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GRETA - “GReen infrastructure: Enhancing biodiversity and ecosysTem services for territoriAl development”

Applied Research

Dún Laoghaire-Rathdown Ireland

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Abbreviations

EC	European Commission
ES	Ecosystem Services
ESPON	European Territorial Observatory Network
EU	European Union
GI	Green Infrastructure
LAU	Local Administrative Unit
NUTS	Nomenclature of Territorial Units for Statistics

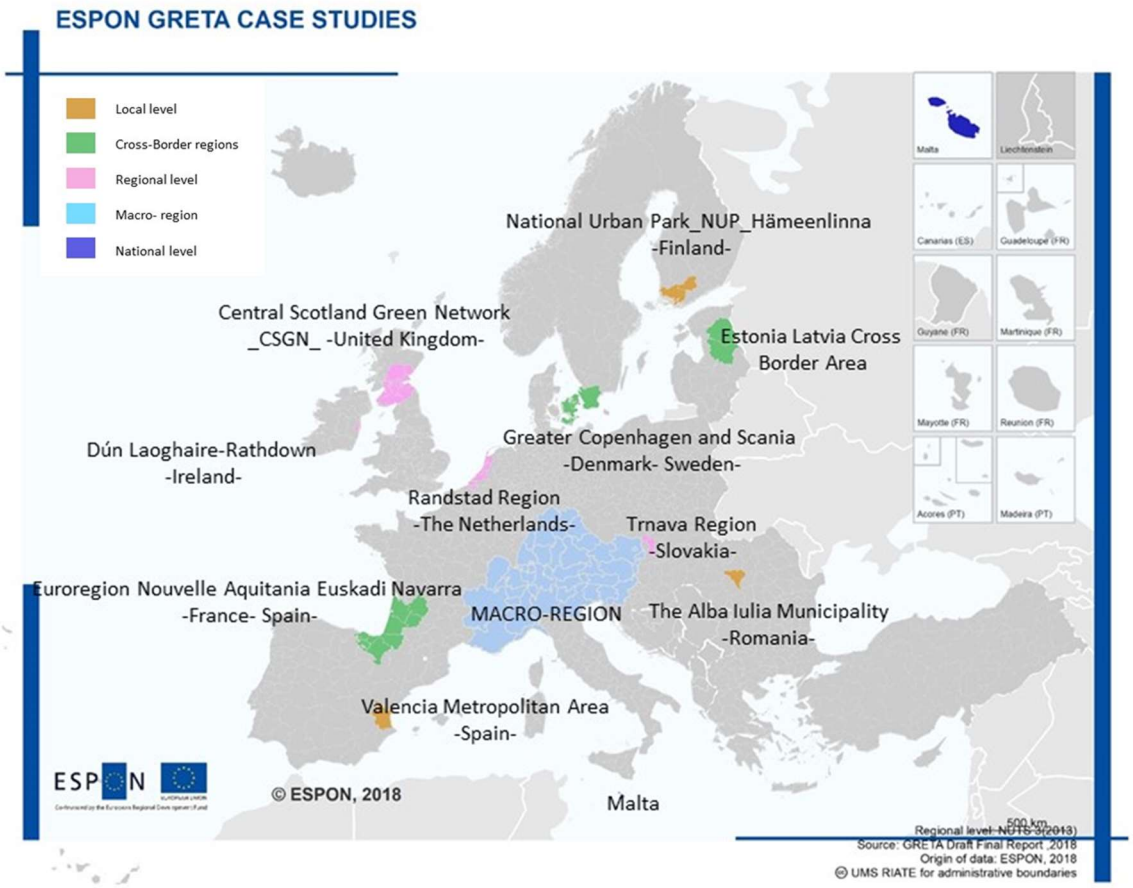
1 Introduction

GRETA investigated 12 case studies that represented different spatial, institutional and governance settings and that ranged from urban centres to rural countryside. The case studies served to:

i. gain knowledge on implementation factors, drivers and constraints in different planning systems and territorial realities;

ii. gain insights on the use and applicability of economic methods in decision making; and

iii. gather knowledge for policy and practice as input and inspiration for the policy recommendations.



Map 1 ESPON GRETA selected case studies

Method

The activities undertaken at the case study level incorporated a combination of desk-based analysis alongside online questionnaires and pre-structured interviews to key actors in each of the case study areas, including: (i) decision and policy making representatives; and (ii) those involved in designing, planning, implementing and managing green infrastructure (GI).

A series of three consultations were developed to gather relevant information from case studies

on different aspects of GI spatial analysis, policies, planning and implementation. The consultation process was seen as a combined approach of an online survey and or a telephone interview (which used the survey questions as the basis) with stakeholders to facilitate getting good engagement and to address any clarifications needed.

Consultation A – Economic Valuation

The questionnaire included 20 questions structured in 2 main parts. The first part aimed at understanding the current use and awareness of valuation methods by respondents while the second part aimed at identifying their perceived barriers and interest of using such methods. We used a mix of open-ended and closed-ended questions to combine comparable results as well as qualitative material; respondents also had the possibility to comment on their responses. Analysis of Consultation A is described in Annex III-C.

Access to Consultation A

https://survey.tecnalia.com/limesurvey/index.php/214247?lang=en

Consultation B – Characterising green infrastructure and ecosystem services characterisation

The objective of this consultation was to identify good practice guidelines, opportunities and challenges that could be useful for a variety of regions and cities. Responses to Consultation B were used to assess the usefulness of the GRETA methodology, a methodology specifically developed to delineate and map the main green infrastructure (GI) elements and their multifunctionality, as well as identifying their capacity to support three main policy domains: Biodiversity, Climate Change and Disaster Risk Reduction, and Water Management. Questions in Consultation B were designed to help us gain further insight into the enabling factors that exist in different regions and cities. We also sought to gather information on the challenges and barriers that may compromise the implementation of GI. The final set of questions focused on identifying the general benefits and potential synergies and trade-offs associated with GI projects.

The maps produced for Consultation B in the GRETA project were intended to provide a starting point for discussion about the applicability of the GRETA methodology from European to local application. As such they did not aim to be a substitute for the maps or other planning material that already exist at local case study level nor were they aiming to characterize the GI on regional or local level. They were not developed to be used as an output from case study levels.

The landscape elements in the maps are produced based on standardized European data sets with a minimum mapping unit of 25ha (i.e. CORINE Land Cover 2012) – smaller geographical features are not depicted. The Consultation B aimed at finding the gaps between datasets produced at the European level and any other data sets produced at regional and local scales.

Access to Consultation B

https://survey.tecnalia.com/limesurvey/index.php/614564?lang=en

Consultation C - Analysis of governance, policy and financial frameworks

The successful implementation of green infrastructure (GI) projects requires a combination of governance structures, integrated policies and financial support. This consultation therefore aimed to investigate the governance systems in place in each case study area in order to determine how policies and policy makers enable the implementation of GI projects in the case study areas.

Responses to Consultation C aimed to help us identify: (i) how much funding (money and personnel) is currently used for GI in the case study regions; (ii) if this funding is sufficient for implementing and maintaining GI; and (iii) the main sources of funding (public tax-based funds, private investments, NGOs or others). Consultation C also examined whether policies compliment or conflict with GI and assesses policy makers' knowledge needs for making full use of GI development potential.

Access to Consultation C

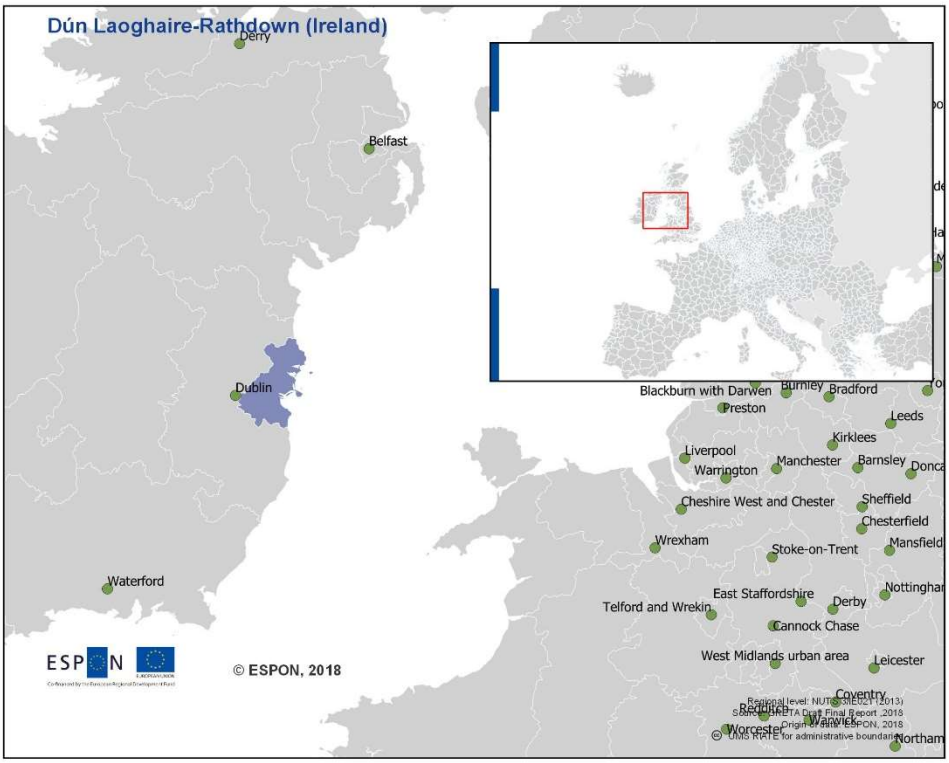
https://survey.tecnalia.com/limesurvey/index.php/129674?lang=en

The content in this report is based on a mixed-method approach. The results presented are interpretations of semi-structured interviews, responses to a questionnaire on national policy and planning, responses to three consultations (Consultation A, B and C) via email, document analysis of plans and strategies (via desk-based analysis), and statistics.and spatial analysis using GIS resulting from the GRETA project. For all case studies, telephone conversations (and for some cases face-to-face meetings i.e. Copenhagen and Scania, Alpine region, Euroregion Aquitania- Euskadi-Navarra) allowed the completion of the consultations B and C.

The respondents who have contributed to this case study are people working in the public administration in Dún Laoghaire-Rathdown.

2 (Geographic) description of Dún Laoghaire-Rathdown

This section provides a general overview to the case study followed by a descriptive assessment of any specific challenges facing the area.



Map 2. Dún Laoghaire Rathdown

2.1 Case study general overview

Table 1 provides a general overview for the case study area focusing on geographical features, deomographic and soci-economoic characteristics. Dún Laoghaire-Rathdown is located just south of Dublin City on the east coast of Ireland. Its population is largely of working age i.e. 18-65 years old) and it has one of the lowest unemployment rates of all administrative counties within the country[1] .

Table 1 General overview for Dún Laoghaire-Rathdown case study

Region/Area (French: Nomenclature des unités territoriales statistiques (NUTS) Classification of Territorial Units for Statistics).	Country: Ireland County within NUTS 3 (IE021)

[1] https://www.cso.ie/en/media/csoie/newsevents/documents/census2016summaryresultspart2/Census_2016_Summary_Results_%E2%80%93_Part_2.pdf

<table>
<tr><td colspan="2">Geographical features
Case study Area in km²
Bioclimatic region</td><td colspan="3">Area: 126 km² (17 km of coastline)

Urban adjacent, expansive agricultural land meets suburban edge and upland areas, also includes coastal areas. Includes a mix of forestry and woodland habitats, with 7 main rivers.

Approx. 930 hectares of publicly-managed public open spaces (parks, green spaces, cemeteries, sports grounds)

Temperate</td></tr>
<tr><td colspan="2">Demographic figures</td><td colspan="3">Socio-economic characteristics</td></tr>
<tr><td>Total population in the case study area[a]

Male

Female

0-19 yrs
20 -39 yrs
40 – 59 yrs
60 -79 yrs
80 + yrs</td><td>218,018

104,584

113,434

54,229
61,908
56,125
36,413
93,43</td><td>Unemployment by sex and age - annual average[1]</td><td colspan="2"><table><tr><td>Unemployment</td><td>Total country (reference year)</td><td>Case study</td></tr><tr><td>All</td><td>12.9% (2016)</td><td>7.4% (2016)</td></tr><tr><td>Males</td><td>13.7 %</td><td>%</td></tr><tr><td>Females</td><td>12 %</td><td>%</td></tr><tr><td>20-24</td><td>21.8 %</td><td>%</td></tr><tr><td>urban</td><td>20 %</td><td></td></tr><tr><td>rural</td><td>12.5 %</td><td></td></tr></table>
DLR Labour force participation rate 64% males and 52% Females</td></tr>
<tr><td>Population density- average in the case study area[b]</td><td>1,643 people/km²</td><td colspan="3">PIB (GDP) of Ireland[c]: $US 75,304 per capita
PIB of DLR: unknown</td></tr>
<tr><td></td><td></td><td>Other general information i.e Self-perceived health by sex, age and degree of urbanisation[d]</td><td colspan="2">General poor health indicators for the region are below the national average.</td></tr>
<tr><td>Other data sources to explore if needed</td><td colspan="4"></td></tr>
</table>

[a] https://www.cso.ie/en/media/csoie/newsevents/documents/census2016summaryresultspart2/Census_2016_Summary_Results_%E2%80%93_Part_2.pdf

[b] https://www.citypopulation.de/php/ireland-admin.php?adm2id=DR

[c] https://data.oecd.org/ireland.htm

[d] https://www.cso.ie/en/releasesandpublications/ep/p-cp9hdc/p8hdc/p9gh/

2.2 Territorial challenges

Dún Laoghaire-Rathdown is an urbanising authority that is part of the Greater Dublin Region. A high proportion of the land in Dún Laoghaire-Rathdown is either intensive agricultural, forestry or impervious surface with some areas of green spaces and other green corridors e.g. tree lined roads. The region continues to undergo economic and urban development which has a direct impact on both the built and natural environments. To manage and mitigate the impact of this growth, several local area plans have been adopted – for example in Glenamuck, Woodbrook/Shangagh, Blackrock – that comprise elements of a green infrastructure (GI). These include enhancement of existing parks, green corridors, and tree preservation. Additionally, strategic development zones have been designated in Dún Laoghaire-Rathdown which are planned to incorporate new public parks, which are to form part of a GI network connecting to enhanced existing green spaces[2] thereby enhancing connectivity between habitats and accessibility for people.

Within the case study area there are several geographical challenges to the implementation of GI. For example, roads, rivers and railways provide physical obstacles to building connectivity between the urban green spaces and GI hubs such as the Natura 2000 area along the regions' south west boundary. This reduces opportunity for recreational services from natural areas. One of the major constraints is the high proportion of artificial surfaces covering the urban areas of the region which limits the capacity to develop GI. An additional potential constraint is the effect of the coast as a border. The coast is at the interface between land and sea. Here, we only consider the landside given the boundary conditions of the GRETA project. However, in the future, it would be appropriate to integrate the seaside.

Additional challenges to future development of GI in Dún Laoghaire-Rathdown are weak governance structures and a lack of high level support to deliver on local strategic plans that promote or incorporate GI. There are currently no specific national plans, policies or guidelines for GI. Although various planning policy guidance notes 'seek to foster or encourage incorporation of GI in regional and local plans' (personal correspondence), there is no statutory requirement to do so, therefore attempts to implement GI are based on persuasion rather than mandate.

[2] https://www.dlrcoco.ie/sites/default/files/atoms/files/cherrywood_amenity_space_guidance_document_2017.pdf

3 The green infrastructure network and its potentialities for territorial development in Dún Laoghaire-Rathdown

This section aims to provide more detailed insight into the benefits of green infrastructure (GI) and ecosystem services for smart, sustainable and inclusive territorial development within the case stuy area.

3.1 What is the approach to GI and Ecosystem Services

Dún Laoghaire-Rathdown council has developed and put in place a Green Infrastructure Strategy document (DLR Green Infrastructure Strategy 2016-2022). The strategy was prepared by the council's Parks and Landscapes Services department in collaboration with the Planning department and external planning consultants. Preparation and consultation began for the strategy in March 2014 together with the overall County Development Plan 2016-2022 which the council has a statutory duty to produce. This strategy considers the following questions: Is the current GI resource base fit for purpose for the future? How can barriers and deficits be mitigated and/or removed? What actions should be prioritised to ensure delivery of benefits? How can these actions be funded?

The Green Infrastructure Strategy forms just one part of the overall county plan (it is Appendix 14 within the Strategy). The strategy provides a set of several objectives, and recommendations to achieve these, incorportated within the main themes of: (i) accessibility, recreation, health and well-being which concerns the nature, quality and continuity of connections of the GI and ease of access to open spaces, greenways and recreation; (ii) natural and cultural heritage, which concerns the range of natural and man-made assets of heritage value, including areas of importance for biodiversity and cultural assets; and (iii) water management, which concerns the role and potential of GI to better manage surface and flood water and to contribute to maintaining and improving water quality. For example, some of the recommendations include the development of 'gateway' public parks at peri-urban locations, restoration or mitigation of the fragmentation of ecological corridors throughout the county and enabling Sustainable urban Drainage Systems (SuDS) schemes to be located in the public realm.

The Green Infrastructure Strategy recommends a spatial framework to be incorporated, the key features of this include:

- A higher level, County-wide network of integrated elements, which connects to surrounding and Regional GI networks;
- A structure for integrating the rich network of local-level GI in Dún Laoghaire-Rathdown;
- A network of overlapping and multifunctional GI corridors, connecting higher-level GI hubs and the main elements of the mountains, the urban area and the coast;
- Integration of important regional GI corridors, such as the East Coast Trail route, and the Dublin and Wicklow Mountain Ways; and
- A 'chain' of improved 'gateway hubs' (major parks and gardens), which provide the transition between the mountains and the urban area.

It appears that many of the recommendations within the Strategy have not yet been or begun to be delivered. Additionally, a delivery plan on GI has been produced by the Parks and Landscape Services, however this has yet to be fully adopted and implemented by Dún Laoghaire-Rathdown council.

In summary, the approach and delivery of components that contribute to GI in Dún Laoghaire-Rathdown appear only to be championed by a few individuals within the council using limited powers within the local planning system. It appears there is a lack of funding and political pressure to deliver GI projects within Dún Laoghaire-Rathdown. It was noted that this (with some exceptions) is the current situation facing other regions around the Republic of Ireland.

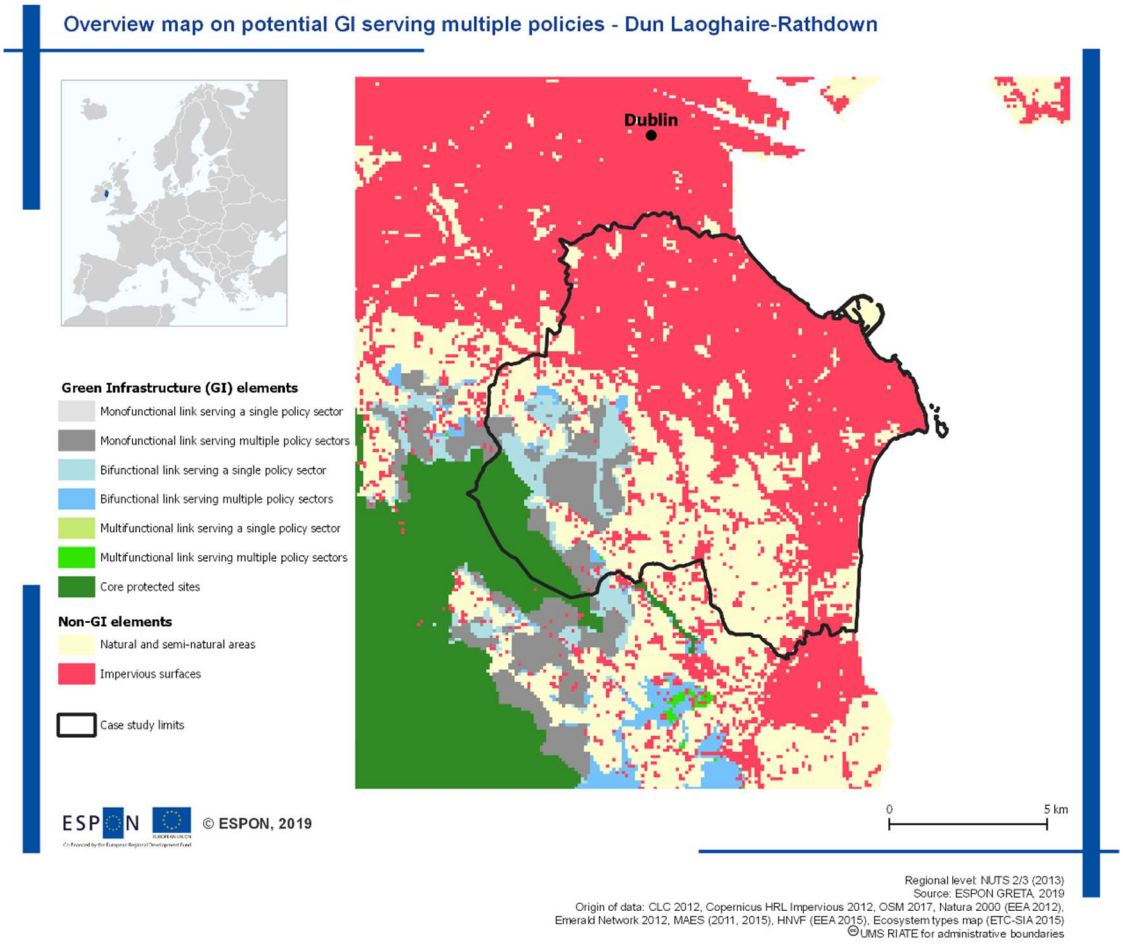
3.2 Benefits of GI and ecosystem services for smart, sustainable and inclusive territorial development

The case study is located in a NUTS 2 region. This section describes the potential green infrastructure (GI) network in the Dún Laoghaire-Rathdown case study as delineated by the GRETA spatial analysis methodology. The analyses of synergies and trade-offs between the ecosystem services (ES) provided by the GI network and its potential for serving several policy objectives is also provided. This includes an analysis of the Dún Laoghaire-Rathdown case study area reltavei to general EU patterns (Map 3 and Table 2).

Table 2 Potentialities for green infrastructure network in Dún Laoghaire-Rathdown.

Questions related to maps	**Description of phenomena in the case study**	**Implication for management**
Extent of GI	Potential green infrastructure (GI) covers less than 20% of the region, limited by large urban areas and by intensive agricultural land.	The area has a major constraint defined by the extent of urban areas. Therefore, good planning and management on the interface between urban and rural areas is key to maintain a coherent GI network.
Integration of protected areas	Considering the complete NUTS3 region there is poor integration of protected areas (low percentage of protected areas are connected with GI).	Connectivity of protected areas is a major issue in the wider region since the potential GI does not ensure a complete connectivity. Agricultural areas may play a key role in supporting GI.
Support to policies related to: Biodiversity, Climate Change and Disaster	There is limited capacity to provide support to different policies, and most of the GI is monofunctional.	Most of the potential GI is monofunctional, with limited capacity to support all three policies (biodiversity, climate change, water management). More detailed information, at local level, would be required to confirm these limitations, and to identify

Risk Reduction, and Water Management		where specific ecosystem services could be improved by appropriate management.
Synergies and trade-offs	Most of the ES have a neutral relationship, i.e. there is no interaction or no influence between ES.	Improvement of the capacity of provision of ES is not expected to have negative side effects.
City level	Not available	



Map 3. Dún Laoghaire-Rathdown area GRETA case study. Overview map on potential GI serving multiple policies.

Based on consultations with stakeholders in the area, the main ecosystem services currently being delivered from the GI in Dún Laoghaire-Rathdown are flood storage, biodiversity, recreation and enhanced landscape aesthetics. Best practice examples of these can be found in Honeypark and Glenageary. However, our respondents indicate that there is more potential to expand GI throughout Dún Laoghaire-Rathdown using innovative planning and design solutions that enhance the existing flood alleviation and biodiversity services. There exists an opportunity through the protection and enhancement of riparian habitats within the urban and

peri-urban catchments, through the incorporation of local SuDS, Green Streets and Green Roofs. The GI strategy states that these measure can create new and enhance existing links to a county-wide GI network and provide cumulative water quality, biodiversity and flood risk benefits.

Dún Laoghaire-Rathdown, along with the three other Dublin local councils (Dublin City, Fingal and South Dublin) commissioned the University College Dublin to undertake an Urban Tree/Forestry survey (UCD Dublin Tree Canopy project 2012-15) which included an evaluation of the ecosystem services provided by Dublin trees, on a sub-regional basis. The study specifically evaluated two ecosystem services provided by urban trees - regulation of stormwater flows and carbon sequestration. The economic value of intercepted run-off is estimated at €200,000 and that for CO2 sequestered at €622,212 per annum (assuming a carbon credit value of €6/ton10).

4 Capacity of GI network in in Dún Laoghaire-Rathdown to meet the demand of ES

This section considers the use of and demand for green infrastructure (GI) and ecosystem services (ES) in territorial development within the case study area. The evidence from the case study suggests the demand for GI and ES currently exists within specific parts of the Dún Laoghaire-Rathdown council, but it appears there is limited demand from senior council decision makers or from private developers and external planning consultants. The adoption of GI in private developments appears to be be driven through stipulations and guidance within the local planning system, rather than through commercial incentives, for example hedonic valuations.

Following extensive discussions between Dún Laoghaire-Rathdown Planning and DLR Parks and Landscape Services, the 'Strategic Development Zones' (SDZ) and 'Local Area Plans' (LAP) incorporate varying degrees of GI elements. Within the planning governance for the SDZs there are demands placed on the private developers to install four town parks ahead of any construction of residential accommodation. In addition, large areas of semi-natural habitats (e.g. woodland buffers) are stated for conservation.

Currently DLR council are developing a Climate Action Plan (CAP) in conjunction with other councils from the Greater Dublin area. This follows a structured approach that focuses on seven key areas: citizen and stakeholder engagement, planning; energy; transport; water; waste; and ecosystems and biodiversity. Through the CAP development, there appears to be a focus towards the incorporation of Nature-Based Solutions, particularly around flooding and climate resilience. This indicates an opportunity for GI to form part of the ongoing development of the CAP and for GI to be subsequently embedded into the implementation of the plan (which is a statutory duty). Subsequently. this may lead to the enhancement and delivery of the ecosystem

services and policies identified through GRETA i.e. biodiversity, climate change and disaster risk reduction, and water management as well as meeting the objectives of the CAP.

4.1 What do GRETA analysis on ES supply and demand reveal?

GRETA have explored the capacity of GI network to meet the demand of ES where:

ES supply is defined as the capacity of ecosystems to provide ES, irrespective of them being used.

ES demand can be defined as the amount of a service required or desired by society in a given location and time. This demand depends on several factors such as socio-economic conditions, cultural/behavioural norms, technological innovations, availability of alternatives, among others.

	ES Supply – benefits provided	ES Demand -specific definitions	Approaches to quantify Demand
Regulating services	Benefits are provided by maintaining desirable environmental conditions	Amount of regulation needed to meet target conditions	Reduction of risk
Cultural services	Benefits are provided by experiencing the natural environment	Desired total use (if rival service) or individual use (if nonrival service)	Preference and values // direct use
Provisioning services	Benefits are derived from consumption of final goods	Amount of goods obtained per unit of space and time or per capita	Direct use // Consumption

Table 3 Relation between benefits provided by ES supply and the corresponding ES demand definitions and operationalisation approaches. Adapted from: Villamagna et al., 2013 and Wolff et al., 2015.

Demand for **regulating services** can be defined as the amount of those environmental conditions that ensure the provision of a desired regulation level. A reduction of risk approach has been usually applied to quantify demands for these services. Vulnerability to potential changes in regulating services may provide valuable insight into society's needs capturing main linkages from the socio-ecological system.

Demand for **cultural services** has been mostly assessed by preferences and values for attributes of certain landscapes, ecosystems or heritage sites. Preferences may be either quantified through stated preferences that relate to the desired level of services, or through revealed preferences (a proxy for the actual use of the service). Demand for cultural services has also been assessed by the direct use of a specific ecosystem, e.g. for recreation. This can be quantified by total visitor days per year or the number of fishing/hunting licenses, the presence of tourists or accounting the accessibility or proximity to recreational areas.

Demand for **provisioning services** has been quantified based on direct use and consumption of final. It is worthy to note that there is normally a spatial mismatch between the area where the service is provided and the area where the service is consumed, especially true for

provisioning services. For this reason, interregional linkages have to be considered in order to properly identify faraway dependencies and assess magnitude of potential impacts

Following the proposed conceptual framework, we have combined demand and supply for each of the selected ES. The focus of this approach was to highlight those areas where there is a high demand and a low supply, i.e. those areas where GI is unable to cover the ES demand. It should be noted that these results are of a more exploratory nature in the whole GRETA project considering the following limitations:

- This is a research area still under development;
- There is need for a higher resolution of the data sources given the nature of the phenomena analysed;
- Balance between supply and demand is semiquantitative; and
- In some cases, a more sophisticated modelling would be required to have an appropriate quantitative balance.

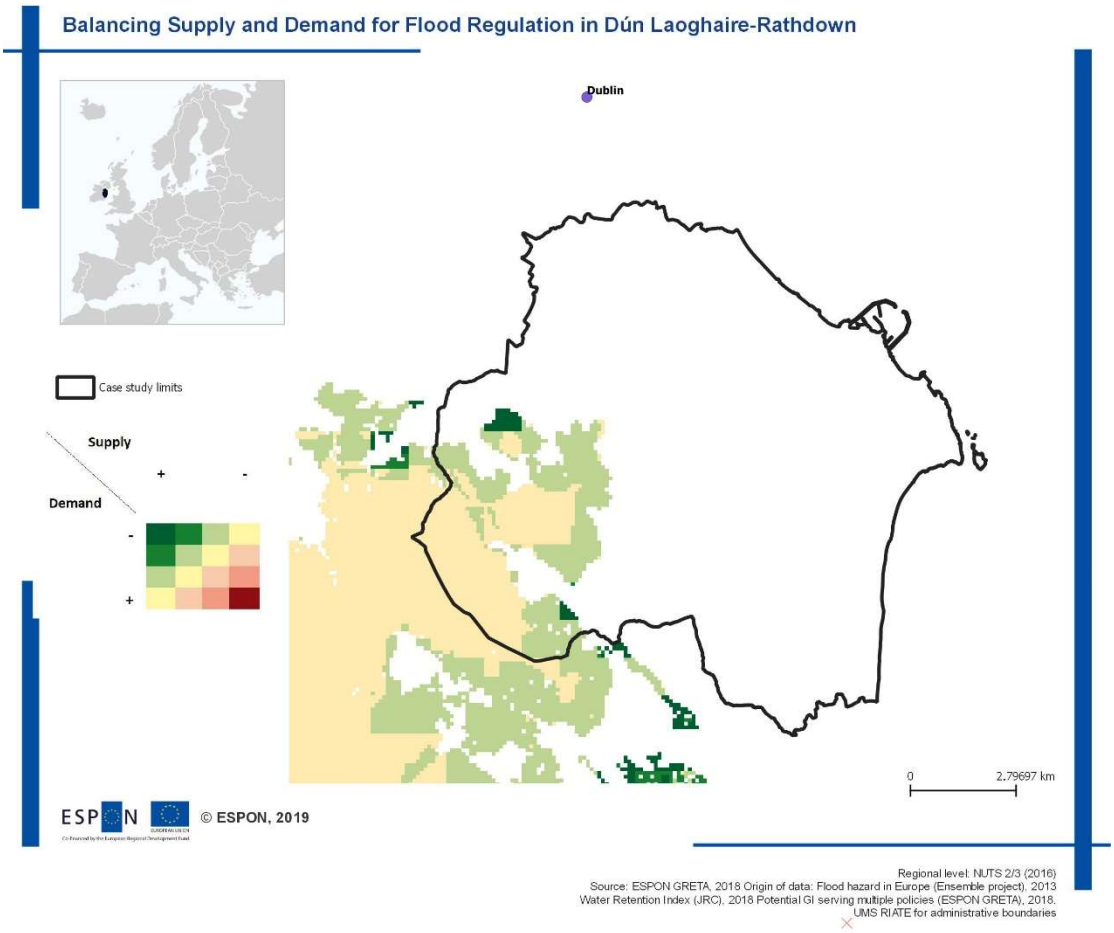
Therefore, these results should be seen as illustration on how this demand and balance could be approached.

4.1.1 Analysis of supply and demand for Flood Regulation in Dún Laoghaire-Rathdown

We have quantified demand for flood regulation based on the potential flood hazard. Exposure is described by the projected potential flooding risk[3]. On the other hand, benefits are provided by the water storage capacity of land to regulate floods. The supply for flood regulation is quantified by the Water Retention Index, which assesses the capacity of landscape to retain and regulate water passing through. This index is dimensionless and considers the role of interception by vegetation, the water-holding capacity of the soil, and the relative capacity of both the soil and the bedrock to allow percolation of water. The influence of soil sealing and slope gradient are additionally considered.

Map 4 presents a semi-quantitative balance between supply and demand for flood regulation in Dún Laoghaire-Rathdown, with a positive balance in a large part of the southwest area where supply is high due mainly to the core green areas included in the GI network. This in practical terms it would mean that improving or reinforcing GI with the objective of water retention will have a substantial benefit.

[3] for the period 2011-2044 that results after applying the LISFLOOD model from the ENSEMBLES project



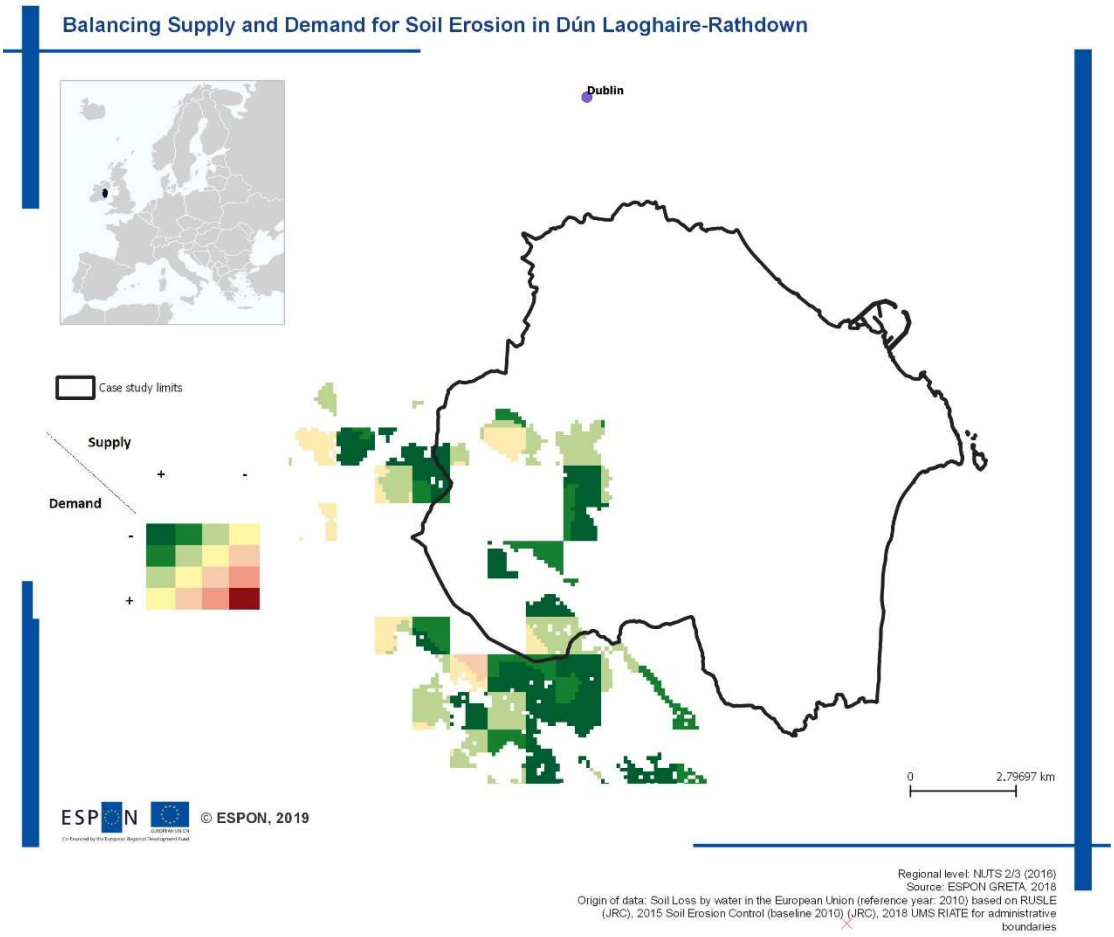
Map 4 Balancing Supply and Demand for Flood Regulation in Dún Laoghaire-Rathdown.

4.1.2 Analysis of supply and demand for Reducing Soil Erosion in Dún Laoghaire-Rathdown

We have assessed the demand for the reduction of soil erosion by water producing a negative impact on several ES; in particular to the ones related to crop production, drinking water and carbon stocks. Soil erosion by water is mainly affected by precipitation, soil type, topography, land use and land management. Exposure is described by the soil loss rate[4] (t ha^{-1} yr^{-1}). Benefits are provided by the capacity of vegetation to control or reduce erosion rates. The supply is quantified by the Soil Erosion Control dataset (JRC) that describes the capacity of ecosystems to avoid soil erosion.

Map 5 shows that there is a clear pattern of positive balance in all the area with some room for improvement in some areas i.e Golf clubs.

[4] as estimated by the modified version of the Revised Universal Soil Loss Equation (RUSLE) model



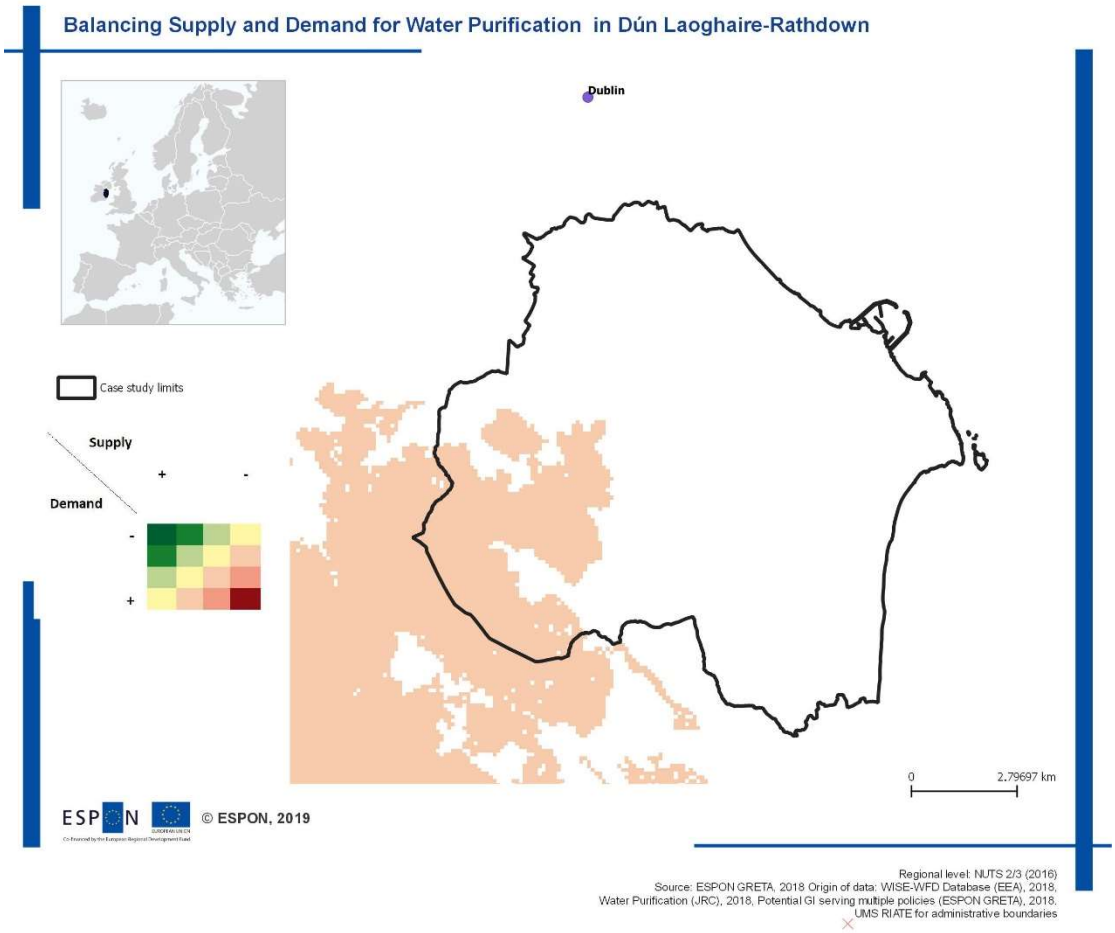
Map 5. Balancing Supply and Demand for Soil Erosion in Dún Laoghaire-Rathdown

4.1.3 Analysis of supply and demand for Water Purification in Dún Laoghaire-Rathdown

We have quantified demand for water purification based on the level of pollutants emitted to freshwater ecosystems by polluting sectors, primarily agriculture and waste water treatment discharges from industry and households. Exposure is described by mean annual concentration of nitrates in water [5](. The supply is quantified by the Water Purification dataset (JRC) that assesses the in-stream retention efficiency of ecosystems to dilute or degrade nutrients.

Resulting Map 6 shows that water pollution is a big challenge and substantial increase on the provision of water purification is still required under current status in most of the area.

[5] tonne per year) captured in monitoring stations and aggregated by rivers (the WISE-WFD database)

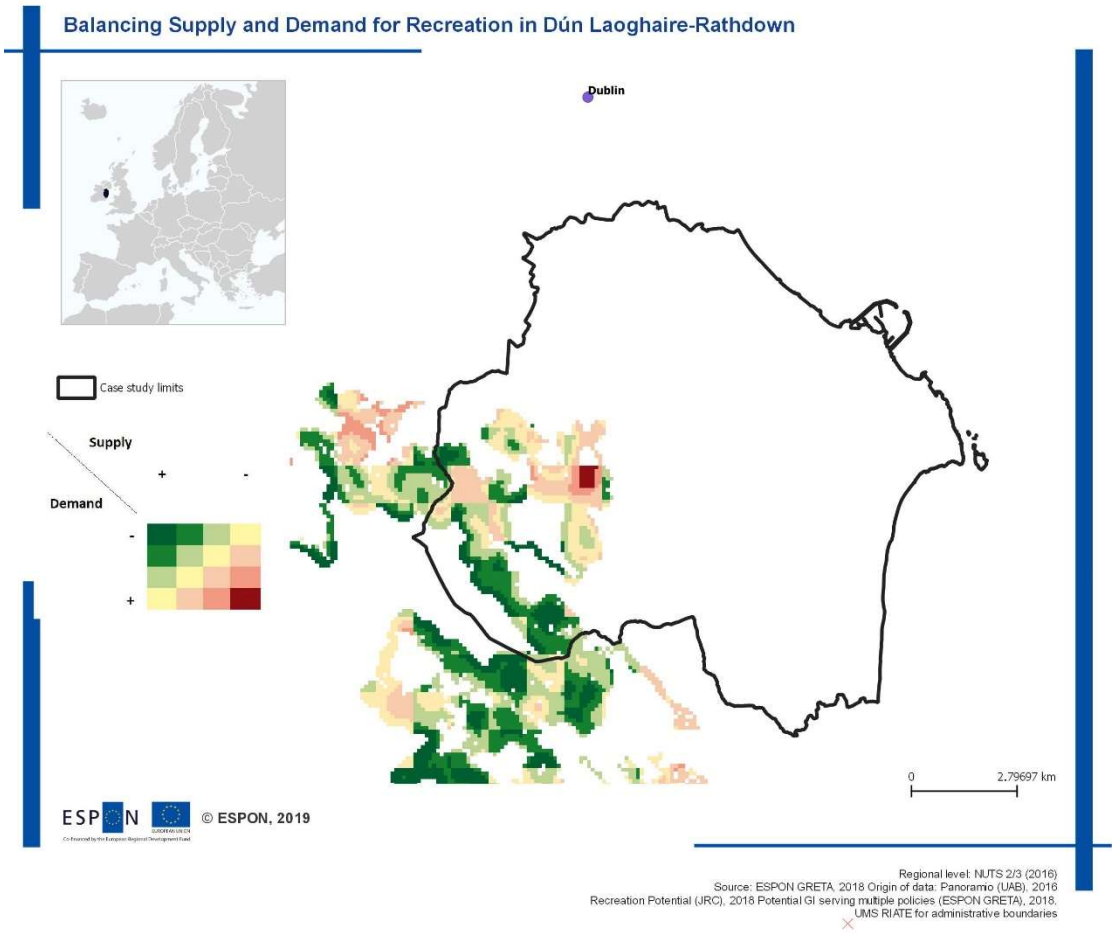


Map 6. Balancing Supply and Demand for Water Purification in Dún Laoghaire-Rathdown

4.1.4 Analysis of supply and demand for Recreation in Dún Laoghaire-Rathdown

We have described demand for recreation by means of a proxy for visitation. Recreation and tourism are important elements for national and local economies, that also contribute to other intangible benefits. Recreation directly depends on environmental attributes like species richness, diversity of habitats, and climate. The usability of crowd-sourced information by means of location photographs has already been shown to be as a reliable proxy for visitation rates to recreational sites. We have used the location of photographs in Panoramio as a proxy for landscape attractiveness for visitors. Demand is quantified by the number of pictures per square km. On the other hand, supply is described by the Recreation Potential dataset (JRC) that quantifies the potential for citizens for outdoor recreation.

Map 7 shows some spots (in red) where supply does not meet the demand, which may be explained by the geographical challenges to the implementation of GI, i.e. roads, rivers and railways providing physical obstacles to building connectivity between the urban green spaces. This reduces opportunity for recreational services from natural areas. Best practice examples of these can be found in Honeypark and Glenageary.



Map 7. Balancing Supply and Demand for Recreation in Dún Laoghaire-Rathdown

5 Governance practices, policy and planning instruments to implement green infrastructure and enhance ecosystem services in Dún Laoghaire-Rathdown

The Dún Laoghaire-Rathdown 'Green Infrastructure Strategy' is the primary document to form the basis for green infrastructure (GI) in the case study area. However, as indicated, there appears to be a limited number of mechanisms through which to implement the strategy, because as such there is no formal governance framework/structure or decision-making process. Any GI related actions are largely 'silo-based', e.g. restricted to the Dún Laoghaire-Rathdown Parks and Landscape Services and Plannning departments with sporadic, disaggregated implementation of GI projects through the planning system. A delivery plan was prepared by the Parks and Planning departments but this has yet to be formally approved by senior decision makers within Dún Laoghaire-Rathdown council. Our respondents cite a lack of resources (both financial and human) on the back of a recovering economy and austerity measures for the apparent inertia in developing and implementing GI further in Dún Laoghaire-Rathdown. This lack of integrated GI governance, in particular mechanisms to deliver GI, could be a legacy of weak governance at national scale, as was identified in the GRETA Interim Report through the national factsheet for Ireland. In particular it was stated that '*there are many*

strategies or programmes that consider GI, [but] there is no national actor or institutional body with the main responsibility for GI in Ireland' (p. 143, GRETA Annexes Interim Report[6])..

Based on our responses to consultation A, economic valuation techniques are not used to promote territorial development of GI in Dún Laoghaire-Rathdown. These techniques do not appear to be widely known and there are a lack of skilled people in their application. It was noted by our respondents that a lack of support/leadership within Dún Laoghaire-Rathdown are reasons why economic valuation of GI is not widely used/known.

6 Lessons learned and good practice examples from the Dún Laoghaire-Rathdown case study

The Dún Laoghaire-Rathdown is located in a metropolitan context, which poses an important constraint to the development of green infrastructure (GI). Potential GI covers a small area of the whole region, with low multifunctionality. Agricultural areas could play an important role supporting the development of GI.

Lessons learned from DLR are that even with comprehensive GI plan that was produced via interdepartmental and across public (Local Authority) andprivate (Planning Consultants) realms the implementation of GI in DLR is lacking. From our consultations it appears there is lack of support and drive within senior management and political pressure to implement changes.

Best Practice Example: 'Honeypark'

Honeypark is a recent residential development privately built on the site of an old golf course. The public open spaces have been designed as 'multifunctional Green infrastructure'[7]. It provides a good example of how GI has been incorporated into local planning policy by Parks and Landscapes, Drainage and Planning departments. It has resulted in a residential development incorporating multifunctional open spaces, including a featured lake with wetlands. This wetland has been designed to provide flood storage, habitat, recreation and aesthetic functions. The wetland attenuates the flow of storm water, as well as providing habitat for a variety of species and recreational opportunities for the local community. Throughout the development, planting schemes have been installed which provide shading, privacy and permeable surfaces to attenuate storm water flow and filter pollutants and sediment.

[6] https://www.espon.eu/green-infrastructure

[7] DLR Green Infrastructure Strategy 2016-2022 https://www.dlrcoco.ie/sites/default/files/atoms/files/appendix14.pdf

7 Policy messages and recomendations in Dún Laoghaire-Rathdown

Even with the comprehensive strategy, the lack of high level and political support for green infrastructure (GI) seems to be halting implementation of the strategy. Economic valuation could be used as the means to communicate the value of GI to senior management and gain support and backing for implementation.

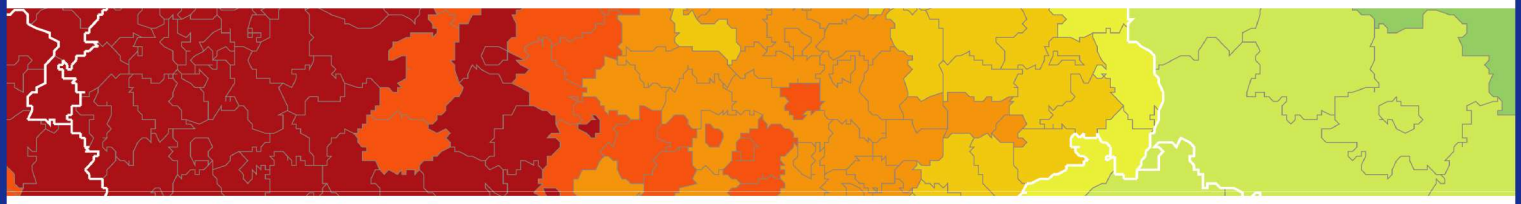
It would be valuable to align and incorporate GI principles into national scale policy. For example, current implementation of GI seems to be occurring in relation to land use and water (e.g. SuDS) which are national policies within Ireland. A recommendation would be to review other other national policy sectors (e.g. climate change) that could facilitatebringing about more GI.

The use of se of 'nature-based solutions' when implementing SuDS can be a way to incorporate GI into existing initiatives for multifunctional service delivery.

8 Annex

Details for stakeholders who contributed to preliminary outreach and consultations in relation to Dún Laoghaire-Rathdown case study.

Type of stakeholder	**Workplace**	**Type of interaction**	**Date**
Technical expert / decision maker	Regional level public authority	Phone interview, emails for preliminary outreach / baseline information	01/03/2018
Technical expert	Environmental Consultancy	Phone interview, emails for preliminary outreach / baseline information	02/03/2018
Policy maker/ decision maker	Regional level public authority	Online questionnaire	02/10/2018
Technical expert/Policy maker	Regional level public authority	Telephone interview, emails and online questionnaire	02/10/2018, 03/10/2018
Policy Maker	Regional level public authority	Online questionnaire	01/10/2018



ESPON 2020 – More information

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