive ones) have some capacity to accommodate change without altering their intrinsic character. Making balanced planning judgements about this requires a rounded appreciation both of landscape values (the cultural and aesthetic importance that people attach to it) and of the sensitivities to different kinds of change that can be found in different landscapes. Because this has a strong spatial component, it is a subject that the NPF review should be mindful of, particularly in terms of alignment with emerging national landscape assessments, policies, and studies.
>
> Department of Housing, Local Government and Heritage (2023)

High-level policy in landscape is represented by the National Landscape Strategy 2015–2025 (NLS; Department of Housing, Local Government and Heritage, 2020). The NLS includes actions and objectives such as recognising landscapes in law; developing a national LCA; developing landscape policies; increasing awareness of landscape; identifying education, research and training needs; and strengthening public participation. The review found that, ultimately, the impact of the NLS on higher level policy is unclear. There appear to be few references to the Landscape Policy Statement, the Objectives of the NLS and the 19 actions therein in critical recent high-level policy and guidance documents such as the NPF and *Development Plans: Guidelines for Planning Authorities* (Department of Housing, Local Government and Heritage, 2022). Moreover, the implementation of the actions in the NLS and in supporting policies such as National Policy Objective 61 remain slow.

## 3.3 Key Working Principles for the LCA Toolkit Development

Figure 3.1 presents the key principles identified in the evaluation of the best practice literature review for incorporating into the evolving LCA toolkit.

### *3.3.1. LCA toolkit development*

Following identification of best practice, two key actions took place in the development of the toolkit: workshops and interviews with key expert stakeholders

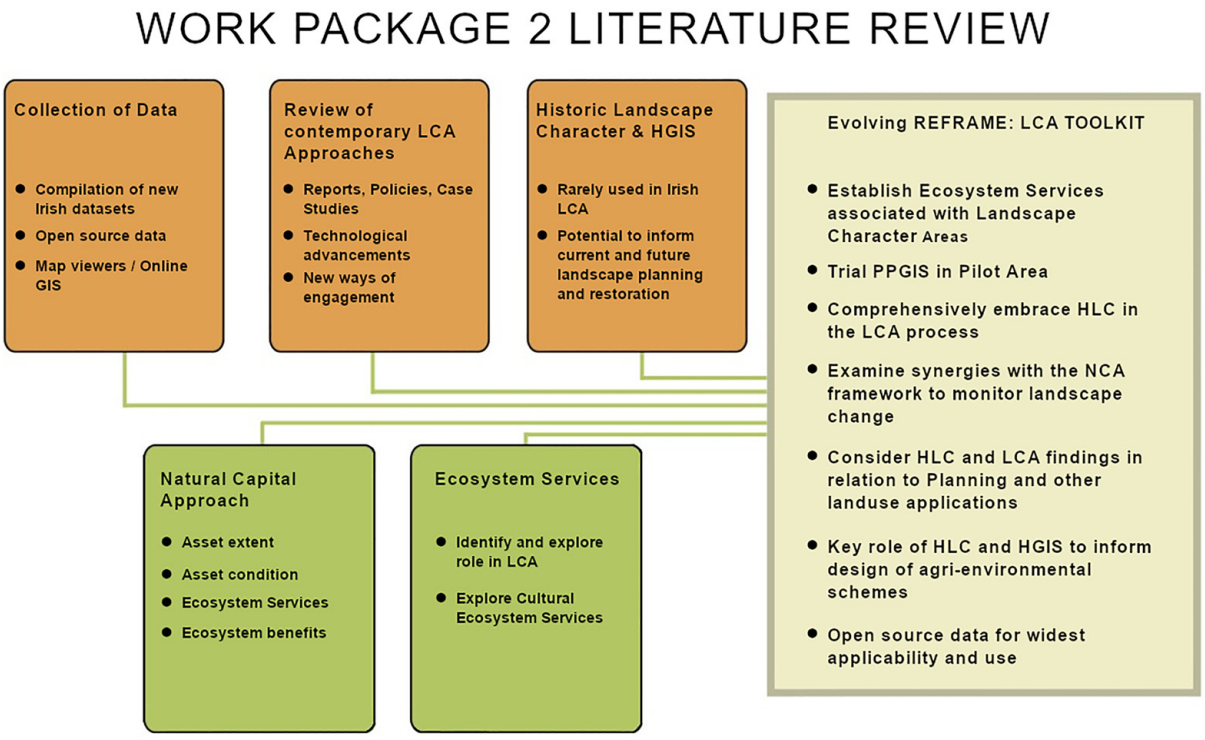


**Figure 3.1. Key working principles for LCA toolkit development.**

(i.e. individuals with extensive experience of the LCA process). Pilot areas were identified and key findings emerging from the best practice review were tested on the ground.

### *3.3.2 Stakeholder engagement and workshops held during the project*

Thematic workshops were held over the course of the project and included a workshop on spatial data (April 2022) and on the EPA Land Cover Map, and also a workshop with the steering group on scenarios for testing the toolkit and the proposed pilot areas (June 2022).

Structured interviews were conducted with local authority planners, consultants in LCA, agri-environmental scheme managers (Rathcroghan European Innovation Partnership and Hen Harrier Project) and academic researchers on the key topics identified in the best practice review. This activity assisted in understanding and identifying barriers to adapting LCA and also quality issues and inconsistencies in LCA processes and applications in Ireland.

## 3.4 Selection of Pilot Areas

The research team and the Reframe LCA steering group held an online workshop on 22 June 2022 to explore the proposed three areas that were identified for testing the LCA toolkit. Various criteria were used in the selection of these areas, including scale, geographical location, landscape type, farm type and potential or anticipated drivers of landscape change. Figures 3.2 to 3.4 show the pilot areas selected.

## 3.5 Development of a GIS to Identify Landscape Character Types

The generation of landscape character type maps from national coverage-scale data is an essential part of the LCA process. Establishing a robust, easy to conduct and repeatable methodology that can be applied across local authority boundaries is fundamental to achieving consistent results that can be used nationwide. The use of published spatial data to arrive at descriptions of landscape character types can be a first step in the identification of character types that reflect the true nature of the landscape. Subsequently,

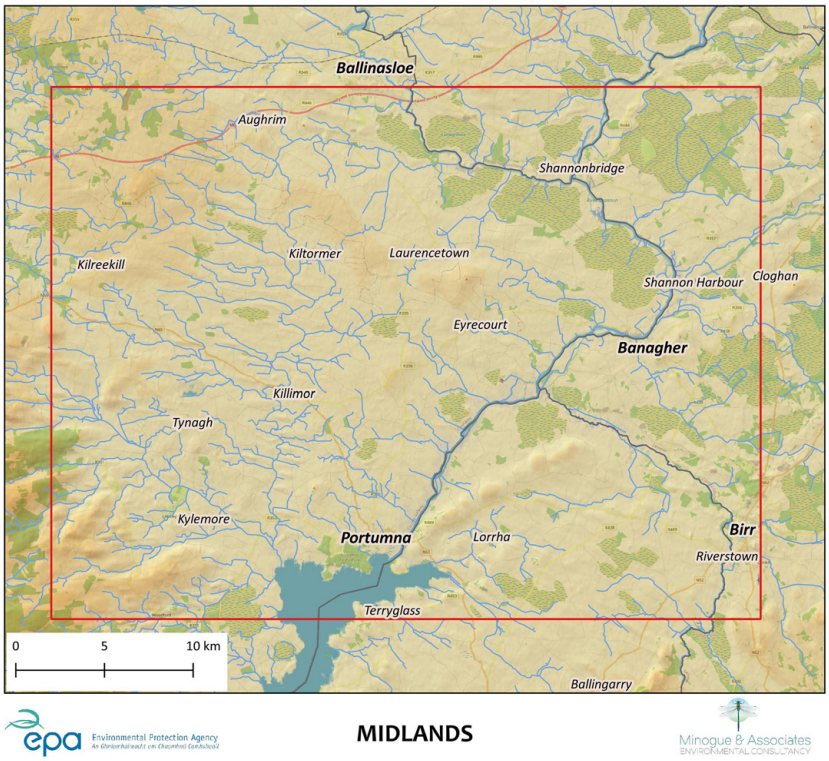


**Figure 3.2. Midlands pilot area. Reproduced under Tailte Éireann Licence No. 2019/OSi_NMA_074. © Tailte Éireann. All rights reserved. Unauthorised reproduction infringes Tailte Éireann Government of Ireland copyright.**

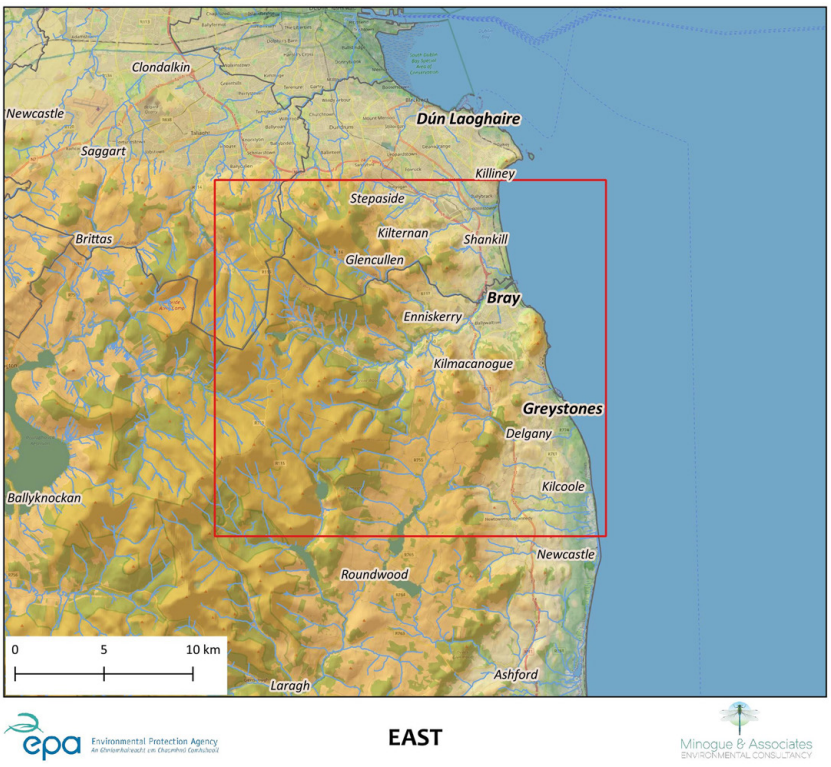


**Figure 3.3. Eastern pilot area. Reproduced under Tailte Éireann Licence No. 2019/OSi_NMA_074. © Tailte Éireann. All rights reserved. Unauthorised reproduction infringes Tailte Éireann Government of Ireland copyright.**

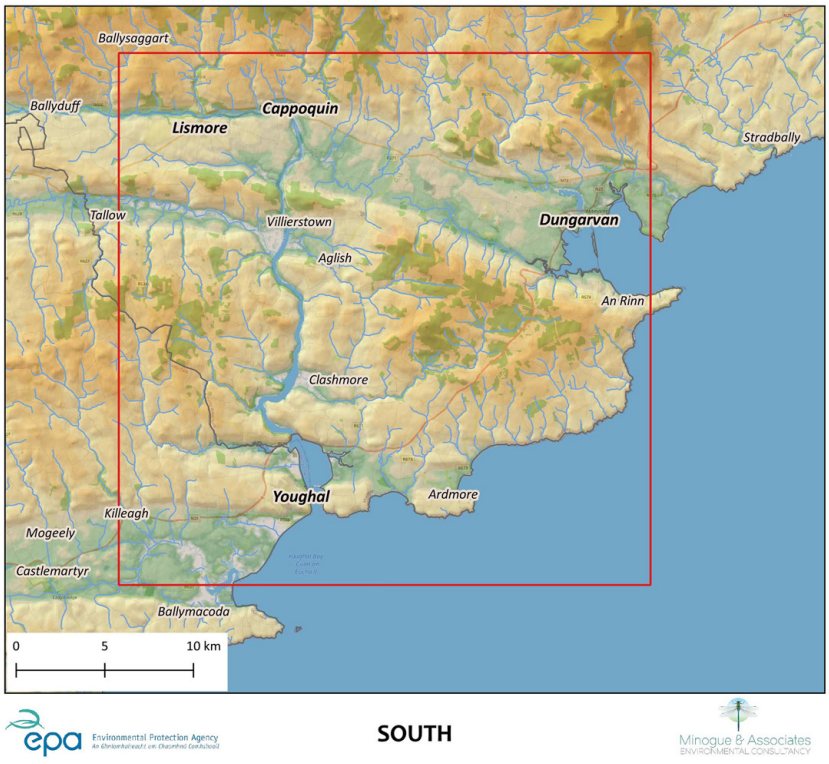


**Figure 3.4. Southern pilot area. Reproduced under Tailte Éireann Licence No. 2019/OSi_NMA_074. © Tailte Éireann. All rights reserved. Unauthorised reproduction infringes Tailte Éireann Government of Ireland copyright.**

more local or geographically specific descriptors can be assigned to character types.

A simple approach to generating landscape character type data is to use an assemblage of three landscape element variables (e.g. elevation range, bedrock geology and land cover) that occur in the cells of a grid overlay (e.g. 100 m × 100 m grid cells) covering the area under study. In the example in Table 3.1, the baseline datasets are Copernicus EU-DEM, Geological Survey Ireland Bedrock Geology 1 million scale open-source data and the National Land Cover Map. CORINE Land Cover (coarser resolution) open-source data can be used in place of the National Land Cover data.[2]

A 100 m × 100 m polygon feature grid layer can be generated for the study area. In the example in Figure 3.5, it is a 30 km × 30 km study area in County Waterford and County Cork.

Baseline data variable values (elevation range, bedrock type, land cover type) can be assigned to each 100 m × 100 m grid cell based on the input variable feature with the maximum combined area. For example, the land cover type with the maximum combined area in a cell is assigned to the 100 m × 100 m cell. Using standard geoprocessing tools ("Union", aggregate, single to multipart), the elevation range, bedrock geology and land cover grids can be combined to generate a dataset with an output landscape character type value for each grid cell that corresponds to the dominant elevation range value, dominant bedrock geology type and dominant land cover type in each cell. Polygon features with an area below a defined threshold (e.g. < 1 ha) can be eliminated and merged with adjacent landscape character types based on maximum touching boundary criteria. Figure 3.6 shows the resultant landscape character type map for the 30 km × 30 km study areas in County Waterford and County Cork.

The use of elevation categories can lead to inaccuracies in terms of physiography. For example, extensive areas of near-horizontal terrain (plateau)

**Table 3.1. Baseline data**

| Data | Number of categories | Category description |
|---|---|---|
| EU-DEM 25 m elevation (Copernicus) – resampled to 100 m | 3 | Elevation range |
| National Land Cover Level 1 (EPA) | 8 | Level 1 land cover |
| Bedrock Geology 1:1,000,000 (GSI) | 3 | Dominant rock type and age |

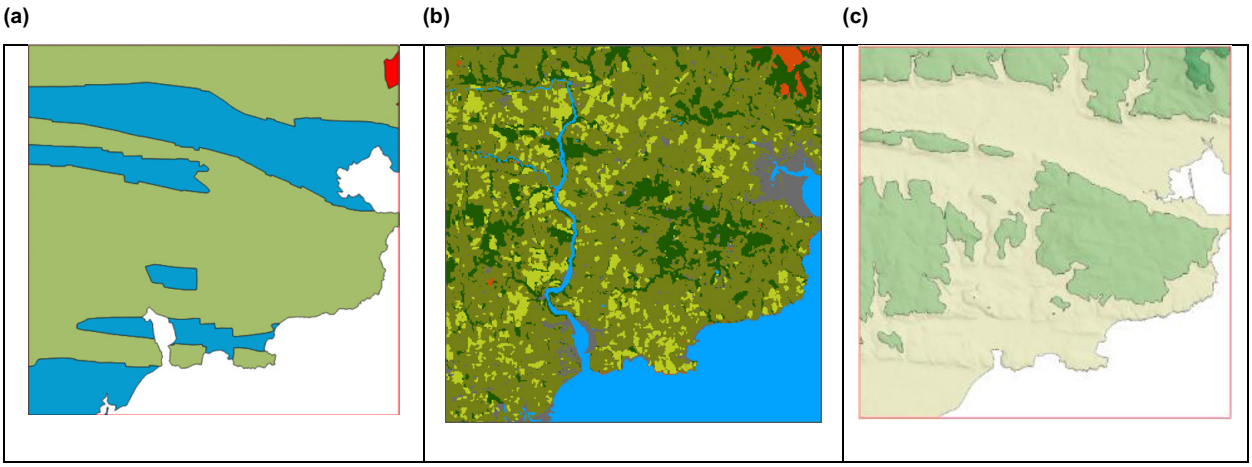


**Figure 3.5. Southern pilot area. (a) Three bedrock geology types (blue, Palaeozoic carbonate; green, Palaeozoic clastic; red, igneous/metamorphic) extracted from GSI 1,000,000 Bedrock data. (b) National Land Cover Map data resampled to 100 m × 100 m grid. (c) Three elevation range (0–100 m, 100–300 m and > 300 m) vector polygons extracted from EU-DEM data.**

2 The national landcover map will be open data from June 2024.

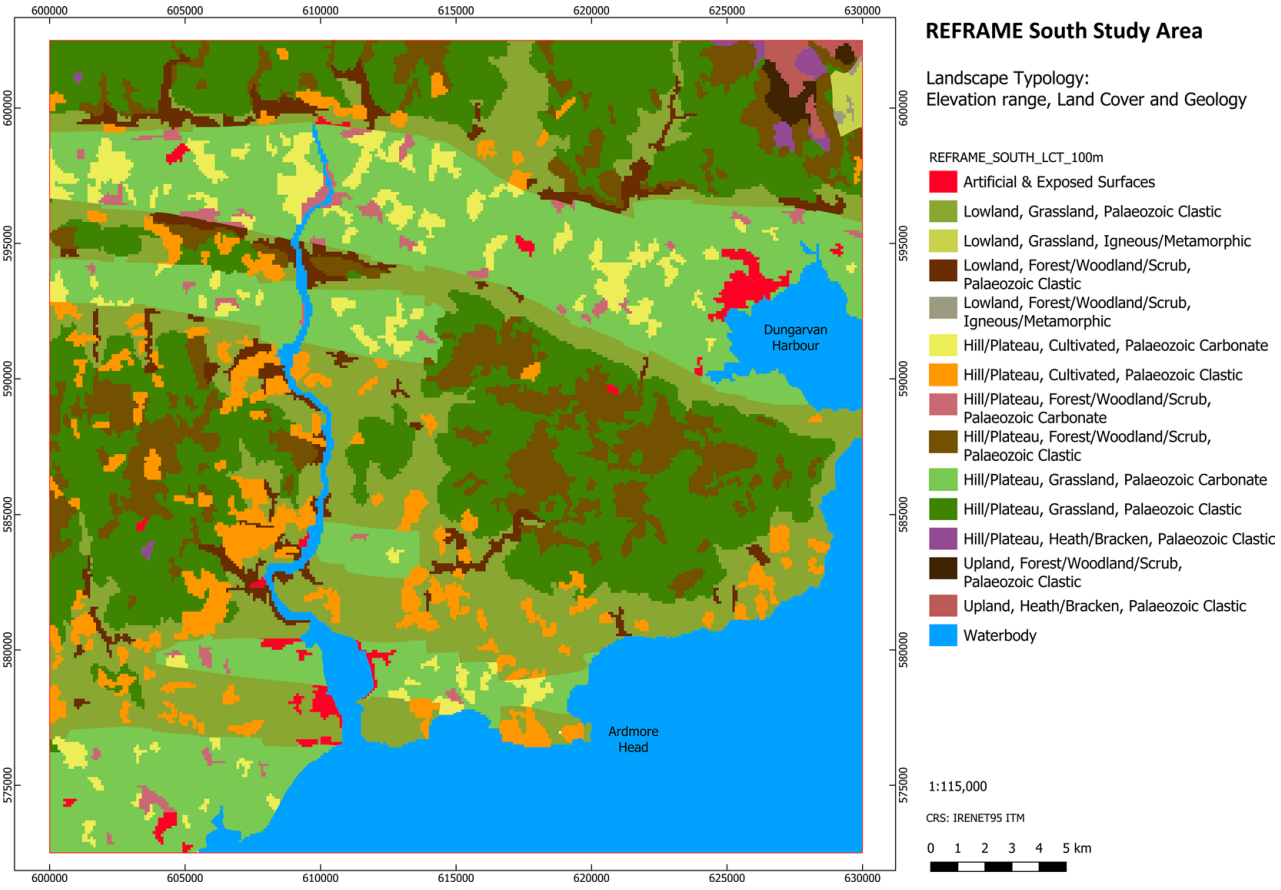


**Figure 3.6. Landscape character type map generated on a 100 m × 100 m cell grid (southern area).**

above 100 m are classed as hills, and no consideration is given to landforms such as ridges, valleys or lowland hills. The use of a physiography (landforms) dataset generated from elevation and slope may better serve to represent the geomorphometric character of landscapes. Area (hectares) statistics can be calculated using the GIS and can be used as a dataset to track change in types over time and contribute to monitoring landscape change.

## 3.6 Testing the Toolkit in the Field

As the LCA toolkit was being developed, the team tested a number of key research questions in the field to ground-truth the emerging toolkit methodologies. The following approaches were applied.

- **Midlands pilot area.** Ground-truthing the methodology of the GIS in identifying landscape character types (see preceding section). Applying HGIS and historical landscape change to explore potential interventions in areas subject to significant landscape change.
- **Eastern pilot area.** Ground-truthing the methodology of the GIS in identifying landscape character types. Evaluating how LCA may be able to inform ecosystem services.
- **Southern pilot area.** HLC alternative methodology applied. PPGIS combined with in-person participatory approaches were explored.

### *3.6.1 Production of toolkit*

The production of the LCA toolkit was the main output of the project and was subject to review by the Reframe LCA steering group. The LCA toolkit comprises four key steps in undertaking LCA and includes a series of technical appendices and annexes that provide greater detail on GIS approaches (using the Logainm site for townland research), participatory GIS approaches and sample field survey forms. The LCA toolkit was designed by graphic designers to be user-friendly and visually interesting and will be uploaded/published by the EPA.

**Figure 3.7. Pilot Reframe LCA toolkit training day: testing the toolkit in the Midlands.**

### *3.6.2 Toolkit training day*

A pilot LCA toolkit training day was held in Portlaoise on 11 September 2023. The location was selected due to its Midlands location and accessibility by public transport. Participants were self-selecting following an open invitation sent out via the EPA Reframe LCA steering group. The participants comprised local authority planners, heritage officers and representatives from government departments. The training day involved briefing participants on the main steps of the toolkit through a combination of presentations and exercises. The participants also travelled to the Rock of Dunamase and the Heath to explore local landscape character and fill out a sample LCA field survey form (Figure 3.7).

# 4 Relevant Findings

Relevant findings from different steps of this project are collated in this section. The relevant findings from the first stage, the best practice review, are identified in Figure 3.1.

## 4.1 Overview of Existing LCAs to Date in Ireland

The LCA toolkit was developed to provide a robust approach to undertaking LCA in Ireland. In terms of the quality of LCAs to date, there has been an inconsistent approach among local authorities, which have undertaken the majority of LCA work, with limited application of LCA at a regional scale. This has, in turn, presented a challenge for landscape management planning, particularly in certain sectors such as renewable energy.

- Of the LCAs undertaken to date, 11 were carried out prior to 2013 and seven were carried out before 2018. This raises the issue of whether they are fit for purpose, given the scale and extent of contemporary landscape change. Only one-third of LCAs reviewed included a historical analysis or baseline description. Participation was frequently undertaken as part of a consultation under the statutory process for county development plans, and, due to time constraints associated with development plan preparation and resourcing, this can reduce the ability to undertake more meaningful participation.
- Although significant data have been made available to local authorities under the national mapping agreement and progress has been made in open-access data, the absence of landscape-related LCA data means that monitoring landscape change is also very challenging, and this in turn affects the ability of SEA to monitor the effectiveness of policies on the landscape. The LCA toolkit provides a list of approximately 20 key datasets required to undertake an LCA.
- The inconsistency and absence of guidance has also meant a reluctance by some to engage with LCA or understand its usefulness in helping to design and respond to challenges that require a landscape-scale response.
- There is an urgent need for national or, at the very least, regional LCA for those plans and projects that are inter-county/inter-regional in scope, i.e. energy, climate action, river basin management and agricultural and forestry schemes. The research team recommends a regional LCA be undertaken given the delays with carrying out a national LCA to date; this would be consistent with the *Regional Seascape Character Assessment for Ireland 2020* (Marine Institute, 2020) and the most recent Northern Ireland LCA.

### *4.1.1 Examples of good practice in existing LCAs*

Notwithstanding the above, good practice was identified around historical analysis, participation and approach, and such exemplars informed and were integrated into the LCA toolkit process and are included in Chapter 5.

### *4.1.2 Key findings from the three pilot areas*

*Hotspot mapping and heat mapping*

Different datasets and spatial analyses were used by the team to produce biodiversity hotspot mapping in the Midlands area and cultural heritage heatmapping for the southern pilot area.

Different approaches were used as the data sources vary, but the mapping outputs offer a useful means to look strategically at these elements of the landscape. In turn, this can be used in strategic environmental assessment applications and can have other potential uses such as targeting habitat interventions. See Figures 4.1 and 4.2 for examples.

*Historical analysis is essential to understanding character*

The pilot areas, particularly the Midlands and the southern pilot area, demonstrated the importance of understanding the time depth to landscape and how past human activities have shaped and influenced the contemporary landscape. The above GIS applications,

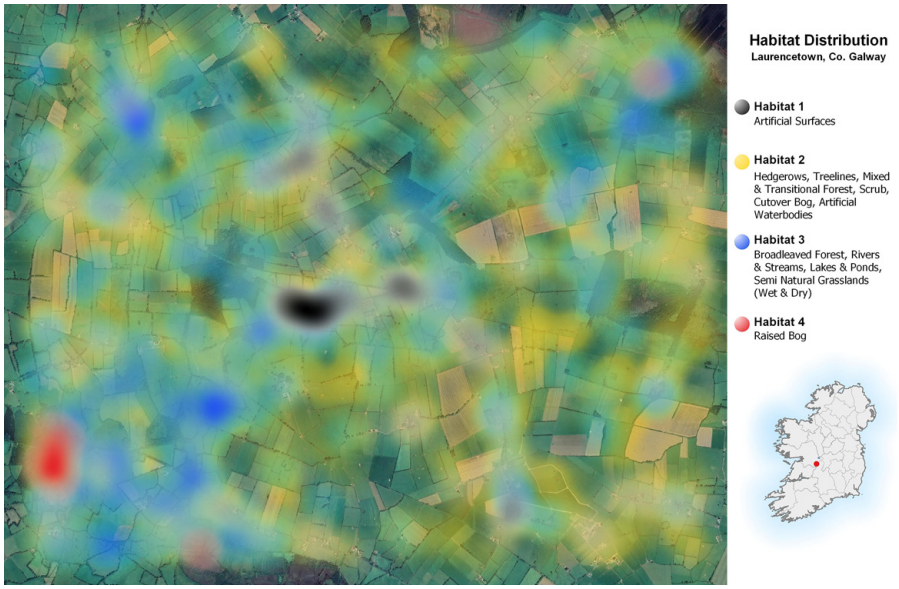


**Figure 4.1. Midlands pilot area biodiversity hotspot mapping. Reproduced under Tailte Éireann Licence No. 2019/OSi_NMA_074. © Tailte Éireann. All rights reserved. Unauthorised reproduction infringes Tailte Éireann Government of Ireland copyright.**

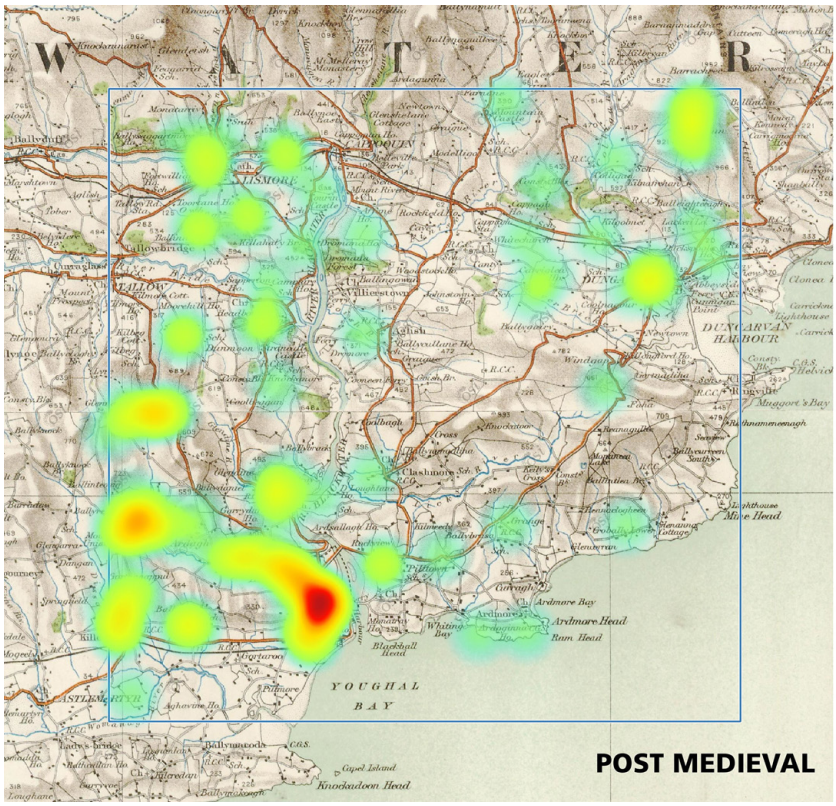


**Figure 4.2. Southern pilot area post-medieval heat mapping. Reproduced under Tailte Éireann Licence No. 2019/OSi_NMA_074. © Tailte Éireann. All rights reserved. Unauthorised reproduction infringes Tailte Éireann Government of Ireland copyright.**

combined with participation, desktop research and cultural heritage expertise, bring significant richness and depth of understanding to landscape character assessments and approaches.

*Participation and engagement*

The southern pilot area tested participatory approaches and, while the participatory GIS was a useful tool, the most engagement took place at an agricultural show with a large map. This allowed people to mark up, explain and tell the story of their landscape and particular landscape features.

*Links to ecosystem services*

The eastern pilot area explored the potential for an ecosystem services approach to be linked with LCA. In particular, the LCA approach could be used to explore and underpin the more intangible aspects of ecosystem services around cultural attributes and sense of place.

*Pilot LCA toolkit training day*

The conclusion of the pilot toolkit training day provided an opportunity for the research team to reflect on its effectiveness and receive feedback from the participants. The research team noted that it was challenging to introduce the process in a 1-day event that included a short field trip. The feedback from the participants was positive. There were some comments relating to the amount of material to be covered in a short time frame:

> Possibly expand on each of the [toolkit] topics discussed.
>
> A bit more practical intro to the field sessions before going out (though I liked the field sessions being early in the day).
>
> Expand the need for the toolkit, expand on each of the steps

There was a specific query regarding how the approach to Seascape Character Assessment fitted in with the Reframe LCA toolkit. Seascape was not part of the research brief but the methodology is broadly the same, so the two approaches are compatible.

There were several specific comments from participants anticipating how the toolkit might be implemented:

> Look[ing] forward to seeing the final toolkit [and] seeing the methodology rolled out on a national and local scale.
>
> Ideally roll [the toolkit] out to local authority/ regional authority to pilot: ask DHLGH to place on a statutory basis.

# 5 Recommendations

## 5.1 Introduction

### *5.1.1 Planning and LCA*

The landscape-related commitments of the NPF, regional spatial economic strategies and the NLS need to be delivered on and implemented. The review of the NPF is an opportunity to meaningfully commit to LCA at scale to address the numerous challenges and vacuum of LCA baseline descriptions at national and regional levels in particular.

The LCA approach will help address the urgent need for landscape monitoring by providing a robust evidence base and data to monitor and plan landscape change.

The heat mapping and hotspot mapping piloted in the southern and Midlands areas offer means to highlight at landscape scale key cultural and biodiversity resources. This has great potential to inform strategic planning.

### *5.1.2 Spatial data and GISs*

All LCA and landscape character type GIS data that are produced should use a common schema and be shared as open-source data on a public data repository (e.g. https://data.gov.ie). Sharing open-source GIS data will aid and encourage inter-county and cross-community co-operation. The project recommends that all local authorities and government bodies make data available via a portal, similarly to Galway and Fingal County Councils (e.g. https://data.fingal.ie/).

### *5.1.3 LCA and green and blue infrastructure*

More guidance is needed on how landscape planning and green/blue infrastructure as distinct disciplines, policies and practices can be successfully incorporated into rural planning and spatial planning more generally. Green and blue infrastructure-associated maps/plans should include provisions for review to remain relevant to informing future decision-making across many sectors. It is important to note that GI is an evolving policy and practice area in which alignment with larger objectives, such as climate action objectives, remains a priority. Similarly, the integration of GI policy and practice with landscape planning and the integration of LCA with GI policy remains to be properly explored and resolved. This should be supported by monitoring to determine how effectively GI policy is being implemented.

### *5.1.4 LCA and LCA toolkit*

The toolkit for undertaking LCA represents an established, robust methodology to identify and describe the landscape character of a place. National LCA mapping would go a long way to standardising the methodology, allowing for more finely grained regional and local approaches. In the absence of a national LCA, the scale of the regional authorities are ideal for this type of umbrella assessment. All three have, through their Regional Spatial and Economic Strategies, identified the need to undertake a regional landscape character map as a regional policy objective. There is a need to prepare regional LCAs that can provide the necessary hierarchy of LCA baseline descriptions that can then be applied at county and local levels. This would align with the Northern Ireland regional LCA and also the Regional Seascape Character Assessment.

Support is needed to communicate the LCA toolkit to a wider audience and increase capacity across sectors (public, private and community) to understand LCA and to be able to undertake and understand LCA as a way of addressing the gap in data and baseline descriptions of landscape that is identified in the research project. This could be done by online and in-person training events and by developing in-house capacity through professional institutes. See feedback from the pilot LCA toolkit training day in section 4.1.2.

The LCA toolkit in particular highlights the need to consider, describe and assess cultural heritage (both tangible and intangible), and to meaningfully engage with people about their place.

#### *5.1.5 Historical GIS and historical landscape analysis*

The potential for LCA and historical LCA to help guide and inform landscape interventions to improve climate change resilience (through habitat creation or linking of corridors) and facilitate a strategic approach to key energy challenges (through cultural heritage or biodiversity hotspot mapping used in the LCA toolkit) is significant.

HGIS analysis can assist in understanding historical to contemporary landscape change. This can help with the identification of locations that may be suitable for restoration through agri-environmental and other spatial planning measures. This historical analysis also offers insight into and potential solutions to contemporary environmental problems.

International research has focused on the role of habitats, including wetlands such as rivers, bogs and ponds, in the agricultural landscape. Extant wetlands are also subject to a range of pressures from diffuse and source pollution. Meanwhile, their role and function as an adaptative measure for climate change, in particular surface water management, water storage, purification and groundwater recharge, are recognised. Local conditions influence the ecological success of constructed ponds, and effects can be positive or, where they fundamentally alter hydrological functions, can be negative for species and water quality.

#### *5.1.6 Participation and engagement*

Well-designed and planned stakeholder mapping and approaches to consultation and participation are essential to appropriately inform the LCA process, in particular for identifying local landscape character. Examples of good practice can be found in case studies in the best practice review and commonly involve a mix of participatory approaches, from workshops to participatory GIS.

#### *5.1.7 Strategic environmental assessment and landscape*

By providing a robust baseline for landscape character through an LCA methodology, the landscape topic in the SEA Directive could be integrated and addressed more completely through the SEA process. The research identified cultural heritage hotspot mapping as a useful tool when considering recorded cultural heritage features for larger scale sectoral planning that would be captured through the SEA process.

Finally, the above recommendations would contribute in a meaningful way to integrating Ireland's commitments under the ELC with the NLS.

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# Appendix 1 LCA Recommendations Checklist/Key Points

- Scale considerations are necessary when approaching LCA at varying geographical coverages, such as regional, county, catchment or local. The choice of baseline data is important; for example, small-scale bedrock data (1:500,000) might not be best suited to assessments at a large scale (1:50,000). Local authorities usually have a GIS officer who is responsible for requesting the data and making them accessible within the local authority via their own intranet or GIS software. There are large numbers of data, so this may require local authorities to consider how this can be accommodated in their existing and potential future information technology infrastructure resourcing.
- Data mapping and analysis of all spatial data within the assessment database should be in a common coordinate reference system. The use of the IRENET95 Irish Transverse Mercator (EPSG 2157) format, otherwise known as ITM, in accordance with open-source data available from national bodies such as Tailte Éireann, the EPA and the National Parks and Wildlife Service, and from the INSPIRE Directive, is recommended (Transport Infrastructure Ireland, 2020). Where data are available in Irish Grid TM65 (EPSG 29902), it is good practice to convert them to ITM.
- Use online mapping viewers/map libraries (e.g. Tailte Éireann GeoHive, Logainm historical maps, National Library collections) to access data not readily available or formatted for use on a GIS platform.
- Historical analysis of the landscape is strongly recommended. HGISs can trace the long-term spatial development of certain landscape features (e.g. hedgerows, water features and built features) particularly from the 18th century onwards using maps available from Tailte Éireann and estate maps in the context of Ireland.
- Historical landscape and human influences over time should be a core stream in LCA, written by a cultural heritage specialist.
- Ecosystem service and natural capital approaches do not account overtly for built heritage and historical features but can be combined with HLC, particularly within participatory processes. Ecosystem service and natural capital approaches can also be supplemented with LCA to identify where humans have influenced the unique character of particular landscapes through practices such as land use/agriculture.

Methods to examine how people understand, name and perceive their locality present challenges in terms of validity and ethical considerations. A PPGIS approach can be extremely useful, when designed and applied carefully. PPGISs can form part of the engagement approach but should be complemented by other in-person engagement techniques.

**Urban development, built heritage and landscape.** The importance of the urban environment for biodiversity, including refuges and stepping stones for wildlife, is particularly relevant in terms of policy driving regeneration and brownfield development. One example is the infill or backlands of many 18th and 19th century market towns that have become locally important areas of wildlife, with mature trees, older buildings and scrub vegetation.

# Abbreviations

| | |
|---|---|
| **ELC** | European Landscape Convention |
| **GI** | Green infrastructure |
| **GIS** | Geographic information system |
| **HGIS** | Historical geographic information system |
| **HLC** | Historical landscape characterisation |
| **LCA** | Landscape character assessment |
| **NLS** | National Landscape Strategy |
| **NPF** | National Planning Framework |
| **PPGIS** | Public participation GIS |
| **SEA** | Strategic environmental assessment |

# An Ghníomhaireacht Um Chaomhnú Comhshaoil

Tá an GCC freagrach as an gcomhshaol a chosaint agus a fheabhsú, mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaol a chosaint ar thionchar díobhálach na radaíochta agus an truaillithe.

## Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

**Rialáil:** Rialáil agus córais chomhlíonta comhshaoil éifeachtacha a chur i bhfeidhm, chun dea-thorthaí comhshaoil a bhaint amach agus díriú orthu siúd nach mbíonn ag cloí leo.

**Eolas:** Sonraí, eolas agus measúnú ardchaighdeáin, spriocdhírithe agus tráthúil a chur ar fáil i leith an chomhshaoil chun bonn eolais a chur faoin gcinnteoireacht.

**Abhcóideacht:** Ag obair le daoine eile ar son timpeallachta glaine, táirgiúla agus dea-chosanta agus ar son cleachtas inbhuanaithe i dtaobh an chomhshaoil.

## I measc ár gcuid freagrachtaí tá:

### Ceadúnú

- Gníomhaíochtaí tionscail, dramhaíola agus stórála peitril ar scála mór;
- Sceitheadh fuíolluisce uirbigh;
- Úsáid shrianta agus scaoileadh rialaithe Orgánach Géinmhodhnaithe;
- Foinsí radaíochta ianúcháin;
- Astaíochtaí gás ceaptha teasa ó thionscal agus ón eitlíocht trí Scéim an AE um Thrádáil Astaíochtaí.

### Forfheidhmiú Náisiúnta i leith Cúrsaí Comhshaoil

- Iniúchadh agus cigireacht ar shaoráidí a bhfuil ceadúnas acu ón GCC;
- Cur i bhfeidhm an dea-chleachtais a stiúradh i ngníomhaíochtaí agus i saoráidí rialáilte;
- Maoirseacht a dhéanamh ar fhreagrachtaí an údaráis áitiúil as cosaint an chomhshaoil;
- Caighdeán an uisce óil phoiblí a rialáil agus údaruithe um sceitheadh fuíolluisce uirbigh a fhorfheidhmiú
- Caighdeán an uisce óil phoiblí agus phríobháidigh a mheasúnú agus tuairisciú air;
- Comhordú a dhéanamh ar líonra d'eagraíochtaí seirbhíse poiblí chun tacú le gníomhú i gcoinne coireachta comhshaoil;
- An dlí a chur orthu siúd a bhriseann dlí an chomhshaoil agus a dhéanann dochar don chomhshaol.

### Bainistíocht Dramhaíola agus Ceimiceáin sa Chomhshaol

- Rialacháin dramhaíola a chur i bhfeidhm agus a fhorfheidhmiú lena n-áirítear saincheisteanna forfheidhmithe náisiúnta;
- Staitisticí dramhaíola náisiúnta a ullmhú agus a fhoilsiú chomh maith leis an bPlean Náisiúnta um Bainistíocht Dramhaíola Guaisí;
- An Clár Náisiúnta um Chosc Dramhaíola a fhorbairt agus a chur i bhfeidhm;
- Reachtaíocht ar rialú ceimiceán sa timpeallacht a chur i bhfeidhm agus tuairisciú ar an reachtaíocht sin.

### Bainistíocht Uisce

- Plé le struchtúir náisiúnta agus réigiúnacha rialachais agus oibriúcháin chun an Chreat-treoir Uisce a chur i bhfeidhm;
- Monatóireacht, measúnú agus tuairisciú a dhéanamh ar chaighdeán aibhneacha, lochanna, uiscí idirchreasa agus cósta, uiscí snámha agus screamhuisce chomh maith le tomhas ar leibhéil uisce agus sreabhadh abhann.

### Eolaíocht Aeráide & Athrú Aeráide

- Fardail agus réamh-mheastacháin a fhoilsiú um astaíochtaí gás ceaptha teasa na hÉireann;
- Rúnaíocht a chur ar fáil don Chomhairle Chomhairleach ar Athrú Aeráide agus tacaíocht a thabhairt don Idirphlé Náisiúnta ar Ghníomhú ar son na hAeráide;
- Tacú le gníomhaíochtaí forbartha Náisiúnta, AE agus NA um Eolaíocht agus Beartas Aeráide.

### Monatóireacht & Measúnú ar an gComhshaol

- Córais náisiúnta um monatóireacht an chomhshaoil a cheapadh agus a chur i bhfeidhm: teicneolaíocht, bainistíocht sonraí, anailís agus réamhaisnéisiú;
- Tuairiscí ar Staid Thimpeallacht na hÉireann agus ar Tháscairí a chur ar fáil;
- Monatóireacht a dhéanamh ar chaighdeán an aeir agus Treoir an AE i leith Aeir Ghlain don Eoraip a chur i bhfeidhm chomh maith leis an gCoinbhinsiún ar Aerthruailliú Fadraoin Trasteorann, agus an Treoir i leith na Teorann Náisiúnta Astaíochtaí;
- Maoirseacht a dhéanamh ar chur i bhfeidhm na Treorach i leith Torainn Timpeallachta;
- Measúnú a dhéanamh ar thionchar pleananna agus clár beartaithe ar chomhshaol na hÉireann.

### Taighde agus Forbairt Comhshaoil

- Comhordú a dhéanamh ar ghníomhaíochtaí taighde comhshaoil agus iad a mhaoiniú chun brú a aithint, bonn eolais a chur faoin mbeartas agus réitigh a chur ar fáil;
- Comhoibriú le gníomhaíocht náisiúnta agus AE um thaighde comhshaoil.

### Cosaint Raideolaíoch

- Monatóireacht a dhéanamh ar leibhéil radaíochta agus nochtadh an phobail do radaíocht ianúcháin agus do réimsí leictreamaighnéadacha a mheas;
- Cabhrú le pleananna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taismí núicléacha;
- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteacht raideolaíochta;
- Sainseirbhísí um chosaint ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

### Treoir, Ardú Feasachta agus Faisnéis Inrochtana

- Tuairisciú, comhairle agus treoir neamhspleách, fianaise-bhunaithe a chur ar fáil don Rialtas, don tionscal agus don phobal ar ábhair maidir le cosaint comhshaoil agus raideolaíoch;
- An nasc idir sláinte agus folláine, an geilleagar agus timpeallacht ghlan a chur chun cinn;
- Feasacht comhshaoil a chur chun cinn lena n-áirítear tacú le hiompraíocht um éifeachtúlacht acmhainní agus aistriú aeráide;
- Tástáil radóin a chur chun cinn i dtithe agus in ionaid oibre agus feabhsúchán a mholadh áit is gá.

### Comhpháirtíocht agus Líonrú

- Oibriú le gníomhaireachtaí idirnáisiúnta agus náisiúnta, údaráis réigiúnacha agus áitiúla, eagraíochtaí neamhrialtais, comhlachtaí ionadaíocha agus ranna rialtais chun cosaint chomhshaoil agus raideolaíoch a chur ar fáil, chomh maith le taighde, comhordú agus cinnteoireacht bunaithe ar an eolaíocht.

## Bainistíocht agus struchtúr na Gníomhaireachta um Chaomhnú Comhshaoil

Tá an GCC á bainistiú ag Bord lánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóir. Déantar an obair ar fud cúig cinn d'Oifigí:

1. An Oifig um Inbhunaitheacht i leith Cúrsaí Comhshaoil
2. An Oifig Forfheidhmithe i leith Cúrsaí Comhshaoil
3. An Oifig um Fhianaise agus Measúnú
4. An Oifig um Chosaint ar Radaíocht agus Monatóireacht Comhshaoil
5. An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tugann coistí comhairleacha cabhair don Ghníomhaireacht agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair imní agus le comhairle a chur ar an mBord.

# Environmental Protection Agency

The EPA is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

## The work of the EPA can be divided into three main areas:

**Regulation:** Implementing regulation and environmental compliance systems to deliver good environmental outcomes and target those who don't comply.

**Knowledge:** Providing high quality, targeted and timely environmental data, information and assessment to inform decision making.

**Advocacy:** Working with others to advocate for a clean, productive and well protected environment and for sustainable environmental practices.

## Our Responsibilities Include:

### Licensing

- Large-scale industrial, waste and petrol storage activities;
- Urban waste water discharges;
- The contained use and controlled release of Genetically Modified Organisms;
- Sources of ionising radiation;
- Greenhouse gas emissions from industry and aviation through the EU Emissions Trading Scheme.

### National Environmental Enforcement

- Audit and inspection of EPA licensed facilities;
- Drive the implementation of best practice in regulated activities and facilities;
- Oversee local authority responsibilities for environmental protection;
- Regulate the quality of public drinking water and enforce urban waste water discharge authorisations;
- Assess and report on public and private drinking water quality;
- Coordinate a network of public service organisations to support action against environmental crime;
- Prosecute those who flout environmental law and damage the environment.

### Waste Management and Chemicals in the Environment

- Implement and enforce waste regulations including national enforcement issues;
- Prepare and publish national waste statistics and the National Hazardous Waste Management Plan;
- Develop and implement the National Waste Prevention Programme;
- Implement and report on legislation on the control of chemicals in the environment.

### Water Management

- Engage with national and regional governance and operational structures to implement the Water Framework Directive;
- Monitor, assess and report on the quality of rivers, lakes, transitional and coastal waters, bathing waters and groundwaters, and measurement of water levels and river flows.

### Climate Science & Climate Change

- Publish Ireland's greenhouse gas emission inventories and projections;
- Provide the Secretariat to the Climate Change Advisory Council and support to the National Dialogue on Climate Action;
- Support National, EU and UN Climate Science and Policy development activities.

### Environmental Monitoring & Assessment

- Design and implement national environmental monitoring systems: technology, data management, analysis and forecasting;
- Produce the State of Ireland's Environment and Indicator Reports;
- Monitor air quality and implement the EU Clean Air for Europe Directive, the Convention on Long Range Transboundary Air Pollution, and the National Emissions Ceiling Directive;
- Oversee the implementation of the Environmental Noise Directive;
- Assess the impact of proposed plans and programmes on the Irish environment.

### Environmental Research and Development

- Coordinate and fund national environmental research activity to identify pressures, inform policy and provide solutions;
- Collaborate with national and EU environmental research activity.

### Radiological Protection

- Monitoring radiation levels and assess public exposure to ionising radiation and electromagnetic fields;
- Assist in developing national plans for emergencies arising from nuclear accidents;
- Monitor developments abroad relating to nuclear installations and radiological safety;
- Provide, or oversee the provision of, specialist radiation protection services.

### Guidance, Awareness Raising, and Accessible Information

- Provide independent evidence-based reporting, advice and guidance to Government, industry and the public on environmental and radiological protection topics;
- Promote the link between health and wellbeing, the economy and a clean environment;
- Promote environmental awareness including supporting behaviours for resource efficiency and climate transition;
- Promote radon testing in homes and workplaces and encourage remediation where necessary.

### Partnership and Networking

- Work with international and national agencies, regional and local authorities, non-governmental organisations, representative bodies and government departments to deliver environmental and radiological protection, research coordination and science-based decision making.

## Management and Structure of the EPA

The EPA is managed by a full time Board, consisting of a Director General and five Directors. The work is carried out across five Offices:

1. Office of Environmental Sustainability
2. Office of Environmental Enforcement
3. Office of Evidence and Assessment
4. Office of Radiation Protection and Environmental Monitoring
5. Office of Communications and Corporate Services

The EPA is assisted by advisory committees who meet regularly to discuss issues of concern and provide advice to the Board.