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National Transport Authority

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Limerick-Shannon Metropolitan Transport Strategy

Limerick-Shannon Metropolitan Transport Strategy Environmental Report

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National Transport Authority

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Limerick-Shannon Metropolitan Transport Strategy

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Non-Technical Summary

Introduction

The National Transport Authority (NTA) in collaboration with Limerick City and County Council (LCCC) and Clare County Council (CCC), is developing a Transport Strategy for the Limerick Shannon Metropolitan Area (LSMA) covering the period 2020 to 2040. The strategy will provide a framework for the planning and delivery of transport infrastructure and services in the LSMA over the next two decades. It will also provide a planning policy for which other agencies can align their future policies and investment priorities.

The LSMATS (the Strategy) will influence future projects to be identified down the line but which are likely to have a significant effect on the environment, and therefore falls under the scope of the European Directive 2001/42/EC "on the assessment of the effects of certain plans and programmes on the environment" (known as the 'SEA Directive"). The SEA Directive is implemented in Ireland via the European Communities (EC) (Environmental Assessment of Certain Plans and Programmes) Regulations 2003, as amended by the EC (Environmental Assessment of Certain Plans and Programmes) (Amendments) Regulations 2011 (known as the 'SEA Regulations').

SEA Process

The SEA process is outlined in the table below. This Environmental Report provides the findings of the SEA for the draft LSMATS, including alternatives and cumulative effects.

Stage	Purpose and Requirements	Output	Consultation
Stage 1: Screening	Prior to starting the SEA process, a Strategy or programme undergoes 'screening" to determine whether it requires SEA (also if SEA is to be undertaken on a voluntary basis).	SEA Screening Statement – NTA (as the responsible authority) determined that SEA would be undertaken for the LSMATS.	N/A
Stage 2: Scoping	Consideration of the context and objectives of the SEA, provides information on baseline data, identifies relevant environmental issues and trends, and defines the parameters of the scope of the SEA for the purpose of consultation.	SEA Scoping Report.	SEA Scoping report consulted on for 4 week period during September and October 2019
Stage 3: Identification, Prediction, Evaluation and Mitigation of Potential Effects Current Stage in the SEA	Within the context and parameters identified at the Scoping Stage, identification and evaluation of likely significant effects of the LSMATS is carried out, including consideration of alternatives and determination of measures to mitigate and monitor residual effects.	SEA Environmental Report – this report.	We are seeking feedback from consultees on this report during the period
Stage 4: Consultation, Revision and Post-Adoption	Consultation with statutory consultees and the public. This may require changes to the draft Strategy in light of responses. Statement on how the SEA and consultation process has influenced	SEA Statement. Implementation of the monitoring programme.	N/A

Stage	Purpose and Requirements	Output	Consultation
	the final Strategy. The statement is required to include an environmental monitoring Strategy - this is intended to provide feedback on significant environmental effects. This will also aid any future review / revision of the LSMATS and the SEA.		

Summary of Environmental Baseline

The study area for the SEA was taken to be the LSMA plus all European designated sites within 15km of the LSMA.

Following a desktop review of environmental information, the following key points were identified:

- The population of the LSMA increased by 2.7% between 2011 and 2016 and is anticipated to increase significantly again over coming years. Residents within the LSMA are generally in good health, although areas of Limerick City have more people with worse health and higher deprivation that the rest of the LSMA;
- There are a numerous European and national designated sites within the LSMA, with a total of 25 SACS and five SPAs within the extended study area (LSMA plus 15km buffer);
- There are a large number of heritage records within the LSMA. Most are concentrated within the settlement boundary of Limerick, with a number of records also located in Bunratty, Newcastle, Dooradoyle, Annacotty and Cloonlara. Areas considered at higher risk for archaeology are also present within the study area;
- There are currently nine Areas of Further Assessment (AFAs) (areas where risks to flooding might be significant) identified within the study area associated with either coastal/tidal, fluvial sources or pluvial sources; and
- Transport is one of the main contributors to air pollution and carbon emissions within Ireland.

SEA Methodology

Elements included within the draft Strategy were assessed against the twelve Strategic Environmental Objectives (SEOs) developed at the scoping stage of the process (Stage 2) for potential significant positive or negative effects. These SEOs are listed in the table below within the 'Assessment of Preferred Strategy and Alternatives' section. Where there is currently insufficient information to make an assessment of the likely significant effects this was recorded, and also where both positive and negative effects were considered likely.

Based on this initial assessment, SEA mitigation recommendations have been identified, and the draft Strategy reassessed against the SEOs assuming that the mitigation identified is implemented to provide an assessment of residual effects.

Assessment of Preferred Strategy and Alternatives

Alternatives

'Within Strategy' alternatives considered during development of the LSMATS related to the nature of the public transport network required. Early modelling work indicated that public transport was the mode showing greatest potential to flexibly accommodate future changes in demand, and therefore several different alternative modes were considered in terms of their ability to provide the 'backbone' of a comprehensive public transport network for the LSMATS. These included:

- bus network;
- bus rapid transit;
- light rail; and
- suburban rail.

These 'Within Strategy' alternatives were assessed against the SEOs and it was concluded that the bus network option had fewest potential adverse environmental effects as well as the best economic and accessibility outcomes.

'Whole Strategy' alternatives considered included:

- Alternative A: 'Do Minimum' scenario (existing transport networks with additional of the Limerick Northern Distributor Road (LDNR) Phase 1);
- Alternative B: Comprehensive bus network, with bus priority measures within the city centre, improved cycling network, and also the full LNDR (Phase 1 and 2) and the N1 Foynes to Limerick Road with Adare Bypass; and
- Alternative C: Comprehensive bus network with further bus priority measures within the city centre as well as removal of parking spaces, improved cycling and walking network, full LNDR (Phase 1 and 2) with specific bus and cycling provision and at grade junctions, and further measures to increase the attractiveness of public transport (bus and rail), walking and cycling journeys.

Whilst alternative A provides the least risk of adverse effects against SEOs 3,4 5 and 9, alternative C provides the most likely positive effects for public health, air quality, noise and climate associated with modal shift towards public transport, walking and cycling as well as facilitating compact development in the future.

Preferred Strategy

The Preferred Strategy was developed from Alternative C and includes demand management measures within the LSMA which would further encourage modal shift towards public transport, walking and cycling. The table below provides a summary assessment of the preferred Strategy both in the absence of mitigation, and with the inclusion of mitigation, and also lists key mitigation measures identified.

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
1 Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	Impact on public health associated with: ▪ Improvements to air pollutant levels and noise pollution associated with reductions HGV regulation in Limerick City centre. ▪ Improvements to availability, accessibility and amenity of active travel and recreational walking routes. ▪ Measures such as bicycle sharing schemes, bicycling parking and end of trip facilities would help encourage modal shift towards cycling. ▪ Positive impacts on access to community services and facilities and places of employment through support for consolidation of development and limitation of urban sprawl (with potential exception of areas north of Limerick served by the proposed LNDR)	▪ Potential disproportionate negative impact on certain vulnerable groups and/or on small businesses as a result of measures to reduce reliance on private vehicles and restrict or manage freight movement within Limerick City centre. ▪ Consideration of impact of converting areas currently designated for street parking to bus lanes on severance, with particular focus on routes in close proximity to locations of importance to vulnerable groups (e.g. schools, care homes, hospitals, other community facilities). ▪ Risk that implementing LNDR towards the front end of the strategy period would undermine the aim of the Strategy to facilitate consolidated development within the LSMA and support modal shift towards public	+/0	▪ Undertake Equalities Impact Assessment for measures that aim to reduce reliance on private vehicles for social and commuting purposes and restrict freight movements and implement mitigation measures as identified. ▪ Consultation with local communities to identify and mitigate temporary construction impacts given that extensive works planned on multiple transport routes and modes concurrently. ▪ Consideration of inclusion of measures to support increased patronage of bus services by social groups which may be driven by safety and security or accessibility concerns. ▪ Implementation of public transport and other strategy measures to support modal shift towards public	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
		transport, walking and cycling.		transport, walking and cycling with Limerick to be implemented in advance of the LNDR, or consider alternative methods of improving access for communities on the northern outskirts of Limerick.	
2 Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	▪ Provision of a Tourist Walking Strategy, improvements to the public realm along the Old Bunratty Road, as well as general improvements within to the pedestrian realm within Limerick, would support and enhance access for tourists within the region. ▪ Improvements in access to tourist facilities as a result of greenways. ▪ A reduction in traffic volumes within the centre of Limerick City would help improve the amenity of the area for tourists and residents.	▪ Impact on tourist industry arising from disruption to highway and public transport routes during construction of new infrastructure.	0	▪ Consideration of impact of converting areas currently designated for street parking to bus lanes on severance, with particular focus on routes in close proximity to tourist locations; and ▪ Consideration of whether beneficial impacts for the tourism industry (hop on hop off tours etc) can be realised through design and implementation of new bus lanes. ▪ Consider requirement for specific parking strategy for tourists, which may have a seasonal component.	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
				▪ Consider inclusion of specific policies to (i) manage the potential impacts of disruption to existing rail services during construction of new infrastructure and (ii) improve tourist passenger experience, for example simplified ticketing, luggage space on trains, luggage storage at stations, specific tourist signage, travel plans for key tourist destinations.	
3 Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	▪ Reduction in transport related emissions of air pollutants including nitrogen oxides (NO_x), particulate matter (PM) and sulphur dioxide (SO_2).	Temporary or permanent habitat loss and/or mortality/disturbance to wildlife as a result of new infrastructure construction. In particular, the proposed route of the LNDR requires land take the Lower River Shannon SAC and Knockalisheen Marsh pNHA. Impacts on Woodcock Hill Bog NHA are also considered likely. Construction of new bus and cycle lanes may also require land take from River Shannon	+/-	▪ Consideration of opportunities for tree planting and green verges to be incorporated within new or amended walking routes ▪ Minimise land take within ecologically sensitive areas (particularly European and national designated sites) as far as practicable and/or provide compensatory habitat as determined necessary as a result of the	+/-

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
		and River Fergus Estuaries SPA/Fergus Estuary and Inner Shannon, North Shore pNHA and Inner Shannon Estuary – South Shore pNHA.		regulatory processes identified in the following bullet. ▪ Potential impacts on habitats and wildlife to be considered and mitigated through Environmental Impact Assessment (EIA) and Habitat Regulations Assessment (HRA) process down the line. ▪ Consider developing a LSMATS Natural Heritage Strategy' which would pull together aims and objectives in terms of habitat replacement and design principles and can link to enhancement objectives for landscape and cultural heritage. This could include looking at management of verges and open space associated with infrastructure to optimise habitat provision including for example the timing of verge cuttings and species	

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
				mixes used	
4 Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	▪ Positive contribution to visual amenity afforded by blue-green corridors within Limerick City Centre. ▪ Improvements to the public realm within urban areas in Limerick and metropolitan towns realised through improvements to existing walking, cycling and highway infrastructure and improvements to wayfinding would make a positive contribution to townscape and public views.	Temporary or permanent impacts on landscape and townscape as a result of construction of new infrastructure.	+/-	▪ Sensitive design of new infrastructure, in collaboration with local councils, to ensure that existing landscape and townscape character is maintained and where practicable enhanced. ▪ Potential impacts on landscape and townscape as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line. ▪ Consideration of opportunities for tree planting and green verges to be incorporated within new or amended walking routes.	+/-
5 Avoid damage to, maintain and where appropriate enhance, cultural heritage resources and their	Potential opportunity to enhance settings of built cultural heritage assets through public realm improvements identified.	Potential for temporary and permanent impacts on built heritage assets and known and unknown archaeological remains as a result of new	0/-	▪ Design of new infrastructure to be sensitive to the presence of known heritage assets. ▪ Public realm improvements	0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
setting.		infrastructure.		to seek to increase the accessibility and improve the setting of build heritage assets. ▪ Potential impacts on known and unknown heritage as a result of construction of new infrastructure to be considered and mitigated. through Environmental Impact Assessment (EIA) process down the line.	
6 Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	None identified. The strategy however supports development consolidation and limits risk of urban sprawl and therefore can act to minimise additional soil loss from other development.	Loss and/or sterilisation of soil resources and may disturb areas of ground contamination as a result of new infrastructure construction.	0/-	▪ Ensure new infrastructure does not conflict with IGHS sites. Ensure appropriate site specific geotechnical and contaminated land risk assessments are undertaken and any remediation recommendations adhered to. ▪ Potential impacts on valuable soils and geology as a result of new infrastructure construction to be considered and mitigated through Environmental Impact	0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
				Assessment (EIA) process down the line.	
7 Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	Reduction in transport related air pollutant emissions associated with: ▪ HGV regulation in Limerick City centre and decarbonisation of the freight industry. ▪ Measures to support modal shift towards public transport and active travel modes. ▪ Transfer public transport fleet towards low carbon and/or zero emission alternatives. ▪ Electrification/retrofitting of existing train fleet.	Measures such as Park and Rides and freight consolidation centres may worsen air quality locally through changes in traffic patterns in proximity to the chosen locations. new road schemes, including the LNDR, would likely have adverse effects on air pollution levels for local communities.	+/-	▪ Ensure that Freight Consolidation Centres do not have a significant adverse effect on receptors sensitive to air quality outside of Limerick City by concentrating HGV movements within specific areas. This may be achieved through careful siting amongst other measures. ▪ Potential impacts on air quality as a result of construction of new road and rail infrastructure to be considered and mitigated. through Environmental Impact Assessment (EIA) process down the line. This may be achieved through careful routing to minimise direct impacts on sensitive receptors.	+/0
8 Contribute to the mitigation of noise pollution issues as a	Reduction in noise emissions associated with the transport sector in the LSMA:	Measures such as Park and Rides and freight consolidation centres and new railway lines	0/+	▪ Ensure that Freight Consolidation Centres do not have a significant	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
result of transport and optimise potential benefits from reduction in noise pollution.	▪ HGV regulation in Limerick City centre and decarbonisation of the freight industry. ▪ Measures to support modal shift towards public transport and active travel modes.	may worsen noise pollution locally through changes in traffic patterns in proximity to the chosen locations. New road schemes, including the LNDR, would likely have adverse effects on noise pollution levels for local communities.		adverse effect on receptors sensitive to air quality outside of Limerick City by concentrating HGV movements within specific areas. ▪ Ensure new railway lines and stations do not have a significant adverse effect on receptors sensitive to noise located in close proximity to these new infrastructure developments. ▪ Potential impacts on air quality as a result of construction of new road and rail infrastructure to be considered and mitigated. through Environmental Impact Assessment (EIA) process down the line. This may be achieved through careful routing to minimise direct impacts on sensitive receptors, amongst other measures.	
9 Prevent deterioration of the water quality status	Reduction in water pollution associated with road run-off	▪ Increased area of hardstanding required for	-/0	▪ Ensure that the identified solution for the existing	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	associated with: ▪ HGV regulation in Limerick City centre and decarbonisation of the freight industry ▪ Measures to support modal shift towards public transport and active travel modes	new infrastructure may have adverse impact on flood risk. ▪ Potential negative impacts on WFD objectives as a result of new pedestrian infrastructure spanning or adjacent to WFD watercourses including the Shannon, Abbey and Barnakyle.		flood issue on the Limerick-Ennis line at Ballycar is designed to accommodate future predicted changes in flood risk as a result of climate change; ▪ Use of Sustainable Urban Drainage (SuDs) principles in new infrastructure design; and ▪ Potential impacts water quality and flood risk be considered and mitigated through EIA and WFD process down the line.	
10 Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	Reduction in consumption of fossil fuels associated with: ▪ HGV regulation in Limerick City centre and decarbonisation of the freight industry. ▪ Measures to support modal shift towards public transport and active travel modes.	Construction of new infrastructure would require a degree of land take, although proposals seek to make use of existing highway infrastructure through repurposing of on street parking areas and road space as far as practicable.	+/0	New infrastructure design to minimise requirement for additional land take outside the existing highway boundary or railway corridor as far as practicable.	+/0
11 Minimise contributions to climate change (including greenhouse gas emissions) from	Reduction in transport related carbon emissions within the LSMATS associated with:	New infrastructure will result in carbon emissions during construction (both embodied and associated with construction	+/0	Consideration of opportunities for tree planting and green verges to be incorporated within new or amended walking	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	▪ Decarbonisation of the freight industry. ▪ Measures to support modal shift towards public transport and active travel modes.	plant and traffic) and operation (lighting, heating, electric gates etc) (predominantly new Park and Rides, Mobility Hubs, Railway stations).		routes. Ensure that construction methodology for new built infrastructure is undertaken with consideration for the European Union (EU) waste hierarchy and in line with relevant Irish Green Building Council (IGBC) guidance where relevant.	
12 To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	None identified.	Any new built infrastructure required is vulnerable to future climate change, including changes in air temperature, precipitation rates and wind speeds.	?	Ensure that design of new infrastructure reflects likely worst case climate projections in terms of resilience to wind speeds, precipitation, flood risk and increases in air temperature over the full design life of the infrastructure.	+/0

Cumulative Effects

The nature of potential positive and negative cumulative effects with other plans and programmes, primarily those relating to land use and transportation but also other industries, was aligned with those identified for the draft Strategy itself as described above. Therefore, the mitigation identified against the draft Strategy applies also to cumulative effects.

Mitigation and Implementation Plan

We have recommended monitoring measures to check the progress of the LSMATS against the SEOs throughout the lifetime of the Strategy. This covers mitigation identified for individual measures included within the draft Strategy and the draft Strategy as a whole including cumulative impacts with other plans and programmes.

List of Abbreviations

Term	Definition	Term	Definition
AA	Appropriate Assessment	NPWS	National Parks and Wildlife Service
CFRAM	Catchment Flood Risk Assessment and Management	NSO(s)	National Strategic Objective(s)
CSO	Central Statistics Office	NSS	National Spatial Strategy
DAFM	Department for Agriculture, Food and the Marine	NTA	National Transport Authority
DHPLG	Department for Housing, Planning, and Local Government	OPW	Office of Public Works
DTTaS	Department of Transport, Tourism and Sport	PLUTO 2040	Planning Land Use and Transport Outlook 2040
EPA	Environmental Protection Agency	pNHA(s)	Proposed National Heritage Area(s)
EC	European Commission	RBD	River Basin District
EIA	Environmental Impact Assessment	RBMP	River Basin Management Plan
ELC	European Landscape Convention	RMP	Record of Monuments and Places
EU	European Union	RPS	Record of Protected Structures
FRMP	Flood Risk Management Plans	SAC	Special Area of Conservation
GDP	Gross Domestic Product	SEA	Strategic Environmental Assessment
GSI	Geological Survey Ireland	SFILT	Strategic Framework for Investment in Land Transport
GSNI	Geological Survey of Northern Ireland	SFRA	Strategic Flood Risk Assessment
IGH	Irish Geological Heritage	SPA	Special Protection Area
LCA	Landscape Character Area	WFD	Water Framework Directive
LSMA	Limerick Shannon Metropolitan Area	UN	United Nations
LSMATS	Limerick Shannon Metropolitan Area Transport Strategy	UNESCO	United Nations Educational, Scientific and Cultural Organisation
NHA	National Heritage Area	WEC	Western European Countries
NIAH	National Inventory of Architectural Heritage	WFD	Water Framework Directive
NIS	Natura Impact Statement	WHO	World Health Organisation
NPF	National Planning Framework		

Glossary

Glossary Term	Definition
AA Screening Report	The report which provides information on and assesses the potential for the proposed Strategy to impact on European sites within the Natura 2000 network.
Natura Impact Statement	A document which summarises the findings of the AA and how they were factored into the plan, the reason for choosing the preferred Strategy in light of alternatives considered and to state the likely significant effects.
Appropriate Assessment	An assessment required under the Habitats Directive when a Strategy or project has the potential to affect a European site.
Baseline Environment	The state of the environment in the absence of the strategy.
Catchment	The total area of land that drains into a watercourse.
Cumulative effect	The combined effects from several plans, programmes or policies.
SEA Environmental Report	The SEA report that documents the effects of investment priorities outlined in a plan.
Invasive species	Non-native species that out-compete native species to the detriment of an ecosystem.
Mitigation	The implementation of measures designed to reduce the predicted effects of a Strategy or project on the environment.
RAMSAR site	An international designation for an important wetland site under the Ramsar Convention.
SEA Screening Report	The report which determines whether the proposed Strategy requires SEA.
SEA Scoping Report	The SEA report that sets the scope and objectives of the SEA.
SEA Post Adoption Statement	The document which details how environmental considerations have been integrated into the plan, how the environmental report and consultation responses were taken into account, the reasons for choosing the Strategy as adopted in light of reasonable alternatives considered and the measures to be taken into account to monitor or mitigate the likely significant effects.
Special Area of Conservation	An international designation for habitats and/or species under the EC Habitats Directive.
Special Protection Area	A site of international importance for birds, designated as required by the EC Birds Directive.
Strategic Environmental Objectives	Methodological measures against which the effects of the strategy can be tested.

1. Introduction and Background

1.1 Background to the Limerick Metropolitan Area Transport Strategy (LSMATS)

The National Transport Authority (NTA) is a public body set up under statute and established in December 2009. The role and functions of the NTA are set out in three Acts of the Oireachtas; the Dublin Transport Authority Act 2008, the Public Transport Regulation Act 2009 and the Taxi Regulation Act 2013. In August 2015, the Department of Transport, Tourism and Sport (DTTaS) published its policy document "Investing in our Transport Future - Strategic Investment Framework for Land Transport" (SIFLT). Action 4 of that framework states that: "Regional transport strategies will be prepared by the NTA and provide an input to regional spatial and economic strategies".

Having regard to its role in relation to transport, and the action placed upon it in the DTTaS policy document, the NTA, in collaboration with Limerick City and County Council (LCCC) and Clare County Council (CCC), is developing a Transport Strategy for the Limerick Shannon Metropolitan Area (LSMA) covering the period 2020 to 2040. The strategy will provide a framework for the planning and delivery of transport infrastructure and services in the LSMA over the next two decades. It will also provide a planning policy for which other agencies can align their future policies and investment priorities.

1.1.1 Relationship between LSMATS and other plans and programmes

Figure 1.1. illustrates the relationship between the Limerick-Shannon Metropolitan Area Transport Strategy (the LSMATS or the Strategy) and other key national, regional, county and local level land use, economic and transport plans and programmes. These existing plans and programmes have been subject to their own environmental assessment processes as relevant and provide for many of the measures incorporated within the draft Strategy. The draft Strategy aligns with these documents.

In addition to compliance with higher level (e.g. national and regional level) plans and programmes, individual transport projects undertaken under the LSMATS and/or lower level strategies are subject to their own project level environmental assessment processes which may include Environmental Impact Assessment (EIA), Habitats Regulations Assessment (HRA), Water Framework Directive (WFD) compliance assessments and Flood Risk Assessments (FRAs).

	Land Use/Economic	Transport
	Combined land use/economics and transport	
National (Tier 1)	National Planning Framework 2040 (SEA complete)	Strategic Framework for Investment in Land Transport (SFILT) (SEA complete)
	National Development Plan 2018 - 2027	
	Planning Land-Use and Transport - Outlook (PLUTO) 2040 (Department of Transport, Tourism and Sport) Not yet published – SEA underway	
Regional (Tier 2)	Regional Spatial and Economic Strategy (RSES) for the Mid-West (SEA complete)	
	Mid-West Area Strategic Plan (2012-2030) (MWASP) (SEA complete)	
	Limerick Shannon Metropolitan Area Strategic Plan (LSMASP) (SEA complete)	
		LSMATS – SEA assessment provided in this report
County	Limerick County Development Plan (LCDP) 2010-2016 (SEA complete)	Limerick Metropolitan Cycle Network Study (SEA complete)
	Limerick City Development Plan (LCDP) 2010-2016 (SEA complete)	Limerick Metropolitan District Movement Framework Study (LCCC, 2015).
	Clare County Development Plan (CCDP) 2017-2023: [including (SEA complete)	
	Shannon Municipal District – Volume 3 (b)] (Clare CCDP)	
	Southern Environs Local Area Strategy 2011-2017 (extended to 2021) (SEA complete)	
	Shannon Town and Environs Local Area Plan 2012-2018 (SEA complete)	
Local	Strategic Integrated Framework Plan (SIFP) for the Shannon Estuary (2013-2020) (SIFP Steering Group, 2013) (SEA complete)	
	Castletroy Local Area Plan 2019-2025 (LCCC, 2019b) (SEA complete)	

Figure 1.1 Relationship between the LSMATS and other plans and programmes

1.2 Purpose of this Environmental Report

1.2.1 Strategic Environmental Assessment (SEA)

The LSMATS will influence future projects to be identified down the line but which are likely to have a significant effect on the environment, and therefore falls under the scope of the European Directive 2001/42/EC "on the assessment of the effects of certain plans and programmes on the environment" (known as the 'SEA Directive"). The SEA Directive is implemented in Ireland via the European Communities (EC) (Environmental Assessment of Certain Plans and Programmes) Regulations 2003, as amended by the EC (Environmental Assessment of Certain Plans and Programmes) (Amendments) Regulations 2011 (known as the 'SEA Regulations').

The SEA process involves the following:

- collecting and presenting information on the environmental baseline and problems, and their likely future evolution;
- predicting significant environmental effects of the Strategy or programme, including those of strategic alternatives and including cumulative effects within the Strategy and with other plans and strategies or proposed developments;
- addressing adverse environmental effects through mitigation measures;
- consulting the public and authorities with environmental responsibilities as part of the assessment process; and
- monitoring the environmental effects of the Strategy during its implementation.

1.2.2 Purpose and structure of the Environmental Report

This Environmental Report is the output of stage three of the four-stage SEA process (detailed in Table 1.1 below).

Table 1.1 Stages of the SEA process

Stage	Purpose and Requirements	Output
Stage 1: Screening	Prior to starting the SEA process, a Strategy or programme undergoes 'screening" to determine whether it requires SEA (also if SEA is to be undertaken on a voluntary basis).	SEA Screening Statement – NTA (as the responsible authority) determined that SEA would be undertaken for the LSMATS.
Stage 2: Scoping	Consideration of the context and objectives of the SEA, provides information on baseline data, identifies relevant environmental issues and trends, and defines the parameters of the scope of the SEA for the purpose of consultation.	SEA Scoping Report.
Stage 3: Identification, Prediction, Evaluation and Mitigation of Potential Effects Current Stage in the SEA	Within the context and parameters identified at the Scoping Stage, identification and evaluation of likely significant effects of the LSMATS is carried out, including consideration of alternatives and determination of measures to mitigate and monitor residual effects.	SEA Environmental Report – this report.
Stage 4: Consultation,	Consultation with statutory consultees and	SEA Statement.

Stage	Purpose and Requirements	Output
Revision and Post-Adoption	the public. This may require changes to the draft Strategy in light of responses. Statement on how the SEA and consultation process has influenced the final Strategy. The statement is required to include an environmental monitoring Strategy - this is intended to provide feedback on significant environmental effects. This will also aid any future review / revision of the LSMATS and the SEA.	Implementation of the monitoring programme.

The content of this Environmental Report is summarised in Table 1.2 below, demonstrating how each main section relates to the requirement of the SEA Regulations. This report also incorporates responses to stakeholder comments made during the scoping consultation process.

Table 1.2 Structure of this Environmental Report

Section	Description	Relevant SEA Regulation Requirement(s)
Non-Technical Summary	A summary in non-technical language of the content of the SEA Environmental Report.	Regulation 12-(1), Schedule 2 (f).
1 Background	Introduction to the LSMATS, background to the SEA process, other relevant legislative processes and the purpose of the environmental report. It also outlines the structure of the Environmental Report.	Regulation 12-(1), Schedule 2 (a).
2 Development of the LSMATS and Integration of the SEA and AA	Description of the SEA process and how it has been integrated with the LSMATS development.	Regulation 12-(1) Schedule 2 (e). Regulation 12-(1) Schedule 2 (h).
3 Relevant plans and strategies	Describes the legal and policy context of the LSMATS, including international, national and local strategies, objectives and environmental standards which may influence the LSMATS.	Regulation 12-(1), Schedule 2 (a).
4 Consultation	Describes consultation already undertaken at SEA scoping stage, as well as the approach to future consultation.	Regulation 12-(1), Schedule 2 (b). Regulation 12-(1), Schedule 2 (d). Regulation 12-(1), Schedule 2 (e).
5 Baseline and Key Environmental Issues	Describes the characterisation of the existing and predicted future environment in the study area, focusing on the key environmental constraints, issues / problems, and potential opportunities for environmental improvement.	Regulation 12-(1), Schedule 2 (b). Regulation 12-(1), Schedule 2 (d). Regulation 12-(1), Schedule 2 (e).
6 SEA Scope and Methodology	Details how the SEA process was undertaken, providing an outline of the techniques followed and legal	Regulation 12-(1), Schedule 2 (e). Regulation 12-(1) Schedule 2 (h).

Section	Description	Relevant SEA Regulation Requirement(s)
	requirements at the scoping and environmental assessment stages.	
7 Environmental Assessment of Preferred Plan and Alternatives	Assessment of the potential, reasonable alternatives to the Plan considered under each SEA topic and objective, considering the key issues scoped into the SEA. Description of how the preferred alternative was selected in light of environmental effects. Description of any SEA mitigation recommended in light of the assessment undertaken on the preferred alternative.	Regulation 12-(1), Schedule 2 (a). Regulation 12-(1), Schedule 2 (b). Regulation 12-(1), Schedule 2 (h). Regulation 12-(1) (g).
8 Monitoring Programme	Provides a synopsis of the statutory SEA monitoring proposals.	Regulation 12-(1) (i).

1.2.3 Appropriate Assessment (AA)

In addition to compliance with the SEA Directive, the preparation and implementation of the LSMATS must meet the provisions of the EU Habitats Directive (92/43/EEC) and transposing regulations (European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011)) (Birds and Natural Habitats Regulations 2011).

The Habitats Directive requires that:

"Any Strategy or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the Strategy or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public. (EU Habitats Directive, Article 6-(3))".

This process has four stages:

- Stage 1: Screening for AA/Test of Significance — the process which identifies the likely impacts upon a European site from a project or plan, either alone or in-combination with other projects or plans and considers whether these impacts are likely to be significant.
- Stage 2: Appropriate Assessment — the consideration of the impact on the integrity of the European site from the project or plan, either alone or in-combination with other projects or plans, with respect to the site's structure and function and its Conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts.
- Stage 3: Assessment of Alternative Solutions — the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site. All reasonable alternatives must have been considered and assessed, and the least damaging option selected, to progress to Stage 4.
- Stage 4: Imperative Reasons of Overriding Public Interest (IROPI)/Derogation – Assessment where no alternative solutions exist, and adverse impacts remain. Assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed.

The requirements as stipulated in the Habitats Regulations are considered in Appendix A.

2. SEA process

2.1 LSMATS scope and content

2.1.1 Scope of the LSMATS

The LSMATS considers all land transport modes, with the objective of providing a long-term strategic planning framework for the integrated development of transport infrastructure and services in the LSMA. It will be used to inform transport investment priorities over the short and long term and will inform sustainable integrated land use and transport policy formulation at the metropolitan and local level.

The draft LSMATS has been developed by the NTA in collaboration with LCCC, CCC and Transport Infrastructure Ireland (TII). It has also been informed by pre-consultation submissions from a number of stakeholders.

The LSMATS represents:

- the transport sector's response to the LSMA's requirements in relation to climate change;
- an integrated transport strategy for walking, cycling, bus, rail and road to support planned growth up to 2040;
- a strategy to facilitate compact growth;
- a framework for the planning, investment and delivery of transport infrastructure and services to guide the LSMA's development up to 2040 in line with the National Planning Framework 2040, National Development Plan 2018-2027 and the Regional Spatial and Economic Strategy for the Southern Region;
- a flexible strategy with the ability to scale up public transport capacity and frequencies as necessary in response to changing circumstances; and
- a framework plan with which other agencies involved in land-use planning, environmental protection and the delivery of other infrastructure and services such as water, housing and community facilities can align their plans and investment priorities.

Each of the considerations below are included within the draft LSMATS:

- public transport infrastructure and service proposals (rail and bus);
- measures to facilitate and promote walking;
- measures to facilitate and promote cycling, including cycling infrastructure;
- traffic management policies including potential changes to traffic circulation in Limerick City centre;
- demand management measures including policies related to parking and tolling;
- behavioural change measures;
- measures to promote integration between all modes;
- policies related to the management of freight; and
- road infrastructure.

2.1.2 Geographical scale of the LSMATS

The geographical area of the LSMATS has been defined by the Department of Housing, Planning and Local Government (DHPLG) to include the continuous built-up area of Limerick City and Suburbs (as defined by the CSO) and Shannon in Co. Clare (see Figure 2.1). It also includes the following settlements;

- Annacotty;
- Castleconnell;

- Patrickswell;
- Clarina;
- Mungret in County Limerick;
- Sixmilebridge;
- Ardnacrusha;
- Clonlara;
- Cratloe;
- Ballycannan; and
- Bunratty in County Clare.

The population of the LSMA is over 132,420 (CSO, 2016) and covers 387km^2.

Limerick City is the largest urban centre in Ireland's Mid-West region and the country's third largest city. Shannon is a significant employment centre with assets such as Shannon International Airport and Shannon Free-Zone international business park. Limerick City and Shannon are interdependent upon each other, with their complementary functions contributing to a combined strength which is a key economic driver for the Mid-West Region.

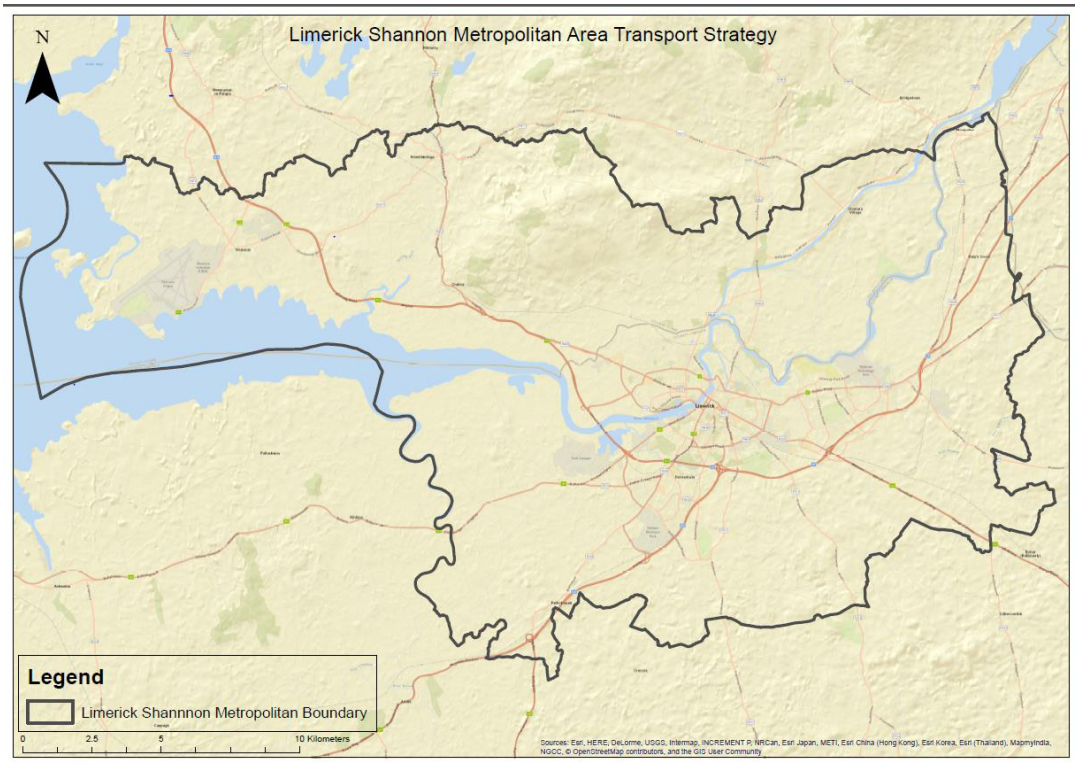


Figure 2.1 Limerick Shannon Metropolitan Area Boundary

Limerick City is home to two major third-level education institutions, University College Limerick (including Mary Immaculate College) which is located to the north-east of the City Centre and Limerick Institute of Technology (including Limerick School of Art and Design) which is located to the west of the City Centre. The City and its Metropolitan Area is served by commuter and intercity rail services; city, regional and expressway bus/ coach services; and Shannon International Airport is located approximately 20km to the north-west of the City Centre.

Existing public transport services are discussed in more detail in Section 5.3.3 of this report.

2.1.3 Temporal scope of the LSMATS

The LSMATS provides a strategic vision for transport within the LSMA between 2020 and 2040. Taking this into account and in line with the SEA Directive, short, medium and long-term impacts (including reference to secondary, cumulative, synergistic, permanent and temporary, positive and negative effects) will be considered during the assessment.

2.1.4 Development of the LSMATS and integration of the SEA and AA

Figure 2.2 below outlines the key stages of the development process for the LSMATS and illustrates how the SEA and AA processes have been integrated throughout. The development and assessment of transport options utilised the Mid-West Regional Model (MWRM) appraisal toolkit, which aligns with the DTTaS Common Appraisal Framework (CAF) (DTTaS, 2016).

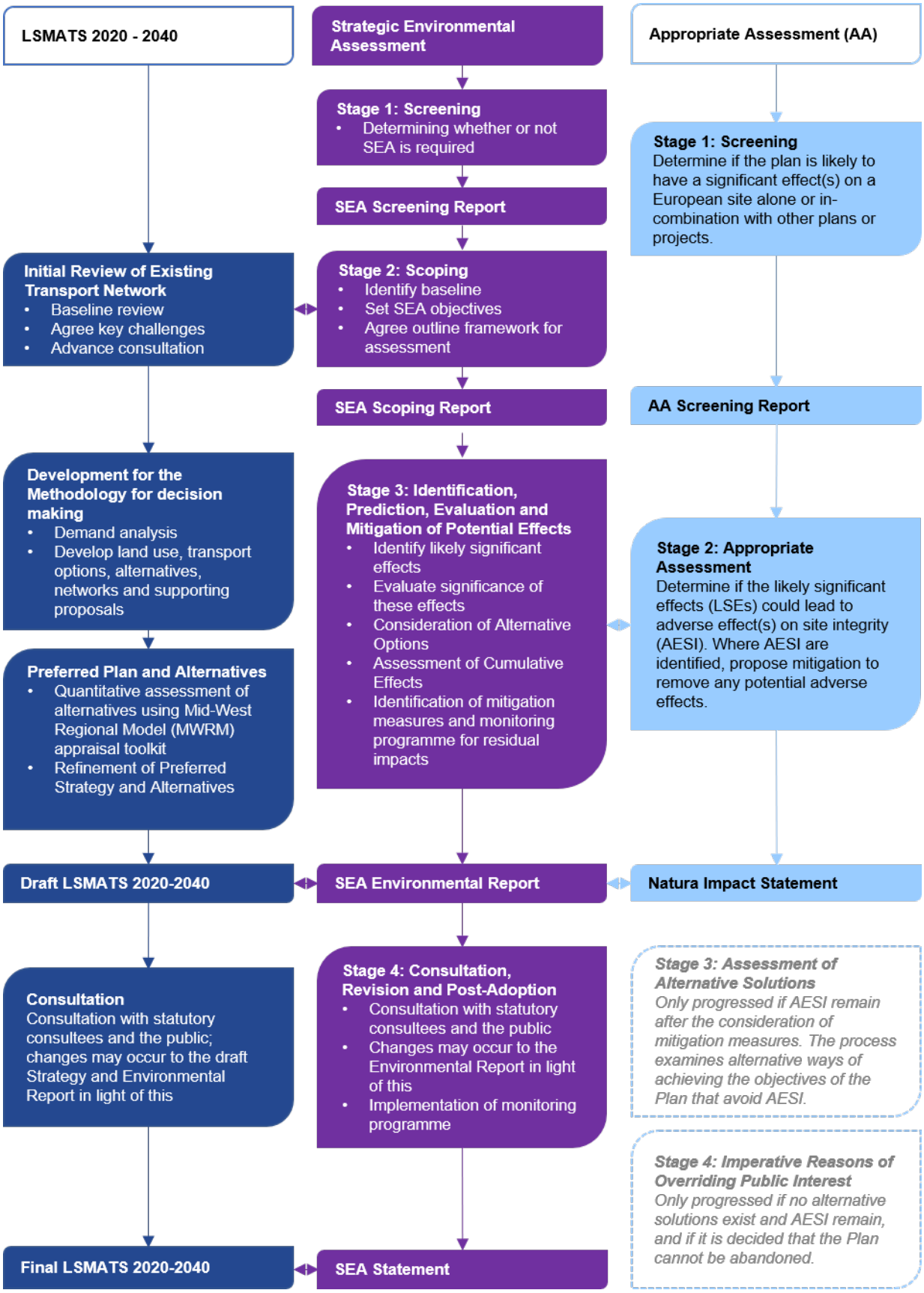


Figure 2.2 Development of the LSMATS and Integration of the SEA and AA

3. Review of Plans, Programmes and Policies

SEA requires a review of other plans, policies and programmes to ensure that the relationship with these other documents and requirements is explored and evaluated. A review of legislation, policies, plans and programmes (PPP review) was undertaken at the scoping stage and documented in the Scoping Report. Key policies plans and programmes of relevance to the Strategy are listed in Table 3.1 below, with additional detail regarding the most relevant national, regional and local strategies and plans provided in Appendix B

Table 3.1 Summary of the Plan, Policy and Programme Review

SEA Theme	Plans, Policy and Programmes
All Aspects	▪ EU Sustainability Policy; ▪ UN Sustainable Development Goals ▪ National Implementation Plan for Sustainable Development Goals; ▪ Strategic Environmental Directive (2001/42/EC) and associated Irish legislation; ▪ Environmental Impact Assessment Directive (2014/52/EU) and associated Irish legislation; ▪ EC Environmental Liability Directive (2004/35/EC); ▪ Ireland 2040: Our Strategy - National Planning Framework; ▪ Regional Spatial and Economic Strategies (RSES) (see Appendix B for further detail); ▪ County and City Development Plans (see Appendix B for further detail); ▪ National Planning and Development Act 2000 (as amended); ▪ Planning and Development Regulations 2001 (as amended); ▪ Smarter Travel – A Sustainable Transport Future; and ▪ National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland.
Population, Economy and Human Health	▪ Aarhus Convention; ▪ Healthy Ireland Framework; ▪ Strategic Framework for Investment in Land Transport; ▪ Capital Investment Strategy 2016 – 2021; ▪ National Development Strategy 2018 – 2027; and ▪ Development Plans and Local Area Plans.
Tourism and Recreation	▪ EU Tourism Policy; ▪ National Countryside Recreation Strategy; ▪ Tourism Policy Statement; ▪ Tourism Action Strategy 2016-2018; and ▪ County-based recreation strategies.
Biodiversity, Flora and Fauna	▪ International and EU Conventions; ▪ EU Biodiversity Strategy, 2011; ▪ The Habitats Directive (92/43/EEC); ▪ The Birds Directive (2009/147/EC); ▪ Wildlife Act 1976 – 2010; ▪ European Communities (Birds and Natural Habitats) Regulations 2011 as amended; ▪ Other National Biodiversity related regulations;

SEA Theme	Plans, Policy and Programmes
	▪ National Biodiversity Action Plan; ▪ All Island Pollinator Plan; and ▪ County and City Heritage Plans.
Landscape and Visual Amenity	▪ European Landscape Convention (ELC); ▪ A National Landscape Strategy (NLS) for Ireland; and ▪ County Landscape Character Assessments.
Cultural Heritage (Archaeological and Architectural)	▪ EU Conventions on Archaeological, Architectural and cultural heritage; ▪ Planning and Development Acts; ▪ Heritage Act; ▪ National Monuments Act; ▪ Architectural Heritage and Historic Monuments Act; and ▪ County Heritage Plans.
Geology and Soils	▪ Planning and Development Act; and ▪ Action Strategy for Rural Development.
Air Quality	▪ Ambient Air Quality and Cleaner Air for Europe (CAFÉ) Directive (2008/50/EC); ▪ Environmental Protection Agency Act 1992 to 2007; ▪ Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011); ▪ National Clean Air Strategy; and ▪ National Air Pollution Control Programme.
Noise and Vibration	▪ Noise Directive (2002/49/EC); ▪ Environmental Noise Regulations (S:I. No. 140/2006); ▪ Environmental Protection Agency Act 1992 to 2007; and ▪ Local area Noise Action Plans (see Section 5.10 and Appendix B for further detail)/
Water Environment	▪ Water Framework Directive (2000/60/EC); ▪ draft River Basin Management Plan for Ireland 2018-2021; ▪ Floods Directive (2007/60/EC); ▪ Marine Strategy Framework Directive (2008/56/EC); ▪ Groundwater Directive (2006/118/EC); ▪ Transposing Regulation for the above Directives; ▪ Draft Flood Risk Management Plans; and ▪ The Planning System and Flood Risk Management – Guidelines for Planning Authorities (the 'FRM Guidelines').
Land Use and Material Assets	▪ Ireland 2040: Our Strategy - National Planning Framework; ▪ Regional Planning Guidelines; ▪ County and City Development Plans (see Appendix B for further detail); ▪ Local Area Plans (see Appendix B for further detail); ▪ Waste Framework Directive (2008/98/EC); ▪ Capital Investment Strategy 2016-2021; ▪ Waste Management Acts 1996 – 2005; ▪ Regional/County-based waste management strategies and mineral plans; ▪ Smarter Travel "A New Transport Policy for Ireland" 2009-2020; ▪ 2030 Rail Network Strategy;

SEA Theme	Plans, Policy and Programmes
	▪ NRA National Secondary Road Needs Study (2011); and ▪ Sectoral Strategy for Accessible Transport; Transport Access for All 2006.
Climate Change	▪ The Kyoto Protocol; ▪ Paris Agreement 2015; ▪ EU Energy and Climate (2020) Package 2009; ▪ The Climate Action and Low Carbon Development Act 2015; ▪ Climate Change Adaptation Framework ▪ Ireland's National Policy Position on Climate Action and Low Carbon Development (2014); ▪ Energy White Paper: Delivering a Sustainable Energy Future for Ireland – The Energy Policy Framework 2007-2020; ▪ National Renewable Energy Action Plan; ▪ National Energy Efficiency Action Strategy (2009-2020) (DCENR, 2009); ▪ Ireland's Second National Energy Efficiency Action Strategy to 2020 (DCENR, 2012); ▪ National Climate Action Plan 2019; ▪ Draft National Energy and Climate Plan 2021-2030; ▪ Draft Climate Change Adaptation Plan for the Transport Sector; and ▪ Local area climate adaptation strategies.

4. Consultation

4.1 Consultation to Date: Scoping

The Limerick Shannon Metropolitan Area Transport Strategy 2040 (LSMATS or the 'Strategy') has been developed by the National Transport Authority in collaboration with Limerick City and County Council, Clare County Council and Transport Infrastructure Ireland (TII). It has also been informed by pre-consultation submissions from a number of stakeholders.

In line with Article 9 (5) of the SEA Regulations (S.I. No. 435 of 2004), this SEA Scoping Report was made available to the following statutory Environmental Authorities for consultation for a four week period between 10 September and 11th October 2019.

- Environmental Protection Agency (EPA);
- Department of Department of Housing, Planning and Local Government (formerly the Department of Environment, Community and Local Government);
- Department of Culture, Heritage and Gaeltacht;
- Department of Agriculture, Food and the Marine; and
- Department of Communications, Climate Action and Environment.
- The following interested parties were also consulted:
- Geological Society for Ireland (GSI).

Responses received specific to the SEA Scoping Report are provided in the table below.

Table 4.1 SEA scoping consultation responses and actions taken

Consultee	Response	Actions taken
GSI	Data for mineral occurrences, bedrock/mineral exploration groundwater/site investigation boreholes, karst features, wells and springs is available on our website and map viewer and should be considered within the SEA baseline.	Datasets made available by GSI have been reviewed and included within the baseline and assessments where appropriate.
EPA	Suggested amendments to SEOs relating to biodiversity and cultural heritage to include objective to "maintain" current status, and to climate mitigation SEO to "contribute to the reduction in GHG emission associated with transport".	SEOs amended in accordance with EPA comments.
	Climate mitigation / emissions reduction needs further consideration as part of the SEA and in preparing the Strategy.	Climate mitigation and energy use is identified as a key issue in the Scoping Report and section 5.13.4 of this report. One of the Strategic Environmental Objectives (SEOs) against which the Strategy has been assessed in "Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or

Consultee	Response	Actions taken
		operation of existing and new transport networks, modal changes or new technologies."
	Where it is envisaged that measures proposed in the Strategy will be implemented via other plans this should be reported in the SEA. Where specific measures will be implemented directly, further detail should be provided in the Environmental Report and Strategy on the relevant environmental assessments to be carried out at the project stage and relevant mitigation measures to be applied, as appropriate.	Where mitigation for measures supported under the LSMATS is required to be identified through lower tier environmental assessment work and project approvals, this is indicated within the monitoring plan provided in Chapter 8.
	The scope and remit of the Strategy, where it sits in the transport planning hierarchy and how it will be implemented, should be clearly set out.	A diagram showing relationship between LSMATS and related plans and programmes is provided in Section 1.1.1.
	A figure should be provided showing the study area for the SEA.	Figure 5.1 (section 5) shows the study area for the SEA.
	Socioeconomics should not be considered within the scope of the SEA.	Direct reference to socioeconomics has been removed from the SEA criteria. However, there are very well established links between social and economic inequalities and health inequalities, and therefore the socioeconomic context of the study area and impact of the LSMATS on the local and regional economy are considered important to the SEA.
	The Article 7 report (NPWS, 2019) and third National Biodiversity Plan (2021-2030) (NPWS, 2017) should be referenced within the biodiversity baseline.	The baseline now considers information provided within these reports.
	National and regional level commitments with respect to landscape and visual amenity within the National Planning Framework and the Southern Regional Assembly Regional Spatial and Economic Strategy should be considered within the landscape baseline.	These commitments are now referenced within the landscape baseline.
	National Policy Objective 65 to "Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and	NPF guidance is now referenced within the baseline.

Consultee	Response	Actions taken
	Noise Action Plans" should be referenced in the noise baseline.	
	A number of additional plans and policies were identified as requiring inclusion within the baseline, such as the Shannon Foynes Integrated Framework Plan, Shannon Foynes Port Company Masterplan, county and regional Greenway strategies, Local Economic and Community Plans for local authorities and recent tourism plans/programmes under preparation by Fáilte Ireland.	The SEA Scoping Report baseline was updated with relevant plans and policies identified through initial feedback from the EPA. Plans and policies published since late 2019 have now been included within the plans, programmes and policies review and baseline as appropriate.
Department of Culture, Heritage and Gaeltacht	The SEA should consider potential impacts on underwater archaeology.	Given the nature of the LSMATS, very limited potential for impacts are considered likely. However, SEA mitigation recommendations include the requirement for lower tier assessment of potential impacts on archaeology where development outside the existing highway boundary is proposed and this assessment would include impacts on underwater archaeology.

4.2 Current Consultation

The formal consultation period for the draft LSMATS and SEA Environmental Report is now underway. A copy of the draft LSMATS and this SEA Environmental Report has been made available online and in some public offices. It is anticipated that the final LSMATS will be completed by Q4 2020.

5. Baseline and Key Environmental Issues

5.1 Introduction

This chapter describes the baseline environment of the study area. The baseline is simply the situation or current conditions, which provides a benchmark against which the predicted environmental effects are assessed. This Section also outlines future trends and the potential evolution of the baseline in the absence of the LSMATS. The baseline information sources are referred to and any key additional data or information which will be required for environmental assessment. Key issues from the baseline review considered relevant to transport development at this strategic scale are also identified.

Information provided in this chapter is based on readily available baseline data from web-based searches and Geographic Information Systems (GIS).

The NPF 2018 is referenced throughout the report. The key trends expected in Ireland are outlined. The NPF sets out the objectives supporting Ireland's long term economic, environmental and social progress for all parts of the country. These objectives are:

- "Guide the future development of Ireland, taking into account a projected 1 million increase in our population, the need to create 660,000 additional jobs to achieve full employment and a need for 550,000 more homes by 2040;
- 25% of growth is planned for Dublin, recognised as our key international and global city of scale and principal economic driver;
- 25% growth across the other four cities combined (Cork, Limerick, Galway and Waterford), enabling all four to grow their population and jobs by 50-60%, and become cities of greater scale, i.e. growing by twice as much as they did over the previous 25 years to 2016;
- With the remaining 50% of growth to occur in key regional centres, towns, villages and rural areas, to be determined in the forthcoming regional plans – Regional Spatial and Economic Strategies (RSESs);
- Enable people to live closer to where they work, moving away from the current unsustainable trends of increased commuting;
- Regenerate rural Ireland by promoting environmentally sustainable growth patterns;
- Plan for and implement a better distribution of regional growth, in terms of jobs and prosperity;
- Transform settlements of all sizes through imaginative urban regeneration and bring life / jobs back into cities, towns and villages; and
- Co-ordinate delivery of infrastructure and services in tandem with growth, through joined-up NPF/National Investment Strategy and consistent sectoral plans, which will help to manage this growth and tackle congestion and quality of life issues in Dublin and elsewhere."

Reference has also been made to the EPA's State of the Environment Report published in November 2016. This report provides:

- An assessment of the overall quality of Ireland's environment;
- An outline of the pressures being placed on this environment; and
- The key actions that can address these pressures

The EPA State of the Environment Report recognises the importance of the natural environment and that the overall quality of Ireland's environment is good. However, the report also acknowledges that many environmental issues such as air quality and water pollution can be more localised and can be subject to masking by the national level assessments and that the environment faces many challenges, particularly as the economy begins to grow (EPA, 2016).

Sources for the baseline environment within LSMA include the Limerick County Development Plan (DP) 2010 - 2016 (as varied and extended), Limerick City Development Plan (DP) 2010 - 2016 (as varied and extended), the Strategic Integrated Framework Strategy for the Shannon Estuary (SIFS) 2013 – 2020 and County Clare Development Plan (CDP) 2017 – 2023 (as varied).

5.2 SEA study area

The study area for the SEA is defined by the geographical area of the LSMATS, incorporating Limerick City and Suburbs, Shannon in County Clare, and the settlements outlined above in Section 2.1.2. Potential impacts on European and International designated sites located within 15 km of the geographical area of LSMATS will also be considered. The LSMATS and a15km buffer area which constitute the study area for the SEA are shown in Figure 5.11.

5.3 Population and Human Health

5.3.1 Population

The LSMA was estimated to have a population of 132,420 in 2016, which represents an increase of 2.7% since 2011, when the total population was 128,947. Data indicates that the increase is larger in the urban areas (i.e. growth is 2.9% in Limerick City and Suburbs and 3.5% in Shannon) than in the rural areas where growth was under 2% (see Table 5.1).

Table 5.1 Breakdown of Limerick Shannon Metropolitan Area Population

Area	2011 Population	2016 Population	2011-16 Growth
Limerick City and Suburbs	96,761	99,548	2.9%
Limerick County Rural Areas	11,260	11,398	1.2%
Shannon	10,085	10,442	3.5%
Clare County Rural Areas	10,841	11,032	1.8%
Total	128,947	132,420	2.7%

Figure 5.1 shows that the geographical breakdown of the population is uneven in the LSMA, with three quarters of all residents living in the Limerick City and Suburbs area, and only 17% of the population living in the rural areas of Clare and Limerick Counties.

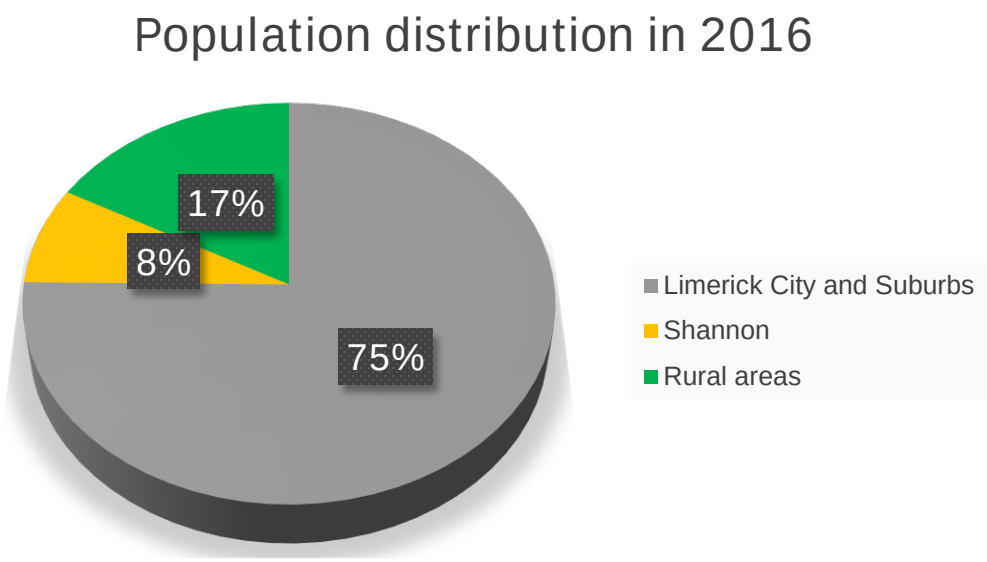


Figure 5.1 Population Percentage Breakdown – LSMA

Population density by CSO Small Area has been mapped for the LSMA as shown in Figure 5.1. The map shows significantly higher population density within Limerick City centre and Dooradoyle and to a lesser extent within Shannon.

The graphics below present the distribution of jobs within the LSMA. Figure 5.2 shows total number of jobs per CSO-defined Small Area and Figure 5.4 shows job density per small area.

Across the wider LSMA area, the most notable concentrations of employment are within Limerick City centre and Shannon, particularly around the International Airport, the town centre and Business Park. Specific locations that are source of high jobs densities within Limerick include Saint Camillus Hospital, University Maternity Hospital Limerick, Limerick Institute of Technology and the Mid-Western Regional General Hospital.

There are also significant clusters of employment to the north-east of Limerick City in the general University of Limerick and the wider Castletroy/ Annacotty area. To the south-west, the Raheen Business Park and University Hospital are complemented by retail and local government functions at Dooradoyle. These are followed by smaller employment clusters along the South Circular Road, O Connell Avenue and the N69 primarily at Docklands Business Park. There are employment clusters to the south-west of the city at a number of light industrial parks and out-of-town retail parks at Limerick One and Parkway Shopping Centres near Garryowen.

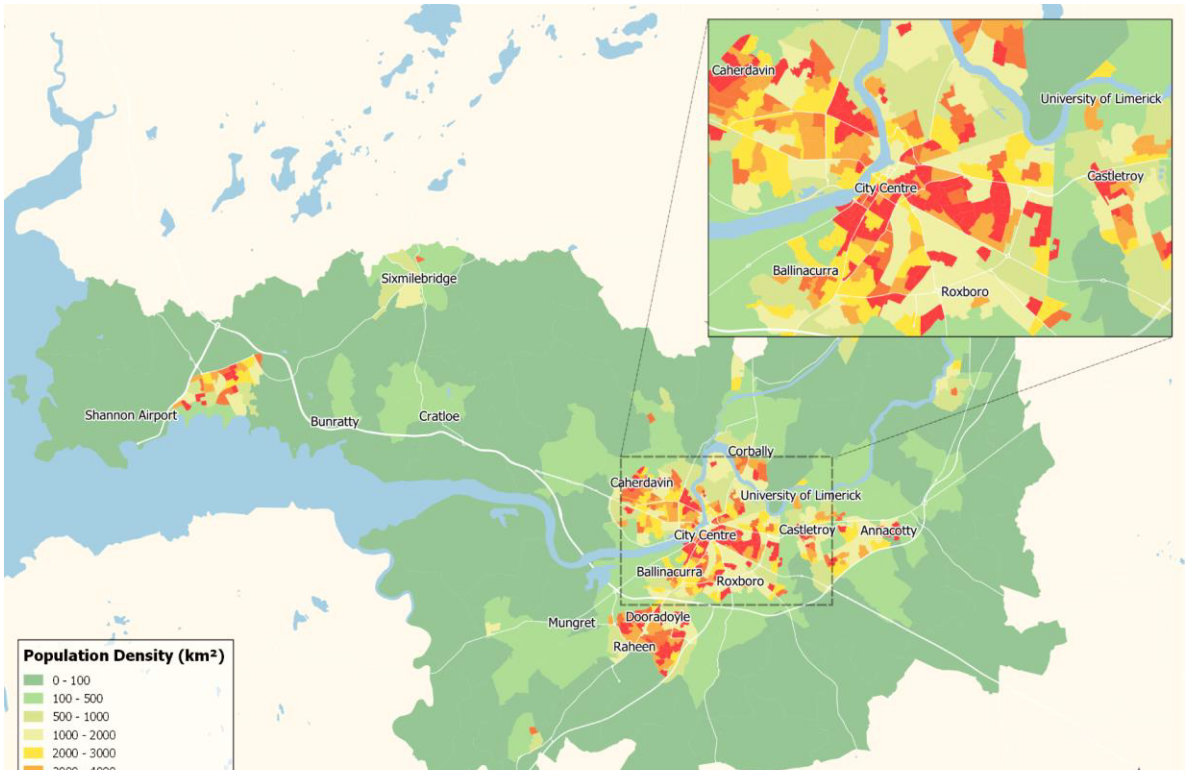


Figure 5.3 Limerick and Shannon Metropolitan Area 2016 Population density (per square kilometre)

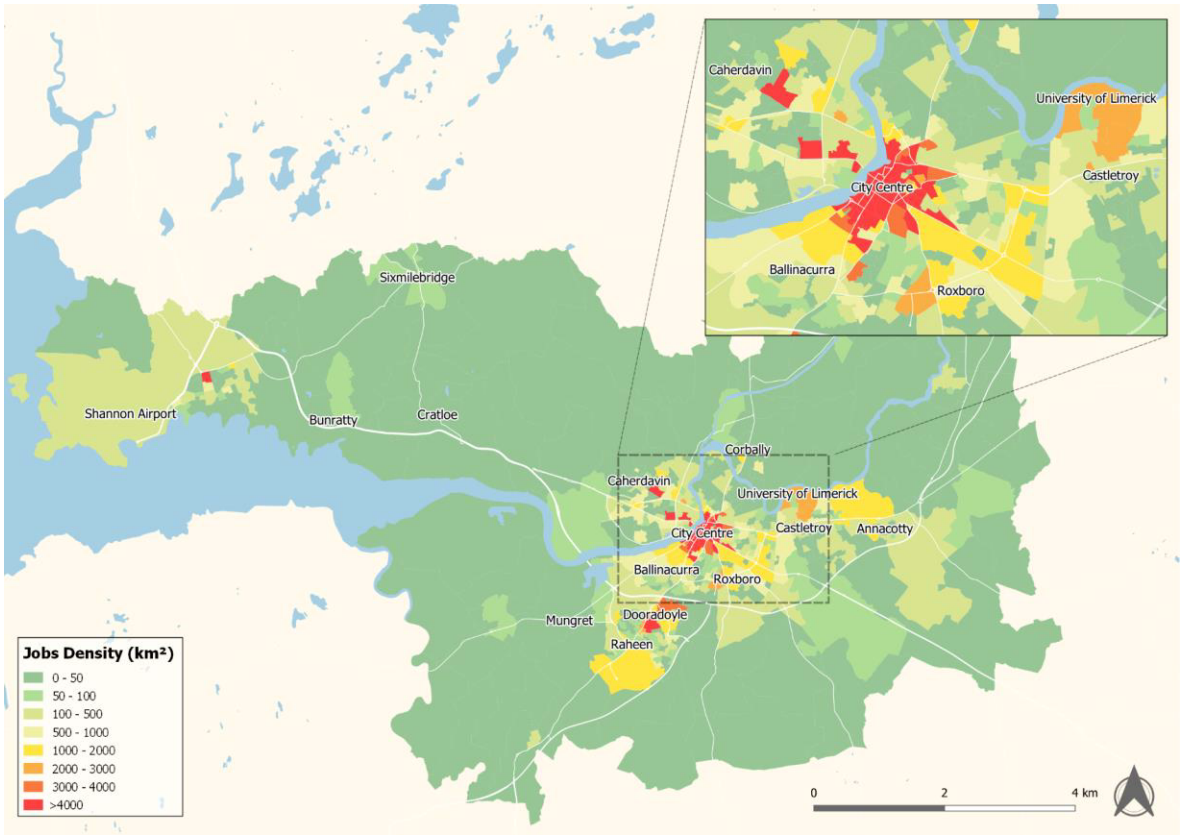


Figure 5.2 Limerick and Shannon Metropolitan Area 2016 Jobs per CSO Small Area

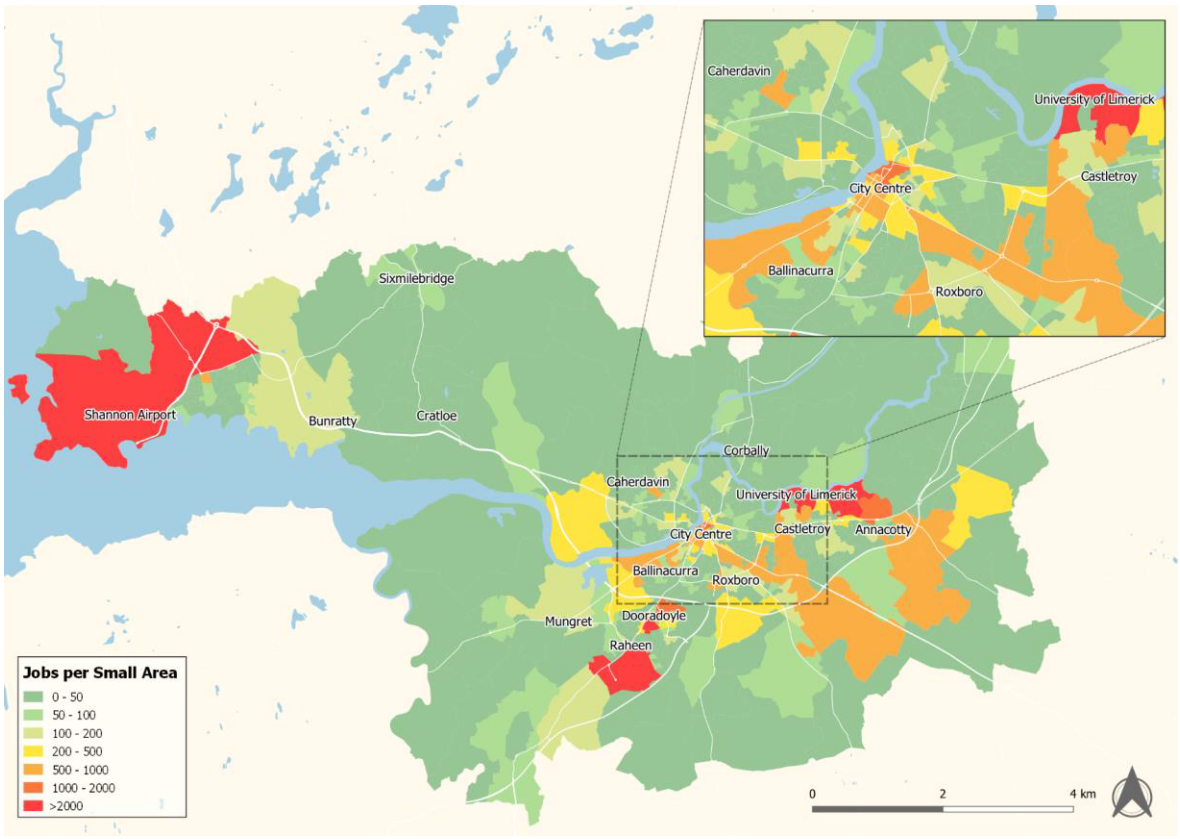
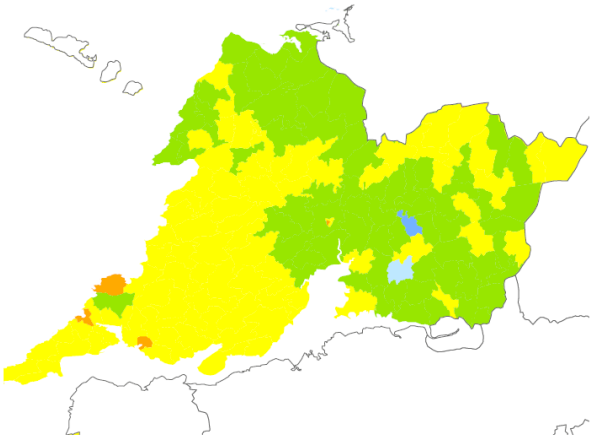


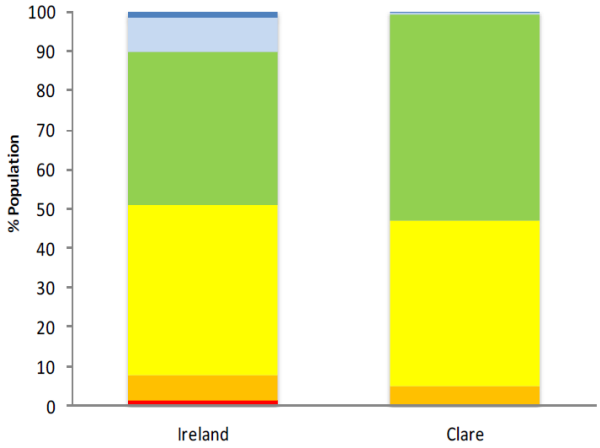
Figure 5.4 Limerick and Shannon Metropolitan Area 2016 Jobs Density (per square kilometre)

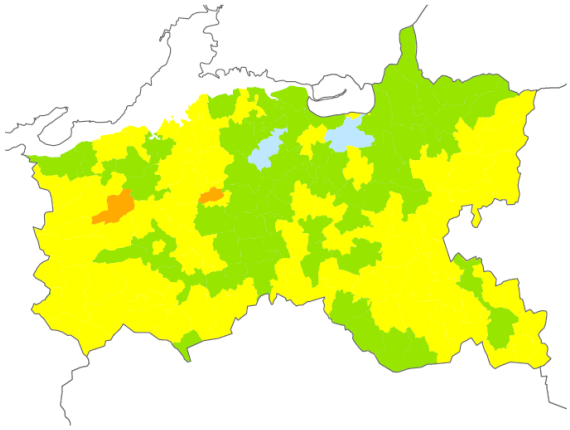
The area formerly known as Limerick County is the eighth most affluent local authority area nationally with 54% of the population either being marginally above average affluence or affluent, and County Clare is the thirteenth most affluent local authority. Neither local authority area contains any areas that are classed as “Very Disadvantaged” as illustrated in Figure 5.5.

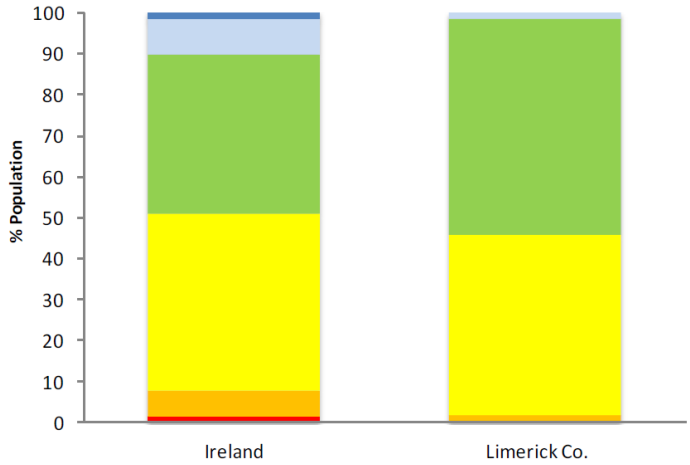
Levels of deprivation by Electoral Divisions



The percentage of the population in this area compared to Ireland who live within levels of deprivation and affluence.







Very disadvantaged
Disadvantaged
Marginally below Average
Marginally above Average
Affluent
Very Affluent

Figure 5.5 Levels of Deprivation compared to Ireland for County Clare, and County Limerick (County Health Profiles; Health Service Executive (HSE), 2015)

The area formerly known as Limerick City however is the most deprived local authority area nationally with 36.8% of its population being classed as either “very disadvantaged” or “disadvantaged” as shown on

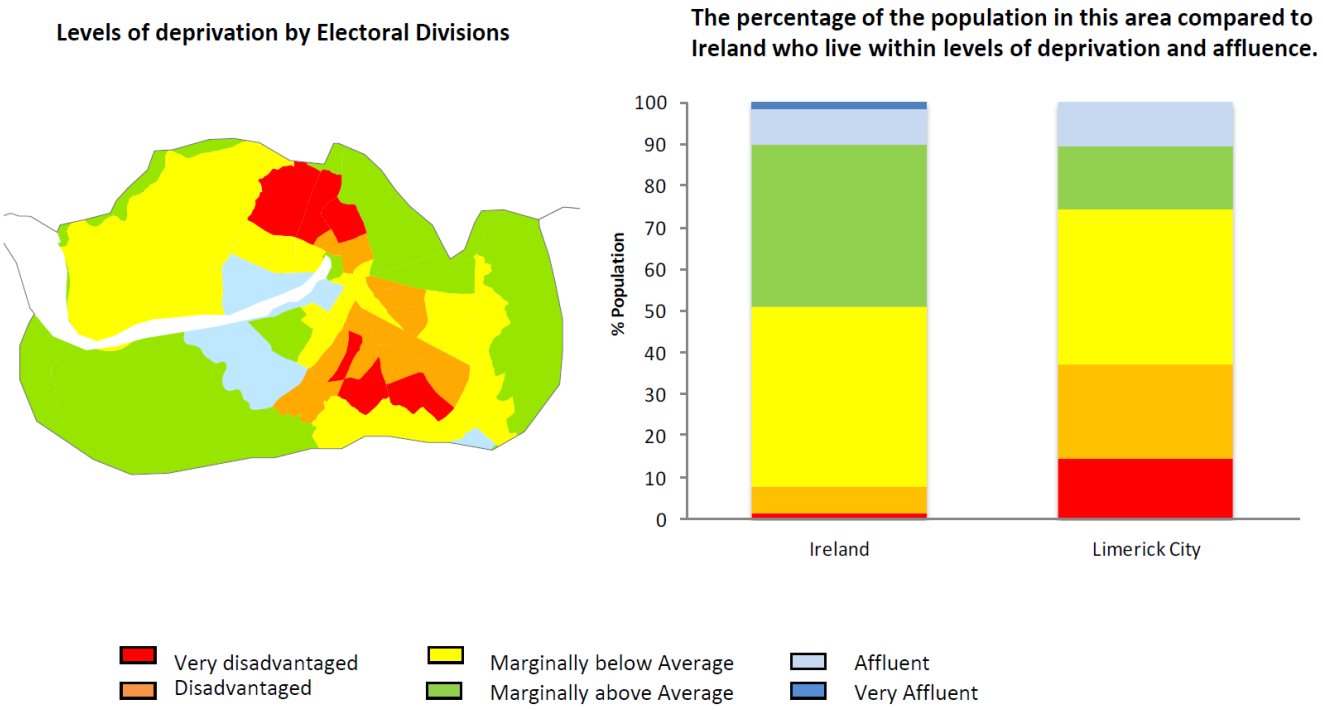


Figure 5.6 below.

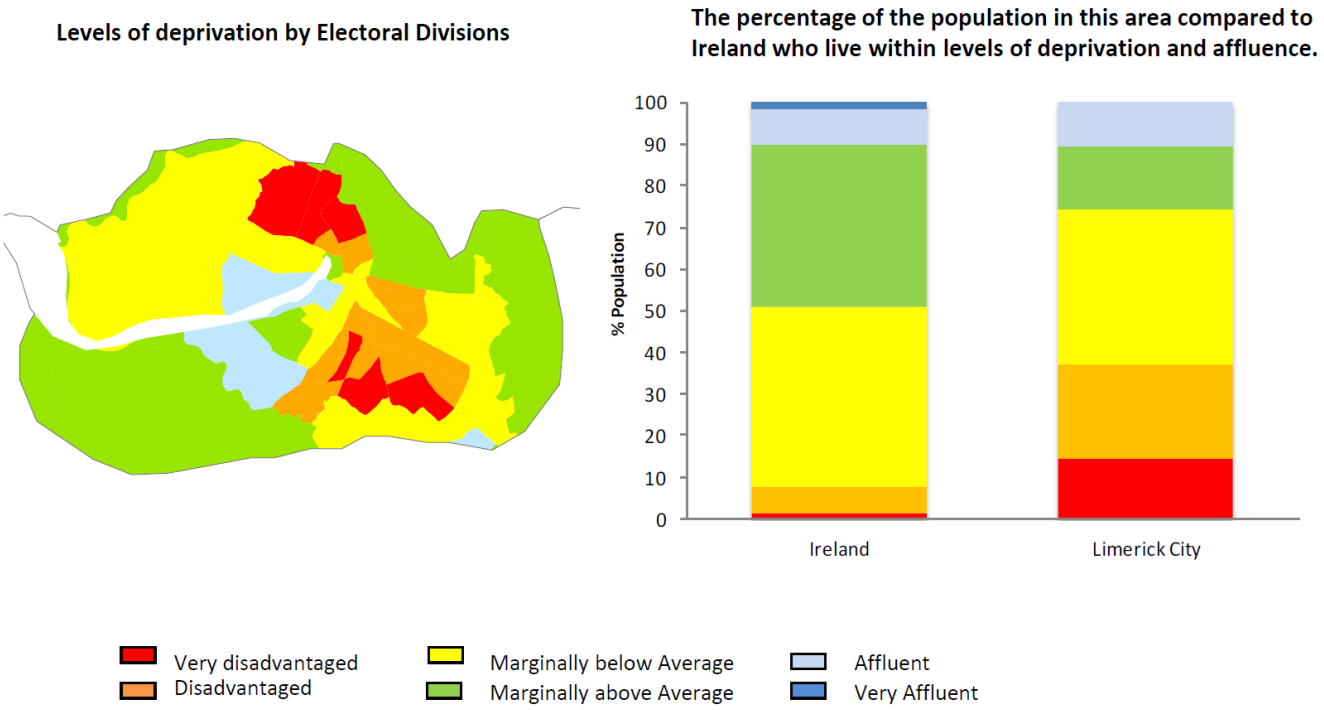


Figure 5.6 Levels of Deprivation compared to Ireland overall for Limerick City (County Health Profiles; Health Service Executive (HSE), 2019)

5.3.2 Human Health

Environmental Health & Wellbeing (EPA, 2016)

Air quality in Ireland is generally of an acceptable standard. Currently, we are not in exceedance of any EU legislative or target values. However, when compared with the more stringent WHO guideline values and EEA reference level values, ozone, particulate matter and PAHs emerge as pollutants of concern in the short term, while NO_2 is expected to increase as our road networks become more congested.

The health of the population within Ireland is generally "Good" to "Very Good" based on the Healthy Ireland Survey 2016, published by the Department of Health as part of the Healthy Ireland Framework.

84% of the population aged 15 and older perceived their health to be in "very good health", whilst just 3% perceived themselves to be in "bad health" or "very bad health". 28% indicate that they have a long-standing illness or health condition and 10% of people indicated a mental health problem (Department of Health, 2016). The 2016 Census data indicates that 13.5% of the population have a disability, with the vast majority being over 85 years old. The number of young people (under the age of 24) with a disability increased in the last 5 years, whilst all other age groups decreased (CSO, 2016).

The area formerly defined as Limerick City however is the most deprived nationally, and the HSE Health Profile for the area presents the following key facts in relation to Limerick City:

- "Has the fourth lowest dependency ratio nationally of 45.1% i.e. the number of those aged 0-14 and 65 and over as a percentage of the number of persons aged 15-64 (national 49.3%);
- Is the most deprived local authority area nationally - 36.8% of its population are either very disadvantaged or disadvantaged;
- Has above average of lone parent households of 13.7% (national 10.9%) and the highest national birth rate to mothers under the age of 20 of 24.1% (national 12.3);

- Has above average levels of those who stated they had bad or very bad health of 2.6% (national 1.5%) and those with a disability of 18.2% (national 13.0%);
- Has the lowest breast-feeding rate nationally of 32.4% (national 46.6%);
- Has above average mortality rates for all causes and for the four major causes of death (City and County data); and
- Has above average suicide rate and the highest rates nationally for female and male self-harm, but below average psychiatric in-patient admission rates".

The impact of road traffic injuries and fatalities is the most obvious and direct link between transport and health. The Road Safety Authority (RSA) reported that a total of 157 people lost their lives in 2017, which was a 15% decrease on 2016 figures. This included a 14% decrease in pedestrian deaths and a 9% decrease in motorcyclist deaths. During the same period there was a 50% increase in cyclist deaths. Statistics on non-fatal injuries as a result of a road traffic accidents are not available for 2017.

The CSO Transport Omnibus 2017 reports on trends in road safety and road lengths within Ireland from 2010 to 2016 (Figure 5.7). In 2016 there were 7,710 accidents, which was a decrease of around 7% from 2010 figures, when 8,270 accidents were recorded. The greatest decrease was in all car accidents (down by approximately 19%) and the highest increase was in pedal cyclist injuries which went up 133% in six years from 399 in 2010 to 932 in 2016 (CSO, 2016c). Pedestrian accidents also increased during the same period by 11% from 923 to 1027.

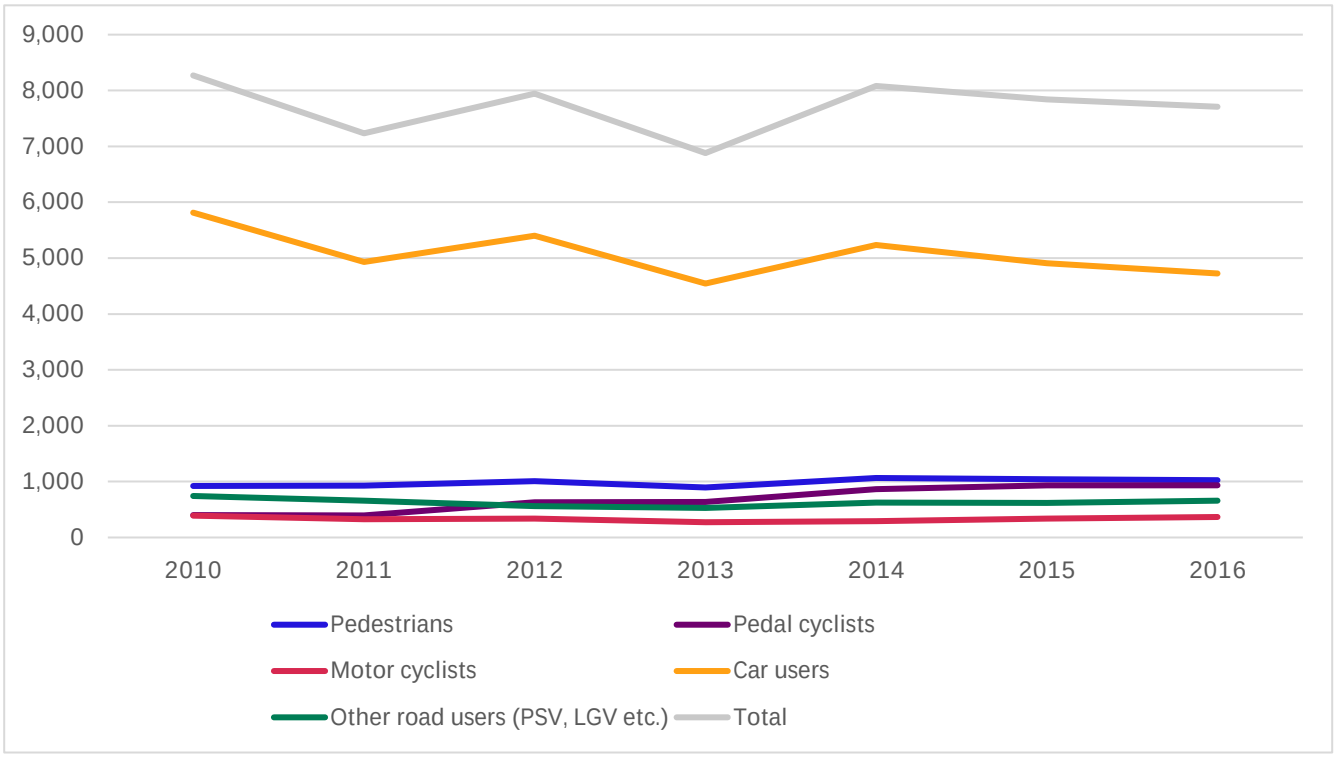


Figure 5.7 Number of persons injured in Ireland classified by road user type, 2010 – 2016

Road traffic accidents can also have an indirect effect on the entire community when these events occur, through changing people's perceptions of safety. The Institute of Public Health in Ireland (2011) suggests that road traffic injuries can lead to long term psychiatric consequences for individuals involved in accidents.

Aside from road traffic injuries and fatalities, transport is known to influence human health in a number of other ways. There are many disadvantaging health impacts associated with transport such as stress and anxiety, the risk of accident constraints to mobility, access and independence and air and noise pollution (Institute of Public Health in Ireland, 2011). Air pollution and noise is a key public health issue related to transport. The transport

sector accounted for 12% of all air pollutant emission in 2015. The predominant health impacts from transport are from particulate matter and nitrogen oxides emissions, contributing to cardiovascular disease, lung disease and heart attacks which points to a clear need to reduce transport-related pollution emissions. Excessive noise can seriously harm human health, including mental health, and interfere with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour (EPA, 2016). Air pollution and noise from transport is discussed in more detail in Section 5.9.

Commuting can significantly impact health and wellbeing. Research has shown that long commutes can reduce mental and physical health and wellbeing, by raising blood pressure as well as reducing free time, for physical activity and personal time. Therefore, the Institute of Public Health in Ireland are promoting active travel as much as possible. Activities such as walking, and cycling have many benefits including a reduction in mortality, death from obesity and obesity related diseases such as cardiovascular diseases, and certain type of cancers, and also improves mood and quality of life. In addition to this a greater shift to active travel can help reduce air and noise pollution, and road traffic accidents (Institute of Public Health in Ireland, 2011).

5.3.3 Transport / Access

Transport Infrastructure is considered a key component for sustainable economic development in modern economies in terms of:

- linking people to jobs;
- delivering products to markets;
- underpinning supply chains and logistics networks; and
- facilitating domestic and international trade.

The LSMATS Baseline Conditions and Policy Context Report (Jacobs, 2019b) details several recent improvements to the transport supply within the LSMA in recent years including:

- construction of Limerick Tunnel crossing River Shannon;
- improvements to the transport infrastructure and bus routes in Limerick;
- redevelopment of Colbert Station and Plaza;
- development of Limerick Smarter Travel walk and cycleway from UL to City Centre;
- improvements to the cycle network from Mungret to Limerick City;
- development of the Rhebogue Neighbourhood Greenway;
- implementation of Limerick Public Bicycle Sharing Scheme (BSS); and
- improvements to the River Walk in Shannon.

Environment and Transport (EPA, 2016)

In Ireland, there is an urgent need for better urban and spatial planning, as well as a major investment programme to encourage much more fuel-efficient transport, a switch to cleaner and alternative fuels, a rapid increase in the electrification of our car stock and a very significant shift from private car to public transport. Without these measures, Ireland will fall well short of meeting its various targets in the transport sector, and of ultimately reducing its emissions of CO_2 by at least 80% by 2050.

Despite these improvements to the transport network, there is still a significant level of congestion within Limerick City that puts pressure on the existing road infrastructure such as the river crossing in the City Centre. Besides, there is limited accessibility to the city centre from County Clare and low connectivity between the areas along the northern fringe of the city. The Limerick Northern Distributor Road would contribute to improving accessibility between these areas. In Shannon, a series of improvements to the cycle and pedestrian networks are planned as part of the Shannon Town Park project, expected to be completed in mid-2019.

Road Networks

The road network is an essential piece of national public infrastructure. This transport network provides strategic access to population centres, ports and airports. Maintaining the capacity of the roads with optimal levels of service is of critical importance for growing the economy of the LSMA. The strategic road network is important for the movement of goods and services within the LSMA, and also provides the main basis for Limerick's inter-regional and national-level connectivity.

Limerick City is connected via seven National Roads, four of which comprise the TEN-T (Trans European Network – Transport) Core (M7/N69) and Comprehensive (N21, N20, N18) network. Shannon Town is located just off the M/N18 National Primary Road between Galway and Limerick, and there are two National roads within this area, one of which is part of the TEN-T comprehensive network. The LSMA also includes the towns and villages of Castleconnell, Patrickswell and Clarina in Limerick and Sixmilebridge, Ardnacrusha, Clonlara, Cratloe, Ballycannan and Bunratty in County Clare. Most of the county towns are located adjacent to the regional and local road networks. The following images outline each of the county towns within the LSMA and their main access roads. Main access roads are shown on Figure 5.8.

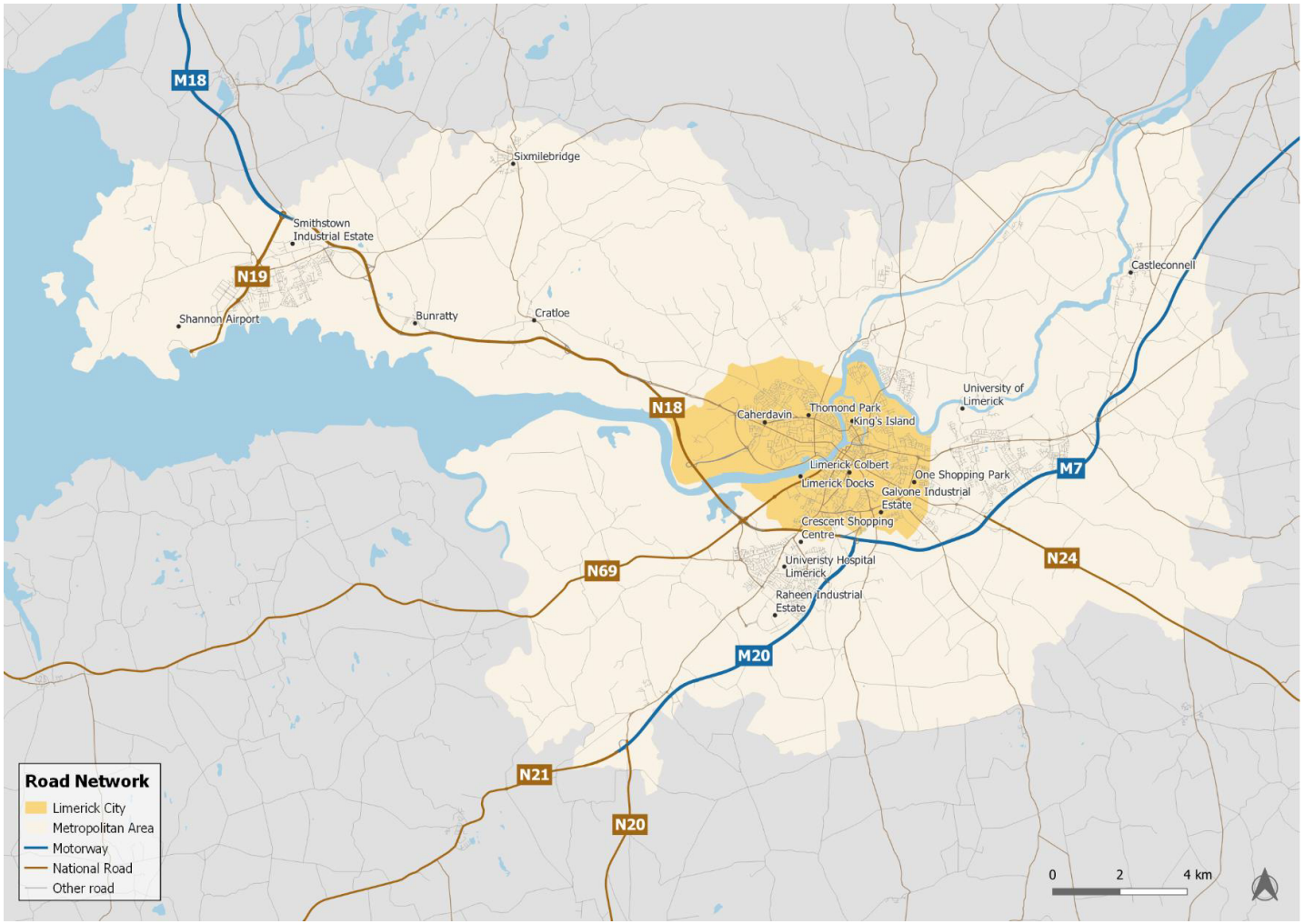


Figure 5.8 Road Network within the LSMA

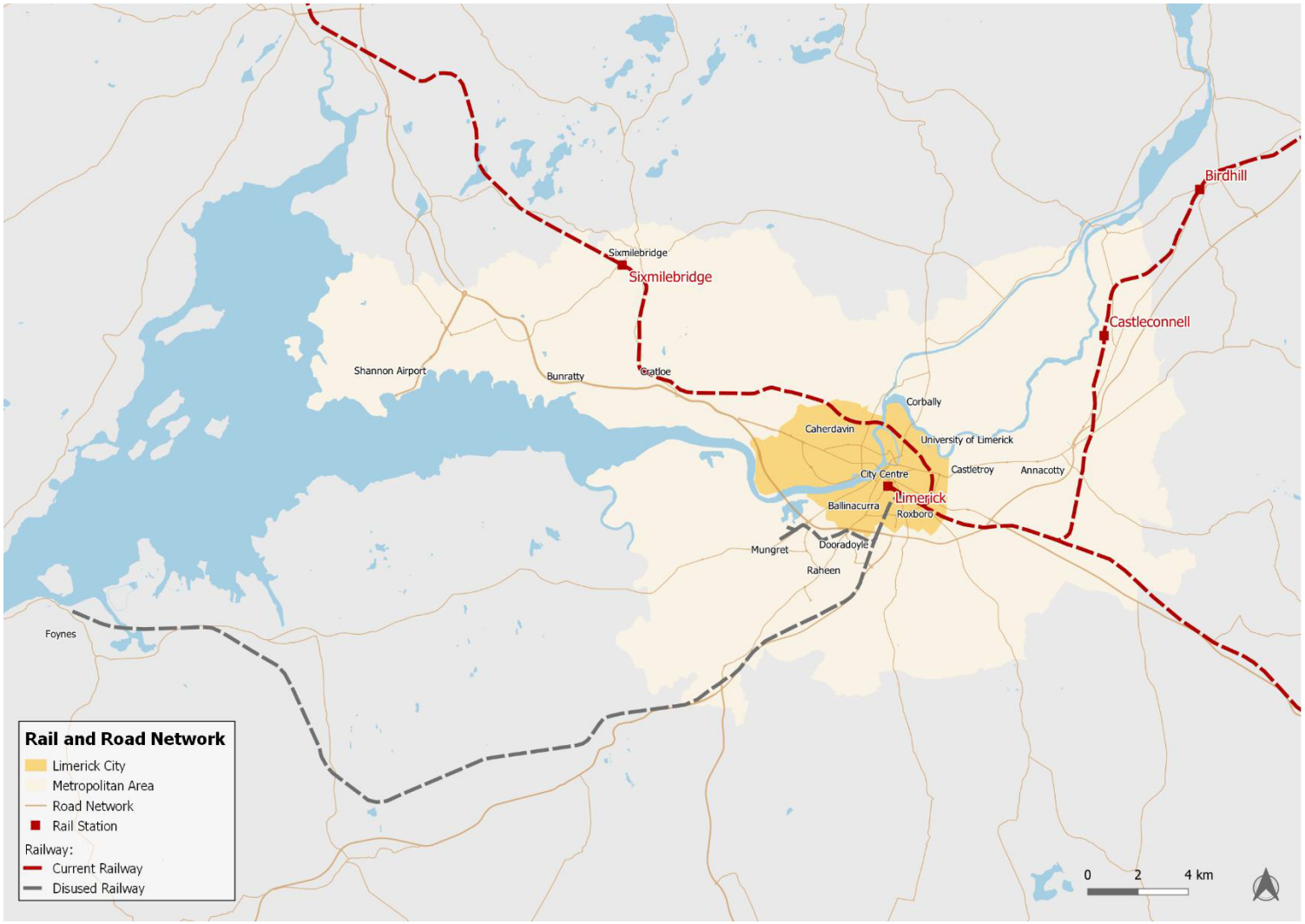


Figure 5.9 Rail Network within the LSMA

There are very limited orbital routes in Limerick, particularly to the north of the city centre, meaning that travellers must make convoluted journeys via the local road network. This factor also contributes to congestion on the national road network. At present, there are no dedicated, permanent park and ride facilities provided within the LSMA.

Limerick Smarter Travel

Limerick City, Dungarvan and Westport were designated as Ireland's Smarter Travel Demonstration Areas 2012 - 2016, representing a city area, a medium-sized town and a small town. The Department of Transport, Tourism & Sport (DTTaS) has invested €23 million in the program across the three areas, with €9 million earmarked for the Limerick area, in an effort to encourage a behavioural switch to more sustainable forms of transport such as cycling, walking and the use of public transport. The Smarter Travel Area (STA) proposal for Limerick was built around four hubs – City Centre, Corbally, Castletroy and Regeneration Hub – and the initiative seeks to facilitate travel in a more sustainable manner, within and between the hubs.

"The delivery of sustainable transport solutions for Limerick presents many transport challenges and opportunities given the diverse population base. Affluent residential communities exist side by side with some of the most deprived areas in the country; there is a flourishing immigrant community and a growing student population; the existence of a major centre of skilled employment and a gateway to tourism in the wider Mid-West region. The proposal is tailored to meet the varying travel needs of communities within the hubs." DTTaS (www.smartertravel.ie)

An interim report (AECOM, 2016) found that walking and cycling had increased in all three STAs when compared with Dublin. The total combined increase for all three areas was 5.7% from 14.7% to 20.4%, and in the Limerick STA the increase was 4.3% from 11.9% to 16.2% (see Figure 5.10).

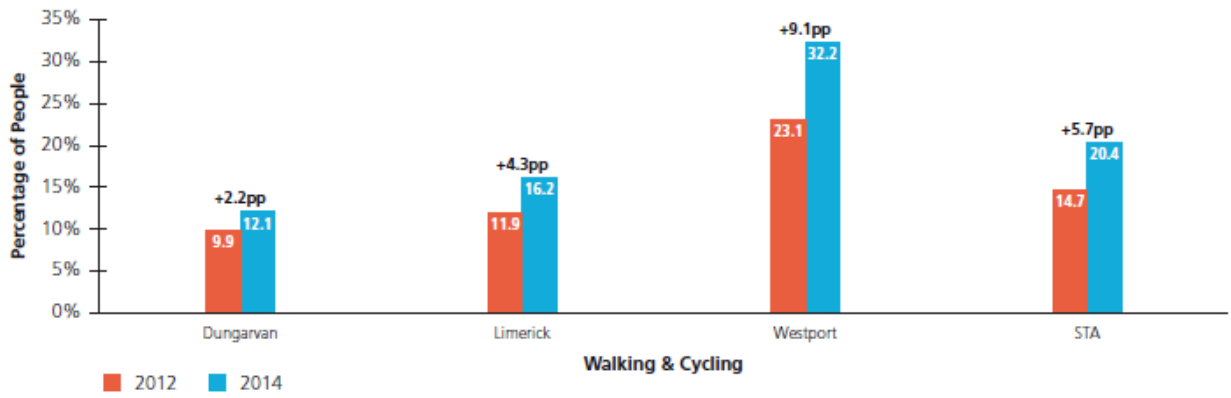


Figure 5.10 Rates of walking and cycling within STAs

Rail Network

Locations of key rail terminals within the study area are shown in Figure 5.9.

The primary terminal for public transport services in Limerick City is at Colbert Station, located just off Parnell Street/Hyde Road, an approximate 10-minute walk from the City Centre. This station facilitates interchange for rail, coach and bus. The station was recently upgraded which enhanced the station environment and improved the interchange facilities. However, the station lacks a clear and obvious connecting pedestrian route to the City Centre.

There are a number of InterCity services providing direct rail connections from Limerick's Colbert Station to Ennis and Galway and further connections available via Limerick Junction to Dublin, Cork, Clonmel, Tralee and Waterford on the Dublin - Cork line. There are three non-stop services to Dublin Heuston Station available in the

morning without the need to transfer at Limerick Junction and three non-stop return journeys are possible in the afternoon and evening peak. While the route via Limerick Junction performs almost to its full potential, the interchange at this station remains a disadvantage for the route and causes additional delays to Dublin - Cork services.

There is no rail network serving Shannon. The closest rail station to Shannon is Sixmilebridge, located approximately 6km east from the town centre and lies on the Limerick-Galway line with direct links to Limerick and Ennis. There are nine services a day to Limerick Colbert Train Station with two services available in the morning peak and frequencies of between 90 mins - 2 hours thereafter. Onward connections are then available to Limerick City, Ennis and Galway. Within the County Clare portion of the study area, Sixmilebridge is the only settlement with a train station. The rest of the towns and villages in the LSMATS area are served by bus connections to stations on the rail network.

Freight now accounts for less than one percent of rail movements in Ireland. A freight line between Limerick and Foynes Port has been inactive since 2001.

Bus Network

The principal service provider of bus services in the LSMA is Bus Éireann, who operate a reasonably extensive city bus network within Limerick City. Limerick City Centre has an extensive one-way traffic system however, which has a negative impact on public transport operations as bus routes are separated on inward and outward legs which can be confusing for less frequent bus passengers and visitors to the City. Certain bus routes are also separated as a result of restricted road widths.

In addition to the city services, there are a number of regional Bus Éireann services providing links to Limerick City from different settlements within the wider County Limerick as well as from counties Clare, Offaly, Tipperary, Cork and Kerry. There is only one Bus Éireann route serving Shannon Town Centre, which connects Limerick Colbert Station to Ennis Station via Sixmilebridge, Bunratty and Shannon Airport, which operates at a low frequency. Further bus routes operating within Shannon and environs only provide connections to Shannon Airport and Shannon Industrial Estate. All County Towns have at least one bus route towards Limerick City and few have similar services to other major towns in the region. This means these areas are highly dependent on available bus connections within Limerick City.

The Southern Regional Spatial and Economic Strategy (RSES) highlights the need to enhance public transport services to Shannon Airport in order to attract and ease the movement of tourist and visitors around the region and to strengthen connectivity to strategic transatlantic hubs from the airport. Between Galway and Shannon Airport, there are 19 bus services provided by Bus Éireann, five of which are direct expressway services. The rest of the services are not direct and take longer travel time from Galway to Shannon. The current direct services provided by Bus Éireann do not coincide with flight times, discouraging the use of public transport to and from the airport.

Cycle Network

The Dublin Bikes scheme began in 2009, and in the five years between 2010 and 2015 the number of journeys per year increased by more than 240% from 1.2 million to 4.1 million. Limerick now offers a similar scheme throughout Limerick City Centre with 215 bikes at 23 stations including Colbert Station. However, the existing network contains many barriers to cycling, both natural and manmade. The primary natural barriers to cycling are the watercourses through the metropolitan area, including the River Shannon, Abbey River, Mulkear River, Ballynaclogh River and the Park Canal. Of these watercourses, the River Shannon is the principal natural barrier to north-south movement. There are currently 3 vehicular bridges crossing the River Shannon from the west, Caherdavin area. None of these bridges currently provide dedicated cycle facilities. The potential to retrofit these bridges is limited due to their width. The LSMA also contains a number of manmade barriers to cycle movement, including three railway lines, a motorway / dual carriageway on which cycling is prohibited, one-way and circuitous routes, and junctions with little or no provision for cyclists.

Currently, the cycle network in Shannon and its environs is very limited and lacks adequate cycling infrastructure. At present, all County Towns also lack dedicated cycling infrastructure and cycling is shared with motor vehicles. The Southern Environs Local Area Strategy (2011 – 2021) sets out a cycling strategy proposal to extend the network having special focus on routes to schools, shopping areas and open spaces. Target locations to be linked by the proposal include Raheen, Dooradoyle, Crescent Shopping Centre and Limerick City. Mungret- Loughmore defined as a primary development area in the Southern Environs has a partially constructed cycle lane extending along the regional road R859 from Quinn's Cross to Mungret Village. In addition, the Limerick Metropolitan Cycle Network Study sets out the envisaged cycling network for the Limerick Metropolitan Area (LMA) for 2025.

5.3.4 Future Trends

Population

The study area population has increased significantly in recent years (2.7% between 2011 and 2016), and the Ireland 2040 NPF seeks to prioritise the achievement of the Mid-West Limerick City Region as a Tier 2 city region by promoting significant population growth within the region. Table 5.2 provides a comparison between the 2016 and 2040 Planning Datasheets for LCCC and CCC and for the LSMATS area. Table 5.2 shows that substantial population increase within the LSMATS is forecast between 2016 and 2040. Note that the figures for Limerick City and Suburbs and Shannon relate to the NTA-defined settlements, which are larger than the CSO Settlements and include areas of employment beyond the CSO boundaries.

Table 5.2 Population forecast for LSMA between 2016 and 2040

County	Population		Population Growth	
	2016	2040	2016 to 2040	
Limerick City & County	194,899	261,475	66,576	34%
Clare County	118,817	151,000	32,183	27%
LSMATS Area	132,420	209,198	76,778	58%
-Limerick City & Suburbs	99,858	153,707	53,849	54%
-Limerick City & Suburbs (Limerick)	93,554	147,210	53,656	57%
-Limerick City & Suburbs (Clare)	6,304	6,496	192	3%
-Shannon	10,442	13,600	3,158	30%
-Remaining Metropolitan Area	22,120	41,891	19,771	89%

Socio-economics

Ireland, and Limerick in particular, has experienced growth in employment in recent years and it is anticipated that the regions unemployment rate will continue to reduce as investment in Limerick facilitates further job creation. It is anticipated that there will be approximately 58% employment growth within the LSMA between 2016 and 2040 (Jacobs, 2019b). New sectors identified for growth include the local food tourism sector and the film and media sector, with new patterns of employment emerging across the region in new sectors (Limerick City Council, 2016). However, it is acknowledged that the impact of Brexit and COVID-19 are not yet fully understood, both in terms of risks and opportunities for the economy of Ireland and the Mid-West region in particular.

Transport / Access

As the economy of the Mid-West region grows, improved transport links will be required to facilitate movements of goods and people.

Human Health

The Healthy Ireland Framework 2013-2025 sets out four high level goals to improve health in Ireland:

- increasing the proportion of Irish people who are healthy at all stages of life;
- reducing health inequalities;
- protecting the public from threats to health and wellbeing; and
- creating an environment where every sector of society can play its part in achieving a healthy Ireland. (Government of Ireland, 2018)

The NPF also aims to "Enhance public health by encouraging and facilitating more active lifestyles and by creating a more walkable and cycling friendly urban environment". National and regional transport strategies have an important role to play in improving public health and reducing health inequalities through promotion of low emission technologies and active travel modes (e.g. walking and cycling).

5.3.5 Key Issues

The key issues in relation to Population, Socio-economics, Human Health and Access are:

- population and economic growth will increase the demand for transport infrastructure within the LSMA and has the potential to affect traffic;
- the construction of transport infrastructure may cause temporary disruption to the local community for example, in the form of noise, disruption to transport services/utilities and increased traffic;
- potential for loss/gain of public amenity as a result of transport related development; and
- patterns for settlement and economic growth will influence the demand for and location of transport infrastructure and the accessibility related to transport infrastructure will in turn influence future development and economic growth.

5.4 Tourism and Recreation

The LSMA contains Shannon Airport, Ireland's third busiest airport after Dublin and Cork, which offers daily direct flights from the US, Europe and the UK. Shannon Airport is located within an hour's drive of the Wild Atlantic Way, a long-distance touring route that runs along the west coast of Ireland from Donegal to West Cork and is managed by Fáilte Ireland. This development aims to achieve greater visibility for the west coast of Ireland in overseas tourist markets by promoting major scenic attractions such as Malin Head, Downpatrick Head, Cliffs of Moher, Skellig's Viewpoint, Mizen Head and Old Kinsale Head, and cultural towns including Bundoran, Westport and Dingle. Visitors arriving at Shannon Airport can drive north to Clare, Galway, Mayo, Sligo and Donegal, or south to Kerry and Cork on the Wild Atlantic Way, and they are just one hour away from the Cliffs of Moher, the most popular attraction in the West of Ireland.

A draft of 'The Limerick Tourism and Marketing Strategy 2017-2023' (Future Analytics et al, 2017) commissioned by LCCC found that in 2015 overseas and domestic tourism in County Limerick generated an annual revenue of over €244 million through close to 800,000 visitors coming to the county. In spite of this, the report further states that "The sector is hugely important to Limerick, yet comparatively the County is underperforming, particularly so in relation to tourism hotspots and neighbouring counties". Likewise, the Limerick County DP acknowledges that the area's tourism resources are being under-utilised: "Lack of investment in tourism products has reinforced the perception that Limerick is a transient stop on the way to more recognised tourist destinations".

Tourism and recreation in the LSMA are influenced by a range of factors. The area's natural heritage offers tourism and recreational opportunities within a varied landscape of agricultural plains, uplands, karst landscapes, lakes, rivers, coastal and estuarine waterways. The LSMA is home to the Ballyhoura Mountains, Galtymore (highest point in inland Ireland), Slieve Felim Way, and the Mullaghareirk Mountains, already largely accessible

through existing walking and cycling trails, and numerous water and waterside experiences are available on the rivers throughout the counties of Limerick and Clare and on the Shannon Estuary. The National Trails Office promotes the use of recreational trails in Ireland and maintains a National Trails Register. There is one National Trail (Lough Derg Way) routed within the LSMA.

The area also includes a network of archaeological sites and architectural points of interest such as Lough Gur, one of Ireland's foremost archaeological sites, and historic towns such as Newcastle West, Rathkeale, Kilmallock, Adare, Askeaton, Bruff and Bruree. Thomond Park, the home ground of Munster Rugby, is one of Limerick City's major attractions for sports tourism, and there are regular fixtures for Gaelic football and hurling. Other opportunities for recreational activities include golfing, cycling, mountain biking, equestrian activities, and fishing, which are utilised by both visitors to, and residents of, the area. Bunratty Castle and Folk Park is a major regional tourist attraction and recreational facility within the LSMA.

Recreation and physical activity are important to the health and wellbeing of people and both tourism and recreation also contribute to the economy at a local and national level.

Cultural Heritage is discussed further in Section 5.7 and landscape in Section 5.6.

5.4.1 Future Trends

The growth of tourism plays a major role in future development as outlined in the Limerick County DP, Limerick City DP and the SILDS for the Shannon Estuary. Increasing population figures will also increase the demand for recreational resources.

Uncertainty surrounding the decision in the UK to leave the European Union has already had an effect on the value of sterling, and Ireland's tourism business from Britain may be negatively impacted.

LSMATS aims to ensure that transport infrastructure is fit to support continued growth of the tourism industry in the LSMA, whilst protecting the environment and ensuring that the transport network is resilient to the effects of climate change and fit to cope with the impacts of Brexit and technological change.

5.4.2 Key Issues relating to LSMATS

The key issues in relation to Tourism and Recreation are:

- transport infrastructure development may have the potential to restrict / reduce, or enhance access to recreation and/or tourism sites; and
- increased tourist numbers will put strain on existing networks, particularly public transport.

5.5 Biodiversity, Flora and Fauna

5.5.1 Biodiversity Governance

There are a number of nature conservation designations in Ireland at an International, European and National level including:

At International level:

- UNESCO (United Nations Educational, Scientific and Cultural Organisation) World Heritage and Biosphere sites; and
- sites designated as Wetlands of International Importance or RAMSAR sites.

At a European level:

- Special Areas of Conservation (SACs); and
- Special Protection Areas (SPAs).

At a national level:

- National Heritage Areas (NHAs) and proposed National Heritage Areas (pNHAs); and
- other designations such as Salmonid Waters, Freshwater Pearl Mussel (FWPM) Catchments and Nature Reserves.

The Habitats Directive (92/43/EEC) was transposed into Irish law in 1997 by the European Communities (Natural Habitats) Regulations, S.I. 94 of 1997. The Regulations were subsequently revised and consolidated in the European Communities (Birds and Natural Habitats) Regulations 2011, S.I. 477 of 2011. The main purpose of the Habitats Directive is to ensure the appropriate conservation of natural habitats and of wild fauna and flora. Under the directive, Ireland like other Member States was required to establish an ecological network of SACs (sites which host a range of natural habitats and species listed in Annex I and II of the Directive) and SPAs as designated under the Birds Directive (2009/147/EC).

Nature (EPA, 2016)

Ireland has international and legal obligations to protect biodiversity. Protection of biodiversity within and outside protected areas is necessary, and this will require greater integration of biodiversity concerns in sectoral policy development and implementation, at local and national levels.

5.5.2 Designated Sites

As described in Section 5.2, the study area for the assessment of potential impacts on Natura 2000 sites (SACs and SPAs) and also internationally designated site such as Ramsar sites and UNESCO sites is taken as the LSMA plus an additional buffer area of 15km (referred to as the "extended study area", in accordance with the study area for the AA. There are no UNESCO sites within the extended study area, and one Ramsar site (Ballyallia Lough) bisects the extended study area at the far northern extent near Ennis. Ballyallia Lough is also a Wildfowl Reserve. There are 23 SACs situated within the extended study area, covering approximately 52,355 hectares, and five SPAs encompassing just over 86,000 hectares of marine and terrestrial habitats (see Figure 5.11 and Table 5.3).

Table 5.3 International and European sites within the extended study area (15km buffer from LSMA)

International/European Site Name
SACS
Askeaton Fen Complex SAC
Ballyallia Lake SAC
Barrigone SAC
Clare Glen SAC
Curraghchase Woods SAC
Danes Hole, Poulnalecka SAC
Glen Bog SAC
Glenomra Wood SAC
Glenstal Wood SAC
Keeper Hill SAC
Kilkishen House SAC
Knockanira House SAC
Lough Gash Turlough SAC
Lower River Shannon SAC
Newgrove House SAC
Newhall and Edenvale Complex SAC
Old Domestic Building (Keevagh) SAC
Pouladatig Cave SAC
Poulnagordon Cave (Quin) SAC
Ratty River Cave SAC
Silvermines Mountains West SAC
Slieve Bernagh Bog SAC
Tory Hill SAC
SPAs
Ballyallia Lough SPA
Lough Derg (Shannon) SPA
River Shannon and River Fergus Estuaries SPA
Slieve Aughty Mountains SPA
Slievefelim to Silvermines Mountains SPA
Ramsar sites
Ballyallia Lough

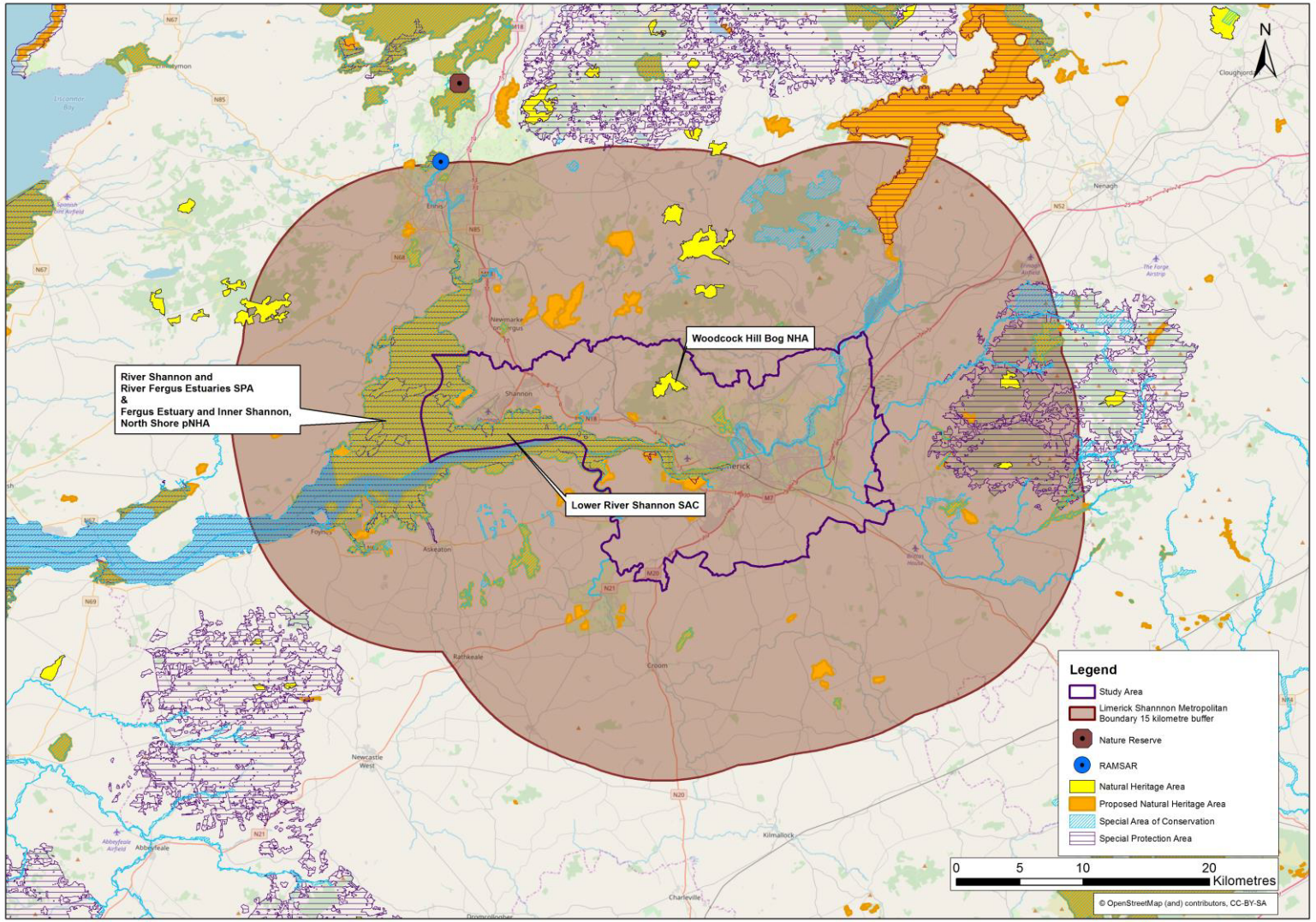


Figure 5.11 Designated Sites within the Study Area and Extended Study Area

There are eight NHAs within the study area, the majority of which are bog-related (listed below and shown on Figure 5.11).

- Doon Lough NHA;
- Loughanilloon Bog NHA;
- Grageen Fen and Bog NHA;
- Cloonloum More Bog NHA;
- Gortacullin Bog NHA;
- Woodcock Hill Bog NHA;
- Lough Acrow Bogs NHA; and
- Bleanbeg Bog NHA.

The National Parks and Wildlife Service (NPWS) monitor and assess the status of protected species (Annex I of 92/43/EEC) and habitats in Ireland (Annex I of 92/43/EEC). This takes into account the status of the range, area, structure and functions and future prospects of each species/habitat before defining an overall status for each. A total of 59 different habitats and 68 species are listed. The overall status of Annex I habitats as of 2019 are as follows (NPWS, 2019):

- Favourable -15%
- Inadequate – 46%
- Bad – 39%

46% of habitats showed a declining trend status, with 54 % showing stable status and only 2% improving. Around 10% of habitats are considered to be under pressure or threat from transport systems.

- The overall status of Annex I species (NPWS, 2019) is:
- Favourable – 57%
- Inadequate – 15%
- Bad -15%
- Unknown -13%

55% of Annex I species showed a stable trend in status, with 15% showing improving and 15% declining (13% unknown).

5.5.3 Aquatic Environment

There are three catchments related to protected species (Salmonid Waters, FWPM Catchments and Nature Reserves) identified within the 15km radius of the study area. Under the EU Biodiversity Strategy, Ireland must halt biodiversity loss by 2020. On the back of the EU Strategy, Ireland has published its 2nd National Biodiversity Plan, Actions for Biodiversity 2011 – 2016. This set out several Strategic Objectives and over 100 actions to achieve these objectives. In 2015, an Interim Review of the 2011-2016 Strategy was published and indicated that the majority of targets were implemented or that implementation was in progress. Specific targets which required further action were highlighted. The 3rd National Biodiversity Strategy 2017-2021 was published in 2017 and builds on the actions not completed in the previous plan.

5.5.4 Invasive Species

The spread of invasive species can have a significant negative effect on wildlife and habitats and the significance of this is reflected in Ireland's third National Biodiversity Strategy (2017-2030) and recent European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). Common invasive species in Ireland include:

- Giant Hogweed (Heracleum Mantegazzianum);
- Giant Rhubarb (Gunnera Tinctoria);
- Himalayan Balsam (Impatiens Glandulifera);
- Japanese Knotweed (Fallopia Japonica); and
- Rhododendron (Rhododendron ponticum).

Climate Change Impacts and Adaptation (EPA, 2016)

Projected shifts in climate, temperature and precipitation may result in the increased occurrence of invasive species and competitive pressures on Ireland's native species.

5.5.5 Future Trends

Increasing land-use change such as urbanisation, plantation forestry and changing agricultural practices are likely to continue to pose risks to the quality and distribution of aquatic and terrestrial habitats and species, both within and outside protected sites. However, the continued implementation of measures required in achieving the objectives of the WFD and the requirements of the Habitats Directive are likely to benefit protected sites and the wider aquatic environment into the future.

NPWS are developing Conservation Management Plans and conservation objectives for many of the European sites, as well as other management plans for declining species (e.g. Species Management Plans) which will help protect biodiversity resources going forward. It should be noted that Conservation Management Plans and site-specific conservation objectives are unlikely to be developed for every site.

Future trends will be influenced by changes/additions to existing designated sites (SACs, SPAs and NHAs). A number of pNHAs may be reviewed and upgraded to NHAs and, similarly, sites listed as tentative on the UNESCO Heritage List may be upgraded to designated heritage sites.

There are currently 29 established and 18 potential invasive species threats. Species which are listed as potential threats may become established threats in the near future. The EPA's report on alien invasive species and the continuing development of the National Biodiversity Data Centre National Invasive Species Database will aid in the documentation of the distribution of invasive species in Ireland. These reports and datasets will go towards the implementation of the recent European legislation on halting the spread of invasive species (Regulation 1143/2014, entered into force on 1 January 2015).

5.5.6 Key Issues relating to LSMATS

The key issues in relation to Biodiversity are:

- potential to affect protected areas including European Sites (SAC, SPA and RAMSAR), and National Sites (NHAs, pNHAs) and other sites of regional or local importance (National Heritage Sites, Wildlife Reserves);
- potential for protected sites to pose constraints to planning of transport infrastructure;
- potential to impact biodiversity in non-designated areas; and
- potential to spread invasive species during construction.

5.6 Landscape and Visual Amenity

The European Landscape Convention (ELC) is the first international treaty to focus solely on landscape. The Convention promotes the protection, management and planning of European landscapes. The Irish government ratified the Convention in 2002. The National Landscape Strategy 2015-2025 published by the Department of Culture, Heritage and the Gaeltacht was put in place to drive compliance with ELC by establishing principles that provide the high-level policy framework to achieve the Convention objectives.

In accordance with the Planning and Development Act 2010 all Local Authorities need to identify Landscape Character Areas (LCAs) within their Development Plans to ensure that defining features are protected and managed. There is no national classification system for LCAs as these are geographically specific and have their own distinctive character based on its location and surrounding environment. Many Local Authorities have incorporated landscape designation into their Development Plans in the form of protected views, prospects, landscape conservation areas and scenic routes etc. Similarly, to the LCAs, there is no national standardised approach for designating these landscape features/sites.

The study area is covered by the Limerick County DP 2010-2016, the Limerick City DP 2010-2016, and the Clare CDP 2017-2023 which includes the area north of the Shannon Estuary.

The Limerick County DP carried out a Landscape Character Assessment (LCA) which identifies ten different landscape areas within the county. The landscape is varied with a mix of agricultural plains, karst landscapes, lakes, rivers, coastal and estuarine waterways, and uplands including the Ballyhoura Mountains, Galty Mountains and the Mullaghareirk Mountains. Another important characteristic of the landscape within the study area is the presence of peatland habitat, most prevalent in the western uplands, which has important ramifications for landslide susceptibility and land transport construction. A number of objectives and policies designed to safeguard the sensitivity of Limerick's landscape types have been put in place by the former Limerick County Council.

The Limerick City Development Plan states that:

"Within cities, such as Limerick, landscape character involves the combination and interplay of many elements, including: the landscape; built environment; riverscape and natural heritage. Landscape is largely a non-renewable resource and therefore it is in the City's interest to ensure that the City's landscape assets that remain are protected for future generations for their visual, functional, natural heritage and other values."

Limerick City Council have put a number of policies in place to preserve and enhance the distinctive landscape character of the city, including its landscape assets, key landscape sites, views and special amenity views.

The Clare CDP proposes that future planning policies for rural areas in County Clare must consider three types of landscapes as follows:

- "i Settled landscapes – areas where people live and work;
- ii Working Landscapes – intensively settled and developed areas within Settled Landscapes or areas with a unique natural resource;
- iii Heritage Landscapes – areas where natural and cultural heritage are given priority and where development is not precluded but happens more slowly and carefully."

Most of the County is made up of Settled Landscapes, where the majority of the population live, including farmland, villages and towns, roads, power-lines, quarries and piped services that service settlements and industry. Working Landscapes are contained within these Settled Landscapes in the form of agriculture, energy, forestry, extraction, transportation, industry and commerce, tourism, recreation and leisure, education, healthcare and social infrastructure. The County contains two key areas of concentrated development; The Western Corridor - Ennis to Limerick Working Landscape and The Shannon Estuary Working Landscape. Heritage Landscapes are those areas that contain sensitive scenic, ecological or historic environmental resources.

The Clare CDP identifies four Heritage Landscape Areas within the county:

- Lough Derg and the Eastern Uplands;
- The Burren;
- The Fergus / Shannon Estuary; and
- The Coast.

The study area includes part of Area 3: The Shannon Estuary, and is in the vicinity of both Area 4 which runs along the coast, and Area 1 as the rivers that carry the onward flow from Lough Derg to the Shannon Estuary are included.

A Seascape Character Assessment of County Clare was also carried out as part of the LCA which identified 12 individual Character Areas with unique scenic, geology, history and sensitivities. The Wild Atlantic Way follows the west coast of County Clare, from Killimer on the Shannon Estuary to New Quay in North Clare, and this stretch of coastline contains a number of important views, valuable scenic and high-amenity areas. Clare County Council will work with Fáilte Ireland to ensure the sustainable development of Discovery Points and Signature Discovery Points along the route.

Land and Soil (EPA, 2016)

The interactions between human activity, such as farming, forestry and the built environment, are interlinked with processes that shape the environment, landscape and biodiversity of the country.

Further commitment at national level to the protection and enhancement of Ireland's landscape is provided through NPO 14 of the NPF to "Protect and promote the sense of place and culture and the quality, character and distinctiveness of the Irish rural landscape that make Ireland's rural areas authentic and attractive as places to live, work and visit" and NPO 22 to "Facilitate tourism development and in particular a National Greenways, Blueways and Peatways Strategy, which prioritises projects on the basis of achieving maximum impact and connectivity at national and regional level." NPO 61 of the NPF is to "Facilitate landscape protection, management and change through the preparation of a National Landscape Character Map and development of guidance on local landscape character assessments, (including historic landscape characterisation) to ensure a consistent approach to landscape character assessment, particularly across planning and administrative boundaries."

5.6.1 Future Trends

The existing landscape is not expected to change significantly in the immediate future. The National Landscape Strategy will be used to aid compliance with the ELC and as part of this, a National Landscape Character Assessment is currently being developed. It is a high-level policy framework aimed at achieving a balance between the protection, management and planning of the landscape by way of supporting actions (DCHG, 2015). The Planning and Development (Amendment) Act 2010 defines the term "landscape[1]", and to support this, complementary legislation and codes will be examined to see whether gaps need to be addressed therefore there may be legislation specific to landscape protection in the near future.

Afforestation has been one of the key trends related to landscape / land cover in Ireland over recent decades. The Forest Statistics Ireland 2018 (DAFM, 2018) report indicates that there was an increase of 4.2% in the national area covered by forestry from the years 1985 to 2006, and a further 0.9% increase from 2006 to 2017. At the end of 2003, 22,614 hectares of the total land area of County Limerick was forestry, which equated to approximately 8%, lower than the national average at the time of 9.9%. This trend has inevitably led to a resultant decrease in agricultural land (0.12%) and peatlands (0.04%) areas. There was also a small increase in urban fabrics/industrial or commercial units and road and rail networks and construction sites. Given the projected trend for urbanisation as discussed in Section 5.5.5, it is anticipated that these land cover trends will continue. Other future trends for land use which will affect the landscape of Ireland are detailed in Section 5.11.5.

5.6.2 Key Issues relating to LSMATS

The key issues in relation to Landscape and Visual Amenity are:

- Potential for permanent infrastructure to impact landscape and visual amenity temporarily during construction or permanently throughout operation; and

[1] Landscape has the same meaning as it has in Article 1 of the European Landscape Convention which states The landscape covers the national territory, including land, inland water and seascapes of each member state. It refers equally to natural, rural, urban and peri-urban areas, from the outstanding to the degraded. It covers, in short, the entire physical environment as specified by each country upon ratification of the Convention.

- Potential for transport development to be constrained by the need to protect the landscape character and local visual amenity.

5.7 Cultural Heritage - Archaeological and Architectural

5.7.1 Record of Monuments and Places (RMP)

The Record of Monuments and Places (RMP) is the statutory list of recorded monuments. Monuments listed in the RMP are afforded legal protection under the National Monuments Act 1930 – 2004 and any work taking place at or in relation to a Recorded Monument will typically need to be notified to the Minister.

The National Monuments Act 1930-2004 was enacted to make provision for the protection and preservation of national monuments and archaeological objects and provides for the protection of monuments and archaeological sites, the protection of the portable archaeological heritage and the regulation of archaeological works.

5.7.2 National Inventory of Architectural Heritage (NIAH)

The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 was enacted to provide for the establishment of a National Inventory of Architectural Heritage and to provide for the obligations of statutory authorities in respect of these historic monuments. In this Act "architectural heritage" means all structures and buildings together with their settings and attendant grounds, fixtures and fittings; groups of such structures and buildings; and sites which are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

Each structure is given a rating: National, Regional, Local or Record Only. Any structure rated as being Regional or higher importance will be recommended to have a separate record under the Record of Protected Structures (RPS).

5.7.3 Record of Protected Structures (RPS)

The Planning and Development Act 2000 (as amended) requires each planning authority to compile and maintain a Record of Protected Structures (RPS) that forms part of each planning authority's development plan. The purpose of the RPS is to protect structures, or parts of structures "which form part of the architectural heritage and which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest." Sites, structures and groups of structures rated by the National Inventory of Architectural Heritage (NIAH) as being of Regional or above importance are included in the RPS which provides statutory protection for Ireland's architectural heritage.

While the prime objective of the RPS is to protect the structure and its setting, proposals for the sensitive restoration, extension and alteration of Protected Structures are positively encouraged by the Planning Authority.

5.7.4 Sites and Monuments Record (SMR)

The SMR appear on the ASI Map Viewer, however it does not, of itself, confer legal protection. Not all of these are included in the RMP and hence have no statutory protection.

The designations considered as part of the cultural heritage baseline are:

- Archaeological sites monuments included on the Record of Monuments and Places (RMPs) and/or Sites and Monuments Records (SMR);
- Architectural structures and sites included on the National Inventory of Architectural Heritage (NIAH) and/or LCC and CCC's Record of Protected Structures (RPSs);
- UNESCO World Heritage Sites (WHS); and

- Unknown archaeological remains.

The National Monuments Service is an interactive mapping search facility that provides access to all records relevant to the archaeological heritage of Ireland. This extensive body of records is stored on the national database of the Archaeological Survey of Ireland (ASI), and a list of recorded archaeological monuments for each county is available at www.archaeology.ie based on OS mapping.

Within the study area the majority of NIAH records are concentrated within the settlement boundary of Limerick, with a number of records also located in Bunratty, Newcastle, Dooradoyle, Annacotty and Cloonlara. There are no designated or tentative UNESCO WHS within or in close proximity to the study area. There are also potentially unknown, undesignated archaeological and architectural remains within the study area which could be disturbed due to the development of the land transport network.

5.7.5 Future Trends

It is unlikely that the cultural heritage environment will change significantly in the near future due to the continued protection of cultural, archaeological and architectural heritage in national legislation. However, there could be minor revisions to the cultural heritage datasets within the lifetime of the LSMATS.

5.7.6 Key Issues relating to LSMATS

The key issues in relation to Cultural Heritage are:

- the potential for the construction of transport infrastructure to permanently or temporarily damage archaeological and architectural heritage monuments/sites;
- the potential for permanent structures to impact the setting of heritage sites/monuments;
- new developments could be constrained by the need to protect the character of areas; and
- the potential to uncover (and/or damage) unknown, undesignated remains, including underwater archaeology.

5.8 Geology and Soils

5.8.1 Geology

Subsoils are made ground within Limerick settlement boundary. Immediately surrounding Limerick subsoils are estuarine silt/clay interspersed with patches of Limestone till adjacent to the Shannon Estuary, with Limestone till dominating towards the outer extends of the study area with the exception of a large area west of the River Maigue which comprises alluvium.

The Geological Survey of Ireland (GSI) have identified Irish Geological Heritage Sites (IGHS) as part of their Irish Geological Heritage (IGH) Programme, a partnership between GSI and the NPWS. IGH sites within or intersecting the study area include:

- Tory Hill (Lough Nagirra);
- Carrigogunnell (Masey's Bridge to the townland of Newton);
- Mungret Quarry;
- Rineanna Point, Shannon Estuary; and
- Ballcar South.

Land and Soil (EPA, 2016)

Land use has changed significantly in Ireland since the early 1990s. A reduction in agricultural land and peatland has been influenced by increased forested land and artificial areas. National policies for forestry, agriculture, peatlands and the built environment will continue to influence land use change and resource management. Land use changes will be heavily influenced by agricultural policies (Food Harvest 2020 and the 2025 Agri-food strategy) and by the National Forestry Programme.

5.8.2 Soils

There is relatively little legislation relating directly to soil and soil protection at an international level and there is no legislation solely directed to soil protection in Ireland. In 2006, the EU published a Thematic Strategy for Soil Protection and introduced a proposed Soil Framework Directive; but in 2014 this was withdrawn. Soils are an immensely valuable, and finite, national resource, which forms and evolves slowly over very long periods of time and can easily be damaged and lost. Soil is a biologically active, complex mixture of weathered minerals (sand, silt and clay), organic matter, organisms, air and water that provides the foundation for life in terrestrial ecosystems. Soil types across the study area are illustrated in Figure 5.12 below. Subsoils within the study area are made up of marine deposits and tills, with some isolated patches of alluvium sediments. Soil quality within the study area is regarded as good with much of the land outside the Limerick and Shannon agglomerations used for pasture and permanent or arable cropping (Corine 2018, see Figure 5.17).

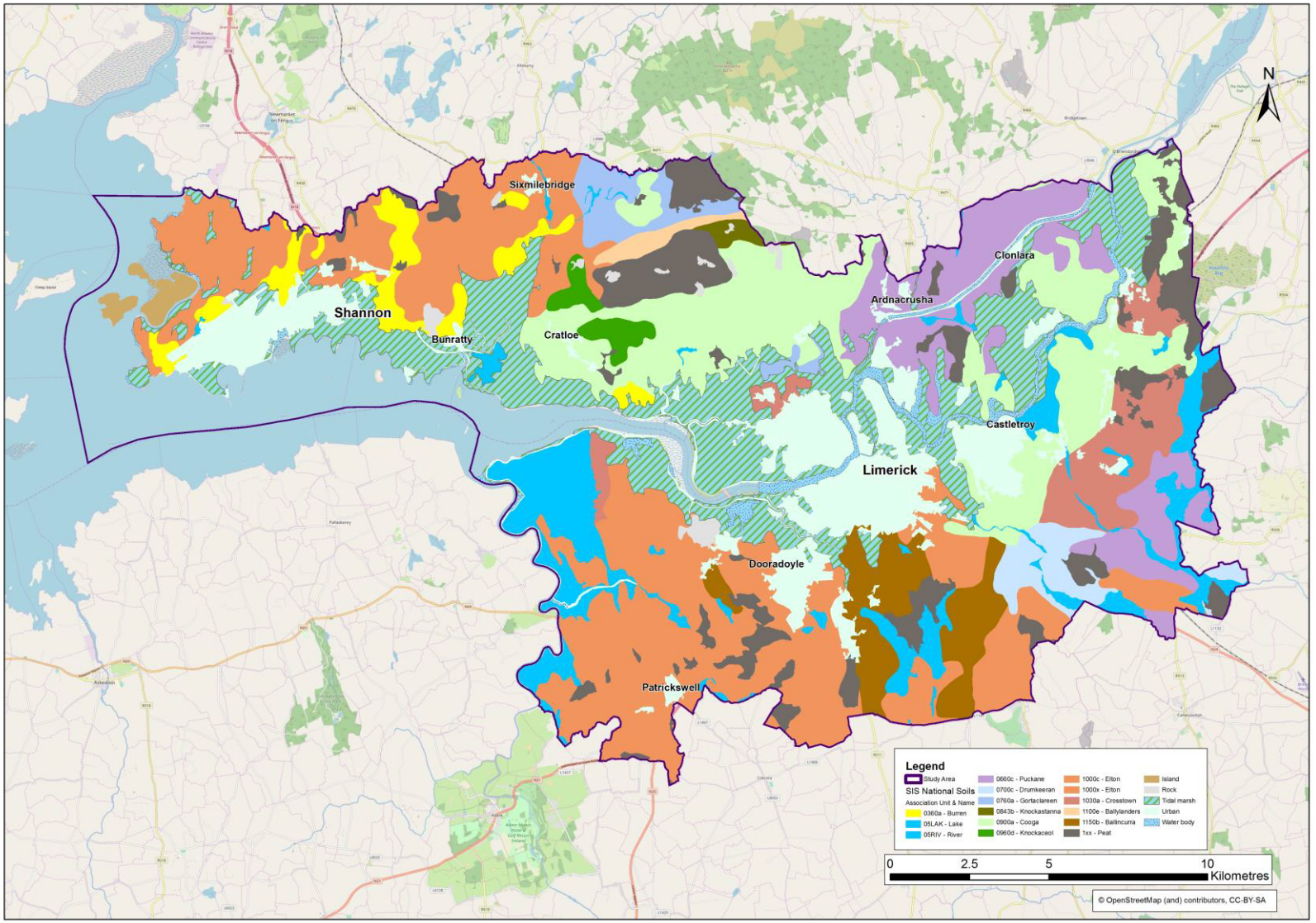


Figure 5.12 Soils within the study area

5.8.3 Future Trends

Changes in geology are generally considered to happen over very long timescales, therefore baseline forecasting is not considered to be critical with regards to geology and soils over the lifetime of LSMATS. However, the NPWS are evaluating proposed IGH sites and, in the near future, some of these will be designated as NHAs and gain statutory protection. Soils are influenced by climate change and land management.

5.8.4 Key Issues related to LSMATS

The key issues in relation to geology and soils are:

- potential for impacts on geological resources (primarily related to karst) or geological conditions to pose problems for construction or new transport links;
- potential for impacts on geological designations;
- potential for impacts on soil resources and soil quality;
- potential impacts to soils (land) vulnerable to erosion; and
- potential for unearthing contaminated material.

5.9 Air Quality

Air Quality (EPA, 2016)

Ireland remains fortunate to have better air quality than most countries in Europe, but some key challenges remain. Traffic is a key pressure on air quality and is the main cause of air quality problems in our larger towns and cities. Local air quality, particularly in small Irish towns with a high dependence on coal, turf and wood for home heating, can be poor at times. Air pollution is estimated to have contributed to annual mortality rates which need to be addressed.

Ireland's air quality is generally good in comparison to other EU member states, largely down to the prevailing Atlantic air-flow and the absence of large cities and heavy industries. Ireland's air quality standards are dictated by the EU Directive on Ambient Air Quality and Cleaner Air for Europe (CAFE Directive 2008/50/EC). The EPA is responsible for monitoring the nation's levels of air pollutants within four zones as follows:

- Zone A: Dublin;
- Zone B: Cork;
- Zone C: Other cities and large towns in Ireland; and
- Zone D: Rural Ireland.

Limerick City, encompassing the electoral divisions of Ballycummin, Ballysimon, Ballyvarra, Limerick South Rural, Roxborough and Ballyglass, is situated in Zone C, with the rest of the study area categorised as Zone D: Rural Ireland.

According to the most recent "Air Quality in Ireland" reports[2], Ireland has not exceeded EU limits on air quality in recent years, however there have been exceedances of the more stringent air quality indicators devised by the WHO. For example, in 2015 PM_{10} (particulate matter with diameter less than or equal to 10 micron) concentrations were below the EU limit at all stations but WHO air quality guideline values were exceeded on some occasions. Air Quality Monitoring Sites have been set up in Limerick City and Shannon within the study area, and monitoring data[3] shows that WHO guideline values for PM_{10} and $PM_{2.5}$ have been exceeded at Limerick City air quality monitoring sites within recent years.

In the State of the Environment Report, the EPA and WHO have estimated that more than 400,000 premature deaths are attributable to poor air quality in Europe annually, including 1,200 deaths in Ireland, and therefore the EPA recognises the importance of these more stringent limits.

[2] Available at: https://www.epa.ie/air/quality/reports/
[3] Provided quarterly at: https://www.limerick.ie/council/services/environment/environmental-control/air-quality#Reports)

The biggest contributors to air pollution in Ireland are vehicle emissions, electricity generation, industry and agriculture (EPA, 2016).

Ireland's transport industry represents 19.5% of Ireland's GHG emissions and this proportion is expected to increase by 10% by 2020 based on the assumption that there will be 50,000 electric vehicles on the road and that the 10% renewable fuel use target will be met. Currently there are 1,700 electric vehicles on the road, highlighting the scale of this challenge. (EPA, 2016).

5.9.1 Future Trends

Current air quality in Ireland is of an acceptable standard and remains within the European Union (EU) legislative and target values. However, ozone, particulate matter and polycyclic aromatic hydrocarbons (PAHs) are emerging as pollutants of concern in the short term, when compared with World Health Organisation (WHO) guidelines and European Economic Area (EEA) reference level values. Levels of Nitrogen Oxide (NO) are also expected to increase.

Although air quality in Ireland is good, there is potential for emerging pollutants to rise above limits/targets in the future. Key contributors to emissions in Ireland are the transport and agriculture sectors. Transport emissions are projected to show strong growth over the period to 2020 with a 10% increase on current levels depending on the level of policy implementation as discussed above (EPA, 2013).

5.9.2 Key Issues relating to LSMATS

The key issues in relation to air quality are:

- temporary generation of air pollution during infrastructure construction;
- new or expanded transport networks could increase number of people affected by transport related air pollution; and
- changes to traffic levels, transport modes and technological development will have implications for transport related air pollution emissions.

5.10 Noise and Vibration

Noise is defined as unwanted sound and can be harmful to human and natural ecosystem health. Noise pollution is an important health concern affecting quality of life and wellbeing, and road transport is one of the main sources of environmental noise pollution in Europe, as outlined in Section 5.3 of this report. According to WHO, noise is the second greatest environmental cause of health problems after air quality: "Environmental noise leads to a disease burden that is second in magnitude only to that from air pollution, among environmental factors in Europe".

Land use planning to safeguard the protection of quiet areas not yet affected by noise can bring significant environmental health benefits. Other environmental aspects include the significant impacts from large transport infrastructural developments on both the human and natural environment, such as on-air quality, climate, land and soil. (EPA, 2016).

The importance of environmental noise is also recognised in the NPF which includes the National Policy Objective 65 to "Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans."

The Noise Directive (2002/49/EC) relates to the assessment and

Environmental Health & Wellbeing (EPA, 2016)

Excessive noise can seriously harm human health, including mental health, and interfere with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes

management of environmental noise and was transposed into Irish national legislation via the Environmental Noise Regulations (S. I. No. 140 of 2006). This Directive called for the development of strategic noise maps and action plans for major roads, railways, airports and cities. Transport Infrastructure Ireland (TII) are responsible for the development of the strategic noise maps for all national roads carrying in excess of 3 million vehicles a year. As well as mapping for 3,000 km of national roads, the 2017 phase of TII noise mapping also includes major non-national roads, although these remain under the jurisdiction of the relevant local authority.

All TII noise maps are presented in terms of two noise indicators: Lden and Lnight.

- Lden is the day-evening-night noise indicator and it represents the noise indicator for overall annoyance. It is “weighted” to account for extra annoyance in the evening and night periods.
- Lnight is the night time noise indicator and is used in the assessment of sleep disturbance.
- These indicators are based on year-long averages of the day (07:00-19:00), evening (19:00-23:00) and night (23:00-07:00) time periods.
- The Lden and Lnight TII Strategic Noise Modelling results for the study area are presented below in Figure 5.13 and Figure 5.14 respectively.

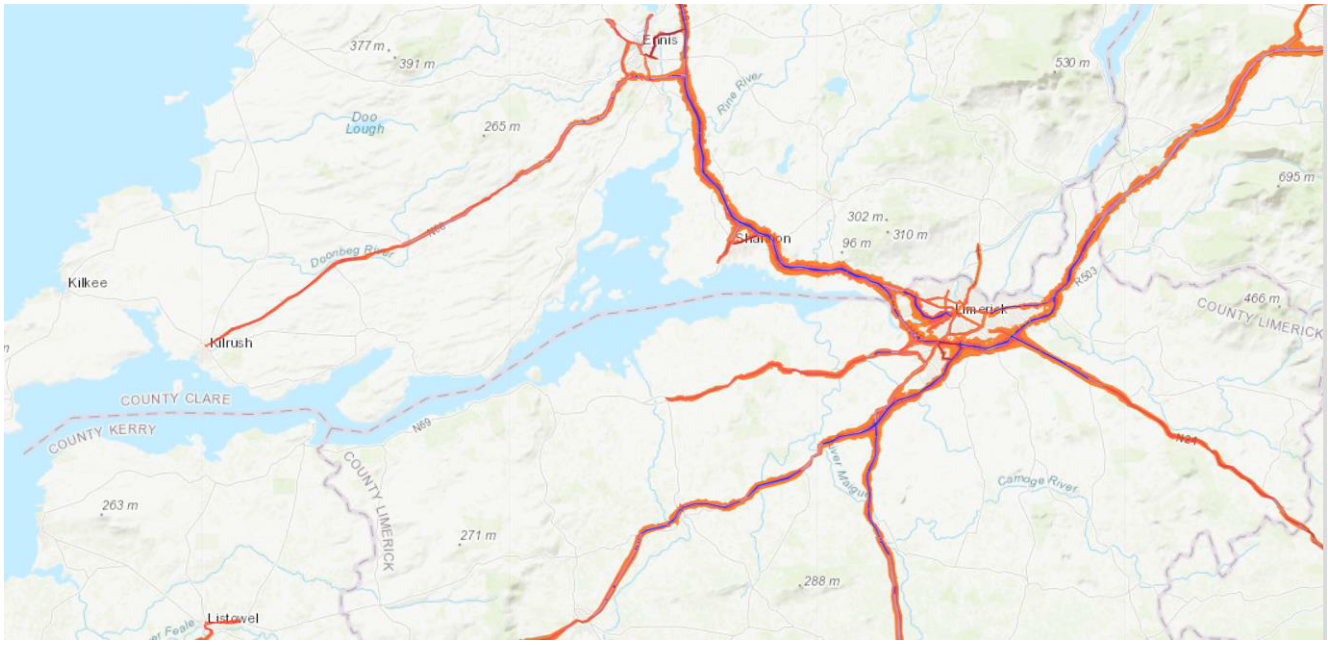


Figure 5.13 Map of Lden Transport Noise within and in proximity to the LSMA area

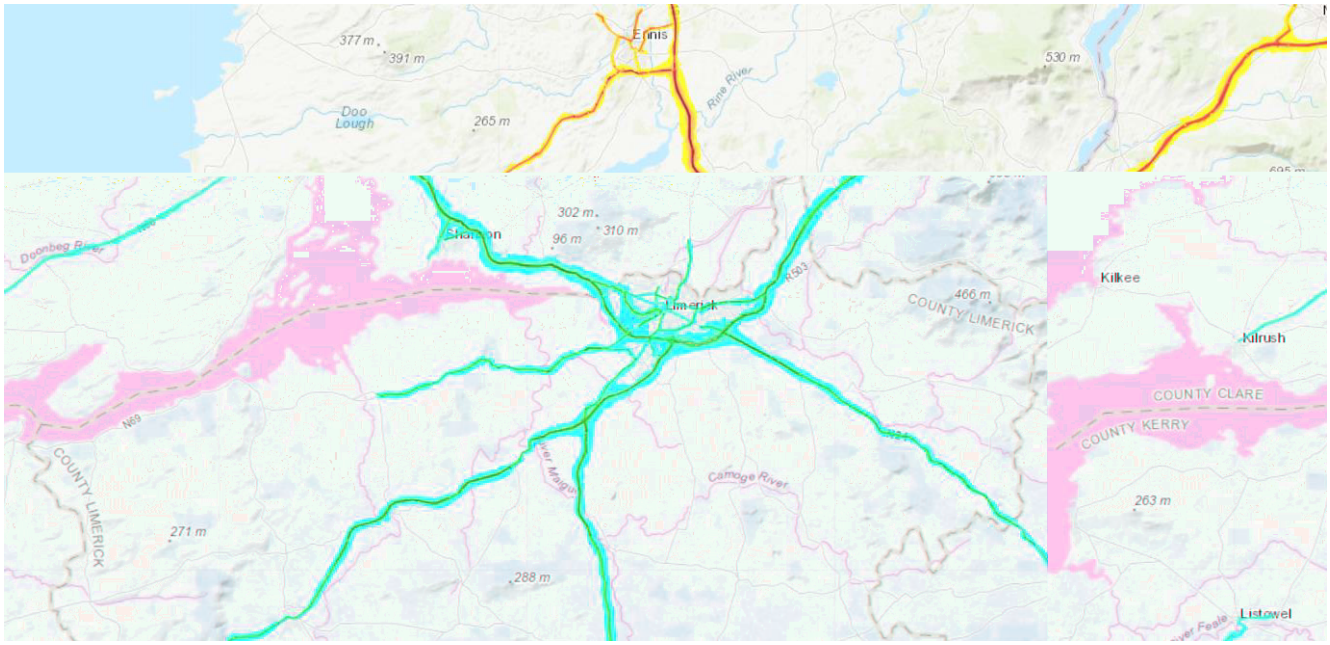


Figure 5.14 Map of Lnight Transport Noise within and in proximity to the LSMA area

LCCC Noise Action Plan 2018-2023 (LCCC, 2018) identifies dwellings and 14 ‘hotspots’ where noise management activities should be prioritised based on current Lden and Lnight levels. Quiet areas are not indicated within this plan, although it is anticipated that they would be identified during the plan period. The draft CCCC Noise Action Plan 2018 (CCC, 2018) identifies 12 roads for which noise mapping indicates that land adjacent may be greater than the identified Lden threshold and sets out a programme for monitoring noise levels in these areas and mitigating where necessary. Quiet areas are not identified int eh CCC Noise Action Plan.

5.10.1 Future Trends

Future noise trends are difficult to predict. The Environmental Noise Regulations 2006 may be revised in future to enforce a stricter level of noise management, and further strategic noise maps and plans may be developed.

5.10.2 Key Issues relating to LSMATS

The key issues in relation to noise and vibration are:

- generation of noise during infrastructure construction;
- new or expanded transport networks could increase the number of people affected by transport noise pollution; and
- changes to traffic levels, transport modes and technological development will have implications for transport related noise pollution.

5.11 Water Environment

Land transport construction and operational use have potential to impact the ecological status of waterbodies. Pollution by suspended solids and other pollutants are a potential significant problem where new infrastructure is constructed close to or over watercourses, particularly where this involves in-stream works, construction of culverts or river diversion, all of which can have severe negative impacts on invertebrate and plant life and on all life stages of fish. In addition, the run-off from roads and rail can contain contaminants from various sources, which can also impact negatively on aquatic life. Transport and strategic utilities infrastructure can be particularly vulnerable to flooding pressure as interruption of their function can have widespread effects well beyond the area that is flooded. For example, flooding of roads or railways can deny access to large areas beyond those directly affected by the flooding for the duration of the flood event, as well as causing long term damage to the road or railway itself.

The EU Water Framework Directive (2000/60/EC) establishes a framework for the protection of both surface and groundwater. Transposing legislation outlines the water protection and water management measures required in Ireland to maintain high status of waters where it exists and to prevent any deterioration in existing water status:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003);
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009);
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010);
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010);
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011); and
- European Union (Water Policy) Regulations 2014 (S.I. No. 350 of 2014).

5.11.1 WFD Status

There are 23 rivers and six estuarine WFD waterbodies within the study area (see Figure 5.15). In terms of groundwater, there are 17 WFD groundwater bodies within the study area (see Figure 5.16). There are five classes of status for surface water bodies, and the status is determined by that of the poorest quality element. Table 5.4 summarises the WFD status of all water bodies within the LSMA including surface and groundwater over the period 2010-2015.

Table 5.4 WFD Status of Rivers, Coastal Waters, Estuaries, Lakes and Groundwater (2013-2015)

Waterbody Type	High	Good	Moderate	Poor	Bad	Data unavailable
Rivers	N/A	30.4%	17.4%	8.7%	N/A	43.4%
Estuary	N/A	85.6%	N/A	N/A	14.4%	N/A
Groundwater	N/A	82.4%	N/A	N/A	17.6%	N/A

Nationally, over 50% of Irish river and coastal waters are at good or high status but over 50% of estuarine and lacustrine waters are at moderate or less status. A long-term trend that has been previously observed is the decline in the number of high status river water bodies (DHPLG, 2017). It is generally understood that mercury and polycyclic aromatic hydrocarbons (PAH) are widespread in the environment, a trend seen globally and in the EPA monitoring data for the WFD.

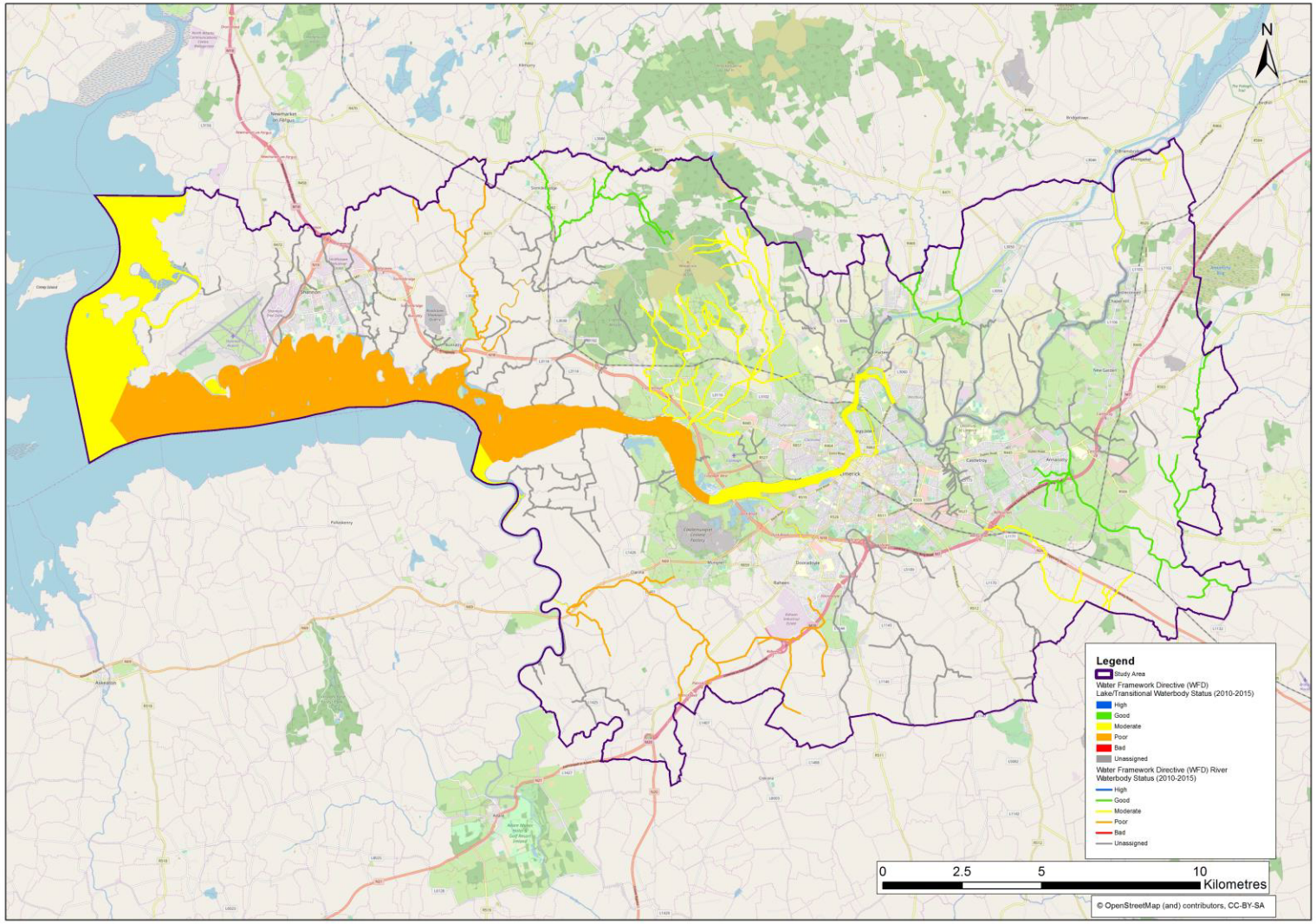


Figure 5.15 Surface Water Quality in the Study Area

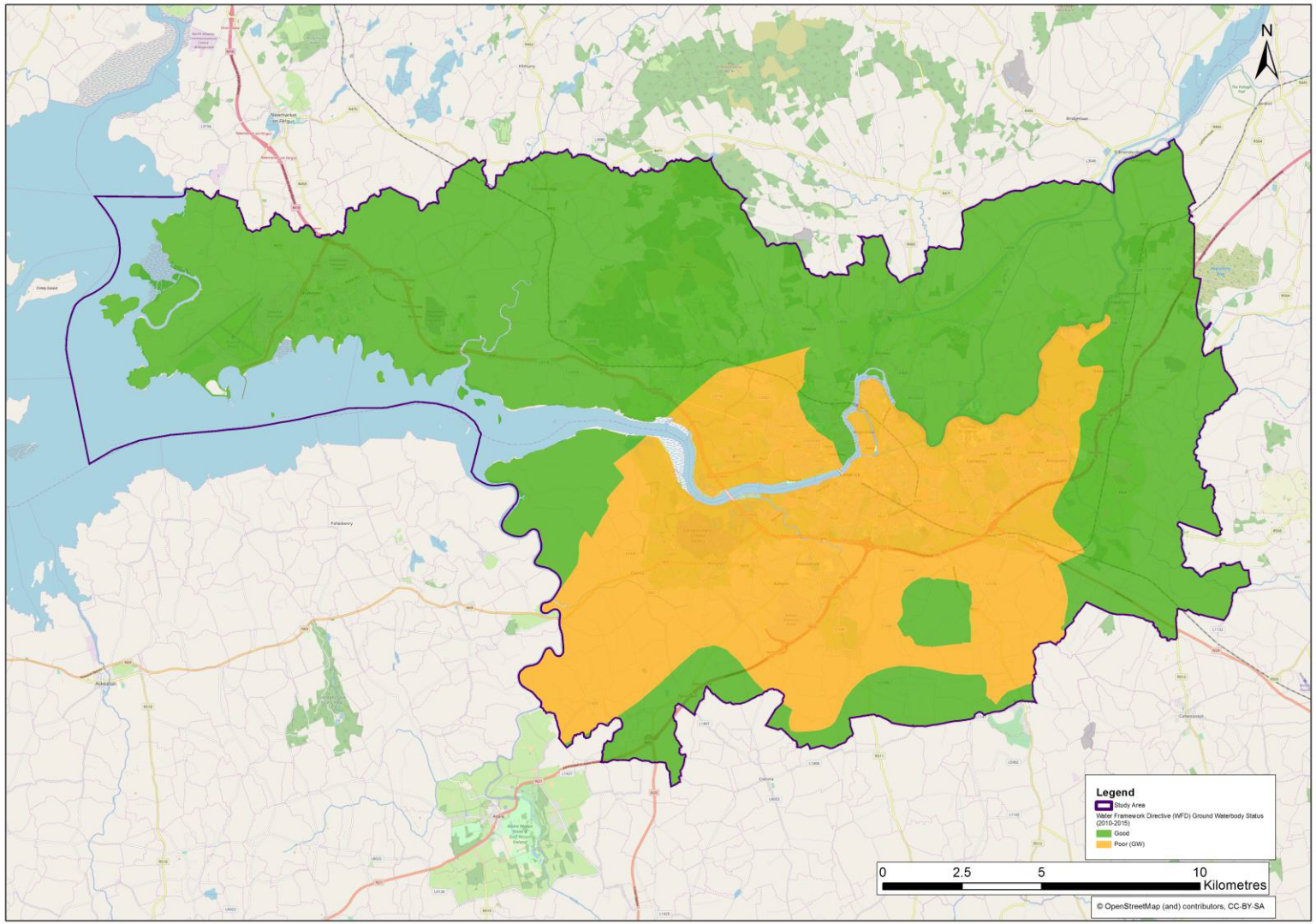


Figure 5.16 Groundwater Quality in the Study Area

5.11.2 River Basin Management Plan

The River Basin Management Strategy is produced as part of the WFD requirements and is key to the protection of the water environment in Ireland. The first cycle of the River Basin Management Strategy (RBMP) ran from 2009-2015, where separate plans were devised for all eight River Basin Districts (RBDs) with the objective of achieving at least "good" status for all waters by 2015. The Shannon International River Basin District (IRBD), stretching from the source of the River Shannon in Counties Cavan and Fermanagh to the Dingle peninsula in north County Kerry, covers an area of more than 18,000 km^2. It includes the natural drainage basin of the Shannon River, which drains an extensive area of central Ireland. The Shannon IRBD is a largely rural district and water is critical to the local economy, supporting activities such as agriculture, forestry, aquaculture, power generation, industry, services, transport and tourism.

An EPA interim status assessment based on the results of monitoring up to 2008, classified the surface waters in the Shannon IRBD according to their ecological status and chemical status; groundwater is classified based on a system combining chemical and quantitative status:

- "42% of rivers and canals, 43% of lakes, 35% of estuaries and 27% of coastal waters are satisfactory, with high or good ecological status (percentage calculated by number);
- 57% of rivers and canals, 55% of lakes, and 35% of estuaries are less than good (moderate, poor or bad);
- 1% of canals, 2% of lakes, 30% of estuaries and 73% of coastal waters are yet to have status assigned;
- most of the surface waters tested so far have good chemical status;
- 75% of groundwaters have good combined status."

The second cycle of the River Basin Management Plans merged the Eastern, South Eastern, Western, South Western and Shannon Districts to form one national RBD. The North Eastern, North Western and Neagh Bann RBDs remain the same and a single administrative area will be established in the Republic of Ireland to manage these areas. The River Basin Management Plan: 2018-2021 outlined that of the water bodies assessed to date:

- 44% are "Not at Risk";
- 30% are "At Risk" of not meeting their environmental objective of good or high status; and
- 26% are currently under review.

A number of significant environmental pressures have been identified and outlined in the RBMP 2018-2021, the most relevant of which to the LSMATS is Urban Run-off, including run-off from paved surfaces.

Key Action 4: Restore and Protect Water Quality (EPA, 2016)

Water protection measures are needed to ensure that we continue to have healthy rivers, lakes and estuaries and clean beaches in order to protect human health, to preserve fish and biodiversity and to allow our important water resources to be a driver for sustainable jobs and tourism.

5.11.3 Floods Directive

Flooding is becoming a bigger issue in Ireland; the frequency of flood events has been increasing and with climate change, is expected to increase further. Increased flooding can cause pressure on transport infrastructure in terms of denying access to roads, railways or services, and long-term damage to roads and railways.

The EU Floods Directive (2007/60/EC) required member states to develop Flood Risk Management Plans for areas of existing and future potentially significant flood risk. The Floods Directive was transposed into Irish law by the EU (Assessment and Management of Flood Risks) Regulations 2010 and sets out the responsibilities of Office of Public Works (OPW). The OPW has been implementing the Directive mainly through the Catchment-based Flood Risk Assessment and Management (CFRAM) Programme, identifying areas where risks associated with flooding might be significant (Areas of Further Assessment, or AFAs) and developing measures to address these risks. There are currently nine AFAs identified within the study area associated with either coastal/tidal, fluvial sources or pluvial sources.

- Shannon Airport.
- Shannon.
- Bunratty.
- Sixmilebridge.
- O'Brien's Bridge and Montpellier.
- Castleconnell.
- Springfield/Cloonlara.
- Limerick City and Environs.
- Clarina.

Land and Soil (EPA, 2016)

Land is subject to many often competing sectoral demands. National policies, such as in forestry, agriculture, peatlands and the built environment, influence land use change and resource management. Establishing and implementing an integrated national land cover, land use and habitat mapping programme is essential to assist in reporting and assessing the impact of different land cover and land use types on the environment. By integrating the National Landscape Strategy into land use planning, sustainable landscape management practices can also be

CRFAMS mapping for all AFAs, including the nine identified above, is available to view on the CFRAMS website (http://maps.opw.ie/floodplans/fhr_map/en/).

5.11.4 Future Trends

Ireland currently has a good understanding of the causes of water pollution, due to the implementation of the WFD. Proposed future development must meet the requirements of the WFD and aim to drive improvements and maintenance of water quality in the short term and provide a basis for the continued maintenance of good status in the future.

The EPA will continue to monitor the status of surface and groundwater bodies, throughout implementation of the second cycle of RBMP.

With the publication of the OPW FRMPs there will be a number of flood management projects rolled out across the country in the next number of years, and like the RBMP, these will be updated on a five-year cycle.

5.11.5 Key Issues related to LSMATS

The key issues in relation to the Water Environment are:

- potential pressures and impacts on water body status from the construction of transport infrastructure i.e. increased sedimentation and accidental spillages;
- potential pressures and impacts on water body status from the operation of new transport infrastructure i.e. accidental fuel spillages and increased road run-off; and
- potential for climate change and the effects of climate change, such as increased flooding, to impede access to transport infrastructure or damage transport infrastructure.

5.12 Land Use and Materials Assets

SEA legislation includes “Material Assets” as a topic to be addressed in SEA, however it does not clearly define what this topic includes. For the purpose of this SEA Scoping Report, Material Assets are considered to be the natural and built assets (non-cultural assets) required to enable a settlement to function as a place to live and work, in giving them material value. Land Use is also a topic to be addressed in the SEA, and is closely related to natural material assets, therefore natural assets which include agricultural land, peatlands and forestry will also be considered within the land use/material assets topic.

Built assets can include infrastructure relating to transport, energy generation/distribution, water supply and waste water management, waste management, buildings and residential and social infrastructure such as housing, healthcare facilities, schools, greenspace and cycle paths.

5.12.1 Land Use (Natural Assets)

Information on land use within the study area can be obtained from the CORINE Land Cover inventory, see Figure 5.17. County Limerick is part of the Golden Vale, one of Europe’s most noted grassland and dairy areas. The value of agriculture in Limerick is valued at over €400 million (LCCC). As can be seen from Figure 5.17, a significant proportion of land within this study area, including both County Clare and County Limerick, comprises pasture or other agricultural cultivation purposes.

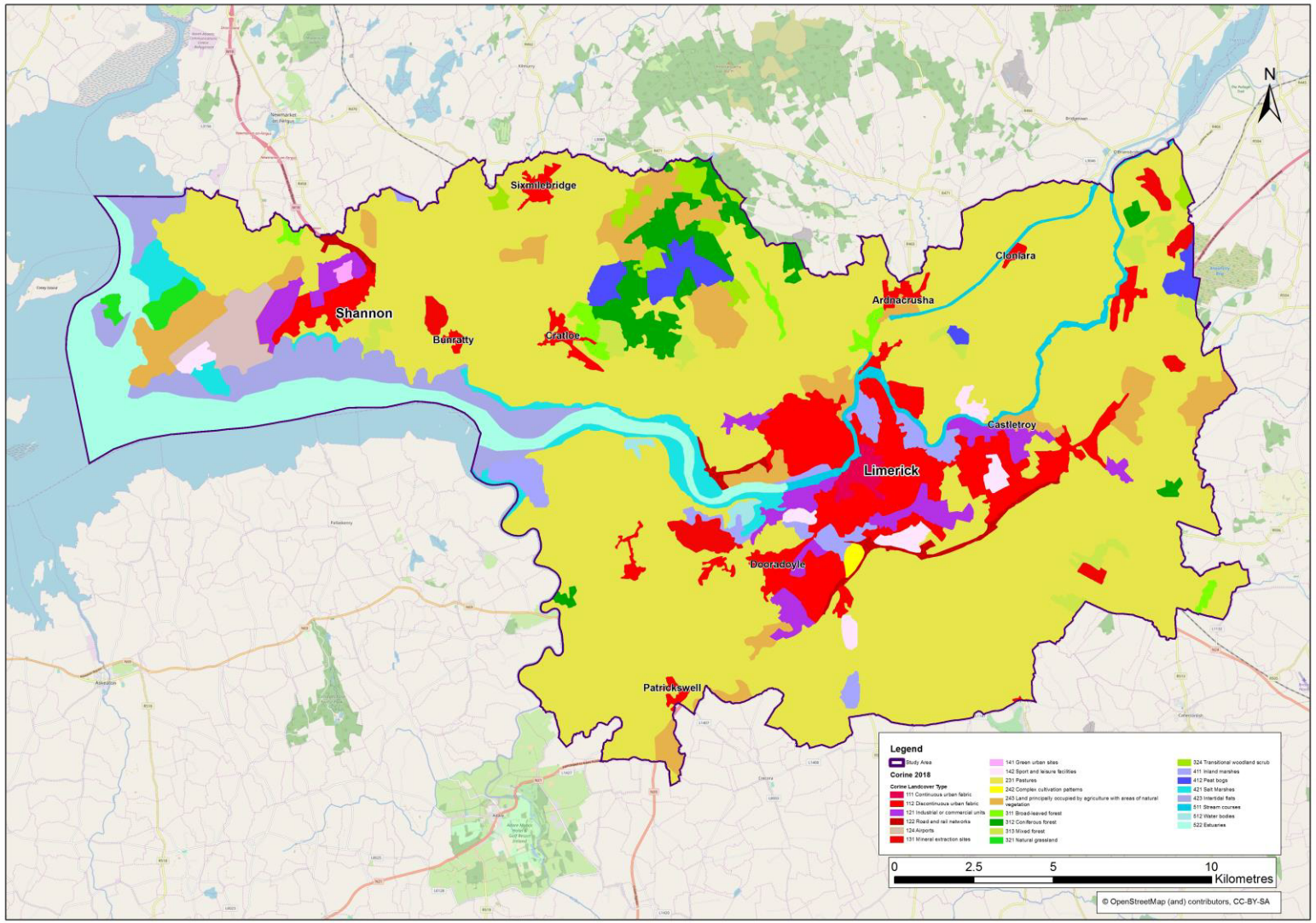


Figure 5.17 CORINE landcover

5.12.2 Built Material Assets (Transport)

Transport infrastructure including road, rail, canals, airports and ports are some of the most important material assets in Ireland.

Shannon International Airport is one of the three main airports servicing the country, along with Dublin and Cork. International air travel is an essential driver of inward direct investment, and surface access to Ireland's airports is crucial for both arriving and departing passengers as well as those working in and around the airport and the movement of freight through the airports.

Shannon Foynes Port Company, located just outside the study area, is recognised as a Port of National Significance (Tier 1). It is currently connected to the national motorway network at Limerick via secondary road network and the improvement of the road connection to Shannon Foynes was identified as a priority in the National Ports Policy (DTTaS, 2013).

Key Action 2: Climate Change (EPA, 2016)

In relation to transport, there needs to be support for a modal shift from the private car to an efficient sustainable transport system through a more proactive and systematic approach to land use and transport planning. Wider policy measures are needed to promote significant increases in alternative fuels and electric vehicle usage.

5.12.3 Future Trends

Natural Assets / Land Use

There is uncertainty regarding the impact of Brexit on the Irish agricultural industry, and it is difficult to anticipate how demand or requirement for agricultural land may alter in the future at this point in time. In addition, there will be changes in land use within the study area as economic regeneration plans are realised and population levels increase (particularly in the urban and suburban Limerick area).

Built Material Assets (Transport)

Demand on existing transport infrastructure is likely to increase in the future as a result of population increase, directly and indirectly resulting from the significant employment growth within the study area anticipated over the next 20 years (see Section 5.3.4).

5.12.4 Key Issues relating to LSMATS

The key issues in relation to the land use/material assets topic are:

- likely increase in the demand for transport within Ireland due to economic growth and development, particularly within urban populations;
- over-reliance on private car and related pressures for supporting infrastructure;
- building materials used, their manufacture and management and/or disposal or waste generated from new transport infrastructure;
- temporary or permanent loss and fragmentation of valuable natural assets such as agricultural land, forests and peatlands; during construction and/or operation of transport options; and
- effects of construction on current infrastructure such as road/rail/waterway networks.

5.13 Climate Change

5.13.1 Climate Change and Transport

The National Mitigation Strategy sets out the key elements in relation to transport:

- increasing the efficiency of the transport system by making the most of digital technologies, smart pricing and further encouraging the shift to lower emission transport modes;
- speeding up the deployment of low-emission alternative energy for transport, such as advanced biofuels, renewable electricity and renewable synthetic fuels and removing obstacles to the electrification of transport; and
- moving towards zero-emission vehicles. While further improvements to the internal combustion engine will be needed, Europe needs to accelerate the transition towards ultra-low- and zero-emission vehicles.

Ireland's emissions profile has changed considerably since 1990, with the contribution from transport increasing by 130% between 1990 and 2015. The transport sector has been the fastest growing source of greenhouse gas emissions over the period, representing 27.5% of Ireland's non-ETS sector emissions in 2015[4]. The transport share of overall national greenhouse gas emissions increased from 9% in 1990 to almost 20% in 2005 and remains now at that 20% level, as illustrated in

Figure 5.18 below. During this period, there was a significant increase in both economic output and car ownership levels, from around 800,000 cars in 1990 to close to two million in 2015 (+149%). (DCCAE, 2017).

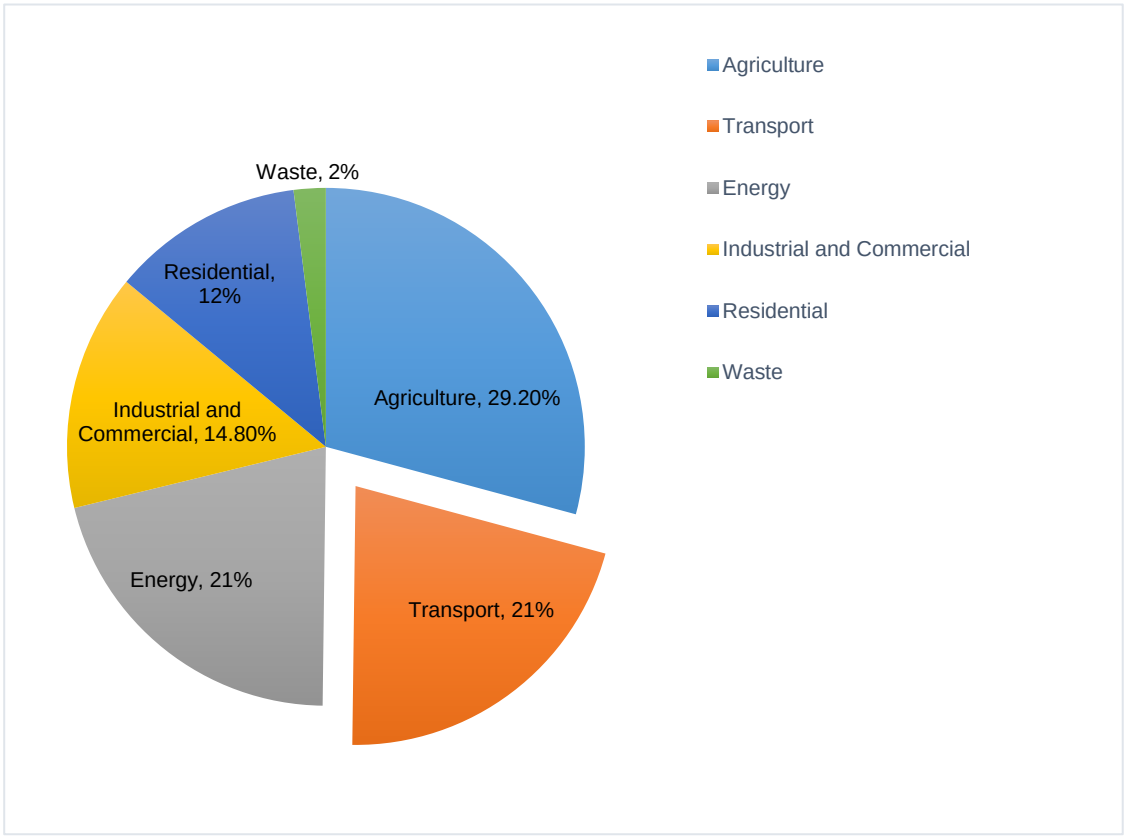


Figure 5.18 Emissions per Sector (%)

[4] It should be noted that these figures include all transport including sea and aviation, however LSMATS only concerns land transport.

5.13.2 Legislative Background

The National Policy Position on Climate Action and Low Carbon Development and the Climate Action and Low Carbon Development Act 2015 provide the policy framework for climate action at national level in Ireland. At EU and United Nations level, there are a number of strategies and policies that set out the requirements for national mitigation and adaptation. In summary, these policies and strategies are looking to minimise global temperature rise to 1.5°C. In order to do so, Ireland's aim is to achieve greenhouse gas emission reductions for non-Emission Trading Scheme[5] (ETS) sectors by at least 20% of 2005 levels by 2020 and 40% of 1990 levels by 2030.

Ireland has adopted its first National Climate Change Adaptation Framework in 2012 which aims to ensure that adaptation actions are taken across all sectors from a national to local level to reduce vulnerability to climate change.

In 2015, Ireland adopted the Climate Action and Low Carbon Development Act 2015 which provides an approach for the transition to a low carbon economy, by integrating the framework for two statutory plans: the National Mitigation Strategy (Department of Communications, Climate Action and Environment, 2017) and the National Adaptation Framework.

The National Mitigation Strategy sets out a series of mitigation measures and actions to address the challenges of meeting the 2020 and 2030 targets. Ireland's key focus to achieve its emissions target is to reduce emissions from its largest contributing sectors: agriculture, transport and energy. Ireland has adopted its first National Adaptation Framework in 2018 which aims to ensure that adaptation actions are taken across all sectors from a national to local level to reduce vulnerability to climate change. A sectoral National Adaptation Plan for the transport sector is also currently under preparation which sets out the priority climate concerns for the transport sector, presents the links between climate impacts and risks to infrastructure in Ireland (DTTaS, 2019).

The Climate Action Plan 2019 puts in place a decarbonisation pathway to 2030 which would be consistent with the adoption of a net zero target in Ireland by 2050. It also commits to evaluating in detail the changes which would be necessary in Ireland to achieve this target, setting these out through a combination of targets, measures and actions to support decarbonisation across a range of sectors.

5.13.3 Future Trends

In May 2018 the EPA reported that Ireland is set to fail to meet the 2020 EU greenhouse gas targets for all sectors. Current projections indicate that Ireland will be 1% below 2005 levels by 2020 against the target of 20% target for non-ETS sector emissions under the "With Additional Measures" scenario, and 0% under the "With Existing Measures" scenario. The "With Existing Measures" scenario assumes that no additional policies and measures, beyond those already in place by the end of 2016, are implemented. The "With Additional Measures" scenario assumes implementation of the "With Existing Measures" scenario in addition to, based on current progress, further implementation of Government renewable and energy efficiency targets for 2020, as set out in the National Renewable Energy Action Strategy and the National Energy Efficiency Action Plan.

Total greenhouse gas emissions including the non-ETS sectors are set to increase by 1% by 2020 and 4% by 2030 under the "With Existing Measures" scenario and increase 2% by 2020 and decrease by 1% by 2030 under the "With Additional Measures" scenario (EPA, 2018).

Relative to 2005, transport emissions are projected to increase slightly or, at best, remain at the same level by 2020. Over the longer term, the EPA project that without intervention transport sector emissions will increase by 11.3% over the period 2020 to 2035 (DCCAE, 2017).

[5] These sectors cover agriculture, transport, built environment (residential, commercial/institutional), waste and non-energy intensive industry.

5.13.4 Key Issues in relation to LSMATS

The key issues in relation to climate change are:

- increased pressure on and damage to transport infrastructure due to more incidents of heavy rainfall;
- more frequent and damaging storms resulting in damage to assets and loss of power;
- more incidents of heavy rainfall leading to spot flooding which can impede access to transport infrastructure;
- sea level rise causing flooding and resulting in increased road run-off contaminating water sources;
- carbon emissions from energy use and the requirement for energy efficiency; and
- the location of the future transport infrastructure (existing or planned) should take into account flood risk and the location of any proposed flood defence schemes.

6. SEA Scope and Methodology

6.1 Scope of Assessment

Table 6.1 sets out the scope of the SEA for each of the ten environmental topic areas scoped into further assessment in the SEA Scoping Report (Jacobs, 2019). Further detail regarding key issues and considerations for each topic area are provided in Chapter 5.

Table 6.1 Scope of the SEA

Topic Area		Scope		Potential for Transboundary Effects
		Construction	Operation	
Population, Human Health, Socioeconomics and Access	Access to employment and recreational amenities Access to walking and cycling infrastructure	✓	✓	X
Tourism and Recreation	Tourism industry and large scale recreational assets	✓	✓	X
Biodiversity, Flora and Fauna	Potential impacts on international, national and locally designated sites	✓	✓	X
Landscape and Visual Amenity	Landscape character and visual amenity	✓	✓	X
Cultural Heritage	Designated assets and unknown archaeological remains	✓	✓	X
Geology and soils	Availability of soil resources Karst limestone – pollution pathways and geotechnical stability	✓	✓	X
Air Quality	Construction activities and motorised transport	✓	✓	X
Noise and Vibration	Construction activities and motorised transport	✓	✓	X
Water Environment	Potential impacts on water quality and flood risk	✓	✓	X
Land Use and Material Assets	Conflicts with existing or planned land uses	✓	✓	X
Climate Change	Energy consumption and carbon emissions Resilience of new infrastructure to climate change	✓	✓	X

6.2 Method of Assessment

6.2.1 Overall Approach

The SEA assesses each element of the Preferred Strategy against the SEOs identified in Table 6.2 within matrices.

The assessment of the effects that are expected to occur from the implementation of measures under each element of Preferred Strategy are based on technical judgement and knowledge of similar schemes. Where it is known that standard procedures are already in place to manage the impacts, or there is legislation in place to protect the receptor against the identified potential impacts, this is also recorded. The assessment takes the procedures or legislative protection identified below into account, since they would be implemented regardless of the SEA process.

- Studies and Surveys
  - Feasibility and scheme option studies aimed at avoiding adverse effects on designated sites and protected structures.
  - Studies, surveys and consultation on environmental effects of development proposed under the LSMATS following relevant good practice guidance to inform design. Identify relevant mitigation and to support appropriate planning permission and licencing processes.
  - Local residents provided with due notice of construction works.
  - Ensure safe access along public right of way (PRoW) for pedestrians, cyclists and equestrians, proving diversions where necessary.
  - Implementation of traffic management measures to minimise disruption to the highway network, including, where possible, limitation of works within peak periods or times.
  - Any disruption to road and rail network to be agreed in advance through relevant transport authorities.
  - European Protected Species Mitigation Licence (EPSML) to be obtained for all works which may affect a European protected species.
  - A suitably qualified and experienced Ecological Clerk of Works (EcoW) to carry out site supervision works during activities that affect sensitive habitats and species, ensure that site specific mitigation identified following surveys is undertaken and that any previously unidentified impacts are managed and mitigated.
  - Appropriate ordinary watercourse consents and environmental permits to be obtained for construction activities in or near water.
  - Best practice measures to control noise, air and water pollution in accordance with the relevant EPA guidance.
  - Full restoration of PRoW, recreational areas, habitats, agricultural land and previously undeveloped land required for temporary works.
  - All footpaths, cycleways and other recreational routes would be reconnected where severed by new road infrastructure.
- The following assumptions have also been made:
- Alignments/locations of new or improved infrastructure required to support objectives can be managed such that no loss or land take from built heritage assets or recreational facilities is required, except where specifically indicated within the assessment tables provided in Appendix C.

The SEA assesses each element of the Strategy against the SEOs identified in Table 6.2 within matrices. Recommendations for specific mitigation to help avoid or reduce the potential impacts or to contribute to achieving objectives have been identified as part of the SEA assessment. An assessment of significance has been

recorded with mitigation in place to address how the effects will change following implementation of the SEA mitigation recommendations and provide an assessment of the residual effects.

6.2.2 Determination of Significance

The significance of the effect was determined based on the sensitivity of the receptor, the scale of the change and the current level of certainty regarding materialisation of the impact identified. Using this method, a sensitive receptor (for example a European designated site) may only require a small change to be considered as a significant effect. Alternatively, a less sensitive environment may tolerate a larger change and may therefore be judged as a minor or no effect.

The effects can be beneficial or adverse as indicated by colour and by the + and – symbol and shown in Table 6.3. The effects are assessed both before and after the identification of mitigation. The assessment of significance takes into account the likelihood of the effect occurring, the severity of the effect and the spatial extent (i.e. how large an area, or size of population) would be affected.

A description of the expected nature of identified effects has been given, for example whether they are cumulative, direct/indirect, short-term/ long-term, negative, positive, mixed positive and negative or neutral., in accordance with Schedule 2, part (f) of the SEA Directive and Schedule 2B of the Planning and Development (SEA) Regulations, 2004 (as amended).

Table 6.2 SEA Objectives and Assessment Criteria

SEOs	Key Linked SEA Topics	Criteria
1 Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	▪ Population, Socio-economics, Access, and Human Health. ▪ Tourism and Recreation.	Is there potential to: ▪ Affect public health and quality of life in terms of improved access to transport to jobs, schools, shops and other community facilities? ▪ Avoid creation of barriers to access from linear infrastructure? ▪ Reduce journey times for commuting? ▪ Improve access for rural populations dependent on land transport? ▪ Improve quality of travel and access to information? ▪ Improve physical access for all mobility impaired people? ▪ Raise public awareness of opportunities for more sustainable transport or more active travel? ▪ Avoid impacts on public health and wellbeing from increased traffic related to congestion, noise and air quality? ▪ Support local economic development for employment and community facilities? ▪ Support resilience against effects of Brexit on the economy?
2 Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	▪ Tourism and Recreation. ▪ Population, Socio-economics, Access, and Human Health. ▪ Land Use and Material Assets.	Is there potential to result in: ▪ Loss of or enhanced access to recreational amenity, footpaths or access to recreational amenity (including water-based recreation); ▪ Loss of or enhanced access to key tourism attractions in Ireland?
3 Prevent damage to, and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	▪ Biodiversity, Flora and Fauna. ▪ Landscape and Visual Amenity. ▪ Geology and Soils. ▪ Land Use and Materials.	Is there potential to result in significant or adverse effects on: ▪ European; (Natura 2000) or species protected in Annex II and IV of Habitats Directive and Annex I of Birds Directive? ▪ Nationally designated sites NHA's and pNHAs? ▪ Local, county or national biodiversity including Irish Biodiversity Action Strategy objectives?
4 Safeguard the character and diversity of the Irish	▪ Landscape and Visual Amenity.	Is there potential to:

SEOs	Key Linked SEA Topics	Criteria
landscape and minimise the visual effects on sensitive, designated landscapes and public views.	▪ Cultural Heritage. ▪ Tourism and Recreation. ▪ Population, Socio-economics, Access and Human Health. ▪ Land Use and Materials.	▪ Affect sensitive landscapes such as seascapes, townscapes and river views or visual amenity, for example are there impacts to landscape protection zones or scenic views or routes?
5 Avoid damage to, and where appropriate enhance, cultural heritage resources and their setting.	▪ Cultural Heritage. ▪ Landscape and Visual Amenity. ▪ Tourism and Recreation.	Is there potential to: ▪ Cause direct damage to, or detract from the setting of, designated cultural heritage assets, or does this contribute to protecting them (including marine based archaeology, old bridges and railway corridors and undiscovered archaeology)?
6 Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	▪ Geology and Soils. ▪ Biodiversity, Flora and Fauna.	Would there be any effects on: ▪ Any designated or non-designated geological features, valuable soils or contaminated land sites?
7 Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	▪ Air Quality. ▪ Population, Socio-economics, Access and Health.	Is there potential to ▪ contribute to improvements to air quality or to increase air pollution? Is there a potential to breach air quality standards?
8 Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	▪ Noise and Vibration. ▪ Population, Socio-economics, Access and Health.	Is there potential to: ▪ reduce or increase the number of people exposed to high levels of transport related noise?
9 Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	▪ Water Environment. ▪ Biodiversity, Flora and Fauna.	Is there potential for: ▪ Non-temporary deterioration of waterbody status or conflict with or contribute to potential to achieve WFD objectives for achieving “Good” status (ground and surface water)? ▪ Is there a potential for the strategy to increase flood risk or result in loss of flood plain?
10 Promote the sustainable use of natural resources (including land), encourage energy efficiency,	▪ Land Use and Material Assets. ▪ Geology and Soils.	Is there potential for: ▪ Conflicts with critical infrastructure, or does the strategy conflict

SEOs	Key Linked SEA Topics	Criteria
reuse, recycling while encouraging the effective use of existing infrastructure.	▪ Water Environment.	with existing business, planned land use or valuable agricultural land? Does the strategy encourage: ▪ Reuse of existing transport infrastructure and/or brownfield sites? ▪ Energy security by reducing use of fossil fuels? ▪ Use of renewable energy fuel sources?
11 Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks, modal changes or new technologies.	▪ Climate Change (Mitigation).	Will there be: ▪ High increase in the level of construction and operational carbon emissions or will proposals contribute to meeting future emission targets?
12 To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	▪ Climate Change (Adaptation). ▪ Population, Socio-economics, Access and Health. ▪ Land Use and Material Assets.	Will there be: ▪ Increased vulnerability or resilience of the environment and transport and other strategic infrastructure to climate change?

Table 6.3 Scale of Effects

Description of Effect	Effect
The draft strategy objective / recommended investment priority is likely to have a significant positive effect on the environmental receptors associated with this objective.	+
The draft strategy objective / recommended investment priority may have neutral or significant positive effects on the environmental receptors associated with this objective depending on how the policy or objective is delivered.	0/+
The draft strategy objective / recommended investment priority is likely to have mixed significant positive & negative effects on the environmental receptors associated with this objective.	+/-
The draft strategy objective/ recommended investment priority is likely to have a neutral effect on the environmental receptors associated with this objective.	0
The draft strategy objective / recommended investment priority may have neutral or significant negative effects on the environmental receptors associated with this objective depending on how the policy or objective is delivered.	0/-
The draft strategy objective / recommended investment priority is likely to have a significant negative effect on the environmental receptors associated with this objective.	-
The draft strategy objective / recommended investment priority effects are uncertain/there is insufficient information on which to determine effect on potential environmental receptors associated with this objective at this stage.	?

6.2.3 Strategy Alternatives

The SEA Directive requires the SEA process to identify and describe “reasonable alternative” means of achieving the objectives of the LSMATS. It states under Article 5(1) that;

“Where an environmental assessment is required under Article 3(1), an environmental report shall be prepared in which the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme, are identified, described and evaluated.”

The reasons for selecting (a) the alternatives and (b) the preferred alternative must be documented, together with a description of how this assessment of alternatives was undertaken.

“Within Strategy” and “Whole Strategy” alternative scenarios have been assessed against the SEOs and clear justification for the selection of the alternative/combination of alternatives as the preferred strategy is provided. Criteria for the assessment of the effects on Strategy alternative scenarios are shown in Table 6.4.

Table 6.4 Assessment Criteria for Effects on Alternatives on SEOs

Description of Effects	Effect
Strategy alternative is likely to make a greater positive contribution to SEO or greatly improve likelihood of delivery of positive effects and reduce risk of adverse effects	++
Strategy alternative has potential to provide a positive contribution to SEO or improve likelihood of delivery of positive effects and reduce risk of adverse effects.	+
Strategy alternative has no identifiable difference from other alternatives in terms of actual or potential contribution or conflict with SEO or risk of effects	0
Strategy alterative has potential to conflict to a greater extent with SEO or increase risk of adverse effects	-
Strategy alterative is likely to conflict to a greater extent with SEO or greater increased risk of adverse effects	--

6.2.4 Cumulative Effects

Cumulative effects can be described as the addition of many small impacts to create one larger, more significant, impact. They can be either:

- Additive effects: the addition of many minor or significant effects to create larger, more significant effects. Therefore, effects that arise, for instance, where several developments (such as multiple options) each have insignificant effects but together have a significant effect; or where several individual effects of the Strategy (for example noise, dust and visual) have a combined effect (in-combination effects).
- Synergistic effects: “Where the resultant effect is of greater significance than the sum of its constituents.” Synergistic effects often happen as habitats, resources or human communities get close to capacity. For instance, a wildlife habitat can become progressively fragmented with limited effects on a particular species until the last fragmentation makes the areas too small to support the species.

Both intra-plan and inter-plan cumulative effects have been considered within the SEA for LSMATS:

- Intra-plan cumulative effects - these arise from the interactions between different types of environmental effects resulting from a plan, programme, etc. The interrelationships between environmental components that help determine these effects are identified on Table 6.5 e.g. interrelationships between: human health and air quality; human health and water quality; air quality and vegetation; human health and flood risk; and ecology and water quality.
- Intra-plan cumulative effects have been considered within the assessment of the Preferred Strategy summarised in Section 7.3 and provided in detail for each element of the Preferred Strategy in Appendix. For example, the assessment against SEO 1 (Population and Health) considers impacts associated with changes in air and noise pollutant levels, access to recreational facilities, impacts other essential infrastructure and visual impacts associated with new infrastructure construction.
- Inter-plan cumulative effects - these arise when the effects of the implementation of one Strategy occur in combination with those of other plans, programmes, projects, etc. With regard to potential inter-Plan cumulative environmental effects, these occur as a result of the combination of: environmental effects which are identified by the assessment; and the effects arising from other policies, plans and programmes.
- Inter-plan cumulative effects are considered within Section 7.4. Inter-plan cumulative effects have been assessed only as having a likely positive effect or likely negative effect base on professional judgment.

Table 6.5 Interrelated Strategic Environmental Assessment topics

	Population, Economy & Human Health	Tourism and Recreation	Biodiversity, Flora and Fauna	Landscape and Visual Amenity	Cultural (Archaeological and Architectural)	Geology and Soils	Air Quality	Noise and Vibration	Water Environment	Land Use and Material Assets
Tourism and Recreation	Y									
Biodiversity, Flora and Fauna	Y	Y								
Landscape and Visual Amenity	Y	Y	Y							
Cultural Heritage (Archaeological and Architectural)	Y	Y	N	Y						
Geology and Soils	Y	Y	Y	Y	Y					
Air Quality	Y	Y	Y	N	N	N				
Noise and Vibration	Y	Y	Y	N	N	N	N			
Water Environment	Y	Y	Y	Y	Y	Y	N	N		
Land Use and Material Assets	Y	Y	Y	Y	Y	Y	Y	N	Y	
Climate Change	Y	Y	Y	Y	Y	Y	Y	N	Y	Y

6.2.5 Appropriate Assessment

As described in Section 2.3.3, all Natura 2000 sites (SPAs, SACs and Ramsar sites, including candidate and potential sites) are the subject of a separate strategic AA, in accordance with the Birds and Natural Habitats Regulations 2011. This has been carried out in parallel with the SEA and has fed into the SEA on International and European site issues, including the assessment of cumulative effects. The Natura Impact Statement is provided as Appendix A to the SEA Environmental Report.

7. Environmental Assessment of Preferred Plan and Alternatives

This chapter provides the environmental assessment of the draft LSMATS (the preferred Strategy) as well as:

- "Within Strategy" alternatives – different options considered for the various elements of the LSMATS; and
- "Whole Strategy" alternatives- alternative ways in which the "Within Strategy" options considered can be combined in a way which fulfils the brief of the LSMATS.

Likely positive and negative environmental effects associated with different "Within Strategy" and "Whole Strategy" alternatives are identified, and the development of the Preferred Strategy summarised with reference to the role of environmental considerations within decision making

7.1 "Within Strategy" Alternatives

Demand analysis (Jacobs, 2019) shows that public transport is the transport mode which has greatest potential for improvement within the LSMATS. Therefore, the first step in development of the draft LSMATS was to consider the public transport network options. During initial demand modelling analysis, the LSMA was divided into several corridors based around the national and regional transport networks around a central city centre core. The demand corridors identified were:

- corridor A: King's Island, Westbury and Parteen;
- corridor B: The University, South Clare SDZ, Annacotty, Castletroy, Garryowen and Castleconnell;
- corridor C: Roxboro;
- corridor D: Dooradoyle, Raheen and Ballinacurra;
- corridor E: Mungret and Ballinacurra;
- corridor F: Moyross, Clareview, Caherdavin, Shannon, Bunratty, Sixmilebridge and Cratloe; and
- orbital movements.

For each corridor (corridor D and E were considered as one for the purposes of the options appraisal process) and for orbital services, the following public transport alternatives were considered:

- bus services;
- bus rapid transit;
- light rail transit; and
- suburban rail.

A Multi Criteria Assessment (MCA) in line with the CAF was undertaken for each public transport alternative and corridor, which considered aspects including economy, environment, safety, integration and accessibility and inclusion. Further details regarding the process and outcomes of the MCA assessment are provided in the LSMATS Transport Options and Network Development Report (NTA, 2020). The MCA concluded that that bus services were the preferred option for all corridors and for orbital movements for the following reasons:

- Demand is significantly below the capacity of light rail transit and suburban rail, and also below the demand capacity for bus rapid transit. Given the high construction and operating costs of these options, they would not provide value for money.
- Suburban light rail only enhances accessibility along existing rail routes, and whilst bus rapid transit and light rail transit provide better opportunities to improve accessibility than suburban rail, they are still subject to significant infrastructure constraints.

Table 7.1 provides an assessment of these "Within Strategy" alternatives for all options.

Table 7.1 Assessment of "Within Strategy" alternatives against SEOs

SEO		Bus services		Bus rapid transit		Light rail transit		Suburban rail	
		Effect	Narrative	Effect	Narrative	Effect	Narrative	Effect	Narrative
1	Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	++	Likely reduction in transport related air and noise pollution as a result of modal shift towards public transport, with secondary benefit to public health from likely increase in active travel journeys. Higher safety rate associated with this option compared to private transport due to the segregation from other road users.	+	Similar positive impacts for public health as identified against bus services option, however accessibility likely to be limited for some areas of the LSMATS due to space constraints would mean degree of positive impact likely reduced relative to bus services.	+	As described against bus services option, but as for bus rapid transit, access in some areas will be limited due to the constraints of existing infrastructure resulting in reduced accessibility.	+	As described against bus services option, however improvements in accessibility limited to those populations who have access to existing rail network with limited options to improve accessibility through transport links to the wider LSMATS, especially with urban areas.
2	Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	-	Potential for negative impacts on recreational and amenity facilities primarily as a result of land take. However negative impacts anticipated to be least likely under this option as bus services could make use of existing highway infrastructure to a significant degree.	--	Increased potential for negative impacts on recreational and amenity facilities relative to bus services option as increased degree new infrastructure required.	--	As per bus rapid transit option.	--	As per bus rapid transit option.
3	Prevent damage to,	-	Potential for negative	-	Increased potential for	--	As per bus rapid	--	As per bus rapid transit

SEO		Bus services		Bus rapid transit		Light rail transit		Suburban rail	
		Effect	Narrative	Effect	Narrative	Effect	Narrative	Effect	Narrative
	maintain, and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.		impacts on biodiversity primarily as a result of land take. However negative impacts anticipated to be least likely under this option as bus services could make use of existing highway infrastructure to a significant degree.		negative impacts on recreational and amenity facilities relative to bus services option as increased degree new infrastructure required.		transit option.		option.
4	Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	-	Bus service routes would predominately follow the existing highway network and therefore would have a minimal effect on visuals and landscape due to the existing traffic present.	-	Similar benefits to preferred option as bus rapid transit routes would predominately follow the existing highway network, however slight increased risk of negative effects as increased degree of new infrastructure required.	--	Increased potential for negative impacts on landscape and visual due to the construction of the infrastructure needed to facilitate light rail transit.	--	As per light rail transit option.
5	Avoid damage to, maintain, and where appropriate enhance, cultural heritage resources and their setting.	-	Bus service routes would predominately follow the existing highway network and therefore risks to known or unknown archaeology and integrity or setting of built heritage assets lowest under this option.	-	Bus rapid transit routes would predominately follow the existing highway network, however slightly increased risk of loss/damage to archaeology where increase to footprint of the existing road network is required and increased	--	Increased potential impacts to heritage and setting due to the greater requirement for new infrastructure and land take in order to facilitate light rail transit option.	--	As per light rail option.

SEO		Bus services		Bus rapid transit		Light rail transit		Suburban rail	
		Effect	Narrative	Effect	Narrative	Effect	Narrative	Effect	Narrative
					risk of negative effects on setting of built heritage assets.				
6	Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	-	Bus service routes would predominately follow the existing highway network and therefore risks to known or unknown archaeology and integrity or setting of built heritage assets lowest under this option.	-	Bus rapid transit routes would predominately follow the existing highway network, however slightly increased risk of loss/damage to valuable soils where increase to footprint of the existing road network is required	--	Increased potential for damage to geological sites of value and soil resources due to greater degree of new infrastructure required to facilitate light rail transit option.	-	Increased potential for damage to geological sites of value and soil resources where new rail infrastructure required to facilitate suburban rail option. However, within some areas there are existing disused rail lines that can be reopened which would have little impact on geological sites of value or soil resources.
7	Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	++	Likely reduction in transport related air pollutant emissions associated with modal shift form private car usage.	++	As per bus services option.	++	As per bus services option.	++	As per bus services option.
8	Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	++	Likely reduction in noise pollution associated with modal shift away from private vehicle to public transport	++	As per bus services option.	++	As per bus services option.	++	As per bus services option.

SEO		Bus services		Bus rapid transit		Light rail transit		Suburban rail	
		Effect	Narrative	Effect	Narrative	Effect	Narrative	Effect	Narrative
9	Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	0	Potential for increase in flood risk associated with additional impermeable infrastructure needed, however risk of adverse effects considered lowest under this option.	-	Slight increase in likelihood of negative effects on flood risk relative to bus services option due to increased requirement for road widening.	--	As per bus rapid transit option.	--	As per bus rapid transit option private vehicle use on the road.
10	Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	-	Some degree of land take likely required to support this option, however requirements likely to be less than for alternative options.	--	Bus rapid transit option would likely require an increased level of new infrastructure construction to facilitate separate lanes for buses relative to the bus service option, as well as increased land take.	--	Increased level of new infrastructure and land take would be required to facilitate the light rail transit option, with greater degree of materials consumption and land take likely.	--	Increased level of additional infrastructure would be required to facilitate the suburban rail option in some areas, with greater materials consumption and land take likely. Some existing infrastructure could be reused however.
11	Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport	++	Modal shift away from private vehicle usage would likely reduce transport related carbon emissions. However, there would be a degree of embodied carbon emissions associated with new infrastructure construction. Embodied carbon emissions	+	Implementation of the bus rapid transit would likely require an increased level of new infrastructure construction to facilitate separate lanes for buses relative to the preferred option. As for bus services likely reduction in GHG emissions associated with	+	Less benefit to preferred option as construction required to facilitate the light rail transit would contribute to climate change, As for preferred option, likely reduction in GHG emissions	+	As per light rail transit.

SEO		Bus services		Bus rapid transit		Light rail transit		Suburban rail	
		Effect	Narrative	Effect	Narrative	Effect	Narrative	Effect	Narrative
	related GHG emissions through modal changes or new technologies.		anticipated to be lowest under this option.		modal shift towards public transport.		associated with modal shift towards public transport.		
12	To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	0	No significant effect against this SEO considered likely.	0	No identifiable difference to bus services option.	0	No identifiable difference to bus services option.	0	No identifiable difference to bus services option.

7.2 "Whole Strategy" Alternatives

Following identification of the bus network option as the preferred public transport network option, modelling was undertaken using the NTAs Mid-West Transport Model (MWTM) to develop and refine the draft LSMATS (see Jacobs, 2020) including public transport, road, rail, cycling, walking and demand management measures to develop the preferred strategy network.

Prior to modelling, initial bus routes and frequencies for each of the transport corridors (including orbital routes) described in section 7.1 were developed to meet the maximum public transport demand identified through the LSMATS Demand Analysis Report (Jacobs, 2019). A number of other public transport options were also developed to try make best use of the existing available infrastructure, such as existing rail lines. The modelling was then undertaken iteratively with each run used to refine the inputs and assumptions for the next run. The outputs of these runs were used to inform the options assessment for each corridor and refine the bus routes and services initially developed. Table 7.2 sets out the modelling runs undertaken and identifies the three main scenarios considered as "Whole Strategy" alternatives.

Further detail regarding the options development process and modelling undertaken to support development of the draft LSMATS, including information regarding the land use, population growth and existing network assumptions, are provided in the LSMATS Transport Options and Network Development Report (Jacobs, 2020) and the LSMATS Transport Modelling Report (Jacobs, 2020). For further detail regarding objectives and measures under preferred Strategy see the draft LSMATS (Jacobs, 2020).

Table 7.2 Model runs undertaken to support strategy network development

Alternative	Scenario Name	Model Run	LNDR Phase 1	Bus Network & Priority	Cycle Network	Improved Rail Network	City Centre PT Measures	Full LNDR	Foynes to Limerick
A	Do Minimum	AAD	✓						
	Bus Network	AAE	✓	✓	✓				
	Bus Network and Rail	AAF	✓	✓	✓	✓			
	Bus Network and City Centre Strategy	AAG	✓	✓	✓		✓		
B	Bus Network, City Centre Strategy and Roads	AAH	✓	✓	✓		✓	✓	✓
		AAH +Inc. public transport (PT) priority	✓	✓	✓		✓	✓	✓
		AAH +Inc. PT priority + Revised LNDR	✓	✓	✓		✓	✓	✓
C	Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ('Do Strategy')	AAH +Inc. PT priority + Revised LNDR Parking restrictions 'Do Strategy'	✓	✓	✓		✓	✓	✓

During development of the preferred Strategy, key alternative scenarios considered include:

- Alternative A: Do Minimum Scenario.
- Alternative B: Bus Network, City Centre Strategy and Roads (Model run AAH).
- Alternative C: Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ('Do Strategy').

Table 7.3 outlines in further detail the suite of measures included in each of these alternative scenarios, and Table 7.4 provides a relative assessment of each alternative against the SEOs in accordance with the methodology outlined in Section 6.2.3. As shown in Table 7.4, the key differences between these alternatives are:

- Alternative C would have the greatest positive impact on SEOs 1, 2, 7, 8 and 12, which is associated primarily with measures to encourage modal shift towards public transport is likely to contribute to reduced air and noise pollution, increased active travel rates, improve accessibility to community and recreational facilities and places of employment, and reduced transport related carbon emissions within the LSMATS. Alternatives B and C provide an opportunity to enhance the resilience of the transport network to future climate change (SEO 12) which is not afforded under Alternative A (Do Minimum).
- The 'Do Minimum' scenario has least potential for conflict with SEOs 3, 4, 5 and 9 relating to risks to designated nature conservation sites, habitats and wildlife, archaeology and landscape character and visual amenity associated with construction of new roads and other infrastructure. However, the proposed improvements to the public realm identified under Alternative C would have a positive impact for townscape and visual amenity and there is also an opportunity to enact positive impacts for built heritage within the LSMATS through these works.
- Alternative B and Alternative C both have greater potential for significant adverse effects against SEO 9 than Alternative A (Do Minimum). This is because they would result in a net increase in area of hardstanding primarily associated with new road construction with resultant potential negative contribution to flood risk and to water quality.
- None of the alternative scenarios are likely to have significant positive or negative impacts against SEO 6 which relates to soils and geology.

Table 7.3 "Whole Strategy "Alternatives

Scenario	Components
Alternative A: Do Minimum (model run AAD)	Existing road, public transport, walking and cycling networks and Phase 1 of the Limerick Northern Distributor Road (LNDR) (Coonagh to Knockalisheen)
Alternative B: Bus Network, City Centre Strategy and Roads (model run AAH)	As per Do Minimum Scenario (model run AAD), and in addition: ▪ Comprehensive network of radial and orbital bus routes developed to meet idealised demand ▪ Improved cycle network as per Limerick Metropolitan Cycling Strategy ▪ Traffic management measures and additional bus priority measures within Limerick City Centre including public transport only measures along O'Connell Street and Sarsfield Bridge ▪ N69 Limerick to Foynes including Adare Bypass ▪ full LNDR (80kph dual lane with grade separated

Scenario	Components
	junctions)
Alternative C: Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ('Do Strategy')	As per Bus Network, City Centre Strategy and Roads, with the following amendments and additions: Amendments ▪ Previous northern orbital routes removed for period prior to implementation of LNDR given poor patronage and journey times ▪ Second bus route provided to Shannon and between Sixmilebridge and Shannon Town and Airport in preference to rail service ▪ Speed limit of LNDR refined to 60 kph and cross section amended to include single carriageway for cars, at grade signalised junction and bus priority and walking and cycling provision ▪ Additional bus priority measures within Limerick (Bridge Street and Charlotte's Quay) ▪ Additions ▪ Improvements to the strategic walking network and to pedestrian provision within Limerick City centre and metropolitan towns (and removal of Limerick City centre parking spaces as required to facilitate proposed walking and cycling infrastructure improvements) ▪ M7/N18 Junction Improvements, M/N20 Cork to Limerick and Link Road between Childers Road to Golf Links Road (with bus priority) ▪ HGV traffic restrictions within Limerick City Centre ▪ Supporting measures including Mobility Management Measures, wayfinding, intelligent traffic systems, cycle and car share schemes, Improved public transport stops, integrated/smart ticketing, real time passenger information and public realm enhancements

Table 7.4 Assessment of "Whole Strategy" alternatives against SEOs

SEO	Alternative A: Do Minimum (model run AAD)		Alternative B: Bus Network, City Centre Strategy and Roads (model run AAH)		Alternative C: Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ("Do Strategy")	
	Effect	Narrative	Effect	Narrative	Effect	Narrative
1 Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	--	Transport related air pollutant and noise emissions likely highest under this scenario as the volume and proportion of journeys undertaken by private car is highest and volume and proportion of walking and cycling journeys is lowest.	+	Implementation of new bus network as well as traffic management and bus priority measures within Limerick City Centre would help reduce the number of private car journeys and increase the number of journeys undertaken by walking and cycling. Benefits to public health associated with reduction in transport related air pollutant and also potentially noise emissions, as well as increasing activity levels through active travel journeys associated with public transport usage (whilst public transport is not a form of active travel in itself, many public transport users walk or cycle to points of access as part of their overall journey), and increased attractiveness of walking and cycling journeys for recreational purposes resulting from reduced	++	As per Alternative B although the following newly included measures would help improve the mode share for public transport and active travel modes, increasing benefits for public health relative to Alternative B. ▪ Specific provision for public transport and cyclists within LNDR cross section; ▪ Additional public transport priority measures within Limerick City Centre; ▪ HGV restrictions within Limerick City Centre; and ▪ Supporting measures to improve the desirability of public transport (e.g. real time passenger information, improved bus stops, integrated/smart ticketing) and walking/cycling (e.g. wayfinding, public realm improvements).

SEO		Alternative A: Do Minimum (model run AAD)		Alternative B: Bus Network, City Centre Strategy and Roads (model run AAH)		Alternative C: Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ("Do Strategy")	
		Effect	Narrative	Effect	Narrative	Effect	Narrative
					traffic volumes within urban and suburban areas.		
2	Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism and recreation.	0	No specific benefits or adverse impacts on recreation and amenity facilities or access for tourism and recreational purposes anticipated.	0	No specific benefits or adverse impacts on recreation and amenity facilities or access for tourism and recreational purposes anticipated.	++	Improvements to walking and cycling provision, including proposed new greenways, would increase amenity and availability of recreational facilities within the LSMATs. Improvements to the public realm within Bunratty, Cratloe and Limerick City in particular, as well as the World Class Waterfront Project would help support access for tourism.
3	Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	-	Increase in air pollutant emissions as described against SEO 1 would potentially adversely affect designated and non-designated nature conservation sites.	--	Modal shift towards public transport and walking/cycling and resultant reduction in traffic related air pollutant emissions as described against SEO 1 would benefit designated and non-designated nature conservation sites, however new road schemes (particularly LNDR) likely to result in significant adverse effects on designated nature conservation sites.	--	Reduction in traffic related air pollutant emissions would be greatest under this scenario as described against SEO 1. However, risk of significant adverse effects on designated nature conservation sites from new road schemes (in particular the LNDR) as described against Alternative B.

SEO		Alternative A: Do Minimum (model run AAD)		Alternative B: Bus Network, City Centre Strategy and Roads (model run AAH)		Alternative C: Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ("Do Strategy")	
		Effect	Narrative	Effect	Narrative	Effect	Narrative
4	Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	0	No new infrastructure required and therefore risks of adverse effects on landscape character and public views lowest under this scenario,	--	New infrastructure, especially new road infrastructure within semi-rural or rural areas, has potential to adversely affect landscape character and public views.	+	Whilst potential adverse effects associated with new infrastructure identified against Alternative B still apply in term of potential negative impacts on landscape character and public views from new road infrastructure, this alternative scenario also includes public realm improvements within Limerick City as well as the 'World Class Waterfront Project which would likely have beneficial impacts for townscapes and visual amenity.
5	Avoid damage to, maintain and where appropriate enhance, cultural heritage resources and their setting.	0	No new infrastructure required and therefore reduced risk of loss/truncation of archaeological remains or adverse effects on setting of built heritage assets.	--	Risk of loss/truncation of archaeological remains associated with construction of new infrastructure, particularly new road infrastructure within floodplain areas north of the Limerick.	-	Whilst potential adverse effects associated with new infrastructure identified against Alternative B still apply, restrictions on HGV movements within Limerick City centre and measures such as wayfinding and public realm improvements provide an opportunity to improve the setting and accessibility of build cultural

SEO		Alternative A: Do Minimum (model run AAD)		Alternative B: Bus Network, City Centre Strategy and Roads (model run AAH)		Alternative C: Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ("Do Strategy")	
		Effect	Narrative	Effect	Narrative	Effect	Narrative
							heritage assets.
6	Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	0	No noticeable difference in outcomes anticipated relative to preferred strategy. Likelihood of adverse impacts on valuable geological sites and soils considered low.	0	Whilst this scenario requires new infrastructure construction, the likelihood of adverse impacts on valuable geological sites and soils is still considered very low.	0	Whilst this scenario requires new infrastructure construction, the likelihood of adverse impacts on valuable geological sites and soils is still considered very low
7	Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	--	Greatest increase in traffic related air pollutant emissions likely to occur under this scenario as described against SEO 1.	+	Reduced traffic related air pollutant emissions relative to DM scenario as described against SEO 1, however potential risk of worsening air quality for small communities on the northern outskirts of Limerick associated with the LNDR which may be minimised or mitigated through careful design.	++	Lowest emissions of traffic related ai pollutant emissions likely to occur under this scenario as described against SEO 1, however potential risk of worsening air quality for small communities on the northern outskirts of Limerick associated with LNDR and in the vicinity of HGV consolidation centres, park and rides and mobility hubs which can likely be minimised or mitigated through careful design.
8	Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from	--	Greatest increase in traffic related noise pollution likely to occur under this scenario as described against SEO 1.	+	Reduced traffic related noise pollution relative to Alternative A as described against SEO 1, however potential risk of worsening noise	++	Lowest emissions of traffic related noise pollution likely to occur under this scenario as described against SEO 1, however potential risk of

SEO		Alternative A: Do Minimum (model run AAD)		Alternative B: Bus Network, City Centre Strategy and Roads (model run AAH)		Alternative C: Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ("Do Strategy")	
		Effect	Narrative	Effect	Narrative	Effect	Narrative
	reduction in noise pollution.				pollution for small communities on the northern outskirts of Limerick associated with LNDR which may be minimised or mitigated through careful design.		worsening noise pollution for small communities on the northern outskirts of Limerick associated with LNDR and in the vicinity of HGV consolidation centres, park and rides and mobility hubs which can likely be minimised or mitigated through careful design.
9	Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	0	There would be no increase in flood risk or increase in vulnerability to flood risk under this scenario.	-	Potential increase in flood risk and increase in vulnerability to flood risk associated with new infrastructure construction, particularly the proposed new road (LNDR) crossing floodplain to the north of Limerick City. Also risks to WFD associated with new river crossings of the Shannon, Abbey and Barnakyle.	-	As described against Alternative B.
10	Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	0	Reduced requirement for new infrastructure relative to other scenarios, and therefore also less land take from greenfield sources. However, greater requirement for fossil fuel	+	Increased requirement for land take from greenfield sources relative to Alternative A and increased demand on fossil fuel resources associated with new infrastructure construction. However, in the longer term, modal	++	As described against Alternative B however relatively greater reduction in fossil fuel demand due to increased modal shift towards public transport, walking and cycling.

SEO	Alternative A: Do Minimum (model run AAD)		Alternative B: Bus Network, City Centre Strategy and Roads (model run AAH)		Alternative C: Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ("Do Strategy")	
	Effect	Narrative	Effect	Narrative	Effect	Narrative
		consumption than other scenarios as relatively greater proportion and number of journeys made via private car.		shift towards public transport, walking and cycling would reduce demand on fossil fuels.		
11 Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	--	Transport related carbon emissions likely to increase as the volume and proportion of journeys made by private vehicle within the LSMA and attractiveness of walking and cycling decreases due to high traffic volumes as described against SEO 1.	+	Reduction in transport related carbon emissions relative to the DM scenario due to modal shift towards public transport, walking and cycling as described against SEO 1. However, also increased carbon emissions associated with embodied carbon and energy requirements for maintenance and operation of new infrastructure.	++	Reduction in transport related carbon emissions greater than under Alternative B due to increased modal shift towards public transport, walking and cycling.
12 To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	-	No opportunity to increase the climate resilience of the transport network within the LSMA through ensuring new infrastructure is designed to withstand future changes in max. air temperature, min. and max. rainfall and windspeeds.	+	Opportunity to help improve resilience of the transport network within the LSMA through ensuring proposed new infrastructure is designed to withstand future changes in max. air temperature, min. and max. rainfall and windspeeds assuming new	+	As for Alternative B.

SEO	Alternative A: Do Minimum (model run AAD)		Alternative B: Bus Network, City Centre Strategy and Roads (model run AAH)		Alternative C: Bus Network, Enhanced City Centre Strategy, Refined Roads Strategy plus Walking and Cycling Improvements and Supporting Measures ("Do Strategy")	
	Effect	Narrative	Effect	Narrative	Effect	Narrative
				infrastructure is designed to accommodate predicted future changes in climate.		

7.3 Preferred Strategy

The Preferred Strategy is based upon Alternative C ('Do Strategy') but assumes further demand management measures are implemented which would further encourage modal shift towards the use of public transport, walking and cycling. The 2017 census data shows a relatively high proportion of short journeys (68% of those under 30 minutes) were undertaken by car, and when considering the combined walk, wait and travel time for public transport against a short distance car trip it is difficult to increase the attractiveness of public transport even with frequent and high priority services as proposed under the draft Strategy. Demand management would include the types of measures included in objective PK3 of the draft Strategy, such as:

- Implement maximum car parking standards for all new developments;
- Seek car-free and low car development in central and accessible areas;
- Support the gradual reduction of long-stay on-street parking in urban centres;
- Support the redevelopment of off-street parking for higher value uses including residential and employment; and
- Examine the case for a Workplace Parking Levy and charges on internet shopping deliveries and out-of-town shopping centres.

A summary of the assessment outcomes for the preferred Strategy, along with SEA mitigation recommendations and residual effects is provided in Table 7.5. Individual assessment matrices were also prepared for each element of the preferred Strategy, i.e. walking, cycling, road, rail, freight, parking and supporting measures. These are provided in Appendix C with a summary of the assessment scores prior to and following implementation of SEA mitigation in Appendix D. These assessment matrices also provide further detail on the specific measures and objectives assessed.

Key likely significant positive effects of the preferred Strategy would be:

- Improvements in public health associated with reduction in transport related air and noise pollution and increased rates of active travel as a result of modal shift towards public transport, walking and cycling. Reductions in air pollutant emissions would also benefit biodiversity;
- Reduction in transport related carbon emissions within the LSMATS as a result of modal shift towards public transport, walking and cycling;
- Improvements in townscape and visual amenity associated with public realm improvements and the construction of greenways and green-blue corridors and the World Class Waterfront Project;
- Opportunities to improve the resilience of the transport network within the LSMATS through implementation of infrastructure design standards which ensure resilience to projected future climate changes; and
- Opportunities to improve the setting of built heritage assets through public realm improvements.

Key potential significant negative effects of the preferred Strategy, in the absence of mitigation, include:

- Temporary and permanent habitat loss, including direct impacts on European and National designated sites a result of the construction of the LNDR;
- Potential negative impacts on landscape character and visual amenity associated with new infrastructure construction (particularly new road schemes);
- Potential negative impacts on WFD objectives and flood risk associated with new infrastructure construction. The LNDR is of particular note regarding flood risk impacts as the proposed route bisects a flood plain; and
- Potential localised negative impacts on air quality and noise associated with measures such as Park and Rides (PnRs), Mobility Hubs and new road infrastructure including the LNDR.

Mitigation identified to address the potential significant adverse effects has been identified and is outlined within Table 7.5 as well as within the individual option matrices provided in Appendix C. Following implementation of the recommended SEA mitigation, it is anticipated that the only potential residual significant negative effects would be associated with impacts on biodiversity associated with habitat losses as a result of construction of new infrastructure (including with European and national designated sites) and on landscape and visual amenity as at this early and high level stage there remains uncertainty regarding the degree to which mitigation identified for implementation down the line at project level assessment would be successful in offsetting the identified potential negative effects.

Table 7.5 Summary of Preferred Plan Assessment

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
1 Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	Impact on public health associated with: ▪ Improvements to air pollutant levels and noise pollution associated with reductions HGV regulation in Limerick City centre. ▪ Improvements to availability, accessibility and amenity of active travel and recreational walking routes. ▪ Measures such as bicycle sharing schemes, bicycling parking and end of trip facilities would help encourage modal shift towards cycling. ▪ Positive impacts on access to community services and facilities and places of employment through support for consolidation of development and limitation of urban sprawl (with potential exception of areas north of Limerick served by the proposed LNDR)	▪ Potential disproportionate negative impact on certain vulnerable groups and/or on small businesses as a result of measures to reduce reliance on private vehicles and restrict or manage freight movement within Limerick City centre. ▪ Consideration of impact of converting areas currently designated for street parking to bus lanes on severance, with particular focus on routes in close proximity to locations of importance to vulnerable groups (e.g. schools, care homes, hospitals, other community facilities). ▪ Risk that implementing LNDR towards the front end of the strategy period would undermine the aim of the Strategy to facilitate consolidated development	+/0	▪ Undertake Equalities Impact Assessment for measures that aim to reduce reliance on private vehicles for social and commuting purposes and restrict freight movements and implement mitigation measures as identified. ▪ Consultation with local communities to identify and mitigate temporary construction impacts given that extensive works planned on multiple transport routes and modes concurrently. ▪ Consideration of inclusion of measures to support increased patronage of bus services by social groups which may be driven by safety and security or accessibility concerns. ▪ Implementation of public transport and other strategy measures to support modal	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
		within the LSMA and support modal shift towards public transport, walking and cycling.		shift towards public transport, walking and cycling with Limerick to be implemented in advance of the LNDR, or consider alternative methods of improving access for communities on the northern outskirts of Limerick.	
2 Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	▪ Provision of a Tourist Walking Strategy, improvements to the public realm along the Old Bunratty Road, as well as general improvements within to the pedestrian realm within Limerick, would support and enhance access for tourists within the region. ▪ Improvements in access to tourist facilities as a result of greenways. ▪ A reduction in traffic volumes within the centre of Limerick City would help improve the amenity of the area for tourists and residents.	▪ Impact on tourist industry arising from disruption to highway and public transport routes during construction of new infrastructure.	0	▪ Consideration of impact of converting areas currently designated for street parking to bus lanes on severance, with particular focus on routes in close proximity to tourist locations; and ▪ Consideration of whether beneficial impacts for the tourism industry (hop on hop off tours etc) can be realised through design and implementation of new bus lanes. ▪ Consider requirement for specific parking strategy for tourists, which may have a seasonal component. ▪ Consider inclusion of specific	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
				policies to (i) manage the potential impacts of disruption to existing rail services during construction of new infrastructure and (ii) improve tourist passenger experience, for example simplified ticketing, luggage space on trains, luggage storage at stations, specific tourist signage, travel plans for key tourist destinations.	
3 Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	▪ Reduction in transport related emissions of air pollutants including nitrogen oxides (NO_x), particulate matter (PM) and sulphur dioxide (SO_2).	Temporary or permanent habitat loss and/or mortality/disturbance to wildlife as a result of new infrastructure construction. In particular, the proposed route of the LNDR requires land take the Lower River Shannon SAC and Knockalisheen Marsh pNHA. Impacts on Woodcock Hill Bog NHA are also considered likely. Construction of new bus and cycle lanes may also require land take from River Shannon and River Fergus Estuaries	+/-	▪ Consideration of opportunities for tree planting and green verges to be incorporated within new or amended walking routes ▪ Minimise land take within ecologically sensitive areas (particularly European and national designated sites) as far as practicable and/or provide compensatory habitat as determined necessary as a result of the regulatory processes identified in the following bullet.	+/-

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
		SPA/Fergus Estuary and Inner Shannon, North Shore pNHA and Inner Shannon Estuary – South Shore pNHA.		▪ Potential impacts on habitats and wildlife to be considered and mitigated through Environmental Impact Assessment (EIA) and Habitat Regulations Assessment (HRA) process down the line. ▪ Consider developing a LSMATS Natural Heritage Strategy' which would pull together aims and objectives in terms of habitat replacement and design principles and can link to enhancement objectives for landscape and cultural heritage. This could include looking at management of verges and open space associated with infrastructure to optimise habitat provision including for example the timing of verge cuttings and species mixes used.	
4 Safeguard the character and diversity of the Irish landscape and minimise the visual effects on	▪ Positive contribution to visual amenity afforded by blue-green corridors within Limerick City Centre.	Temporary or permanent impacts on landscape and townscape as a result of construction of new	+/-	▪ Sensitive design of new infrastructure, in collaboration with local councils, to ensure that	+/-

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
sensitive, designated landscapes and public views.	▪ Improvements to the public realm within urban areas in Limerick and metropolitan towns realised through improvements to existing walking, cycling and highway infrastructure and improvements to wayfinding would make a positive contribution to townscape and public views.	infrastructure.		existing landscape and townscape character is maintained and where practicable enhanced. ▪ Potential impacts on landscape and townscape as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line. ▪ Consideration of opportunities for tree planting and green verges to be incorporated within new or amended walking routes.	
5 Avoid damage to, maintain and where appropriate enhance, cultural heritage resources and their setting.	Potential opportunity to enhance settings of built cultural heritage assets through public realm improvements identified.	Potential for temporary and permanent impacts on built heritage assets and known and unknown archaeological remains as a result of new infrastructure.	0/-	▪ Design of new infrastructure to be sensitive to the presence of known heritage assets. ▪ Public realm improvements to seek to increase the accessibility and improve the setting of build heritage assets. ▪ Potential impacts on known and unknown heritage as a	0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
				result of construction of new infrastructure to be considered and mitigated. through Environmental Impact Assessment (EIA) process down the line.	
6 Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	The strategy however supports development consolidation and limits risk of urban sprawl and therefore can act to minimise additional soil loss from other development.	Loss and/or sterilisation of soil resources and may disturb areas of ground contamination as a result of new infrastructure construction.	0/-	▪ Ensure new infrastructure does not conflict with IGHS sites. Ensure appropriate site specific geotechnical and contaminated land risk assessments are undertaken and any remediation recommendations adhered to. ▪ Potential impacts on valuable soils and geology as a result of new infrastructure construction to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	0
7 Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from	Reduction in transport related air pollutant emissions associated with: ▪ HGV regulation in Limerick City centre and decarbonisation of	Measures such as Park and Rides and freight consolidation centres may worsen air quality locally through changes in traffic patterns in proximity to	+/-	▪ Ensure that Freight Consolidation Centres do not have a significant adverse effect on receptors sensitive to air quality outside of	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
reduction in air pollution.	the freight industry. ▪ Measures to support modal shift towards public transport and active travel modes. ▪ Transfer public transport fleet towards low carbon and/or zero emission alternatives. ▪ Electrification/retrofitting of existing train fleet.	the chosen locations. new road schemes, including the LNDR, would likely have adverse effects on air pollution levels for local communities.		Limerick City by concentrating HGV movements within specific areas. This may be achieved through careful siting amongst other measures. ▪ Potential impacts on air quality as a result of construction of new road and rail infrastructure to be considered and mitigated. through Environmental Impact Assessment (EIA) process down the line. This may be achieved through careful routing to minimise direct impacts on sensitive receptors.	
8 Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	Reduction in noise emissions associated with the transport sector in the LSMA: ▪ HGV regulation in Limerick City centre and decarbonisation of the freight industry. ▪ Measures to support modal shift towards public transport and active travel modes.	Measures such as Park and Rides and freight consolidation centres and new railway lines may worsen noise pollution locally through changes in traffic patterns in proximity to the chosen locations. New road schemes, including the LNDR, would likely have adverse effects on noise pollution	0/+	▪ Ensure that Freight Consolidation Centres do not have a significant adverse effect on receptors sensitive to air quality outside of Limerick City by concentrating HGV movements within specific areas. ▪ Ensure new railway lines and	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
		levels for local communities.		stations do not have a significant adverse effect on receptors sensitive to noise located in close proximity to these new infrastructure developments. ▪ Potential impacts on air quality as a result of construction of new road and rail infrastructure to be considered and mitigated. through Environmental Impact Assessment (EIA) process down the line. This may be achieved through careful routing to minimise direct impacts on sensitive receptors, amongst other measures.	
9 Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	Reduction in water pollution associated with road run-off associated with: ▪ HGV regulation in Limerick City centre and decarbonisation of the freight industry ▪ Measures to support modal shift towards public transport and active travel modes	▪ Increased area of hardstanding required for new infrastructure may have adverse impact on flood risk. ▪ Potential negative impacts on WFD objectives as a result of new pedestrian infrastructure spanning or	-/0	▪ Ensure that the identified solution for the existing flood issue on the Limerick-Ennis line at Ballycar is designed to accommodate future predicted changes in flood risk as a result of climate change; ▪ Use of Sustainable Urban	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
		adjacent to WFD watercourses including the Shannon, Abbey and Barnakyle.		Drainage (SuDs) principles in new infrastructure design; and ▪ Potential impacts water quality and flood risk be considered and mitigated through EIA and WFD process down the line.	
10 Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	Reduction in consumption of fossil fuels associated with: ▪ HGV regulation in Limerick City centre and decarbonisation of the freight industry. ▪ Measures to support modal shift towards public transport and active travel modes.	Construction of new infrastructure would require a degree of land take, although proposals seek to make use of existing highway infrastructure through repurposing of on street parking areas and road space as far as practicable.	+/0	New infrastructure design to minimise requirement for additional land take outside the existing highway boundary or railway corridor as far as practicable.	+/0
11 Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions	Reduction in transport related carbon emissions within the LSMATS associated with: ▪ Decarbonisation of the freight industry. ▪ Measures to support modal shift towards public transport and active travel modes.	New infrastructure will result in carbon emissions during construction (both embodied and associated with construction plant and traffic) and operation (lighting, heating, electric gates etc) (predominantly new Park and Rides, Mobility Hubs, Railway stations).	+/0	Consideration of opportunities for tree planting and green verges to be incorporated within new or amended walking routes. Ensure that construction methodology for new built infrastructure is undertaken with consideration for the European Union (EU) waste hierarchy and in line with relevant Irish Green Building Council (IGBC)	+/0

SEO	Potential significant effects (without SEA mitigation)		Summary assessment (without SEA mitigation)	Recommended SEA mitigation	Summary assessment (with recommended SEA mitigation)
	Positive	Negative			
through modal changes or new technologies.				guidance where relevant.	
12 To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	None identified.	Any new built infrastructure required is vulnerable to future climate change, including changes in air temperature, precipitation rates and wind speeds.	?	Ensure that design of new infrastructure reflects likely worst case climate projections in terms of resilience to wind speeds, precipitation, flood risk and increases in air temperature over the full design life of the infrastructure.	+/0

* Whilst SEA mitigation has been identified to address potential adverse effects identified against these SEOs, the high level nature of this strategy means that no confident assumption regarding the degree of implemented of the SEA mitigation proposals identified is possible. Therefore, potential effects are assessed as mixed positive and negative prior to and following implementation of SEA mitigation, although it is likely that the number and or/severity of adverse effects could be reduced through the identified SEA mitigation.

7.4 Inter-Plan Cumulative Effects

Other plans and programmes with greatest potential to interact with the draft Strategy are the legislation and policy documents identified in Table 3.1 as well as those plans and programmes which relate to transport or land use within the LSMA. Note that intra-plan cumulative effects are considered within the assessment of the preferred Strategy provided in Chapter 7 in accordance with the methodology for the SEA outlined in section 6.2.4.

With regards to interactions with other plans and programmes relating to transport or land use planning, the potential cumulative effects shown in Table 7.6 have been identified and an assessment of likely cumulative impact (either positive of negative) identified against the relevant SEOs.

In order to address the potential for negative cumulative effects on biodiversity, cultural heritage and landscape and visual amenity as identified in Table 7.6 it is proposed that a 'LSMATS Natural Heritage Strategy' is developed which sets out aims and measures to which development under the LSMATS should adhere, for example:

- minimum standards for habitat replacement, and design principles which should be adopted at scheme level (for example, specifying species rich grassland seeding along new road verges);
- principles of new infrastructure design that should be adhered to in order to benefit townscapes;
- principles of new infrastructure design that should be adhered to in order to maintain or enhance the setting of build heritage assets; and
- overarching strategy for managing any archaeological finds detected during construction of new infrastructure, which includes a commitment to facilitating public benefit through measures such as community engagement and/or provision of interpretation boards or other media as appropriate.

Further specific mitigation for potential negative cumulative effects would be best identified at project level through down the line EIA and HRA processes as relevant and it is anticipated that these would be aligned with the LSMATS Natural Heritage Strategy discussed above as well as the measures identified against the LSMATS itself and outlined in further detail in Table 7.5 and Table 8.1 such careful siting and design of new infrastructure to minimise risks of loss of habitat, effects on setting of built cultural heritage assets or landscape character and visual impact receptors as well as the use of SuDs principles where relevant.

Table 7.6 Potential cumulative effects with other plans and programmes

SEO(s)		LSMATS Residual Effect (Summary)	Nature of Cumulative Effect	Plans and Programmes
Potential positive cumulative effects				
1	Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	+/0	Positive cumulative effects on public health relating to: ▪ to reduced air and noise pollution associated with modal shift towards public transport, walking and cycling ▪ increased activity levels associated with modal shift as identified above and improved walking and cycling recreational facilities ▪ accessibility to community facilities and services and places of employment and study facilitated through consolidated development and improved public transport availability	▪ NDP ▪ NPF 2040 ▪ SFILT ▪ Smarter Travel ▪ Pluto 2040 ▪ Limerick City Development Plan ▪ CCC Development Plan ▪ Shannon ▪ LMASP ▪ RSES
7	Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	+/0	As identified under first bullet against SEO 1	
8	Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	+/0	As identified under first bullet against SEO 1	
10	Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure	+/0	Positive cumulative effects associated with modal shift towards public transport, walking and cycling and electrification and/or use of alternative fuels and/or modes in the rail and freight sectors and associated reduction in usage of petroleum derived fuels for transport within the LSMATS	▪ NDP 2040 ▪ Pluto 2040 ▪ SmarterTravel ▪ Draft National Energy

SEO(s)		LSMATS Residual Effect (Summary)	Nature of Cumulative Effect	Plans and Programmes
11	Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies	+/0	Positive cumulative effects associated with modal shift towards public transport, walking and cycling and support for the usage of electric vehicles and associated reduction in transport related carbon emissions within the LSMATS	and Climate Plan 2021-2030 ▪ National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland ▪ National Renewable Energy Action Plan.
Potential mixed or negative cumulative effects				
3	Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	+/-	Negative cumulative effects on biodiversity resulting from loss of designated and non- designated habitats across the LSMA, reductions in water quality and flood risk resulting from increases in non-permeable surface area across the LSMA and landscape and visual amenity associated with and cultural heritage from other plans and programmes which support new infrastructure construction within the LSMA.	Other plans and programmes involving construction of new infrastructure within the LSMA, including but not limited to: ▪ Water supply plans ▪ Small scale housing development and commercial development ▪ Limerick City Centre regeneration programmes
4	Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	+/-		
5	Avoid damage to, maintain and where appropriate enhance, cultural heritage resources and their setting.	+/0		
12	Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid	+/0		

SEO(s)		LSMATS Residual Effect (Summary)	Nature of Cumulative Effect	Plans and Programmes
	increasing risks from floods or increasing vulnerability to flood risk.			

7.5 Appropriate Assessment

With the implementation of avoidance measures as part of the detailed design process undertaken during lower tier environmental assessment work and standard good practice construction methods, it anticipated that the potential for likely significant effects of the LSMATS on International and European designated sites within the LSMA plus 15km buffer area would be avoided/eliminated (see Appendix A for further detail). The Natura Impact Statement for the LSMATS concludes that, following detailed assessment and appropriate mitigation for protecting European sites, there will be no adverse effects on the integrity of any European site(s), either alone or in-combination with other plans or projects.

8. Monitoring and Implementation

The SEA regulations require that the significant environmental effects of the implementation of plans and programmes are monitored to identify at an early stage unforeseen adverse effects, and to be able to undertake appropriate remedial action. The environmental report is also required to provide a monitoring plan describing how the requirement to monitor will be implemented (Stage E of Table 1.1). To meet this requirement indicators and targets have been set for each SEO, these are listed in Table 8.1. These will provide the basis for monitoring the effects of the Strategy against the objectives following implementation.

The purpose of the monitoring plan is to enable a proactive approach by allowing review the predicted impacts of the LSMATS and to undertake additional mitigation if required. It also encourages continual improvement towards the SEOs. The monitoring proposals for the LMSATS will also be updated following consultation on this Environmental Report and will form part of the SEA post adoption statement which will be published with the final Strategy.

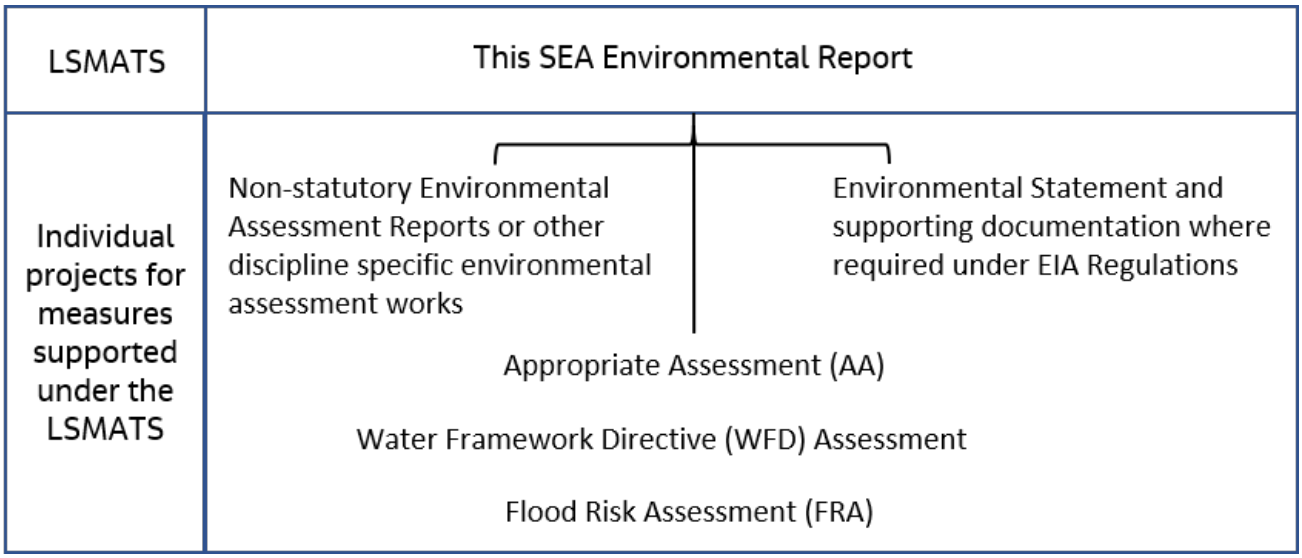


Figure 8.1 Relationship between SEA for the LSMATS and environmental assessment undertaken for projects implemented under the LSMATS

Table 8.1 Monitoring and Implementation Plan

SEO	Potential significant negative effects identified through SEA process	Indicators	Targets	Sources (and frequency of monitoring)
Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	▪ Disproportionate negative impact on certain vulnerable groups and/or on small businesses as a result of measures to reduce reliance on private vehicles and restrict or manage freight movement within Limerick City centre. ▪ Severance impacts associated with converting areas currently designated for street parking to bus lanes, with particular concern over routes in close proximity to locations of importance to vulnerable groups (e.g. schools, care homes, hospitals, other community facilities).	▪ Significant adverse effects/disproportionate adverse effects on groups which fall under the nine protected grounds identified under the Equal Status Acts 2004-2018 arising from implementation of measures or development under the LSMATS. ▪ Increase in health or social inequalities within the LSMATS. ▪ Targets and indicators as identified against SEOs for air quality and noise.	▪ No unmitigated significant adverse effects or disproportionate adverse effects recorded against any groups which fall under one of the nine protected grounds identified in the Equal Status Acts (2000-2018). ▪ No widening of health or social inequalities within the LSMATS.	▪ Assessments and reporting undertaken by NTA and local authorities under Section 42 of the Public Sector Equality and Human Right Duty (Irish Human Rights and Equality Commission Act 2014) (as required for implementation of development and strategies under the LSMATS - timescales currently unknown). ▪ CSO and All Island Research Observatory (AIRO) data for relevant measures such as mortality differentials, income and poverty rates, unemployment statistics, life expectancy, road accident statistics (annually for CSO data, every 4 years for AIRO data).
Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism	▪ Impact on tourist industry arising from disruption to highway and public transport routes during construction of new infrastructure.	▪ Significant adverse effects on public access and recreation facilities identified through lower tier environmental assessment.	▪ No temporary or permanent severance of existing footways, footpaths or cycleways ▪ No permanent unmitigated significant adverse effects on	▪ Lower tier environmental assessment and decision making – including review of project approvals granted and associated documents (as required - timescales currently unknown).

SEO	Potential significant negative effects identified through SEA process	Indicators	Targets	Sources (and frequency of monitoring)
recreation.			recreational facilities through land take or changes in amenity (noise, dust, views) as a result of development under the Strategy ▪ Achievement of objectives, targets and indicators outlined in Healthy Ireland Implementation Plan 2016 - 2019.	▪ Fáilte Ireland visitor number and experience monitoring and publications (annually).
Prevent damage to, and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	Temporary or permanent habitat loss and/or mortality/disturbance to wildlife as a result of new infrastructure construction. Designated sites of concern include: 1) Lower River Shannon SAC. 2) Knockalisheen Marsh pNHA. Woodcock Hill Bog NHA River Shannon and River Fergus Estuaries SPA/Fergus Estuary Inner Shannon, North Shore pNHA 3) Inner Shannon Estuary – South Shore pNHA.	▪ Conservation status of habitats and species as assessed under Article 17 of the Habitats Directive ▪ Percentage loss of functional connectivity without remediation resulting from development under the LSMATS. ▪ Number of significant impacts on relevant habitats, species, environmental features or other sustaining resources in designated sites resulting from development under the LSMATS ▪ Number of derogation licences granted for developments under the LSMATS.	▪ Maintenance of favourable conservation status for all habitats and species protected under national and European legislation to be unaffected by implementation of the LSMATS. ▪ Avoid significant impacts on relevant habitats, species, environmental features or other sustaining resources in designated sites provided for by the LSMATS. ▪ No significant impacts	▪ Lower tier environmental assessment and decision making by local authorities (as required for implementation of development and strategies under the LSMATS - timescales currently unknown). ▪ Department of Arts, Heritage and the Gaeltacht report of the implementation of the measures contained in the Habitats Directive- as required by Article 17 of the Directive (every 6 years). ▪ Department of Arts, Heritage and the Gaeltacht's National Monitoring Report for the Birds Directive under Article

SEO	Potential significant negative effects identified through SEA process	Indicators	Targets	Sources (and frequency of monitoring)
			on the protection of listed species ▪ Full compliance with LSMATS Natural Heritage Strategy requirements	12 (every 3 years). ▪ Consultations with the NPWS.
Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	Temporary or permanent impacts on landscape and townscape as a result of construction of new infrastructure.	▪ Number of unmitigated conflicts with the appropriate protection of statutory designations relating to the landscape, including those included in the land use plans of local authorities.	▪ No unmitigated conflicts with the appropriate protection of statutory designations relating to the landscape, including those included in the land use plans of planning authorities. ▪ Full compliance with LSMATS Natural Heritage Strategy requirements	Lower tier environmental assessment and decision making – including review of project approvals granted and associated documents (as required for implementation of development and strategies under the LSMATS - timescales currently unknown).
Avoid damage to, and where appropriate enhance, cultural heritage resources and their setting.	Temporary or permanent impacts on built heritage assets and known and unknown archaeological remains as a result of new infrastructure.	▪ Significant adverse effects on entries to the Record of Monuments and Places - including Zones of Archaeological Potential (and their context of the above within the surrounding landscape where relevant) from significant adverse effects arising from the LSMATS. ▪ Significant adverse effects on entries to the Records of Protected Structures and Architectural	▪ No unmitigated conflicts with entries to the Record of Monuments and Places or Records of Protected Structures or Archaeological Conservation Areas. ▪ Full compliance with LSMATS Natural Heritage Strategy requirements	▪ Lower tier environmental assessment and decision making – including review of project approvals granted and associated documents (as required for implementation of development and strategies under the LSMATS - timescales currently unknown). ▪ Consultation with Department of Arts, Heritage and the Gaeltacht (annually).

SEO	Potential significant negative effects identified through SEA process	Indicators	Targets	Sources (and frequency of monitoring)
		Conservation Areas and their context from significant adverse effects arising from the LSMATS.		
Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	Loss and/or sterilisation of soil resources and/or disturbance of areas of ground contamination during construction of new infrastructure.	▪ Significant adverse effects on IGHS sites ▪ Development within greenfield land (ha) ▪ Development within agricultural land (ha)	▪ No significant adverse effects on IGHS sites arising from development under the Strategy ▪ Maximise the use of brownfield sites ▪ Soil Management Plans utilised to protect valuable soils from development under the Strategy as far as practicable.	▪ Lower tier environmental assessment and decision making – including review of project approvals granted and associated documents (as required for implementation of development and strategies under the LSMATS - timescales currently unknown) ▪ Corine land cover mapping (5 yearly)
Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	Local changes in air pollution levels associated with LNDR and changes in traffic patterns arising from Park and Rides, freight consolidation centres and new railway lines.	▪ EPA air pollutant monitoring. ▪ Significant adverse effects on sensitive receptors identified through lower tier environmental assessment.	▪ To contribute towards compliance with legislative air quality limits and target values. ▪ No significant adverse effects on sensitive receptors as a result of development under the LSMATS.	▪ EPA monitoring and publications on air quality (annually). ▪ Lower tier environmental assessment and decision making – including review of project approvals granted and associated documents (as required for implementation of development and strategies under the LSMATS - timescales currently unknown).
Contribute to the	Local changes in noise pollution	▪ Population size within LSMATS	▪ No new or increased (in	▪ Lower tier environmental

SEO	Potential significant negative effects identified through SEA process	Indicators	Targets	Sources (and frequency of monitoring)
mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	levels associated with LNDR and changes in traffic patterns arising from Park and Rides, freight consolidation centres and new railway lines.	exposed to Lden and Lnight exceedances. ▪ Number of Lden and Lnight exceedances within the LSMATS. ▪ Significant adverse effects on sensitive receptors identified through lower tier environmental assessment.	population size or degree of exceedance) unmitigated exceedances of Lden and Lnight thresholds arising from development implemented under the Strategy. ▪ No unmitigated significant adverse effects on sensitive receptors as a result of development under the LSMATS.	assessment and decision making – including review of project approvals granted and associated documents (as required for implementation of development and strategies under the LSMATS - timescales currently unknown). ▪ Noise Action Plans prepared by local authorities (Clare County Council and Limerick City and County Council).
Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	▪ Increased area of hardstanding required for new infrastructure may have adverse impact on flood risk. ▪ Potential negative impacts on WFD objectives as a result of new pedestrian infrastructure spanning or adjacent to the Shannon and Barnakyle.	▪ Classification of Overall Status (comprised of ecological and chemical status) under the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No. 272 of 2009). ▪ Groundwater Quality Standards and Threshold Values under Directive 2006/118/EC. ▪ Compliance of lower tier assessments and decision making by local authorities with the Flood Risk Management Guidelines.	▪ No deterioration in the status of any surface water or groundwater or affect the ability of any surface water or groundwater to achieve “good status “by 2021. ▪ All lower tier assessments and decision making by local authorities to comply with the Flood Risk Management Guidelines.	▪ Lower tier environmental assessment and decision making – including review of project approvals granted and associated documents (as required for implementation of development and strategies under the LSMATS - timescales currently unknown). ▪ Data issued under the Water Framework Directive Monitoring Programme for Ireland (multi-annual).
Promote the sustainable	▪ Land take from areas of	▪ Development within greenfield	▪ Development within	▪ Lower tier environmental

SEO	Potential significant negative effects identified through SEA process	Indicators	Targets	Sources (and frequency of monitoring)
use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	greenfield land and agricultural land.	land (ha). ▪ Development within productive agricultural land (ha).	greenfield land (ha) minimised as far as practicable. ▪ Development within productive agricultural land (ha) minimised as far as practicable.	assessment and decision making – including review of project approvals granted and associated documents (as required for implementation of development and strategies under the LSMATS - timescales currently unknown). ▪ Corine land cover mapping (5 yearly).
Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks, modal changes or new technologies.	Carbon emissions associated with: ▪ Construction and operation of new infrastructure ▪ Changes in traffic volumes or patterns associated with new road infrastructure, particularly the LNDR.	▪ EPA carbon emissions monitoring. ▪ Carbon emission data as provided through carbon emission calculators (embodied and operational) for development under the LSMATS	▪ Reduction in greenhouse gas emissions from transport sector within the LSMATS. ▪ Positive contribution to Ireland's GHG emission targets.	▪ EPA monitoring and publications on greenhouse gas emissions (annually). ▪ Carbon emissions calculators maintained for development under the strategy (as required for implementation of development and strategies under the LSMATS - timescales currently unknown). ▪ Internal NTA consultations and review of documentation (as required for implementation of development and strategies under the LSMATS - timescales currently unknown)
To ensure that the resilience to climate change is designed for existing transport network	Resilience of new infrastructure to future changes in climate.	▪ New built infrastructure is compliant with the European Union (EU) waste hierarchy Irish Green Building Council (IGBC) guidance	▪ All new infrastructure resilient to future changes in air temperature,	▪ Lower tier environmental assessment and decision making – including review of project approvals granted and

SEO	Potential significant negative effects identified through SEA process	Indicators	Targets	Sources (and frequency of monitoring)
and new network and promote improved environmental resilience to climate change.		where relevant. ▪ All new infrastructure resilient to future changes in air temperature, precipitation, wind speeds and flood risk throughout full design life.	precipitation, wind speeds and flood risk throughout full design life.	associated documents (as required for implementation of development and strategies under the LSMATS - timescales currently unknown).

9. Conclusions

This Environmental Report is an assessment of the potential environmental effects on the draft LSMATS and provides a summary of the SEA that has been undertaken as part of the development of the LSMATS to comply with the SEA Regulations.

As part of the SEA, the baseline environment was reviewed and likely trends and changes affecting the environment over the lifetime of the LSMATS identified based on best available current knowledge. Relevant legislation, policies, plans and programmes were considered in terms of the constraints, opportunities and priorities for assessment. Together these provide the context for the assessment and were used to highlight key sensitivities within the SEA study area which included the LSMA, plus any National and European designated sites within 15km of the LSMA.

A Scoping Report was issued to consultees in September and October 2019 for a four week consultation period. This document outlined the proposed SEOs, as well as the scope and methodology for assessment. The Environmental Report incorporates the comments provided through scoping where possible and relevant.

- The development of the Strategy was guided through seven principles:

1) To meet the demand generated by existing and planned development
2) To support the future growth of the LSMA through the provision of an efficient transport network
3) To prioritise active travel and sustainable transport and reduce car dependency within the LSMA
4) To provide a high level of public transport connectivity to key destinations within high demand corridors
5) To identify and protect key strategic routes for the movement of freight traffic to the Port of Foynes, Shannon Airport and industrial areas
6) To enhance the public realm through traffic management and transport interventions.
7) To increase transport capacity where needed to achieve the strategy outcomes

The strategy includes measures and objectives relating to improvements in the bus, rail, cycling and walking networks within the LSMA along with demand management (parking) measures and measures relating to freight transport specifically. Additional supporting measures have also been identified to help attractiveness and accessibility of public transport, walking and cycling and support the use of low carbon transport technologies.

Key significant effects assessed for the draft Strategy include potential positive effects on public health associated with reductions in transport related air and noise pollution as a result of modal shift towards public transport and active travel modes as well as increases in physical activity levels due to improvements in the amenity and availability of active travel and recreational journeys. Modal shift towards the use of public transport, walking and cycling as a result of measures included within the Strategy would also have a significant positive effect on climate through a reduction in transport related carbon emissions within the LSMATS. Potential significant negative effects would primarily be related to risks to habitats (including European and nationally designated sites) and wildlife, flooding, archaeology, landscape character and public views as a result of new infrastructure (particularly road and rail, and specifically the LNDR) construction. Cumulative impacts with other plans and programmes have also been considered as part of the SEA, with significant positive and potential significant negative effects (in the absence of SEA mitigation) being of similar nature to those previously described for the Strategy alone.

The SEA has identified a range of mitigation measures to reduce or, where practicable, fully mitigate the potential impacts of the Strategy which have been incorporated into a monitoring and implementation plan to be implemented throughout the lifetime of the LSMATS.

9.1 Next Steps

We welcome your comments and views on the draft SEA Environmental Report .The LSMATS will be finalised in Q4 2020.

10. References

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Appendix A. Natura Impact Statement (NIS)

Limerick Shannon Metropolitan Area Transport Strategy (LSMATS)

Natura Impact Statement - Stage 2 (Appropriate Assessment)

Habitat Regulations Assessment

8th July 2020

National Transport Authority

Limerick-Shannon Metropolitan Area Transport Strategy

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Contents

Executive Summary

The Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) considers all land transport modes, with the objective of providing a long-term strategic planning framework for the integrated development of transport infrastructure and services in the Limerick Shannon Metropolitan Area (LSMA).

Each of the considerations below are included within the LSMATS:

- public transport infrastructure and service proposals (rail, bus, public bikes and taxi);
- measures to facilitate and promote walking;
- measures to facilitate and promote cycling, including cycling infrastructure;
- planning policies aimed at closer integration between land use development and sustainable transport;
- traffic management policies including potential changes to traffic circulation in Limerick City centre;
- demand management measures including policies related to parking and tolling;
- behavioural change measures;
- measures to promote integration between all modes;
- policies related to the management of freight; and
- road infrastructure, including the Limerick Northern Distributor Road (LNDR).

This report summarises the findings of the Stage 1 HRA Screening and identifies the international/European sites that could potentially be affected by the LSMATS and assesses, as far as possible, those options that may result in Likely Significant Effects and therefore require an assessment of potential 'adverse effects' to site integrity (Stage 2: Appropriate Assessment). This report also presents the findings of Stage 2: Appropriate Assessment/NIS to establish whether there are solutions that would avoid or have a lesser effect on European sites.

There are one Ramsar site, 23 Special Areas of Conservation and five Special Protection Areas within 15km of the outer-boundary of the Limerick Shannon Metropolitan Area (the Zone of Influence to which LSMATS relates). With the implementation of avoidance measures as part of the detailed design process and standard good practice construction methods, it is anticipated that the potential for adverse effects on site integrity as a result of the LSMATS would be avoided/eliminated.

The conclusion of this Natura Impact Statement for the LSMATS is that, following detailed assessment and appropriate mitigation for protecting European sites, there will be no adverse effects on the integrity of any European site(s), either alone or in-combination with other plans or projects.

Throughout the plan level assessment it has been highlighted that some elements of the LSMATS, especially the LNDR in relation to the Lower River Shannon SAC crossing, would need significant input at a project level to determine potential for likely significant effects and appropriate strategy to ensure that the conservation objectives of the site are not compromised, and that site integrity can be preserved.

1. Introduction and Background

1.1 Introduction

To prepare for future growth in population and employment; an overall increase in travel; and the changing demographic structure of Ireland, the Irish Government has developed the National Planning Framework: Project Ireland 2040 (NPF). The NPF was published in February 2018 and provides the over-arching strategic policy framework for Ireland's social and economic development. The NPF establishes a macro spatial growth approach to promote balanced regional development, achieved through coordinated spatial planning, sustainable use of resources, protection of the environment and the Natura 2000 network of European sites. The NPF coordinates regional and national investment strategies with respect to housing, water services, communications, energy, health, education and transport infrastructure. The NPF replaced the National Spatial Strategy for Ireland 2002-2020 (NSS).

The National Transport Authority (NTA) is a public body set up under statute and established in December 2009. The role and functions of the NTA are set out in three Acts of the Oireachtas: the Dublin Transport Authority Act 2008, the Public Transport Regulation Act 2009 and the Taxi Regulation Act 2013. In August 2015, the Department of Transport, Tourism and Sport (DTTaS) published its policy document "Investing in our Transport Future - Strategic Investment Framework for Land Transport" (SIFLT). Action 4 of that framework states that: "Regional transport strategies will be prepared by the NTA and provide an input to regional spatial and economic strategies".

Having regard to its role in relation to transport, and the action placed upon it in the DTTaS policy document, the NTA, in collaboration with Limerick City and County Council (LCCC) and Clare County Council (CCC), is developing a Transport Strategy for the Limerick-Shannon Metropolitan Area (LSMA) covering the period 2019 to 2040. The strategy will provide a framework for the planning and delivery of transport infrastructure and services in the L-SMA over the next two decades. It will also provide a planning policy with which other agencies can align their future policies and investment priorities.

1.2 LSMATS Scope and Contents

The Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) considers all land transport modes, with the objective of providing a long-term strategic planning framework for the integrated development of transport infrastructure and services in the LSMA. It will be used to inform transport investment priorities over the short and long term and will inform sustainable integrated land use and transport policy formulation at the metropolitan and local level.

Each of the considerations below are included within the LSMATS:

- public transport infrastructure and service proposals (rail, bus, public bikes and taxi);
- measures to facilitate and promote walking;
- measures to facilitate and promote cycling, including cycling infrastructure;
- planning policies aimed at closer integration between land use development and sustainable transport;
- traffic management policies including potential changes to traffic circulation in Limerick City centre;
- demand management measures including policies related to parking and tolling;
- behavioural change measures;
- measures to promote integration between all modes;

- policies related to the management of freight; and
- road infrastructure including the Limerick Northern Distributor Road (LNDR).

1.3 Legislative Requirements for Habitats Regulations Assessment (HRA)

The Habitats Directive (European Council Directive 92/43/EEC) provides legal protection for habitats and species of European importance. Articles 3 to 9 of the Directive set out the measures to protect these through the establishment and conservation of a Europe-wide network of sites: the Natura 2000 site network. European sites comprise Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC).

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects with potential to affect SACs and SPAs. Article 6(3) of the Habitats Directive establishes the requirement for an Appropriate Assessment (AA) and specifies the first step of the process as Screening to establish whether, in relation to a particular plan or project, an AA is required. Article 6(3) states:

“Ramsar Sites are designated under The Convention on Wetlands of International Importance especially as Waterfowl Habitat, as amended in 1982 and 1987 (the ‘Ramsar Convention’). As a matter of policy, the same procedures for HRA/Appropriate Assessment Ramsar Sites are also applied to Ramsar Sites. For the purposes of this report Ramsar Sites will be included when describing “European Sites”

“Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site’s conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.”

The Habitats Directive has been transposed into Irish law by the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) (hereafter referred to as the Habitat Regulations). The Strategy will be appraised in accordance with the provisions of the Habitat Regulations as a plan. The Habitats Regulations require an assessment to be undertaken for plans that are likely to have a significant effect on European sites, acting either alone or in-combination with other plans and projects. The management objective prescribed for European sites is the maintenance or restoration of the “favourable conservation status” of the habitats and species protected within European sites. Assessment is made against the conservation objectives provided for the European sites that define as targets the parameters for “favourable conservation status.” If screening determines likely significant effects (LSEs) on a European site, then an AA must be carried out for the plan. Information to inform the AA and the competent authority in its decision-making process must be presented in a Natura Impact Statement (NIS).

1.4 Application of the Appropriate Assessment (AA) Process at Plan Level Versus Project Level

The production of a plan itself does not adversely affect any European site. Neither does a plan usually authorise any project that could have such an effect. Most projects that may result from the provisions of a plan will require some form of consent or other authorisation; this is the case with LSMATS. As such, each individual project contained within the LSMATS will be subject to the requirements of the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I.477/2011). Importantly, the key distinction between plan and project level AA relates to the:

- geographic specificity (that is, from generally described regions in the plan to a defined and fixed location/route for the project); and
- duration and timing of impacts (usually not known at the plan level).

Therefore, the scale and nature of the assessment is based on the best available information meeting the provisions and requirements of the Habitats Directive. At the plan level, the assessment will be undertaken at a higher level than would be the case for projects, noting that LSMATS does not provide consent for any future projects arising from this or future iterations of the LSMATS. Likewise, the AA for the plan does not provide consent for any future projects. However, any future project level AA screenings and/or NIS will have regard for this plan level NIS.

Guidance from the European Commission (EC), the judgment of the European Court of Justice in the case of EC v the UK, case C – 6/04 [1][2] and the opinion of the Advocate General in that case, are helpful in understanding how the EC believes plans could have a significant effect on a European site. Based on this guidance, a plan may affect a European site by:

- proposing or resulting in particular types of change that are inherently damaging;
- proposing or resulting in a magnitude of change that would be damaging because it would be so large;
- proposing or resulting in a magnitude of change that in the proposed location would be damaging;
- resulting in cumulative or combined effects that would be damaging, either from a programme of similar or different proposals within the LSMATS Plan itself, or a combination of such proposals in the LSMATS Plan and in other plans or projects;
- blocking options for future plans and proposals;
- providing the justification for damaging change; and
- failing to foresee damaging effects that would occur later in a programme.

1.5 Purpose of the Report

This report summarises the findings of the Stage 1 HRA Screening and identifies the international/European sites that could potentially be affected by the LSMATS and assesses, as far as possible, those options that may result in LSE and therefore require an assessment of potential 'adverse effects' to site integrity (Stage 2: Appropriate Assessment). This report also presents the finding Stage 2: Appropriate Assessment/NIS to establish whether there are solutions that would avoid or have a lesser effect on European sites.

[1] http://curia.europa.eu/juris/showPdf.jsf;jsessionid=7CD79E3A4BEE4D280C8796CB6C235486?text=&docid=60655&pageIndex=0&doclang=EN&mode=lst&dir=&occ=first&part=1&cid=4309711

[2] http://curia.europa.eu/juris/showPdf.jsf;jsessionid=7CD79E3A4BEE4D280C8796CB6C235486?text=&docid=58359&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=4309711

2. Methodology

2.1 Background

The methodology in this report draws on, and has evolved from, European Commission (2001) guidance and Irish guidance from the former Department of Environment, Heritage and Local Government (2010). The entire process can be broken down into four stages (European Commission, 2001), as outlined below. If at any stage in the process it is determined that there will be no implications for the European site in view of the site's conservation objectives, the process is effectively completed. The four stages are described below. Table 2.1 below outlines the overall HRA process.

Table 2.1: Stages in HRA (European Commission, 2001)

Stage	Task	Outcome
Stage 1	Screening	Screening determines whether an AA is required by determining if the project or plan is likely to have a significant effect(s) on any European site(s) either alone or in-combination with other plans or projects. The test is of the "likelihood" of effects rather than the "certainty" of effects. In accordance with the Waddenzee Judgement[3], a likely effect is one that cannot be ruled out based on objective information. This is underpinned by the precautionary principle and the test of beyond reasonable scientific doubt as presented in the Habitats Directive. The same judgement also adds, "where a plan or project not directly connected with or necessary to the management of the site is likely to undermine the site's conservation objectives, it must be considered likely to have a significant effect on that site."
Stage 2	Appropriate Assessment	If the screening has determined that AA is required, the competent authority then considers the effect of the project or plan on the integrity of the European site(s). The AA considers the structure and function of European sites, their conservation objectives and effects from the project/plan both alone and in-combination with other projects or plans. Where adverse effects on site integrity are identified, mitigation measures are proposed as appropriate to avoid negative effects. The AA process is documented within a Natura Impact Statement (NIS). This is provided to the competent authority to facilitate an informed assessment of the plan or project.
Stage 3	Assessment of alternative solutions	Following AA, including mitigation proposals, if adverse effects on site integrity remain, or uncertainty remains, an Assessment of Alternative Solutions is required. This process examines the alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site. This assessment may be carried out concurrently with the AA to find the most appropriate solution. If no alternatives exist, or all alternatives would result in adverse effects on the integrity of a European site, then either the process moves to the next stage (IROPI) or the project is abandoned.

[3] [ECJ case C-127/02]

Stage	Task	Outcome
Stage 4	Imperative Reasons of Overriding Public Interest (IROPI)	In the unlikely event where an Assessment of Alternative Solutions failed to identify any suitable alternatives, IROPI could be enacted to progress the project. IROPI implements compensatory measures to maintain the coherence of the European site network in the face of adverse effects to site integrity. It should be noted that, for European sites that include "priority" habitats or species (defined in Annex I and II of the Habitats Directive) as part of their Qualifying Interests, the demonstration of IROPI is not sufficient, and it must be demonstrated that the plan or project is necessary for "human health or safety considerations". Where plans or projects meet these criteria, they may be accepted, provided adequate compensatory measures are proposed. The IROPI process defines and describes the compensation measures, which must be agreed with the European Commission.

The purpose of the screening stage of an HRA is to identify all aspects of a plan or project which would potentially have effects on a European site, either alone or in combination with other aspects of the same plan or other plans or projects . Where no effect is anticipated (usually because there are no 'pathways' between the plan or project and a European site, or because an effect is considered to be not significant) the plan or project can be eliminated from further consideration (European Commission, 2001).

Where it is not possible to rule out the risk of likely significant effects to a European site, the plan or project will be taken forward to the next stage of the HRA (Stage 2 AA).

The purpose of the Stage 2: "Appropriate Assessment" is to consider the effect of the project or plan, either alone or in combination with other projects or plans, on the integrity of the European/Ramsar site, with respect to the site's structure, function and its conservation objectives. The AA process is documented within a Natura Impact Statement (NIS). This is provided to the competent authority to facilitate an informed assessment of the plan or project and to carry out the Appropriate Assessment.

2.2 Guidance Documents in Relation to Appropriate Assessment

The AA requirements of Article 6 of the Habitats Directive follow a sequential approach, which is outlined in the following guidance documents:

- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (Department of Environment, Heritage and Local Government, 2010);
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2001);
- Communication from the Commission on the Precautionary Principle (European Commission, 2000);
- Guidance Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission (European Commission, 2007);
- Marine Natura Impacts Statements in Irish Special Areas of Conservation. A working Document (Department of Arts, Heritage and the Gaeltacht, 2012); and
- Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission, 2018).

The following circulars also outline the AA requirements:

- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 and PSSP 2/10 (Department of Environment, Heritage and Local Government, 2010);
- Appropriate Assessment of Land Use Plans. Circular Letter SEA 1/08 & NPWS 1/08 (Department of Environment, Heritage and Local Government, 2008a);
- Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites. Circular Letter PD 2/07 and NPWS 1/07;
- Guidance on Compliance with Regulation 23 of the Habitats Directive. Circular Letter NPWS 2/07 (Department of Environment, Heritage and Local Government, 2007); and
- Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments. Circular L8/08 Department of Environment, Heritage and Local Government (2008b).

2.3 Geographical Scale of the Strategy

The geographical area of the LSMATS has been defined by the Department of Housing, Planning and Local Government to include the continuous built-up area of Limerick City and Suburbs (as defined by the Central Statistics Office [CSO]) and Shannon in Co. Clare. It also includes the following settlements:

- Annacotty;
- Castleconnell;
- Patrickswell;
- Clarina;
- Mungret in County Limerick;
- Sixmilebridge;
- Ardnacrusha;
- Clonlara;
- Cratloe;
- Ballycannan; and
- Bunratty in County Clare.

The population of the LSMA is over 132,420 (CSO, 2016) and covers 387km^2. Limerick City is the largest urban centre in Ireland's Mid-West region and the country's third largest city. Shannon is a significant employment centre with assets such as Shannon International Airport and Shannon Free-Zone international business park. Limerick City and Shannon are interdependent upon each other, with their complementary functions contributing to a combined strength which is a key economic driver for the Mid-West Region.

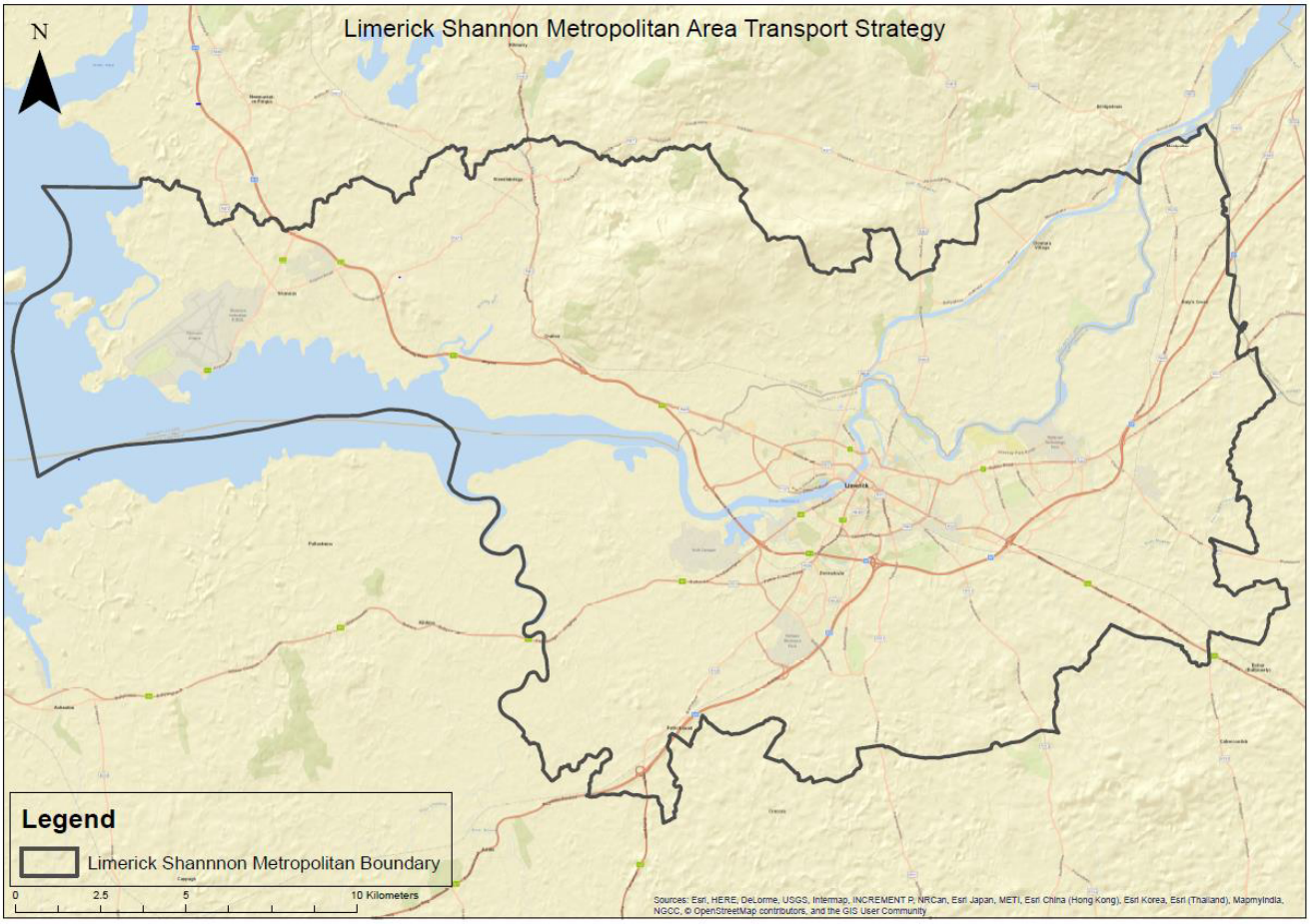

Figure 2.1 Limerick-Shannon Metropolitan Area Boundary

Limerick City is home to two major third-level education institutions, University College Limerick (including Mary Immaculate College) which is located to the north-east of the City Centre and Limerick Institute of Technology (including Limerick School of Art and Design) which is located to the west of the City Centre. The City and its Metropolitan Area is served by commuter and intercity rail services; city, regional and expressway bus/ coach services; and Shannon International Airport is located approximately 20km to the north-west of the City Centre.

2.4 Temporal Scope of the Strategy

The LSMATS aims to provide a strategic vision for transport within the LSMA between 2019 and 2040.

2.5 Interpretation of a 'Likely Significant Effect' (LSE)

A likely effect is one that cannot be ruled out on the basis of objective information. The test is a 'likelihood' of effects rather than a 'certainty' of effects. In the Waddenzee case (case C-127/02) the European Court of Justice ruled that a project should be subject to AA "if it cannot be excluded, on the basis of objective information, that it will have a significant effect on the site, either individually or in combination with other plans and projects". This establishes that 'likely', in this context, should not simply be interpreted as 'probable' or 'more likely than not', but rather whether a significant effect can objectively be ruled out.

Where a project is likely to undermine the site's conservation objectives, it must be considered likely to have a significant effect on the site. The assessment of that risk must be made in the light of the characteristics and specific environmental conditions of the site concerned. Thus, an effect that would undermine the conservation objectives would be a significant effect and the likelihood of it occurring is a case-by-case judgement, taking account of the precautionary principle and the local circumstances of the site. Implicit in the Habitats Directive is the application of the precautionary principle, which requires that the conservation objectives of Natura 2000 should prevail where there is uncertainty. This requires objectively demonstrating, with supporting evidence, that

there will be no adverse effects on the integrity of the Natura 2000 site. Where this is not the case, adverse effects must be assumed.

2.6 Conservation Objectives

The overall aim of the Habitats Directive (Article 2 and 3) is to develop a coherent ecological network of designated sites (SACs and SPAs) across Europe through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States, and to maintain or restore the favourable conservation status of annexed habitats and species (QIs/SCIs) of community interest for which an SAC or SPA has been designated. The Conservation Objectives (COs) for a European site are set out to ensure that the QIs/SCIs of that site are maintained or restored to a favourable conservation condition. Maintenance of a favourable conservation condition of habitats and species at a site level in turn contributes to maintaining or restoring favourable conservation status of habitats and species at a national level and, ultimately, at the Natura 2000 network level.

Detailed site synopses for each European site are also available from the NPWS website[4]. In Ireland, "generic" COs have been prepared for all European sites, while "site-specific" COs have been prepared for a number of individual sites to take account of the specific QIs/SCIs of those sites. Both the generic and the site-specific COs define the requirements for favourable conservation condition for habitats and species at the site level[5]. Generic COs which have been developed by NPWS encompass the spirit of site-specific COs in the context of maintaining and restoring favourable conservation condition as follows (NPWS, 2016):

- For SACs: "To maintain or restore the favourable conservation condition of the Annex I habitats and/or Annex II species for which the SAC has been selected"; and
- For SPAs: "To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the SPA".

Following from this, favourable conservation status (or condition, at a site level) of a habitat is achieved when:

- Its natural range, and area it covers within that range, are stable or increasing;
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- The conservation status of its typical species is "favourable".

The favourable conservation status (or condition, at a site level) of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

A full list of the COs and QIs/SCIs that each European site is designated for, as well as the attributes and targets to maintain or restore the QIs/SCIs to a favourable conservation condition, are available on the NPWS website[6].

2.7 Consideration of Likely Significant Effects in Combination

Under Article 6(3) of the Habitats Directive, an assessment of in-combination effects with other plans and projects is required. The assessment encompasses projects or plans that have been completed, approved but not completed or proposed (but not yet approved). The assessment used the best available information at the time of writing. Effects can include, but are not limited to, multiple effects of the same or similar type from a number of developments on the same receptor/resource.

[4] https://www.npws.ie/protected-sites (accessed June 2018)
[5] http://www.irishstatutebook.ie/eli/2011/si/477/made/en/pdf (accessed May 2018).
[6] https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives (Access April 2018)

In line with the relevant guidance (European Commission, 2000b), considering of in-combination effects was undertaken using a stepwise approach, as follows:

- Identify plans/projects that might act in combination;
- Identify the types of Likely Significant Effects (LSEs) that might occur;
- Define boundaries of the assessment;
- Identify pathways for effects; and
- Prediction and assessment.

The plans and policies considered as part of the Screening Process is as follows;

Other plans, programmes and policies considered in the in-combination assessment, are as follows:

- National Planning Framework 2040 (Department of Housing, Planning, Community and Local Government, 2018);
- The National Development Strategy (NDP) 2018-2027;
- Strategic Framework for Investment in Land Transport (SFILT);
- Planning Land-Use and Transport - Outlook (PLUTO) 2040 (Department of Transport, Tourism and Sport);
- Smarter Travel: A Sustainable Transport Future 2009-2020 (Department of Transport, Tourism and Sport, 2009);
- Investing in our Transport Future - Strategic Investment Framework for Land Transport (SFILT);
- Water Resource Plans;
- Mid-West Regional Planning Guidelines 2010-2022;
- Regional Spatial and Economic Strategy (RSES);
- Limerick Shannon Metropolitan Area Strategic Strategy (LSMASP); and
- Limerick County Development Plan 2010-2016.
- Limerick City Development Plan 2010-2016;
- Clare County Development Plan 2017-2023: [incl. Shannon Municipal District – Volume 3 (b)];
- Southern Environs Local Area Strategy 2011-2017 (extended to 2021);
- Shannon Town and Environs Local Area Plan 2012-2018; and
- Limerick Metropolitan Cycle Network Study.

Given the strategic nature of the LSMATS, including information on spatial location, detailed design and timescales, it is not possible to identify and assess every potential for 'in combination' effects at the plan level. Project level HRAs would be carried out at the planning stage which would consider effects alone and effects in combination with other relevant plans and projects. The general scope of issues for the consideration of in combination effects at project level, include temporary habitat loss and disturbance effects associated with construction and water quality issues.

3. Stage 1 HRA Screening

This section provides an overview of the previous Stage 1 HRA Screening report prepared by Jacobs in 2019.

3.1 Elements of the LSMATS with Potential to Give Rise to Likely Significant Effects

The purpose of this section is to 'screen' the Strategy to identify elements for which a likely significant effect on a European site cannot be ruled out.

The mechanisms by which European sites could be affected would be via the policies or objectives within the Strategy that direct the future development of transport infrastructure. Many of the policies and objectives will have no effect on European sites, such as policies including demand Management measures, policies related to parking and tolling and behavioural change measures.

Policies that reduce car use and increase public transport would have some environmental. The suite of non-infrastructural supporting measures is also unlikely to result in significant effects. As measures within the LSMATS would be primarily public transport based or include measure to encourage other transport modes such as cycling, and on existing infrastructure it is also likely that much of the envisaged development will take place on previously developed land. Therefore, the operational phase of the Strategy would likely be consistent with current land uses within the LSMA.

However, the Strategy may contain measures that direct bridge crossings for all modes of transport and works relating to the Limerick northern Distributor Road and associated improvements to road facilities. Such measures would have the potential to cause environmental issues in relation to construction and transport related emissions to air, soil and water. As the location of such measures is currently unknown, the potential for such development to occur adjacent to European sites could not be excluded and is assumed.

In the absence of scheme-specific information, it has been necessary to adopt a precautionary approach to AA Screening at the plan level that assumes an impact where there is uncertainty. Projects arising as a result of the Strategy would be subject to project-level assessment where potential effects on European sites can be explored in detail.

3.1.1 Types of Potential Effects and Changes

The construction of new transport infrastructure can result in environmental changes which can have potential implications for European sites, either directly or indirectly. The specific sensitivities and susceptibility of qualifying interests and functional supporting habitat for an individual European site determine the existence and strength of a potential impact pathway and therefore not all potential effects discussed will apply to all sites.

To establish which aspects of the Strategy might lead to likely significant effects the following activities listed in EC Guidance (2002) as having the potential to affect European sites were reviewed in light of the strategy's provisions:

- land take;
- resource Requirements (Drinking Water Abstraction etc.);
- emissions (Disposal to Land, Water or Air);
- excavation requirements;
- transportation requirements; and
- duration of construction, operation, decommissioning.

The guidance further articulates that the following effects could result:

- loss/reduction of habitat area;

- disturbance to key species;
- habitat or species fragmentation;
- reduction in species density;
- changes in key indicators of conservation value (water quality etc.); and
- climate change.

With reference to the LSMATS, the following effects were considered potentially pertinent to the assessment. Each is discussed further in Section 3.2. below:

- habitat loss and/or fragmentation;
- disturbance (noise, vibration, movement, lighting);
- species mortality;
- negative changes in water quality and hydrology; and
- negative changes in air quality.

3.2 Characterising Potential Significant Effects

3.2.1 Effect Categories and Description

3.2.1.1 Habitat Loss and/or Fragmentation

Direct loss of habitat would only be likely to significantly affect a European site if any of the projects arising from the Strategy relate to development (e.g. new roads such as the LNDR, bus routes, cycle ways) within the boundary of a European site. However, new infrastructure projects or maintenance/upgrading of existing roads and other transport infrastructure have the potential to introduce barriers that may restrict the movement of species and cause fragmentation of habitats. Policies to extend infrastructure could also increase the risk of fragmentation of habitats.

3.2.1.2 Disturbance (Noise, Vibration, Visual, Lighting)

Construction and operational activities, such as traffic and construction noise, human presence and other visual disturbances such as lighting in the proximity to European sites, or that could affect mobile species associated with a European site, could result in noise and visual disturbance to species. Noise and lighting associated with transport will only be an issue if they affect European sites designated for their animal interest rather than their habitats. Any potential sources of disturbance would be objectively quantified through an assessment of the effects of construction and operation works, traffic and human noise and disturbance.

3.2.1.3 Species mortality

Depending on the type and location of new infrastructure, species mortality could occur through interactions with plant and material during the construction of infrastructure, pollution of watercourses during construction or due to interactions with traffic on roads.

3.2.1.4 Air quality

The development of strategic roads and improved transport links could lead to an increase in vehicles within the LSMA. Vehicles, particularly those with diesel engines (IAQM, 2019) are a contributor to air pollution and can result in changes to local air quality through emission of nitrogen oxides (NOx). Air pollution is most likely to affect European sites where habitats and watercourses are the qualifying features, but some qualifying animal species may also be affected, either directly or indirectly, by any deterioration in habitat.

3.2.1.5 Water quality

Transport activities can have an impact on hydrological conditions and water quality. Fuel, chemicals from cars, trucks and trains or from port and airport terminal operations can contaminate the environment, if managed incorrectly. New infrastructure projects could contribute towards pollutants, such as in surface water run off during construction. Surface run-off of poor-quality water from roads with elevated levels of pollutants, nutrients and salinity could affect Annex I habitats and supporting habitats for Annex II species. If sensitive habitats within European sites are situated downriver of a development area, an assessment of likely drainage and pollution sources from the development would need to be undertaken to determine the nature of hydrological effect pathways and the potential dispersal of sediments and pollutants. Water pollution impacts would only occur where there is hydrological connectivity between new transport infrastructure and European sites.

3.2.1.6 Visitor pressure

Transport policies that support increased mobility and demands for passengers and proposals which seek to improve connectivity and accessibility across the plan area may contribute to an increase in the number of people accessing European sites. European sites may be sensitive to visitor pressure and associated disturbance.

3.2.2 Identification of Potential Effects and Screening

There are one Ramsar Site, 23 SACs and five SPAs within 15km of the outer-boundary of the Limerick-Shannon Metropolitan Area (the Zone of Influence to which LSMATS relates), these sites are presented in Figure 3-1.

Table 2.1 examines, broadly, how measures anticipated in LSMATS might interact with European sites. Screening, also needs to consider the sensitivity of the sites potentially exposed to plan-directed effects. Higher sensitivity means there is a higher chance of likely significant effects, no sensitivity discounts the possibility of effects.

Table 3.1 – Measures anticipated in LSMATS and how each might interact with European sites.

Potential Policy Type	Assessment of potential implications to European sites
Public transport infrastructure and service proposals (rail, bus, public bikes and taxi).	Some activities within this broad category of measures have the potential to deliver a net positive impact on biodiversity. However, construction and operational impacts and increased visitor numbers and fragmentation could affect qualifying interests of European sites.
New road infrastructure (LNDR)	The implications of construction and operational effects should be considered with reference to European sites, especially in the case of the LNDR where the proposed corridor requires a new crossing of the Lower River Shannon SAC. This has the potential for adverse effects on Water dependant qualifying interest species and habitats, including freshwater pearl mussel, Atlantic salmon, lamprey spp. and otter.
Measures to facilitate and promote walking.	Measures to promote walking could include increased access to recreational areas. This could leave to increased disturbance to qualifying interests of European sites, in particular birds.
Measures to facilitate and promote cycling, including cycling infrastructure.	Although measures are only likely to involve minor development of cycling infrastructure if any are in close proximity to a European site, they could have construction related effects on qualifying interests.
Planning policies aimed at closer integration between land use development and sustainable transport.	Measures that connect land development to sustainable transport would result in reduced traffic emissions in areas of new development. Effects are only anticipated if such integration required new infrastructure (e.g. new cycle paths, bus lanes, footpath bridges) then European sites might experience effects during construction, or from increased visitor numbers.

Potential Policy Type	Assessment of potential implications to European sites
Traffic Management policies including potential changes to traffic circulation in Limerick City Centre.	The implications of increasing traffic volumes in new areas should be considered with reference to European sites, in particular SAC habitats with particular sensitivities to nitrogen deposition.
Demand Management measures including policies related to parking and tolling.	No effects on European sites anticipated.
Behavioural Change measures.	No effects on European sites anticipated.
Measures to promote integration between all modes.	No effects on European sites anticipated.
Policies related to the management of freight; and road infrastructure.	Changes to how freight and road infrastructures are managed could be beneficial to the environment by increasing efficiency of the network, thereby reducing congestion (and related emissions). However, the potential for increased traffic volumes in new areas should be considered, for example enhanced connectivity to ports and traffic related impacts along those routes. An increase in heavy duty vehicles (HDVs) may result in significant effects on European sites.

3.3 Screening Assessment Summary

In line with current Irish departmental guidance (DoEHLG, 2010) on the ZoI to be considered during the AA process all European sites within 15km of the LSMA boundary were initially considered. European sites that occur within 15km of the LSMA are listed in Table 3.1 and illustrated on Figure 3.1. This did not preclude the Screening of European sites outside this area where significant ecological links to the plan area were identified (none were).

All European sites with the potential to be affected by development directed by the Strategy must be considered at Screening. This includes European sites within the plan area where environmental issues such as, disturbance impacts are most likely with respect to the design and operational stage of proposals. It also potentially includes more distant European sites. For example, where policies are likely to prompt an increase in recreational pressure or vehicle numbers within, or close to a European site.

The Limerick Shannon Metropolitan Area covers 387km^2 (see Figure 2.1). The area includes the continuous built-up area of Limerick City and Suburbs (as defined by the CSO) and Shannon in Co Clare. A regional road network supports the national road network by providing connectivity with other national roads. InterCity connections are provided at Limerick Junction onward to Dublin, Cork, Clonmel, Tralee and Waterford. The intrinsic transport linkages by the M18/N19 motorway between Ennis and Shannon/Limerick and increasing numbers on the Limerick-Sixmilbridge-Ennis Western Rail Corridor, were highlighted during consultation as a basis for extending the zone of influence of the Strategy to Ennis and to capture interactions between Ennis and the study area.

Potential effect pathways from likely projects directed by the Strategy to the sensitive receptors of each site were investigated and a determination made as to the potential effects of implementing LSMATS. These considerations were supported by a review of information on qualifying interests for the sites and site-specific vulnerabilities and sensitivities

The screening exercise applied the precautionary principle with all decision-making being transparent and objective. Plans and projects were only screened out where it could be demonstrated with sufficient certainty that there would be no LSE on a European site. Where the potential to affect a European site was identified, high level information was provided in order to assist in conducting an appropriate assessment of the LSMATS.

Where standard mitigation was required to discount LSE, such as habitat loss or large-scale disturbance, then a site was "screened in" and taken forward to Stage 2 (AA) in accordance with the decision reached by the Court of Justice of the European Union (CJEU) in People Over Wind and Sweetman v Coillte Teoranta (C-323/17)

The Stage 1 Screening Assessment considered 1 Ramsar site, 23 SACs and 5 SPAs within 15km of the outer-boundary of the Limerick-Shannon Metropolitan Area (the Zone of Influence to which LSMATS relates), these sites are presented in Figure 3.1.

3.4 European/International Sites Potentially Affected by the LSMATS

This section lists the European/international sites considered in the Stage 1 HRA Screening Report (Jacobs, 2019) . All sites considered are listed below in Table 3.1, these sites are also presented on Figure 3.1. These sites have been taken forward to be included in the Stage 2 AA as potential for likely significant effects could not be screened out.

Table 3.1: European/International Sites Considered by the Screening Assessment

Qualifying Interest	Site Vulnerabilities and Potential Likely Significant Effects	European with Potential Pathways to Experience Likely Significant Effects
European sites protected for wide-ranging, mobile species such as bats, otter, or bird species.	Disturbance - Disturbance related impacts are a key vulnerability for sites hosting mobile species as disturbance, due to noise, vibration or light pollution could deter designated species important habitat areas. Construction or operational activities (e.g. traffic) within and outside the sites boundaries could result in disturbance. Disturbance and displacement from artificial lighting (e.g. along roads or in new development areas) is a key sensitivity for lesser horseshoe bats. This species is known to commute up to 4km from their roost sites to forage at night. Commuting routes are important features of the landscape for lesser horseshoe bats as they generally avoid flying across open spaces. The same tree line, woodland or hedgerow can be used by the same population year on year. Lighting exposure could permanently affect behaviour and possibly use of flight lines to feeding areas). Visitor pressure - Recreational pressure e.g. availability of alternative/new recreation spaces could to disturbance related impacts. Habitat loss - Direct or indirect habitat loss or degradation, particularly pasture and woodland (for bats) and habitats supporting prey could result in the loss of foraging resource for designated bird, bat or otter species. Loss of habitat between feeding and roosting sites could have a significant impact on Lesser horseshoe bats. Direct physical loss is unlikely unless projects occur within site boundaries. However, consideration must be made to the potential for loss of non-designated habitat beyond site boundaries (e.g. commuting habitat for bats, otter etc.), while increased nitrogen	• Lower River Shannon SAC • Curraghchase Woods SAC • Danes Hole, Poulnalecka SAC • Kilkishen House SAC • Knockanira House SAC • Newgrove House SAC • Newhall and Edenvale Complex SAC • Old Domestic Building (Keevagh) SAC • Old Domestic Buildings, Rylane SAC • Pouladatig Cave SAC • Poulnagordon Cave (Quin) SAC • Ratty River Cave SAC • Ballyallia Lough SPA • Lough Derg (Shannon) SPA • River Shannon and River Fergus Estuaries SPA • Slieve Aughty Mountains SPA • Slievefelim to Silvermines Mountains SPA

	deposition associated with vehicular traffic outside a European site could potentially impact on sensitive habitats within a European site (e.g. heathland/bog habitats). Fragmentation - proposals for new roads that might sever the landscape. The loss, damage or fragmentation of bat commuting routes (e.g. due to new roads) could result in significant impacts which could can have a long-term effect on viability.	
Fen Complexes	Fen sites are highly sensitive to changes in the quality and quantity of water supply and its seasonal availability. The ecohydrological function of the individual wetland must be maintained, including the chemistry and nutrient status of the wetland. Fens are vulnerable to the impact of nutrients (EC, 2008). Road or infrastructure development with connectivity to a designated fen complex must ensure regulation of water sources. E.g. drainage and potential run-off from highway surfaces, the interruption of ground and surface water flows factors that increase flood risk or contamination of habitats may occur from a number of sources on or off site and may be toxic or non-toxic. Assessments should also consider the impact of changes in land-use on surrounding land and the deposition of airborne pollutants.	• Askeaton Fen Complex SAC • Tory Hill SAC
Standing Open Water	Highly sensitive to changes in water quality and quantity. Road or infrastructure development with connectivity to the lakes must ensure regulation of water sources. e.g. drainage and potential run-off from highway surfaces, the interruption of ground and surface water flow, factors that increase flood risk or contamination of habitats may occur from a number of sources on or off site and may be toxic or non-toxic.	• Ballyallia Lake SAC • Ballyallia Lough Ramsar Site
Unimproved calcareous grasslands and orchid sites. Grassland, sand dune grassland, mixed grassland, heaths, bogs, deciduous woodland.	Habitats adapted to low nutrient conditions and/or are vulnerable to acidification and are sensitive to nitrogen deposition Habitats including heathland, bogs and unimproved calcareous grasslands are sensitive to changes in air quality. Air pollution could result from traffic increases on existing or new roads which could increase airborne, or dust emissions causing a decline in plant species richness. Air pollution from traffic may have eutrophication effects, which would impact on species composition in the sward. Assessments should be based on spatial calculation of impact in terms of their exposure to NOx from road traffic, taking into account other background sources of NOx. A quantitative air quality assessment is required if European Sites are within 200m of affected roads.	• Barrigone SAC
Woodland	Policy measures to promote sustainable transport might be regarded as beneficial to these SACs. In-	• Clare Glen SAC

	city development is unlikely to impact areas of woodland. However, any factors that increase the isolation of woodlands, such as new roads that further fragment this already fragmented feature or contribute to environmental stresses such as reduced air or soil quality (deposition of traffic pollutants could easily cause impacts even at low levels (Woodland Trust, 2000). Any physical loss of woodland within a European site to accommodate new infrastructure is likely to cause significant effects and adversely affect site integrity.	• Curraghchase Woods SAC • Danes Hole, Poulnalecka SAC • Glen Bog SAC • Glenomra Wood SAC • Glenstal Wood SAC
Killarney Fern	Killarney fern is particularly sensitive to desiccation because it is not adapted to control water loss (Rumsey, 1994 cited in NPWS, 2008) Modifications to local hydrology, woodland clearance or measures that lead an increase in visitor pressure and human disturbance (trampling) have a detrimental effect on a population (NPWS, 2008). Impacts would only occur if within the European site.	• Clare Glen SAC • Glenstal Wood SAC
Aquatic species	Water dependant qualifying interest species and habitats, including freshwater pearl mussel, Atlantic salmon, lamprey spp. and otter are present within the study area. Such species are particularly at risk from increased sedimentation and a reduction in water quality that might result from stripping of topsoil and particulates or pollutants washed into watercourses. Construction near (e.g. water crossing) or within waterbodies linked to the River Shannon present a risk.	• Lower River Shannon SAC
Wetland habitats (marshes, fens, bogs, wet grasslands, wet woodland) and QI Birds.	Particularly vulnerable to changes in hydrodynamics (the movement of water through and from a wetland), or flooding. The structure and function of the habitats will be compromised if there is too much or too little water is available. The construction of highways and facilities and associated drainage (e.g. ditches) and embankments could block surface and sub-surface flows and change the water chemistry. Ecological (as well as hydrological) connectivity to similar habitats is important and regard should be had to the capacity of new infrastructure to divide wetlands or alter surrounding land use. Wetlands are also critical habitat for migratory birds and waterfowl and assessments should capture the potential indirect effects of habitat loss on birds for which the SPA is designated. Roads by wetlands and ponds typically have the highest roadkill rates (Forman et al, 1998) so the impact of traffic rates on roads adjacent to wetlands should be considered also. It should also be noted that qualifying interest bird species may utilise habitats outside European sites for foraging. These supporting habitats are functionally linked to the SPAs. Impacts on these	• Keeper Hill SAC • Lough Gash Turlough SAC • Silvermines Mountains West SAC • Slieve Bernagh Bog SAC • Ballyallia Lough SPA • Lough Derg (Shannon) SPA • River Shannon and River Fergus Estuaries SPA • Slieve Aughty Mountains SPA • Slievefelim to Silvermines Mountains SPA

	areas as a result of development could result in adverse effects on site integrity.	

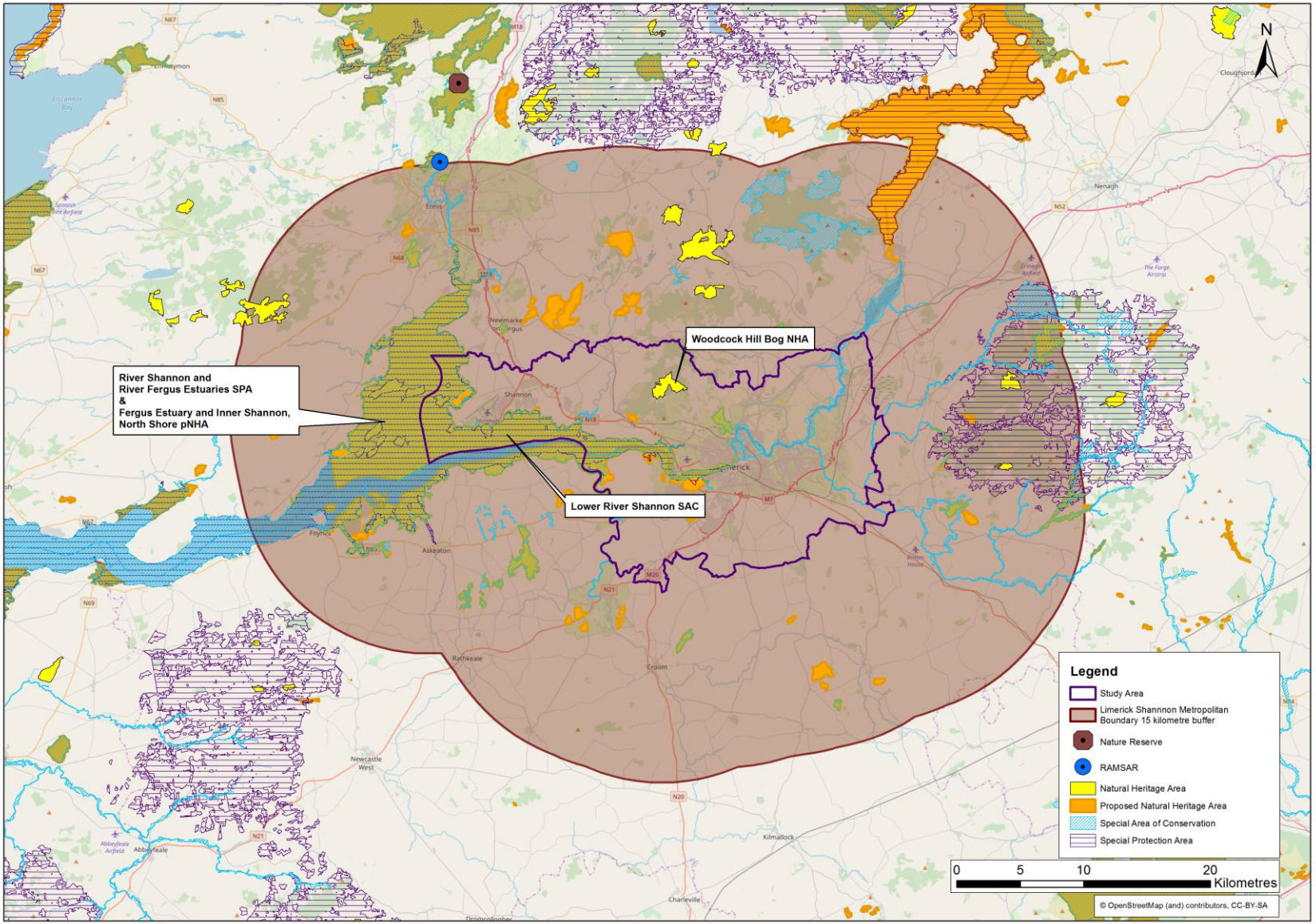

Figure 3.1 Designated Sites within the LSMA Study Area

4. Stage 2 – Appropriate Assessment

4.1 LSMATS

As detailed in Table 3.1 the Stage 1 Screening Assessment identified, 1 Ramsar site, 23 SACs and 5 SPAs within 15km of the outer-boundary of the Limerick Shannon Metropolitan Area (the Zone of Influence to which LSMATS relates).

4.2 Standardised Construction Good Practice and Mitigation Measures

The Stage 2 Appropriate Assessment assumes that construction good practice and appropriate mitigation measures would be applied to each element of the LSMATS, and successful adoption of avoidance/mitigation measures based on project specific assessments. Table 3.1 below provides a brief overview of likely measures to be considered during detailed design or construction/operation of specific elements or project with the LSMATS.

Table 4.1: Potential Significant Effects and Measure Considered as Part of the Stage 2 Appropriate Assessment

Potential Effect	Avoidance/Mitigation Measures Considered
Habitat Loss/Fragmentation	Ecological input at a project level for LSMATS option at detailed design stage to determine if landtake from Natura 2000 site could be feasibly avoided to ensure that no conservation objectives of the site are compromised so that site integrity can be preserved. Where European sites cannot be avoided altogether, detailed surveys of habitats within the affected area will be undertaken to locate and avoid sensitive habitats to ensure there is no loss of Qualifying Interests (QI) Annex I habitats or Annex II species and ensure that functionally supporting habitats are maintained. Where required a habitat management plan will be implemented to ensure appropriate treatment and reinstatement of habitats, during and after construction. In general proposals for the LSMATS focuses on upgrading/improvements to existing infrastructure. However, the proposed corridor for the LNDR includes a crossing of the Lower River Shannon SAC which may result in direct habitat loss and fragmentation of QIs from within the SAC itself. Based on a project level assessment additional measures may be required such as habitat creation/restoration to ensure that the conservation objectives of the site are not compromised, and that site integrity can be preserved.
Disturbance (Noise, Vibration, Visual and lighting)	A number of Industry standard good practice measures could be implemented during the design or construction/operation phase of the LSMATS to minimise disturbance to avoid the potential for effects on the site integrity from disturbance such as: • sensitive timings of work, • restriction/avoidance of night time working, sensitive lighting design (Voight et.al. 2018, EUROBATS Publication Series No. 8) for construction areas and operational scheme. • siting of construction areas away from sensitive habitats that support QI's of the designated site. • providing appropriate buffers or screening around sensitive habitats that support QI's of the designated site during construction and/or operation.
Species Mortality	Surveys focusing on mobile QI species (which can move outside the confines of a European site) will ensure any significant areas of supporting habitat (i.e. foraging areas for QI birds very near but outside of an SPA, otter holts outside an SAC boundary) will be identified and avoided or appropriate mitigation measures put in place. Where specific projects require landtake from a European site, such as the LNDR crossing of the Lower River Shannon SAC, then specific mitigation strategies would be required to ensure that sufficient measures were in place to ensure the conservation objectives for the QI species area maintained. This would be determined based on a project level assessment.

Potential Effect	Avoidance/Mitigation Measures Considered
	Good practice construction measures to avoid the likelihood of direct mortality (i.e. restricting speed and time of day for site traffic movements, timing of construction activities, ensuring excavations are covered overnight or incorporate slopes to allow egress and incorporating buffers around known QI features such as holts or resting places to ensure that there is no encroachment).
Air Quality	In general, the LSMAT is anticipated to have a positive effect on air quality in terms of reduction in transport related air pollutant emissions associated with: • reductions HGV movements in Limerick City centre and decarbonisation of the freight industry. • measures to support modal shift towards public transport and active travel modes. • transfer public transport fleet towards low carbon and/or zero emission alternatives. • electrification/retrofitting of existing train fleet. There may be some effects where Park and Rides and freight consolidation centres may worsen air quality on a local level through changes in traffic patterns in proximity to the chosen locations. These issues would be addressed on a project by project basis. In addition, where significant new infrastructure is proposed that has the potential to adversely affect air quality (LNDR), project level assessments and modelling would be required. This information would be used to determine the potential significant effects on QI habitat (in the case of the LNDR the Lower River Shannon SAC) and form the basis of any mitigation strategy required to ensure that the conservation objectives of the site are not compromised, and that site integrity can be preserved. These issues would be addressed on a project by project basis.
Water Quality	Potential impacts on water quality and flood risk to be considered and mitigated through EIA/HRA process on a project by project basis within the LSMATS. The EU Water Framework Directive (2000/60/EC) establishes a framework for the protection of both surface and groundwater. Transposing legislation outlines the water protection and water management measures required in Ireland to maintain high status of waters where it exists and to prevent any deterioration in existing water status: • European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003); • European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009); • European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010); • European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010); • European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011); and • European Union (Water Policy) Regulations 2014 (S.I. No. 350 of 2014).
Visitor Pressure	Several measures can be considered to address impacts of visitor pressure on designated sites including: restriction of access to sensitive areas of the designated site, creation of screening buffers through planting or other physical barriers, creation of physical barriers such as water channels and designated access routes to focus visitor use of the site away from sensitive areas. This would need to be considered on a project by project basis and require additional information on visitor number to develop a coherent access management strategy that could be incorporated in the overall management plans for each site.

Table 4.2 in the following section provides the details of each designated site identified and the outcome of the assessment of likely significant effects taking in to account the measures identified above.

Table 4.2: Stage 2 Appropriate Assessment Results

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
Ramsar Sites					
Ballyallia Lough Ramsar Site	Distance from LSMA: 13km QIs: Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation (NPWS, 2017a).	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Special Areas of Conservation (SACs)					
Askeaton Fen Complex SAC	Distance from LSMA: 4.5km QIs: Calcareous fens with Cladium mariscus and species of the Caricion davallianae Alkaline fens. (NPWS, 2018a).	• Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Ballyallia Lake SAC	Distance from LSMA: 13km QIs: Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation (NPWS, 2017a).	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
Barrigone SAC	Distance from LSMA: 5km QIs: Juniperus communis formations on heaths or calcareous grasslands Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) Limestone pavements Euphydryas aurinia (Marsh Fritillary) (NPWS, 2019).	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Clare Glen SAC	Distance from LSMA: 4km QIs: Old sessile oak woods with Ilex and Blechnum in the British Isles Trichomanes speciosum (Killarney Fern (NPWS, 2018b).	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
Curraghchase Woods SAC	Distance from LSMA: 5km QIs: Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae). Taxus baccata woods of the British Isles. Rhinolophus hipposideros (Lesser Horseshoe Bat) (NPWS, 2018c)	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Danes Hole, Poulnalecka SAC	Distance from LSMA: 4.2km QIs: Caves not open to the public Old sessile oak woods with Ilex and Blechnum in the British Isles Rhinolophus hipposideros (Lesser Horseshoe Bat)	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Glen Bog SAC	Distance from LSMA:11km QIs: Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (NPWS, 2017b).	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
Glenomra Wood SAC	Distance from LSMA: 0.85km QIs: Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (NPWS, 2017b).	• Disturbance • Habitat Fragmentation • Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Glenstal Wood SAC	Distance from LSMA: 7.5km QIs: Trichomanes speciosum (Killarney Fern) (NPWS, 2018f)	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Keeper Hill SAC	Distance from LSMA: 13.3km QIs: Northern Atlantic wet heaths with Erica tetralix Blanket bogs (* if active bog) (NPWS, 2017c)	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Kilkishen House SAC	Distance from LSMA: 6.6km QIs: Rhinolophus hipposideros (Lesser Horseshoe Bat) (NPSW, 2018g)	Disturbance Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
Knockanira House SAC	Distance from LSMA: 8.7km QIs: Rhinolophus hipposideros (Lesser Horseshoe Bat) (NPSW, 2018h)	Disturbance Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Lough Gash Turlough SAC	Distance from LSMA: 2.6km QIs: Turloughs Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation (NPWS, 2017d)	• Water Quality • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Lower River Shannon SAC	<u>Distance from LSMA:</u> 0km (partially located with the LSMA) <u>QIs:</u> Margaritifera margaritifera (Freshwater Pearl Mussel) Petromyzon marinus (Sea Lamprey) Lampetra planeri (Brook Lamprey) Lampetra fluviatilis (River Lamprey) Salmo salar (Salmon) Tursiops truncatus (Common Bottlenose Dolphin) Lutra (Otter) Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Sandbanks which are slightly covered by sea water all the time Estuaries Mudflats and sandflats not covered by seawater at low tide Coastal lagoons Large shallow inlets and bays Reefs Perennial vegetation of stony banks Vegetated sea cliffs of the Atlantic and Baltic coasts Salicornia and other annuals colonising mud and sand	• Habitat Loss • Disturbance • Habitat Fragmentation • Water Quality • Air Quality • Visitor Pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Mediterranean salt meadows (Juncetalia maritimi) Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (NPWS, 2012a)				
Newgrove House SAC	Distance from LSMA: 14.5km QIs: Rhinolophus hipposideros (Lesser Horseshoe Bat) (NPWS, 2018i)	• Disturbance • Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Newhall and Edenvale Complex SAC	Distance from LSMA: 7.5km QIs: Rhinolophus hipposideros (Lesser Horseshoe Bat) Caves not open to the public (NPWS, 2018j).	• Disturbance • Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
Old Domestic Building (Keevagh) SAC	Distance from LSMA: 11.8km QIs: Rhinolophus hipposideros (Lesser Horseshoe Bat) (NPWS, 2018j)	• Disturbance • Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Pouladatig Cave SAC	Distance from LSMA: 11.8km QIs: Rhinolophus hipposideros (Lesser Horseshoe Bat) Caves not open to the public (NPWS, 2018n)	• Disturbance • Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Poulnagordon Cave (Quin) SAC	Distance from LSMA: 6.4km QIs: Rhinolophus hipposideros (Lesser Horseshoe Bat) Caves not open to the public (NPWS, 2018o)	• Disturbance • Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Ratty River Cave SAC	Distance from LSMA: 1.9km QIs: Rhinolophus hipposideros (Lesser Horseshoe Bat) Caves not open to the public (NPWS, 2018p)	• Disturbance • Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
Silvermines Mountains West SAC	Distance from LSMA: 11.4km QIs: Northern Atlantic wet heaths with Erica tetralix European dry heaths Calaminarian grasslands of the Violetalia calaminariae (NPSW, 2017e)	• Water Quality/Hydrology • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Slieve Bernagh Bog SAC	Distance from LSMA: 8.9km QIs: Northern Atlantic wet heaths with Erica tetralix European dry heaths Calaminarian grasslands of the Violetalia calaminariae (NPSW, 2017e)	• Water Quality/Hydrology • Air Quality • Visitor pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
Tory Hill SAC	Distance from LSMA: 3.9km QIs: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) Calcareous fens with Cladium mariscus and species of the Caricion davallianae Alkaline fens (NPWS, 2018r)	• Water Quality/Hydrology • Air Quality • Visitor Pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Special Protection Area (SPA)					
Ballyallia Lough SPA	Distance from LSMA: 14.4km QIs: Wigeon (Anas penelope) Gadwall (Anas strepera) Teal (Anas crecca) Mallard (Anas platyrhynchos) Shoveler (Anas clypeata) Coot (Fulica atra) Black-tailed Godwit (Limosa limosa) Wetland and Waterbirds (NPWS, 2018s)	• Water Quality/Hydrology • Air Quality • Visitor Pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
Lough Derg (Shannon) SPA	Distance from LSMA: 6.8km QIs: Cormorant (Phalacrocorax carbo) Tufted Duck (Aythya fuligula) Goldeneye (Bucephala clangula) Common Tern (Sterna hirundo) Wetland and Waterbirds (NPWS, 2018t)	• Water Quality/Hydrology • Air Quality • Visitor Pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
River Shannon and River Fergus Estuaries SPA	Distance from LSMA: 0km (partially located with the LSMA) QIs: Cormorant (Phalacrocorax carbo) Whooper Swan (Cygnus cygnus) Light-bellied Brent Goose (Branta bernicla hrota) Shelduck (Tadorna tadorna) Wigeon (Anas penelope) Teal (Anas crecca) Pintail (Anas acuta) Shoveler (Anas clypeata) Scaup (Aythya marila) Ringed Plover (Charadrius hiaticula) Golden Plover (Pluvialis apricaria)	• Habitat Loss • Disturbance • Habitat Fragmentation • Water Quality/Hydrology • Air Quality • Visitor Pressure	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

Site Name	Distance from LSMA Area and Qualifying Interest(s) (QIs)	Potential pathways for effects on qualifying interests at Screening Stage	Effect from LSMATS plan alone?	Effect in combination with other Plans/ Projects?	Is the LSMATS likely to have a significant effect on European site(s) integrity?
	Grey Plover (Pluvialis squatarola) Lapwing (Vanellus vanellus) Knot (Calidris canutus) Dunlin (Calidris alpina) Black-tailed Godwit (Limosa limosa) Bar-tailed Godwit (Limosa lapponica) Curlew (Numenius arquata) Redshank (Tringa totanus) Greenshank (Tringa nebularia) Black-headed Gull (Chroicocephalus ridibundus) Wetland and Waterbirds (NPWS, 2012b)				
Slieve Aughty Mountains SPA	Distance from LSMA: 15km QIs: Hen Harrier (Circus cyaneus) Merlin (Falco columbarius) (NPWS, 2018u)	• Disturbance • Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.
Slievefelim to Silvermines Mountains SPA	Distance from LSMA: 9.3km QIs: Hen Harrier (Circus cyaneus) Merlin (Falco columbarius) (NPWS, 2018v)	• Disturbance • Habitat Fragmentation	No	No	No adverse effect on site integrity – assuming appropriate construction best practice applied, and successful adoption of avoidance/ mitigation measures based on project specific assessments.

4.3 NIS Conclusion

As detailed in Section 4 (Table 4.1), 1 Ramsar site, 23 SACs and 5 SPAs within 15km of the outer-boundary of the Limerick-Shannon Metropolitan Area (the Zone of Influence to which LSMATS relates). As outlined in the previous sections with the implementation of avoidance and mitigation measures as part of the detailed design process and standard good practice construction methods, it anticipated that the potential for adverse effects on site integrity as a result of the LSMATS would be avoided/eliminated.

Throughout this plan level assessment it has been highlighted that some elements of the LSMATS, especially the LNDR in relation to the Lower River Shannon SAC crossing, would need significant input at a project level to determine potential for likely significant effects and appropriate strategy to ensure that the conservation objectives of the site are not compromised, and that site integrity can be preserved.

The conclusion of this Natura Impact Statement for the LSMATS is that, following detailed assessment and appropriate mitigation for protecting European sites, there will be no adverse effects on the integrity of any European site(s), either alone or in-combination with other plans or projects.

Appendix A. References

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Appendix B. Plans, Policies and Programmes (PPP) Review

B.1 Key National Policy Influences

Project Ireland 2040 is the overarching policy and planning framework for the social, economic and cultural development of Ireland. It assumes that 25 years from now, one million extra people will be living in the State, and the framework aims to provide a coordinated and sustainable approach to balanced regional development. Project Ireland 2040 includes the 20-year National Planning Framework 2040, the National Development Strategy 2018-2027, and a detailed capital investment Strategy for the period 2018 to 2027.

B.1.1 National Planning Framework 2040 (Department of Housing, Planning, Community and Local Government, 2018)

The National Planning Framework (NPF) 2040 is a strategic development framework setting out the long-term context for Ireland's physical development and associated progress in economic, social and environmental terms. The NPF is being followed and underpinned by supporting policies and actions at sectoral, regional and local level.

In the period to 2040, the NPF recognises Dublin as Ireland's key international and global city of scale and principal economic driver, accounting for 25% of growth. A further 25% of growth is estimated to occur across the other four cities combined (Cork, Limerick, Galway and Waterford), enabling all four to become cities of greater scale by growing their population and jobs by 50-60%. The remaining 50% of growth relates to key regional centres, towns, villages and rural areas, to be determined in the forthcoming Regional Spatial and Economic Strategies (RSESs).

Under the framework three regional assemblies have been identified, Eastern and Midland, Northern and Western, and Southern. Limerick and Clare are part of the Southern Region Assembly. Each of the assemblies is illustrated in Figure B.1 below.

Figure B.1 Ireland's Regional Assembly Areas and Northern Ireland (Source: National Planning Framework 2040)

The NPF identifies the most significant challenge for the Southern Region in the period to 2040, "to position its cities as more significantly scaled, while also more compact and attractive, acting as metropolitan drivers for the region as a whole and as effective complements to the economic strength of Dublin. Ensuring a balanced approach in activating and realising much underutilised potential in wider rural towns and dispersed communities will also be a priority.as the positioning of its cities as metropolitan drivers for the region as a whole, and as effective complements to the economic strength of the Greater Dublin Area."

Due to the large geographical extent of each assembly, each regional strategy will be informed by smaller Strategic Planning Areas which cover key economic catchments. The City of Limerick lies within the Mid-West Strategic Planning Areas, along with County Clare, County Limerick and much of County Tipperary. Shannon Airport and the Tier 1 Shannon-Foynes Port on the Shannon Estuary are also key resources within the region, with potential for further growth.

Limerick is projected to grow with at least an additional 55,000 people by 2040 to support a minimum population of 145,000 within the CSO defined City and Suburbs alone.

The key transport growth enablers outlined in the NPF that are relevant to the development of LSMATS are summarised below.

- Implement the Limerick 2030 economic strategy to revitalise and redevelop Limerick City Centre and further extend the Strategy towards Limerick Docks area;
- Identify development opportunities to improve housing and employment in suburban areas;
- Develop new greenfield areas for housing, along with the provision of sustainable public transport and infrastructure required to support this development;
- Develop a Citywide public transport network which enhances accessibility from the City Centre to the National Technological Park, UL and Shannon Airport;
- Develop a strategic cycleway network to include a number of high-capacity "flagship routes";
- Improve the road connectivity to Shannon-Foynes Port, through the use of local by-passes; and
- Enhance the regional connectivity by road to both Cork and Waterford by improving average journey times.

B.1.2 The National Development Strategy (NDP) 2018-2027

The National Development Strategy 2018-2027 (NDP) was published in tandem with the NPF to support the delivery of the framework's objectives. It sets out the investment priorities that will underpin the successful implementation of the NPF, and guides national, regional and local planning and investment decisions in Ireland, including in the transport sector.

In order to drive a more balanced approach to Ireland's long term economic, environmental and social progress, a core priority under the NPF is "the essential requirement to enhance and upgrade accessibility between urban centres of population and their regions, in parallel with the initiation of compact growth of urban centres. This has a crucial role to play in maximising the growth potential of the regional urban centres and the economy as a whole".

The NDP is fully integrated with the approach to Ireland's spatial planning in the NPF and provides a comprehensive breakdown of the ten National Strategic Outcomes (NSO):

8) Compact Growth;

- Enhanced Regional Accessibility;
- Strengthened Rural Economies and Communities;
- Sustainable Mobility;
- A Strong Economy, supported by Enterprise, Innovation and Skills;
- High-Quality International Connectivity;
- Enhanced Amenity and Heritage;
- Transition to a Low-Carbon and Climate-Resilient Society;
- Sustainable Management of Water and other Environmental Resources; and
- Access to Quality Childcare, Education and Health Services.

The NSOs most relevant to the area of transport planning are as follows:

NSO 2: Enhanced Regional Accessibility "A core priority under the NPF is the essential requirement to enhance and upgrade accessibility between urban centres of population and their regions, in parallel with the initiation of compact growth of urban centres. This has a crucial role to play in maximising the growth potential of the regional urban centres and the economy as a whole. "

NSO 4: Sustainable Mobility "An environmentally sustainable public transport system will enable growth and change, meet the significant increase in travel demand and urban congestion while also contributing to our national policy vision of a low-carbon economy."

NSO 6: High-Quality International Connectivity "As an island, continued investment in our port and airport connections to the UK, the EU and the rest of the world, is integral to underpinning international competitiveness. It is also central to responding to the challenges as well as the opportunities arising from Brexit"

If transport planning within the local area is neglected however, this will also have a negative impact on achievement of the other NSOs, such as NSO 1: Compact Growth, NSO 3: Strengthened Rural Economies and Communities, and NSO 10: Access to Quality Childcare, Education and Health Services.

A number of the investment actions outlined within the NDP are of particular relevance to the LSMATS:

- Improvement of the existing M20 Cork to Limerick Road;
- N21/N69 Limerick to Adare to Foynes, to improve access to Shannon Foynes Port;
- N24 Cahir to Limerick Junction; and
- The Limerick Regeneration Program.

B.1.3 Strategic Framework for Investment in Land Transport (SFILT)

The Department of Transport, Tourism and Sport (DTTaS) is the Government Department responsible for the development of safe and sustainable transport, tourism, and sport to support economic growth and social progress in Ireland. DTTaS has over-sight of the decision-making framework specific to transport investment, and the Strategic Framework for Investment in Land Transport (SFILT) was published in 2015.

The main output of the SFILT was to identify high-level priorities for future investment in land transport, against a backdrop of growing, though still constrained, funding after the recession. SFILT identified the following three high-level priorities:

1) Achieve 'steady state" maintenance. The first priority was to ensure the maintenance and renewal expenditure necessary to keep the system in adequate condition. The steady state cost of the land transport network was estimated in SFILT to be €1.6 million per annum.
2) Address urban congestion. The next priority was to address urban congestion. It was expected that this would include measures to: improve and expand public transport capacity; improve and expand walking and cycling infrastructure; enhance the use of Intelligent Transport Systems (ITS). A 2017 DTTaS report found that congestion in the Greater Dublin Area had an economic cost of more than €358 million in 2013, and this was projected to grow to more than €2 billion per annum by 2035, in the absence of additional measures and investment.
3) Maximise the contribution of land transport networks to our national development. The final priority was to maximise the value of existing networks through: enhanced efficiency of the network, particularly through ITS; improved connections to key airports and seaports; provide better access for poorly served regions, large-scale employment proposals, to complete missing links, and to address critical safety issues; and to support identified national and regional spatial planning priorities.

B.1.4 Planning Land-Use and Transport - Outlook (PLUTO) 2040 (Department of Transport, Tourism and Sport)

DTTaS is currently preparing a Planning Land Use and Transport Outlook (PLUTO) 2040 document which will take the objectives of the NPF and the priorities set out in the SFILT as a starting point and develop high-level priorities for investment in Ireland's roads, active travel and public transport infrastructure on this basis.

PLUTO 2040 is necessary to determine the objectives for transport infrastructure and services in Ireland at a national level. PLUTO 2040 will provide the framework for decision making, determine investment priorities and guide the allocation of resources. As a spatial planning strategy, PLUTO 2040 will coordinate the development of an efficient land transport network, tailored to meet transport-related challenges over the coming decades. The NPF has identified that the transport planning framework is needed to prioritise projects which ensure urban growth is enabled, while also supporting rural development and inter-urban connectivity.

One of the key challenges PLUTO 2040 will set out to address is the fact that Ireland's transport system faces a number of, at times competing, policy priorities (such as expanding our transport infrastructure while keeping the existing infrastructure in good condition).

PLUTO 2040 is expected to be published in 2020 and the high-level priorities of the Strategy are:

- supporting the development of a land transport network that delivers a high level of service for everyone;
- enabling the delivery of NPF objectives for where people will live and work;
- increasing Ireland's economic competitiveness; and
- realising a low-carbon, sustainable transport system in Ireland (DTTaS, 2018).

B.1.5 Smarter Travel: A Sustainable Transport Future 2009-2020 (Department of Transport, Tourism and Sport, 2009)

The Government policy document 'smarter Travel: A Sustainable Transport Future 2009 – 2020", recognises the vital importance of continued investment in transport to ensure an efficient economy and continued social development, but it also sets out the necessary steps to ensure that people choose more sustainable transport modes such as walking, cycling and public transport.

The policy acknowledges that continued growth in demand for road transport is not sustainable due to the impact on congestion, local air pollution, contribution to global warming and promotion of increasingly sedentary lifestyles. Its main objective is to promote a significant modal shift from private transport to public transport and active modes over the period up to 2020 and also to reduce the share of travel demand growth that is car dependant. Controlling development so that it is sustainable / public transport oriented, is identified as a mechanism by which this can be achieved.

The key goals of the policy document are to:

- Improve quality of life and accessibility to transport for all and with emphasis on people with reduced mobility and those who may experience isolation due to lack of transport;
- Improve economic competitiveness through maximising the efficiency of the transport system and alleviating congestion and infrastructural bottlenecks;
- Minimise the negative impacts of transport on the local and global environment through reducing localised air pollutants and greenhouse gas emissions;
- Reduce overall travel demand and commuting distances travelled by the private car; and
- Improve security of energy supply by reducing dependency on imported fossil fuels.

These are to be achieved through four main actions;

- Actions to reduce distance travelled by private car and encourage smarter travel, including focusing population growth in areas of employment and to encourage people to live near places of employment and the use of pricing mechanisms or fiscal measures to encourage behavioural change;
- Actions aimed at ensuring that alternatives to the car are more widely available, mainly through a radically improved public transport service and through investment in cycling and walking;
- Actions aimed at improving the fuel efficiency of motorised transport through improved fleet structure, energy efficient driving and alternative technologies; and

- Actions aimed at strengthening institutional arrangements.

Smarter Travel outlines a key target to reduce work-related commuting by car from a current modal share of 65% to 45%, with commuting by alternative sustainable modes rising to 55% by 2020.

B.2 Key Regional Policy and Guidance

B.2.1 Mid-West Regional Planning Guidelines 2010-2022

The Mid-West Regional Planning Guidelines 2010-22 were developed and adopted by the Mid-West Regional Authority in 2010 within the overall policy framework of the National Spatial Strategy (NSS) and the National Development Strategy 2007-2013. The guidelines set out recommendations to local authorities within County Limerick, County Clare, and the northern part of County Tipperary which are intended to ensure that policy making and planning at a local level is made in line with regional and national planning frameworks.

The Mid-West Regional Authority was replaced by the Southern Regional Assembly in 2014, with all of its functions and responsibilities transferring to the new administrative body. The Mid-West Regional Planning Guidelines 2010-22 will continue to have effect until a new Regional Spatial & Economic Strategy is prepared and adopted by the Southern Regional Assembly.

One of the key concepts of the NSS was the development of a series of “Gateways” or “Hubs”. Gateways are larger strategically located centres, both nationally and relative to their surrounding areas, which could be used to provide the region with national-scale social and economic infrastructure and support services. Hubs would consist of other smaller towns used to link the Gateways to other areas. The NSS recognised the Limerick/Ennis/Shannon area as a key Gateway/Hub zone and its further development is a key component of its strategy. Transport corridors are another critical factor in the development of the Mid-West as set out in the NSS, along with achieving a greater spread of economic and spatial development through the identification of several key medium sized town and rural areas that can offer broad areas of opportunity in the Mid-West.

The key objectives of the Mid-West Regional Planning Guidelines 2010-22 in terms of transport are therefore to:

- provide good quality road and public transport connections through the strategic radial transport corridor of Dublin/Limerick;
- strengthen the transport network around the area’s Gateways and Hubs;
- provide improved access to Shannon Airport and to the Shannon estuary ports; and
- to identify key medium-sized towns and rural areas that can be used as drivers of economic growth and sustainable development.

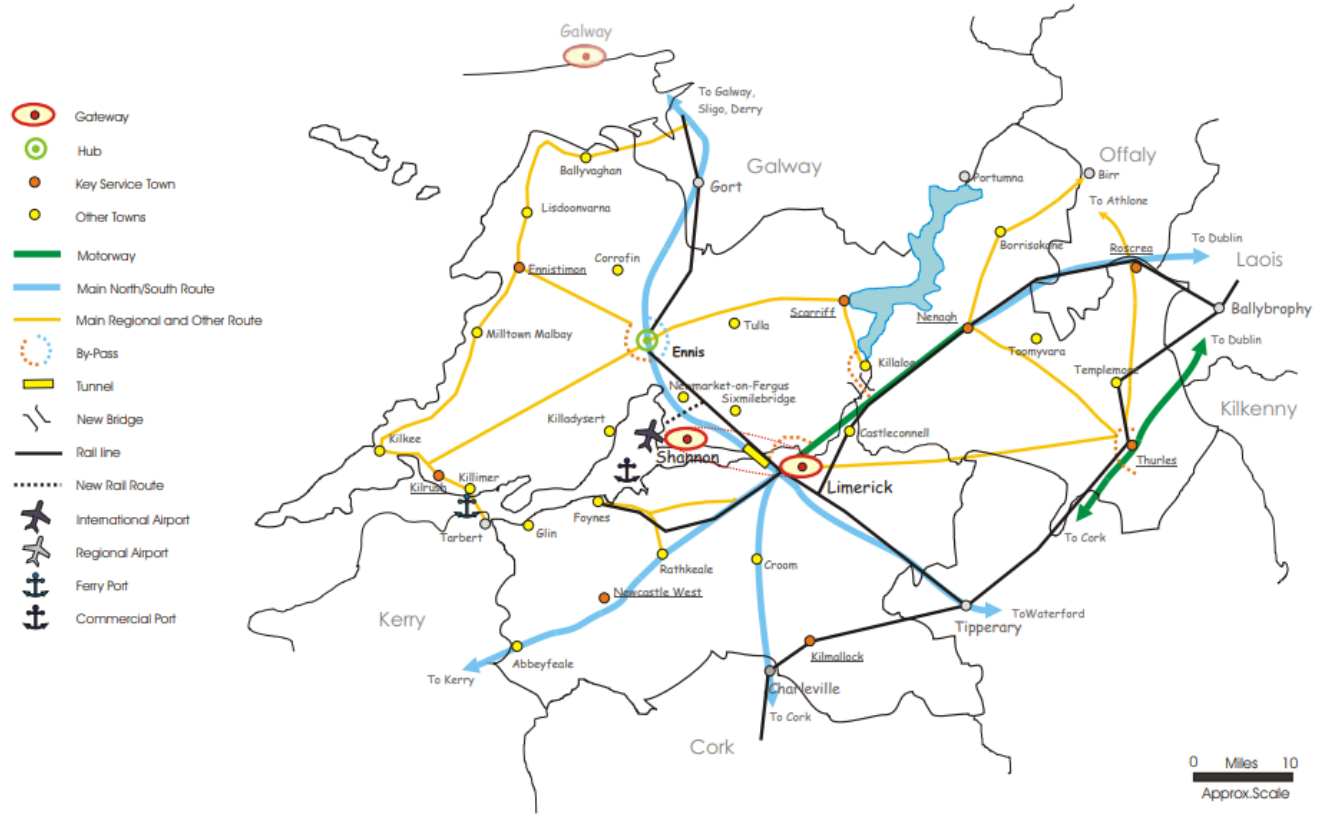

Figure B.2 Mid-West Region: Transport and Infrastructure Strategy Diagram (Source: Mid-West Regional Planning Guidelines 2010-22)

B.2.2 Regional Spatial and Economic Strategy (RSES)

The LSMA lies within the area of The Southern Regional Assembly, which was established on 1st January 2015, as one of three Assemblies in Ireland along with the Eastern and Midland, and Northern and Western regional assemblies. Each new assembly is tasked with preparing a new Regional Spatial and Economic Strategy (RSES) for their region, which will provide a link between the NPF, the relevant City and County Development Plans, and the Local Economic and Community Plans. The RSES will provide a long-term regional level strategic planning and economic framework for the future physical, economic and social developments for the region, to ensure the balanced dispersal of economic growth and development.

The Southern Regional Assembly published the final version of the RSES for 2020 to 2031 in January 2020 for the Southern Region. The RSES outlines strategic priorities for the Limerick Metropolitan Area to ensure it can fulfil its strategic function as a driver for growth in the Mid-West Region. The delivery of the LSMATS and an integrated multi-modal transport network is recognised as a key priority.

B.2.3 Limerick Shannon Metropolitan Area Strategic Plan (LSMASP)

RSESs are developed to co-ordinate local authority plans at a strategic and regional assembly level. However, the area of the assemblies is too broad to be able to sufficiently focus on city and metropolitan issues. Accordingly, in tandem with and as part of the RSES process, the NPF stipulates that five coordinated MASPs for the Dublin, Cork, Limerick Shannon, Galway and Waterford Metropolitan Areas will be prepared.

The MASP will provide statutory underpinning in line with the relevant RSES, to act as 12-year strategic planning and investment frameworks for the city metropolitan areas, addressing high-level and long-term strategic development issues.

Key transport priorities for the LSMA include the following measures.

- Preparation of the LSMATS;

- Target growth along high-quality public transport corridors and nodes linked to the delivery of key public transport projects;
- Development of the Limerick Northern Distributor Route (LNDR) to enhance access across the region to the UL, the IDA national technology park, the regeneration area of Moyross, Shannon International Airport, and across east and north County Limerick, south County Clare and onto the national road network;
- Implementation of an integrated, multi-modal public transport network across the Metropolitan Area servicing strategic residential and employment growth locations;
- Development and promotion of existing intercity rail and commuter links from Limerick to Dublin, Cork, and Galway, together with Ennis, Nenagh, Thurles, Clonmel, Ballybrophy and Athenry;
- Reinstatement of the Limerick to Foynes rail line, linking Ireland's deepest port to the national rail network; and
- Investigate the potential for a higher speed rail link between Dublin and Limerick City.

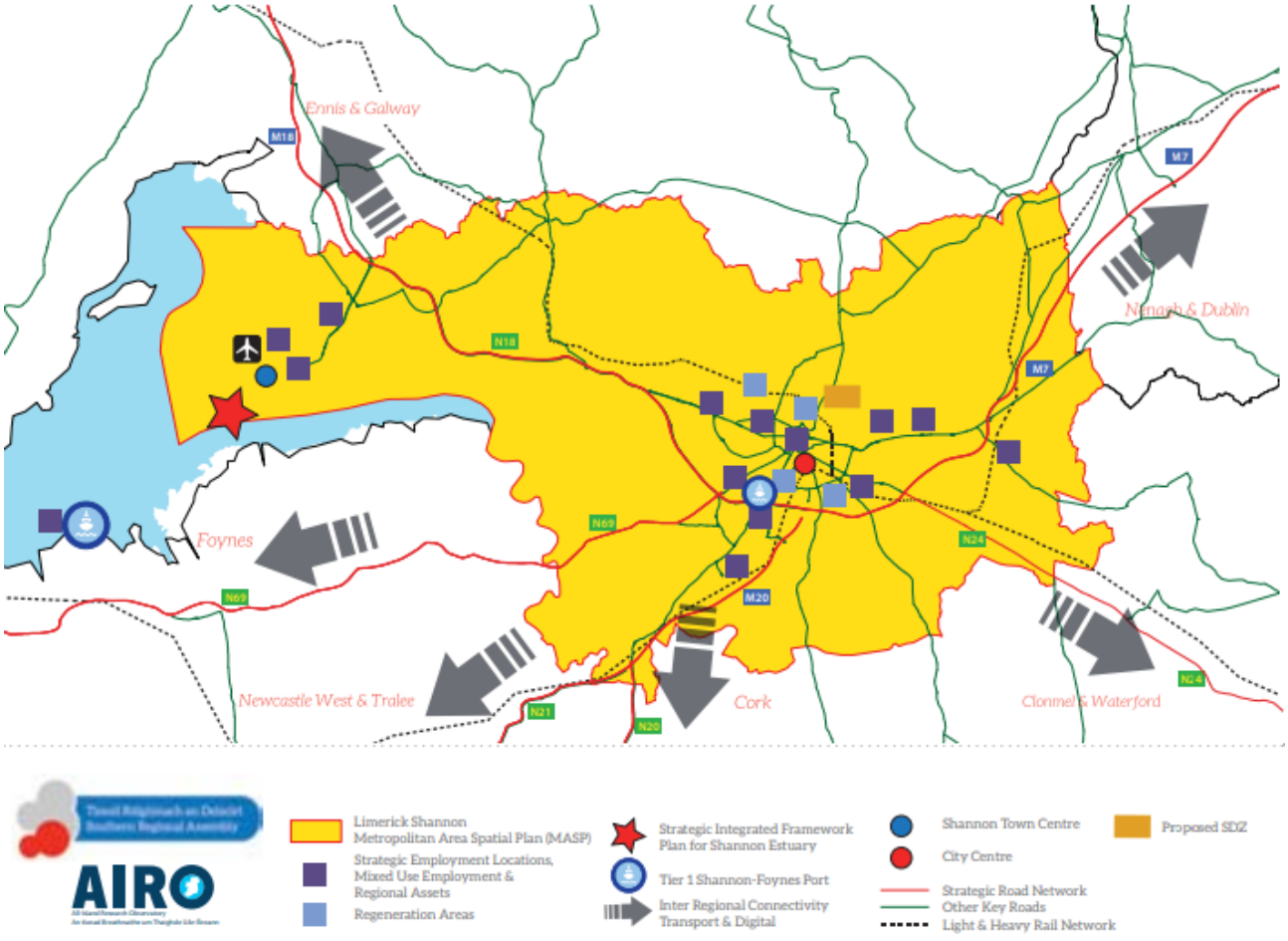

Figure B.3 Limerick Shannon Metropolitan Area Strategic Plan. (Source: RSES 2018)

LSMATS, in combination with the RSES for the Southern Region and the MASP for the LSMA, will provide the building blocks for regional planning within the Limerick Shannon area, as informed by the national policy objectives within the NPF and the NDP.

B.2.5 Other

Other relevant land use and economic plans and strategies include:

- Strategic Integrated Framework Plan (SIFP)for the Shannon Estuary (2013-2020) (SIFP Steering Group, 2013)
- Wild Atlantic Way Operational Programme (2015-2019) (Fáilte Ireland, 2015)
- Draft Tourism Masterplan for the Shannon (Waterways Ireland, 2020)
- Draft Burren Cliffs of Moher Visitor Experience Development Plan (Fáilte Ireland, 2019)

B.3 Key Local Policy and Guidance

The following local development plans set out land use plans and transport planning measures for areas within the geographic scope for the LSMATS:

- Limerick County Development Plan (DP) 2010-2016 (Limerick County Council, 2010);
- Limerick City Development Plan (DP) 2010-2016 (Limerick City Council, 2010);
- Clare County Development Plan 2017-2023: [including Shannon Municipal District – Volume 3 (b)] (Clare CDP) (Clare County Council, 2017);
- Southern Environs Local Area Strategy 2011-2017 (extended to 2021) (LCCC, 2011);
- Shannon Town and Environs Local Area Plan 2012-2018 (CCC, 2012);
- Castletroy Local Area Plan 2019-2025 (LCCC, 2019b);
- Limerick Metropolitan Cycle Network Study (LCCC, 2018); and
- Limerick Metropolitan District Movement Framework Study (LCCC, 2015).

In addition, the following local level plans and strategies relating to noise, air quality and climate for areas within the geographic scope for the LSMATS are relevant:

- Draft Climate Change Adaptation Strategy 2019-2024 (Limerick City and County Council (LCCC), 2019b);
- Climate Change Adaptation Strategy 2019-2024 (Clare County Council, 2019);
- Noise Action Plan 2018-2023 (Clare County Council, 2018); and
- Noise Action Plan 2018-2023 (Limerick City and County Council, 2018).

Appendix C. Individual Element Assessment Matrices

Description of Effect	Effect
The draft strategy objective / recommended investment priority is likely to have a significant positive effect on the environmental receptors associated with this objective.	+
The draft strategy objective / recommended investment priority may have neutral or significant positive effects on the environmental receptors associated with this objective depending on how the policy or objective is delivered.	0/+
The draft strategy objective / recommended investment priority is likely to have mixed significant positive & negative effects on the environmental receptors associated with this objective.	+/-
The draft strategy objective/ recommended investment priority is likely to have a neutral effect on the environmental receptors associated with this objective.	0
The draft strategy objective / recommended investment priority may have neutral or significant negative effects on the environmental receptors associated with this objective depending on how the policy or objective is delivered.	0/-
The draft strategy objective / recommended investment priority is likely to have a significant negative effect on the environmental receptors associated with this objective.	-
The draft strategy objective / recommended investment priority effects are uncertain/there is insufficient information on which to determine effect on potential environmental receptors associated with this objective at this stage.	?

C.1 BusConnects Assessment Matrix

BUSCONNECTS

LSMATS Objective BC1 BusConnects Limerick

- develop and deliver the BusConnects Limerick Programme, consisting of:
- a “branch and spine” network;
- orbital routes;
- additional Radial routes;
- significantly increased bus priority;
- increased capacity and frequency;
- conversion of public transport fleet to zero carbon alternatives; and
- improvements to fares, ticketing and interchange services and infrastructure.

LSMATS Objective BC2 Bus Only Link at Colbert Station

- examine the feasibility of a bus-only link behind Colbert Station on Roxboro Road.

LSMATS Objective BC3 Bus Priority

- provide Bus Priority through the reallocation of road space from the private car, Advance bus Signalisation, bus gates and acquisition of land where required.
- provide Bus Priority within Limerick City Centre and Sarsfield Bridge through reallocation of space from general traffic lanes.

LSMATS Objective BC4 Shannon Bus Connectivity

- improve local and regional bus connectivity to Shannon town centre, employment areas and Airport.

LSMATS Objective BC5 Regional Bus Networks

- maintain and enhance regional bus networks.

LSMATS Objective BC6 Local Link Services

- maintain and enhance Local Link services where required.

LSMATS Objective BC7 Coach Management Strategy

- produce a Coach Management Strategy to support growing visitor numbers.

LSMATS Objective BC8 Supporting Measures

- deliver supporting measures to complement the implementation of BusConnects Limerick and improved regional services.

Assumptions and limitations

- specific locations of land take required to support implementation of bus lanes, either within or without the existing highway boundary, are unknown; and
- it is assumed that the alignments/locations of new or improved infrastructure required to support objectives can be managed such that no loss or land take from built heritage assets or recreational facilities is required, except where specifically indicated below.

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	Measures to improve the public transport network, particularly within Limerick City and Shannon, would help improve access to places of employment and community facilities. Measures would support modal shift away from private vehicle towards the use of public transport, with likely attendant benefits for air and noise pollution associated with transport within the LSMA and particularly within Limerick City.	+/0	▪ Consideration of inclusion of measures to support increased patronage of bus services by vulnerable and social groups which may be driven by safety and security or accessibility concerns; and ▪ Consideration of impact of converting areas currently designated for street parking to bus lanes on severance, with particular focus on routes in close proximity to locations of importance to vulnerable groups (e.g. schools, care homes, hospitals, other community facilities).	+/0
Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	None identified (potential impacts with land take associated with new road infrastructure considered against “Roads” objectives).	0	▪ Consideration of impact of converting areas currently designated for street parking to bus lanes on severance, with particular focus on routes in close proximity to tourist locations; and ▪ Consideration of whether beneficial impacts for the tourism industry (hop on hop off tours etc.) can be realised through design and implementation of new bus lanes.	+/0
Prevent damage to, and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	Potential impacts on biodiversity associated with new road infrastructure considered against “Roads” objectives. Improvements to the public transport network within Limerick, Shannon and the wider LSMA would support modal shift away from private cars towards the use of public	+/0	▪ None identified	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	transport. Together with the supporting measures to transfer the public transport fleet to low carbon and/or zero emission alternatives, this would reduce emissions of air quality pollutants including particulate matter (PM), nitrogen oxides (NO_x) and sulphur dioxide (SO_2) from road transport, with a beneficial impact for ecology.			
Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	There would be temporary impacts on landscape and townscape character whilst construction works required support the reallocation of road space to bus lanes, or provision of new bus lanes, is undertaken. No significant impact on landscape or townscape character or public views is anticipated in the longer term. Positive impact from reduced traffic as a result of bus-only links i.e. removing general traffic from certain roads and streets	0	Potential impacts on landscape/townscape character and public views, to be considered through EIA process and appropriate mitigation identified and implemented.	0
Avoid damage to, maintain, and where appropriate enhance, cultural heritage resources and their setting.	There may be temporary disruption to the setting of built heritage assets during construction the new bus only link at Colbert Station (BC2), new bus priority lanes (objective BC3) and walking network updates around existing bus stops (objective BC8). Construction of new infrastructure also has potential to result in the loss or truncation of known or unknown	-/0	Potential impacts on heritage assets, particularly archaeology, to be considered through EIA process and appropriate mitigation identified and implemented.	0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	buried archaeology where the new or improved bus lanes would not be contained within the existing highway boundary.			
Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	Construction the new bus only link at Colbert Station (BC2) and new bus priority lanes (objective BC3) will require a degree of sterilisation and/or loss of soil resources. Most of the proposed new bus lanes would be within the existing highway boundary and within an urban environment (excepting those included within the LNDR which are considered within the "Roads" assessment), and therefore the impact on soils as a resource would be minimal and the risk of encountering new areas of contaminated ground is also relatively low. No impact on Irish Geological Heritage Sites (IGHS) is anticipated.	-/0	Potential impacts on soil resources and contaminated land to be considered through EIA process and appropriate mitigation identified and implemented.	0
Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	In the longer term, improvements to the public transport network within Limerick, Shannon and the wider LSMA would support modal shift away from private cars towards the use of public transport. Together with the supporting measures to transfer the public transport fleet to low carbon and/or zero emission alternatives, this would reduce emissions of air quality pollutants including particulate matter (PM), nitrogen oxides (NO_x) and sulphur dioxide (SO_2)	+/0	None identified.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	from road transport.			
Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	In the longer term, improvements to the public transport network within Limerick, Shannon and the wider LSMA would support modal shift away from private cars towards the use of public transport, reducing the volume of traffic utilising roads within built up areas with beneficial impacts for noise pollution.	+/0	None identified.	+/0
Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	New or improved crossings of Water Framework Directive (WFD) waterbodies will be required in a number of locations, including new crossings of the Lower Shannon and South Ballycannan, which may potentially have negative impacts on WFD objectives for affected waterbodies. In addition, where new or improved infrastructure requires increased areas of hard surfacing this could contribute to increased flood risk. However, supporting measures to transfer the public transport fleet to low carbon and/or zero emission alternatives may support a reduction in pollutant concentrations within road run-off.	-/0	Potential impacts water quality and flood risk be considered and mitigated through EIA and Water Framework Directive (WFD) assessment process down the line.	0
Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	It is intended to make use of existing infrastructure where practicable e.g. through conversion of on street parking areas into bus lanes, In the longer term, improvements to public transport the network within Limerick,	+/0	None identified.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	Shannon and the wider LSMA would support modal shift away from private cars towards the use of public transport, reducing traffic volumes within the LSMA and particularly within Limerick City. Together with the supporting measures to transfer the public transport fleet to low carbon and/or zero emission alternatives, this would reduce reliance on fossil fuel sources for transport within the LSMA.			
Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	In the longer term, improvements to the public transport network within Limerick, Shannon and the wider LSMA would support modal shift away from private cars towards the use of public transport, reducing traffic volumes within the LSMA and particularly within Limerick City. Together with the supporting measures to transfer the public transport fleet to low carbon and/or zero emission alternatives, this would reduce carbon emissions associated with road transport within the LSMA.	+/0	None identified.	+/0
To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	New bus lanes and associated infrastructure are vulnerable to future climate change, including changes in air temperature, precipitation rates and wind speeds.	?	Ensure that design of new infrastructure reflects likely worst case climate projections in terms of resilience to wind speeds, precipitation, flood risk and increases in air temperature over the full design life of the infrastructure.	+/0

C.2 Cycling Assessment Matrix

CYCLING

Objective CC1 Develop a Comprehensive Strategic Cycling Network

- Build upon the existing Limerick Metropolitan Cycle Network Study and Shannon and Environs Local Area Plan to deliver a comprehensive cycle network for the LSMA, in a manner consistent with the National Cycle Manual;
- To deliver an integrated, fully connected high-quality cycle network linking all major origins and destinations within the LSMA;
- Develop an Inter-Urban network connecting Limerick City and Metropolitan town centres;
- Identify local opportunities for permeability and feeder routes to improve links to the primary, secondary and greenway network and enhance the attractiveness of cycling for short trips; and
- Maintain and enhance existing infrastructure to a high standard.

Objective CC2 – Bicycle Sharing Schemes (BSS)

- Maintain the Limerick City Bicycle Sharing Scheme and expand the service where feasible based on identified potential patterns of demand; and
- Consider the feasibility of Dockless BSS in more peripheral areas across the LSMA.

Objective CC3 – Cycle Parking

- Deliver high-quality on-street bicycle parking; secure sheltered public bicycle parking; and to ensure that sheltered and secure bicycle parking is provided as part of any development proposals in line with the standards set out in the National Cycle Manual as a minimum.

Objective CC4 –End-of-Trip Facilities

- Ensure the provision of end-of-trip supporting facilities such as showers and lockers in new developments.

Objective CC5 – Behavioural Change and Promotion

- Prioritise investment in improving cycling routes to schools; and

Foster a cycling culture through promotional events and behavioural change initiatives.

Key measures identified:

- Identification of the following types of cycle routes within Limerick City settlement boundary:
- Primary radial and orbital routes;
- Secondary routes;
- Greenway Networks;
- Inter-urban Network;
- Feeder Network;
- Quietways; and
- Shannon Cycle Network;

Supporting measures including:

- Support for existing Limerick City Bicycle Sharing Scheme and consideration of feasibility of Dockless BSS;
- Delivery of high quality, sheltered bicycle parking – on street and as part of any new development proposals. Long stay bicycle parking at key transport nodes;
- Provision of end of trip facilities; and

Range of behavioural change measures to support modal shift towards cycling, predominantly targeting schools and work places.

Assumptions and limitations

- Specific locations of land take required to support implementation of cycle routes, either within or without the existing highway boundary, have not yet been quantified at this stage in most of the proposed locations; and
- It is assumed that the alignments/locations of new or improved infrastructure required to support objectives can be managed such that no loss or land take from built heritage assets or recreational facilities is required, except where specifically indicated below.

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	Improvement and/or provision of new cycling infrastructure in the form of new routes and additional measures such as bicycle sharing schemes, bicycling parking and end of trip facilities would help encourage modal shift towards cycling with subsequent beneficial impacts on public health as a result of increased activity levels and reductions in noise and air pollution.	+	None identified.	+
Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	Construction of new cycling infrastructure (routes, bicycle parking and end of trip facilities) may result in a degree of loss of existing recreational facilities, depending on location. However, the proposed new greenway routes would function as recreational facilities in their own rights and would help improve access to existing recreational and tourist facilities.	+/-	Potential impacts on recreational facilities as to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	+/-
Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	Construction of new cycling infrastructure (routes, bicycle parking and end of trip facilities) would likely require a degree of habitat loss and disturbance to wildlife (including protected species). The proposed routes the River Shannon and River Fergus Special Protection Area (SPA) and Fergus Estuary, Inner Shannon, North Shore NHA and Inner Shannon South Shore pNHA (impacts associated with the cycleways incorporated within the LNDR are assessed within the Roads matrix). In the longer term, measures proposed would help encourage modal shift from private car use to cycling, helping reduce particular matter (PM), nitrogen oxides (NO_x) and sulphur dioxide (SO_2) emissions from road transport, and with beneficial impacts for ecology.	+/-	Potential construction impacts on habitats and wildlife to be considered and mitigated through Environmental Impact Assessment (EIA) and Habitat Regulations Assessment (HRA) process down the line.	+/-
Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated	There may be temporary disruption to landscape and townscape during construction of new infrastructure, however no significant impacts are anticipated in the longer term.	0	▪ Sensitive design of new infrastructure, including street furniture in collaboration with local councils, to ensure that existing landscape and	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
landscapes and public views.			townscape character is maintained and where practicable enhanced. ▪ Consideration of opportunities for tree planting and green verges to be incorporated within new or amended routes; and ▪ Potential impacts on landscape and townscape be considered and mitigated through EIA process down the line.	
Avoid damage to, maintains and where appropriate enhance, cultural heritage resources and their setting.	There may be temporary disruption to the setting of built heritage assets during construction of new infrastructure or improvement works to existing infrastructure. Construction of new infrastructure also has potential to result in the loss or truncation of known or unknown buried archaeology, particularly in low lying previously undisturbed areas near Knockalisheen Marsh, however as most of the proposed new cycle routes would adjoin existing the existing highway, the risk of significant finds is considered low.	-/0	Potential impacts on heritage assets, particularly archaeology, to be considered through EIA process and appropriate mitigation identified and implemented.	0
Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	Construction of new cycling infrastructure (routes, bicycle parking and end of trip facilities) would likely require a degree of sterilisation and/or loss of soil resources. Most of the proposed new cycle routes would adjoin existing the existing highway, and therefore the impact on soils as a resource would be minimal. No impact on Irish Geological Heritage Sites (IGHS) is anticipated.	-/0	Potential impacts on soil resources to be considered through EIA process and appropriate mitigation identified and implemented.	0
Contribute to the mitigation of air pollution issues as a result of	Measures proposed would help encourage modal shift from private car use to cycling, helping reduce particular matter (PM), nitrogen oxides	+/0	None identified.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
transport and optimise potential benefits from reduction in air pollution.	(NO_x) and sulphur dioxide (SO_2) emissions from road transport, and with beneficial impacts for air quality.			
Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	Measures proposed would help encourage modal shift from private car use to cycling, which is likely to have a beneficial impact on noise pollution within the LSMA, in particular within Limerick City, and for receptors located adjacent to arterial roads.	+/0	None identified.	+/0
Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	Improvement and/or provision of new cycling infrastructure will encourage modal shift towards active travel modes, contributing to a reduction in water pollution associated with road runoff. However, where new or improved infrastructure requires increased areas of hard surfacing this could contribute to increased flood risk.	+/-	▪ Use of Sustainable Urban Drainage (SuDs) principles, such as use of geosynthetics for surfacing where appropriate; and ▪ Potential impacts water quality and flood risk be considered and mitigated through EIA and Water Framework Directive (WFD) assessment process down the line.	
Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	Improvement and/or provision of new cycling infrastructure will encourage modal shift towards active travel modes within the LSMA, reducing demand for fossil fuel dependent methods of transport. Proposals make use of existing infrastructure where practicable to reduce land take.	+/0	None identified.	+/0
Minimise contributions to climate change (including	Improvement and/or provision of new cycling infrastructure would help contribute to modal shift towards active travel modes, reducing	+/0	None identified.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	carbon emissions associated with road transport in the LSMA.			
To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	Proposed new and existing cycling routes and bicycle parking facilities are vulnerable to future climate change, predominantly through changes in air temperature (e.g. impacts of integrity of surfacing), precipitation and resilience to flood risk.	?	▪ Ensure that design of new infrastructure or infrastructure improvements reflect likely worst case climate projections in terms of resilience to wind speeds, precipitation, flood risk and increases in air temperature over the full design life of the infrastructure; and ▪ Consider whether measures to support the future use of cycle routes under a changing climate is required, such as new or more frequent seating provision along pedestrian routes or improvements in access to public drinking water supplies, drying rooms and showering facilities.	+/0

C.3 Rail Assessment Matrix

Rail

Objective RL1 InterCity Services

- Improve InterCity services, particularly journey times between Dublin, Limerick Junction and Cork.

Objective RL2 Limerick Junction -Limerick Dual Track

- Investigate the feasibility of providing a dual-track between Limerick Colbert and Limerick Junction to facilitate improved national and regional connectivity.

Objective RL3 Rail-Based Park and Ride

- Investigate the potential for a new station to support the Park and Ride at Ballysimon.

Objective RL4 – Suburban Rail Network and New Stations

- Promote the consolidation of development around stations

Objective RL5 –Colbert Station Redevelopment

- Complete the redevelopment of Colbert rail and bus station to provide a more attractive, secure and comfortable experience for passengers, in line with the project developed by Irish Rail and the NTA; and
- Provide a bus-only link behind Colbert Station on Roxboro Road and enhanced improved pedestrian, cycle and bus connectivity to the city centre.

Objective RL6- Rail-Based Freight

- Investigate the potential for rail freight in support of the proposed Regional Freight Strategy, including the reinstatement of the line between Limerick and the Port of Foynes.

Objective RL7 - Supporting Rail Infrastructure

- Enhance the attractiveness and efficiency of LSMA rail services through station enhancements, signaling improvements and completing the National Train Control Centre.

Objective RL8 - Flood Management at Ballycar

- Resolve the localised flooding issue on the Limerick-Ennis line at Ballycar.

Objective RL9 – Electrification and Alternative Fuelling

- Progress the electrification of the Rail Network in line with the Climate Action Plan 2019; and
- Investigate the potential for alternatively fueled trains.

Objective RL10 - Rail Lines and Greenways

Examine the feasibility of the provision of new greenways either within disused rail lines or immediately adjacent to existing or proposed rail corridors.

Key measures identified:

- Evaluation of the economic benefits of high-speed rail for the Dublin-Belfast, Dublin-Limerick Junction and Dublin-Cork lines;
- Dual-track the existing line between Colbert Station and Limerick Junction, in conjunction with wider InterCity frequency improvements to align with Cork / Dublin services and timetables and potential consideration and appraisal for new stations with complementary Park and Ride facilities at Oola and Pallas Green;
- Explore opportunity to provide new railway stations to align with strategic land-use planning objectives;
- Improve the Colbert station building and environs;
- Reinstatement of the line between Limerick and the Port of Foynes, recognition of the potential to develop Limerick Junction for rail freight logistics and support for the RSES objective to develop a Regional Freight Strategy; and
- Improvements to existing stations including improvements to accessibility for those with reduced mobility, smart ticketing facilities, sheltered waiting areas, Real Time Passenger Information (RTPI) and sheltered cycle parking;
- Signalling improvements;
- New National Train Control Centre for Ireland;
- Investigate solution for flooding problems on the Limerick-Ennis line at Ballycar; and
- Potential commitment to electrification of the LSMA Rail Network during the latter half of the strategy lifetime and/or examine the feasibility of a fleet upgrade to battery and/or hybrid trains.

Assumptions and limitations

- Specific locations of improvements to existing infrastructure and new infrastructure required under these objectives are unknown; and

It is assumed that the alignments/locations new and improved infrastructure required to support these objectives can be managed such that no loss or land take from built heritage assets or recreational facilities is required, except where specifically indicated below.

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	Potential dual tracking of the existing line between Colbert Station and Limerick Junction, InterCity frequency improvements and potential new train stations would help improve the accessibility of employment opportunities for the LSMA population and further support continued economic growth in the region. Measures to improve the rail network within the LSMA through improvements to station amenity and timetabling would likely contribute to modal shift away from private vehicle usage and towards public transport. Together with measures to electrify and/or retrofit the existing fleet with battery or hybrid technologies, these measures would likely have a positive contribution to public health within the LSMA as a whole through a reduction in air and noise pollutant emissions.	+/0	Whilst it is anticipated that measures would have a beneficial impact on noise across the LSMA as a whole, the appropriate environmental assessment work must be undertaken to ensure that new railway lines and stations do not have a significant adverse effect on receptors sensitive to noise located in close proximity to these new infrastructure developments.	+/0
Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	No significant impacts on existing recreation and amenity facilities are anticipated.	0	Consider inclusion of specific policies to (i) manage the potential impacts of disruption to existing rail services during construction of new infrastructure and (ii) improve tourist passenger experience, for example simplified ticketing, luggage space on trains, luggage storage at stations, specific tourist signage, travel plans for key tourist destinations.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	Construction of new infrastructure to support improvement to existing stations, and in particular construction of new stations and dual tracking of the existing line between Colbert Station and Limerick Junction, will likely result in a degree of loss or damage to habitats and risk disturbance or mortality of wildlife (including protected species). In the longer term, measures to improve the rail network within the LSMA through improvements to station amenity and timetabling would likely contribute to modal shift away from private vehicle usage and towards public transport with attendant positive impacts on air and noise pollution.	-/0	Potential impacts on terrestrial and aquatic habitats as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) and Habitat Regulations Assessment (HRA) process down the line.	-/0
Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	Construction of new infrastructure to support improvement to existing stations, and in particular construction of new stations and dual tracking of the existing line between Colbert Station and Limerick Junction, have potential temporary and permanent adverse impacts on landscape and townscape.	-/0	▪ Sensitive design of new infrastructure, including street furniture in collaboration with local councils, to ensure that existing landscape and townscape character is maintained and where practicable enhanced; and ▪ Potential impacts on landscape and townscape be considered and mitigated through EIA process down the line.	-/0
Avoid damage to, maintain and where appropriate enhance, cultural heritage resources and their setting.	Construction of new infrastructure to support improvement to existing stations, and in particular construction of new stations and	-/0	▪ Design of new infrastructure and street furniture to be sensitive to the presence of built heritage assets; and	-/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	dual tracking of the existing line between Colbert Station and Limerick Junction, have potential temporary and permanent adverse impacts on the setting of cultural heritage assets.		▪ Potential impacts on heritage assets to be considered and mitigated through EIA process down the line.	
Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	Construction of new infrastructure to support improvement to existing stations, and in particular construction of new stations and dual tracking of the existing line between Colbert Station and Limerick Junction, will likely require a degree of loss of sterilisation of soil resources. Dualling of the existing line between Colbert Station and Limerick Junction may require land take from or cause damage to Irish Geological Heritage Sites (IGHS) located at Brittas (Brittas Morainic Ridge) and Limerick Junction (Gortdrum). It is likely that areas of made or contaminated land will encountered during works to dual track the existing Colbert Station to Limerick Junction line.	-	▪ Ensure appropriate site specific geotechnical and contaminated land risk assessments are undertaken and any remediation recommendations adhered to. ▪ Potential impacts on IGHS sites and soil resources quality be considered and mitigated through EIA process down the line.	-/0
Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	Measures to improve the rail network within the LSMA through improvements to station amenity and timetabling would likely contribute to modal shift away from private vehicle usage and towards public transport.	0/+	None identified.	0/+

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	Together with measures to electrify and/or retrofit the existing fleet with battery or hybrid technologies, these measures would likely have a positive contribution to air quality across the LSMA as a whole.			
Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	Measures to improve the rail network within the LSMA through improvements to station amenity and timetabling would likely contribute to modal shift away from private vehicle usage and towards public transport. This would likely have a beneficial impact on noise pollution across the LSMA as a whole, although sensitive receptors in close proximity to the upgraded Colbert Station to Limerick Junction route and any new stations (depending on location) would likely experience an increase in noise pollution.	0/+	Whilst it is anticipated that measures would have a beneficial impact on noise across the LSMA as a whole, the appropriate environmental assessment work must be undertaken to ensure that new railway lines and stations do not have a significant adverse effect on receptors sensitive to noise located in close proximity to these new infrastructure developments.	0/+
Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	The objective to resolve the existing localised flood issue at Ballycar on the Limerick-Ennis line would have a positive impact on this SEO through reducing vulnerability from flood risks. Construction of new infrastructure, particularly new stations and new sections of track may potentially have an adverse impact on flood risk. The Colbert Station to Limerick Junction track passes adjacent to areas of	-/0	▪ Ensure that the identified solution for the existing flood issue on the Limerick-Ennis line at Ballycar is designed to accommodate future predicted changes in flood risk as a result of climate change; ▪ Use of Sustainable Urban Drainage (SuDs) principles in new infrastructure design; and ▪ Potential impacts water quality and flood risk be considered and mitigated through EIA and WFD process down the line. This may include	0/+

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	moderate and high fluvial flood risk.		provision of flood plain compensatory storage.	
Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	The objective to progress the electrification of the Rail Network and/or investigate the feasibility of alternatively fuelled trains would reduce the fossil fuel consumption associated with the transport sector within the LSMA if realised.	+/0	None identified.	+/0
Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	Measures to improve the rail network within the LSMA through improvements to station amenity and timetabling would likely contribute to modal shift away from private vehicle usage and towards public transport. Together with measures to electrify and/or retrofit the existing fleet with battery or hybrid technologies, these measures would likely help reduce carbon emissions associated with the transport sector within the LSMA.	0/+	None identified.	0/+
To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	Any new built infrastructure, including that required to support amenity improvements to existing stations and signalling arrangements as well as new stations or new sections of track (and associated lighting, signalling etc), is vulnerable to future climate change, including changes in air temperature, precipitation rates and wind speeds.	?	Ensure that design of new infrastructure reflects likely worst case climate projections in terms of resilience to wind speeds, precipitation, flood risk and increases in air temperature over the full design life of the infrastructure.	+/0

C.4 Walking Assessment Matrix

WALKING: LSMATs Objective WK1 Improvements to the Pedestrian Environment ▪ Develop a primary pedestrian network throughout Limerick City, Shannon and other metropolitan towns; ▪ Retrofit neighbourhood infrastructure to enhance walkability and increase the attractiveness of walking such as permeability and passive surveillance; ▪ Ensure pedestrian infrastructure is inclusive and accessible for all individuals using Universal Design principles and collaboration between a diverse range of stakeholders; ▪ Develop a Tourist Walking Strategy; ▪ Lower traffic speeds to increase pedestrian safety; ▪ Continue to implement behavioural change initiatives that promote walking provide through workplaces and schools, e.g. Smarter Travel, and initiatives such as Safe Routes to School and School Streets; ▪ Improve junctions and pedestrian crossings such as Pedestrian Countdown, longer crossing times and crossings that align with desire lines LSMATs Objective WK4 Leisure and Recreation Routes ▪ Upgrade walking facilities linking up green spaces, the River Shannon and other recreational areas to create green-blue corridors to promote positive physical and mental well-being; and LSMATs Objective WK4 Supporting Measures for Walking Implement pedestrian network and upgrades in tandem with the implementation of the Cycle and BusConnects Networks to promote multi-modal travel and to minimise conflicts in shared spaces.
Key measures identified: ▪ Walkability improvements to Limerick City Centre; ▪ Upgrades to key commuter routes within Limerick City in tandem with the Bus Connects and cycle network upgrades; ▪ Opportunities to create green-blue corridors throughout Limerick and suburbs, connecting existing greenways and green spaces; ▪ Improvements to pedestrian environment around bus and train stations in Cratloe, Shannon, Sixmilebridge and other metropolitan town and village centres; ▪ Shannon – support LAP objectives to reform and recreate pedestrian linkages between existing and new development; ▪ Sixmilebridge – measures focussed on improving connection between train station and town centre as per LAP; ▪ Cratloe - strengthening the village centre between Wood Road and Cratloe Cross and improving the streetscape in this area to improve pedestrian safety and comfort; ▪ Patrickswell – retrofit and safeguard the permeability of residential areas and the town centre and implement off-road footpath and cycleway along the River Barnakyle

as per LAP;

- Bunratty – improve the public realm along Old Bunratty Road, including the upgrade of footpaths and crossing facilities;
- Annacotty – enhance pedestrian environment as part of wider UL improvements; and
- Clarina -discourage further ribbon development.
- Identification of amenity routes in Castletroy (River Shannon, Groody and Mulcair) with potential for tourism development (as per LAP); and
- Propose Area Based Transport Strategy for the South Clare Economic Strategic Development Zone (SDZ).

Supporting measures include:

- Follow principles of universal design such that the public realm is accessible by all;
- Consideration how the public realm and transport networks require adaptation to consider the varied needs of older people;
- Walking routes to schools;
- Wayfinding: Walkable Limerick Map as Limerick City and County Council in 2019; and

Consider permeability for pedestrians in future development.

Assumptions and limitations

- Uncertainty regarding timescales and funding availability for delivery of measures not included within the Limerick Metropolitan District Movement Framework or within Limerick City and connected to the proposed Bus Connects or Cycling measures; and

Uncertainty regarding level of commitment to exploring proposals for enhanced recreational opportunities and tourism development with Castletroy and Patrickswell.

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	Improvements to provision, accessibility and amenity of active travel and recreational routes, with consideration of accessibility requirements and facilitating connections with other public transport modes such as bus and rail. Long term benefits to public health (mental and physical) and quality of life. Potential tourism development	+	Consultation with local communities to identify and mitigate temporary construction impacts given that extensive works planned on multiple transport routes and modes concurrently.	+

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	opportunities in Castletroy would contribute to local economy if taken forward.			
Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	Provision of a Tourist Walking Strategy, improvements to the public realm along the Old Bunratty Road and the World Class Waterfront Project, as well as general improvements within to the pedestrian realm within Limerick, would support and enhance access for tourists within the region.	+	Timing of construction works to avoid peak period for tourism.	+
Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	Creation of blue-green corridors within the LSMA would positively contribute to biodiversity and improve ecosystem connectivity. Potential for new infrastructure to conflict with existing terrestrial habitat and protected species. Improvements to pedestrian infrastructure on the banks of the Shannon and provision of a new pedestrian/cycle bridge over the Shannon has potential for adverse impacts on European designated sites (Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA, Fergus and Inner Shannon, North Shore Proposed NHA), particularly during construction.	+/-	▪ Potential impacts on terrestrial and aquatic habitats as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) and Habitat Regulations Assessment (HRA) process down the line. ▪ Consideration of opportunities for tree planting and green verges to be incorporated within new or amended pedestrian routes.	+/0
Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	Potential for temporary and permanent impacts on townscape as a result of introduction of new infrastructure, including street furniture, as required to facilitate new and improved walking routes. Provision of blue green corridors would	+/-	▪ Sensitive design of new infrastructure, including street furniture in collaboration with local councils, to ensure that existing landscape and townscape character is maintained and where practicable enhanced.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	likely positive contribute to visual amenity for nearby residents and users of these routes.		▪ Consideration of opportunities for tree planting and green verges to be incorporated within new or amended routes. ▪ Potential impacts on landscape and townscape be considered and mitigated through EIA process down the line.	
Avoid damage to, maintain and where appropriate enhance, cultural heritage resources and their setting.	New infrastructure could conflict with the settling of heritage assets (protected structures). Most new/improved infrastructure proposed within existing built urban environment and therefore potential for disturbance to unknown archaeological remains is considered low.	+/-	▪ Design of new infrastructure and street furniture to be sensitive to the presence of built heritage assets. ▪ Potential impacts on heritage assets to be considered and mitigated through EIA process down the line.	+/0
Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	Most new/improved infrastructure proposed within existing built urban environment and therefore potential for loss of valuable soil resources low, although risk of encountering contaminated land is greater.	0/-	▪ Ensure new infrastructure does not conflict with IGHS sites. ▪ Ensure appropriate site specific geotechnical and contaminated land risk assessments are undertaken and any remediation recommendations adhered to. Potential impacts on and soil resources quality be considered and mitigated through EIA process down the line.	0
Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	Improvements to provision and accessibility of active travel routes will likely help reduce emissions of air quality pollutants (particulate matter and NOx) associated with road transport through encouraging model shift to sustainable	0/+	Consideration of opportunities for tree planting and green verges to be incorporated within new or amended routes.	0/+

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	transport modes, particularly if walking routes are well integrated with public transport interchanges. Provision of blue green corridors would also support localised air quality improvements within Limerick.			
Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	Improvements to provision and accessibility of active travel routes will likely help reduce noise emissions associated with road transport through encouraging modal shift to sustainable transport modes, particularly if walking routes are well integrated with the cycling network and public transport interchanges.	0/+	Consideration of opportunities for tree planting and green verges to be incorporated within new or amended routes.	0/+
Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	Improvements to provision and accessibility of active travel route may help reduce water pollution associated with road runoff. However, where new or improved infrastructure requires increased areas of hard surfacing this could contribute to increased flood risk. New pedestrian infrastructure adjacent or spanning the Shannon, Abbey and Barnakyle may have an adverse effect on water quality and/or WFD objectives.	0/+	Use of Sustainable Urban Drainage (SuDs) principles, such as use of geosynthetics for surfacing where appropriate. Potential impacts water quality and flood risk be considered and mitigated through EIA and WFD process down the line.	0/+
Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	Walking proposals within the LSMATs are predominantly focused on improving existing infrastructure. Improvements to provision and accessibility of active travel routes will likely help reduce demand for fossil fuel dependent methods of transport.	+	Consideration of opportunities for tree planting and green verges to be incorporated within new or amended routes.	+

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	Improvements to provision and accessibility of active travel routes will likely help GHG emissions associated with road transport through encouraging modal shift to sustainable transport modes, particularly if walking routes are well integrated with public transport interchanges.	0/+	Consideration of opportunities for tree planting and green verges to be incorporated within new or amended routes.	0/+
To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	New and existing built infrastructure is vulnerable to future climate change, including changes in air temperature, precipitation rates and wind speeds. Provision of blue-green corridors would contribute to climate resilience through supporting ecosystem resilience and resilience to flood risk.	?	▪ Ensure that design of new infrastructure reflects likely worst case climate projections in terms of resilience to wind speeds, precipitation, flood risk and increases in air temperature over the full design life of the infrastructure. ▪ Consider whether measures to support the future use of active travel routes under a changing climate is required, such as new or more frequent seating provision along pedestrian routes or improvements in access to public drinking water supplies, drying rooms and showering facilities.	+/0

C.5 Roads and Streets Assessment Matrix

Roads and Streets

Objective RS1 Road and Street Network

- Maintain, manage and operate the existing road infrastructure in a more efficient manner;
- Manage the road network to discourage through-traffic in built-up areas; and
- Prioritise the placemaking functions of the urban street network in line with the hierarchy outlined in DMURS.

Objective RS2 – Supporting Sustainable Mobility

- Better manage the road network to protect the function of the strategic road network and to minimise use of the private car for short journeys;
- Reallocate road space in Limerick City and Shannon to prioritise walking, cycling and public transport use; and
- Prioritise the placemaking functions of the urban street network in line with the hierarchy outlined in DMURS.

Objective RS3 – Principles for the provision of New Roads

- Subject to the feasibility and environmental assessment process, new roads, where provided, will be developed in accordance with the principles and objectives outlined in this chapter.

Objective RS4 – National Roads

- Retain and protect the strategic function of the National Road network;
- Complete the appraisal process for the M/N20 Cork-Limerick;
- Reduce peak time congestion on the N18/N19 network at Shannon; and
- Upgrade N69 Limerick – Foynes to TEN-T standard.

Objective RS 5 – Limerick Northern Distributor Road

- Deliver the LNDR, subject to appraisal and environmental assessment, in line with its functions and characteristics as set out in the LSMATS.

Objective RS6 – Traffic Management in Limerick City and Metropolitan Centres

- Manage the road network to discourage through-traffic in built-up areas;
- Prioritise the placemaking functions of the urban street network in line with the hierarchy outlined in DMURS;
- Undertake public realm improvements in Metropolitan town and village centres; and
- Provide bus priority.

Key measures identified:

- Manage and restrict local access to the strategic road network to protect the function of National roads;
- Urban roads and streets designed to facilitate walking and cycling;
- Street networks to emphasis “place” function and enhance liveability of urban neighbourhoods;
- Any new road schemes must demonstrate that alternative solutions are not applicable/appropriate, be developed in accordance with NPF objectives, and (with the exception of motorway or expressway proposals) designed to facilitate active travel and public transport provision;
- Upgrade to the N18/N19 junctions;
- Support for the M/N20 Cork to Limerick Road;
- Support for the N69 Limerick-Foynes Road;
- Review of Limerick City street network to prioritise space for public transport and active travel. Consideration of congestion charge for Limerick City;
- Limerick Northern Distributor Road, including provision for new multimodal access to the University of Limerick (UL) and an additional access from the M7 to UL; and

Streetscape and public realm improvements to the road network within Metropolitan towns as developed through individual Local Transport Plans (LTPs) (as discussed in Walking).

Assumptions and limitations

- Extents of future road infrastructure improvements are unknown, and routing of the M/N20 Cork-Limerick and N69 Limerick-Foynes routes are unknown
- Potential charging zone with Limerick has not been assessed as no timescale for implementation is indicated; and
- It is assumed that the alignments/locations of future highway and streetscape
- improvements can be managed such that no loss or land take from built heritage assets or recreational facilities is required, except where specifically indicated below.
- All footpaths, cycleways and other recreational routes would be reconnected where severed by new road infrastructure

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	Proposals to consider complete the appraisal process for the N18/N19 junction upgrades, N69 Limerick – Foynes to TEN-T standard upgrade and implement the LNDR would help improve access to places of employment and community facilities and support continued economic growth. However, the LNDR would likely cause some degree of severance for communities located outside north of Limerick City and would adversely affect the amenity of these communities as a result of the new severance, potential loss of facilities (including residential property, businesses including agricultural holdings and commercial facilities) and noise and visual impact of the new road infrastructure. The LNDR also has potential to undermine the Strategy principles of facilitating compact growth and supporting modal shift towards public transport, walking and cycling. The M/N20 Cork to Limerick Road and N69 Limerick-Foynes Road are likely to have mixed positive and negative impacts on air and noise pollution and on the amenity of local communities.	+/-	▪ Potential impacts on local economy and on public health relating to and noise pollution, loss of access to recreational facilities and severance to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line. ▪ Final routing of the LNDR and N69 Limerick to Foynes to avoid or minimise loss of residential, community and commercial premises and include measures as deemed appropriate following determination of preferred route and design to minimise the noise and visual impact of the new infrastructure as far as practicable. ▪ Reconnect all local roads severed by LNDR ▪ BusConnects and other strategy measures to support modal shift towards public transport, walking and cycling with Limerick to be implemented in advance of the LNDR, or consider alternative methods of improving access for communities on the northern outskirts of Limerick such as improved bus routes.	+/-
Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism	The proposed route of the LNDR and the N69 Limerick to Foynes is likely to require a degree of land take from recreational assets. Proximity of the LNDR to recreational assets would also lead to long term impacts on amenity. Other future road schemes may also result in land take or amenity impacts on recreational facilities. Improvements to the public realm within urban areas in Limerick and metropolitan towns would make a positive	-/0	Potential impacts on recreational assets to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	-/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
recreation.	contribution to townscape and public views, with a positive contribution to tourism.			
Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	The LNDR proposed route passes through Knockalisheen Marsh potential Natural Heritage Area (pNHA) and the Lower River Shannon Special Area for Conservation (SAC), as well as in relatively close proximity to Woodcock Hill Bog NHA. Other as yet unspecified future road construction would also likely result in the temporary and permanent loss of habitat and mortality/disturbance to wildlife (including protected species). The N69 Limerick to Foynes and M/N20 Cork to Limerick is likely to pass through the Lower River Shannon SAC, and the N69 Limerick to Foynes is also likely to pass through River Shannon and Fergus Estuaries SPA and Askeaton Fen Complex SAC, and within 500m of Curraghchase Woods SAC, Barrigone SAC and Inner Shannon Estuary – South Shore pNHA. The existing N20 passes through Blackwater River (Cork/Waterford) SAC in two locations.	–	▪ Minimise land take, particularly within European and nationally designated sites; and ▪ Potential impacts on habitats and wildlife as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) and Habitats Regulation Assessment (HRA) process down the line. This would likely include provision of compensatory habitat and measures to mitigate potential disturbance effects and maintain habitat connectivity.	-/0
Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	New road infrastructure would likely have a significant adverse impact on landscape character without mitigation, particularly where routed through rural areas (for example the proposed route of the LNDR northeast of Limerick). However, improvements to the public realm within urban areas in Limerick and metropolitan towns would make a positive contribution to townscape and public views.	+/-	▪ Potential impacts on landscape and townscape as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line. ▪ Sensitive design of new infrastructure, in collaboration with local councils, to ensure that existing landscape and townscape character is maintained and where practicable enhanced; and ▪ Potential impacts on landscape and townscape as a	-/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
			result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	
Avoid damage to, maintain and where appropriate enhance, cultural heritage resources and their setting.	The LNDR proposed route passes in close proximity to a number of protected structures and through areas of previously undisturbed low lying land within the floodplain of the River Shannon which has relatively high potential for known and unknown archaeological remains. Potential for significant adverse impacts on the setting of designated heritage assets and for the loss or truncation of archaeological remains is considered high. Other junction improvement and road schemes may also result in impact on the setting of protected structures and/or truncation and loss of known and unknown buried archaeology, particularly where the new footprint extends beyond the existing highway boundary.	-/0	Potential impacts on cultural heritage to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	-/0
Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	Planned new roads or junction improvement schemes included within the strategy would result in the loss or sterilisation of soils. No impact on Irish Geological Heritage Sites (IGHS) is considered likely.	-/0	Potential impacts on soil resources to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	-/0
Contribute to the mitigation of air pollution issues as a result of transport	▪ The LNDR could potentially increase concentrations of traffic related air quality pollutants around the northern suburbs of Limerick (Moyross, Westbury)	-/0	Ensure design of new strategic, regional and local roads facilitates the use of electric vehicles (EVs) through measures such as provision for public charging	-/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
and optimise potential benefits from reduction in air pollution.	and settlements located immediately north of Limerick (Windsor, Lisgreen, Brennan's Cross, Ballycannon North, Huntsfield, Meelick, Quinpool, Parteen, Firhill, O"Connors Cross, Cloncarhee, Clonoughter, Gillogue, Derryduff, Shravokee). Based on the indicative routing shown within the draft LSMATs report these settlements may be located within 600m of the Proposed Scheme, with a subset of settlements and individual properties and dwellings located within 200m; and. ▪ Planned new regional and local road infrastructure would incorporate provision for public transport, walking and cycling in addition to car traffic, with an approximate equal space allocation for each of these modes. This would help encourage modal shift towards public transport and active travel modes, minimising the additional air pollution generated by new road infrastructure in the LSMA.		infrastructure.	
Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	▪ The LNDR could potentially increase noise pollution levels experienced by communities within the northern suburbs of Limerick (Moyross, Westbury) and immediately north of Limerick (Windsor, Lisgreen, Ballycannon North, Brennan's Cross, Huntsfield, Meelick, Quinpool, Parteen, Firhill, O"Connors Cross, Cloncarhee, Clonoughter, Gillogue, Derryduff, Shravokee). Based on the indicative routing shown within the draft LSMATs report these settlements may be located within 600m of the Proposed Scheme, with a subset of settlements and individual properties and dwellings located within	-/0	Ensure design of new strategic, regional and local roads facilitates the use of electric vehicles (EVs) through measures such as provision for public charging infrastructure.	-/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	200m; and ▪ Planned new regional and local road infrastructure would incorporate provision for public transport, walking and cycling in addition to car traffic, with an approximate equal space allocation for each of these modes. This would help encourage modal shift towards public transport and active travel modes, minimising the additional noise pollution generated by new road infrastructure in the LSMA.			
Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	▪ The proposed LNDR is routed through an existing flood plain within areas identified as having medium and high risk of fluvial and coastal flooding under current conditions and an increase in the hardstanding within these catchments would help increase flood risk; and ▪ New or improved crossings of Water Framework Directive (WFD) waterbodies will be required in a number of locations, including new crossings of the Lower Shannon and South Ballycannan, which may potentially have negative impacts on WFD objectives for affected waterbodies.	-/0	Potential impacts water quality and flood risk be considered and mitigated through EIA and Water Framework Directive (WFD) assessment process down the line.	-/0
Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of	Measures which aim to better manage the existing road network to protect the function of the strategic road network and reallocate existing road space for use by public transport and active travel modes seek to minimise the requirement for additional land take and reuse existing infrastructure as far as possible to support increased demand within the LSMA. However, the new road infrastructure proposed or under consideration (e.g. the LNDR, N18/N19 junction improvements,	+/-	None identified.	+/-

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
existing infrastructure.	M/N20 Cork to Limerick Roads, the short section of the N69 Limerick to Foynes scheme within the LSMA) will require a degree of land take.			
Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	Planned new road schemes would be required to demonstrate that lower carbon alternatives are either not applicable or not appropriate. Planned new regional and local road infrastructure would incorporate provision for public transport, walking and cycling in addition to car traffic, with an approximate equal space allocation for each of these modes.	-/0	Ensure design of new strategic, regional and local roads facilitates the use of electric vehicles (EVs) through measures such as provision for public charging infrastructure.	-/0
To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental	New and improved highway infrastructure is vulnerable to future climate change, including changes in air temperature, precipitation rates, wind speeds and fluvial/pluvial flood risk. The proposed LNDR is routed through an existing flood plain within areas identified as having medium and high risk of fluvial and coastal flooding under current conditions.	?	Ensure that design of new infrastructure reflects likely worst case climate projections in terms of resilience to wind speeds, precipitation, flood risk and increases in air temperature over the full design life of the infrastructure.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
resilience to climate change.				

C.6 Freight Assessment Matrix

FREIGHT LSMATS Objective FDS1 HGV Restrictions ▪ Identify specific lorry routes and/or time restrictions; to reduce peak-time HGV movements through Limerick City and neighbourhoods; LSMATS Objective FDS2 Local Freight Management ▪ Examine the feasibility of consolidation centres and break-bulk facilities outside of the National Road network in the medium-term, to facilitate smaller vehicles delivering to Limerick City Centre LSMATS Objective FDS3 Rail Freight ▪ Investigate the feasibility of rail freight from the Port of Foynes to Limerick and further afield over the lifetime of the Strategy. LSMATS Objective FDS4 Regional Freight Strategy ▪ Support the development of a Regional Freight Strategy to accelerate the decarbonisation of the freight sector, integrate smart technologies in logistics management and reinforce the important role that the strategic rail and road network play in efficiently moving freight ▪ Facilitate the transition to zero-emission delivery vehicles such as cargo bikes, solar powered and electric vehicles. LSMATS Objective FDS5 Delivery and Servicing Strategy ▪ Reduce the amount of “last mile trips” being made by motorised vehicles; ▪ Facilitate the transition to zero-emission delivery vehicles such as cargo bikes, solar powered and electric vehicles; and ▪ Support local “Click and Collect facilities where appropriate to minimise trips to individual homes and workplaces
Key measures identified: ▪ Implementation of HGV restrictions within the area bounded by N18/M7 South Ring Road and the LNDR; ▪ Mobility management planning at key freight locations; ▪ Support investigation into feasibility of rail freight, linking Tier 1 Ports of Cork, Rosslare and Foynes; ▪ Support development of Regional Freight Strategy to accelerate decarbonisation within this sector; and ▪ Objectives to manage future increases in demand for personal delivery and waste management services such as (i) micro consolidation centres, (ii) use of low noise vehicles (e.g. electric vehicles), (iii) feasibility of using smaller and non-motorised vehicles for delivery and servicing, (iv) minimising empty return trips, (v) supporting the placement of local Click and Collect facilities at rail stations, new residential developments and Park and Ride facilities.

Assumptions and limitations

- Feasibility and deliverability of new rail freight links between Tier 1 ports;
- Feasibility of using low emission vehicles or non-motorised vehicles to replace a proportion of freight movements currently undertaken by HGV; and
- Locations, routes and spatial extents of new infrastructure required to implement measures are not known.

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	Measures to limit and regulate the number of HGV movements within the central area of Limerick City would improve the accessibility and amenity of local routes for walkers and cyclists and alleviate congestion. These measures would also contribute positively to air quality by reducing particulate matter (PM) and nitrogen oxides (NO_x) emissions from road transport, supporting health outcomes in this densely populated area. However, whilst the overall economic impact of such measures is anticipated to be positive, there may be disproportionate negative impacts on certain business sectors (for example small retail businesses), and therefore indirectly also on certain vulnerable or social groups.	+/-	Undertake Equalities Impact Assessment for HGV restriction measures and measures to promote fright decarbonisation and implement mitigation measures as identified.	0/+
Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	Measures to limit and regulate the number of HGV movements within the Limerick City would help improve amenity of the central area.	0	None identified.	0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	Provision of new rail infrastructure and smaller scale infrastructure required to support freight consolidation such as Construction Logistics Centres (CLCs) and micro-consolidation centres has potential to result in to the loss of habitats and disturbance/mortality of wildlife, including protected species. Measures to decarbonise the freight industry would help reduce PM, NO_x and sulphur dioxide (SO_2) emissions from road transport, with beneficial impacts.	+/-	Potential impacts on habitats and wildlife as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	+/-
Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	Potential for temporary and permanent impacts on townscapes and landscapes as a result of new infrastructure required to support road freight consolidation and rail freight links between the Tier 1 ports of Cork, Rosslare and Foynes.	+/-	▪ Sensitive design of new infrastructure, in collaboration with local councils, to ensure that existing landscape and townscape character is maintained and where practicable enhanced. ▪ Potential impacts on landscape and townscape as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	+/-
Avoid damage to, maintain, and where appropriate enhance, cultural heritage resources and their setting.	Potential for temporary and permanent impacts on built heritage assets and known and unknown archaeological remains as a result of new infrastructure required to support road freight consolidation and, in particular, any new stretches of rail infrastructure constructed between the Tier 1 ports of Cork, Rosslare and Foynes.	0/-	▪ Design of new infrastructure to be sensitive to the presence of known heritage assets. ▪ Potential impacts on known and unknown heritage as a result of construction of new infrastructure to be considered and mitigated. through Environmental Impact Assessment (EIA) process down the line.	0
Avoid conflicts with geological sites of value. Minimise loss of soil	Provision of new rail links between Tier 1 Ports and also smaller scale infrastructure required to support freight consolidation such as Construction Logistics Centres	0/-	▪ Ensure new infrastructure does not conflict with IGHS sites. Ensure appropriate site specific geotechnical and contaminated land risk assessments are undertaken and any remediation	0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
resources and contribute towards the appropriate management of soil resources and quality.	(CLCs) and micro-consolidation centres would likely require a degree of loss and/or sterilisation of soil resources and may disturb areas of ground contamination.		recommendations adhered to. ▪ Potential impacts on landscape and townscape as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	
Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	Support for and/or implementation of measures which are likely to reduce the volumes of HGVs and other motorised vehicles utilising conventional fuel sources travelling within the central area of Limerick City could potentially lead to improvements in air quality through reducing in transport related emissions of air pollutants such as particulate matter and nitrogen oxides.	+/-	Whilst it is anticipated that measures would have a beneficial impact on air quality, the appropriate environmental assessment work must be undertaken to ensure that measures do not have a significant adverse effect on receptors sensitive to air quality outside of Limerick City by concentrating HGV movements within specific areas.	+/0
Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	Support for and/or implementation of measures which are likely to reduce the volumes of HGVs and other motorised vehicles within Limerick could potentially lead to a reduction in noise emissions associated with road transport.	+/-	Whilst it is anticipated that measures would have a beneficial impact on noise, the appropriate environmental assessment work must be undertaken to ensure that measures do not have a significant adverse effect on receptors sensitive to noise outside of Limerick City by concentrating HGV movements within specific areas.	+/0
Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to	Support for and/or implementation of measures which are likely to reduce the volumes of HGVs and other motorised vehicles utilising conventional fuel sources within Limerick and surrounding areas and encourage modal shift towards walking and cycling within the central area of Limerick City could potentially reduce water pollution associated with highway runoff.	+/0	None identified.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
flood risk				
Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	Support for and/or implementation of measures which are likely to reduce the volumes of HGVs and other motorised vehicles using conventional fuel sources would help reduce consumption of fossil fuels.	+/0	Make use of existing infrastructure as far as practicable to facilitate potential new rail links between Tier 1 ports.	+/0
Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	Support for and/or implementation of measures which are likely to reduce the volumes of HGVs and other motorised vehicles using conventional fuel sources could help reduce greenhouse gas (GHG) emissions associated with road transport in Ireland. Measures to minimise and/or regulate HGV movements within the central area of Limerick City would also help encourage a modal shift towards walking and cycling, further contributing to a reduction in GHG emissions.	+/0	None identified.	+/0
To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to	Any new built infrastructure required to support freight consolidation and rail freight links between the Tier 1 ports of Cork, Rosslare and Foynes is vulnerable to future climate change, including changes in air temperature, precipitation rates and wind speeds.	?	Ensure that design of new infrastructure reflects likely worst case climate projections in terms of resilience to wind speeds, precipitation, flood risk and increases in air temperature over the full design life of the infrastructure.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
climate change.				

C.7 Parking Assessment Matrix

PARKING LSMATS Objective PK1 Strategic Park and Rides ▪ Implement a network of strategic Park and Ride facilities outside of the main approach roads to the city, served by high-frequency bus services, and walking and cycling networks; LSMATS Objective PK2 Mobility Hubs ▪ Determine the feasibility of mobility hubs to support Public Transport Orientated Development and low car regeneration sites. LSMATS Objective PK3 Parking Management ▪ Implement maximum car parking standards for all new developments; ▪ Seek car-free and low car development in central and accessible areas; ▪ Repurpose car parking areas to support bus priority, cycle lanes, footpath widening, street trees and placemaking features; ▪ Support the gradual reduction of long stay on-street parking in urban centres; ▪ Support the redevelopment of off-street parking for higher value uses including residential and employment; and ▪ Examine the case for a Workplace Parking Levy and charges on internet shopping deliveries and out-of-town shopping centres
Key measures identified: ▪ Strategic Park and Rides (PnR) at designated public transport interchanges on the approach roads to Limerick City (and potentially Shannon); ▪ Development of a Park and Ride Strategy for the LSMA; ▪ Mobility hubs will be encouraged in regeneration areas or central areas where high-density housing is planned, such as the Land Development Agency (LDA) Colbert Station lands; and ▪ Parking management: – New guiding principles for parking in new developments in the LSMA; – Review parking management within Shannon Town with view to developing a Parking Management Strategy; – On street parking: review availability and pricing structure for on-street parking within the LSMA to: (i) facilitate a quicker turnover of spaces which facilitates the economic functions of town centres and provision of Electric Vehicle Charge Points (ECVPs); and (ii) in residential areas discourage commuter parking that contributes to parking stress and unsafe parking practices immediately outside paid parking zones, and to free-up kerbside space by providing alternatives to private car ownership; and – Off street parking: free-up kerbside space within urban centres and to support a viable, public transport system through co-ordinated local and national measures including PnR centres, mobility hubs, parking charges at out of town retail centres, examining the case of a Work Place Levy (WPL) and development mandatory, target-

based Mobility Management Plans for new development and area-based travel planning for clusters of existing places of education and employment.
Assumptions and limitations ▪ Timescales for delivery of PnRs currently unknown, although it is anticipated that key locations will be delivered in the short to medium term in tandem with the BusConnects measures; ▪ Timescales for implementation of on street and off-street parking measures; and ▪ Locations of Mobility Hubs (as proposed in regeneration areas).

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	Measures to support the faster turnover of on street parking spaces within Limerick City will help support the local economy. Measures that aim to reduce reliance on private transport, for example through increasing prices of on street parking permits, introducing parking charges at out of town retail centres, Work Place Levy and mandatory target based Mobility Management Plans may have a disproportionate adverse impact on accessibility to place of employment and community facilities for certain vulnerable or social groups who are less able to make use of public transport and/or active travel modes.	+/-	Undertake Equalities Impact Assessment for measures that aim to reduce reliance on private vehicles for social and commuting purposes and implement mitigation measures as identified.	+/0
Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for	At the indicative locations identified, it is not considered likely that the proposed new PnRs would have an adverse impact on existing recreation and amenity facilities. As Mobility Hubs would be located in areas of new development, it is not anticipated that they would have an adverse impact on existing	+/0	▪ Consider requirement for specific parking strategy for tourists, which may have a seasonal component; and ▪ Potential impacts on access and amenity of recreational facilities as a result of new infrastructure to be considered and mitigated	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
tourism recreation.	recreation and amenity facilities. A reduction in traffic volumes within the centre of Limerick City help improve the amenity of the area for tourists and residents.		through Environmental Impact Assessment (EIA) process down the line.	
Prevent damage to, maintain and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	Construction of new infrastructure required to support the proposed PnRs and Mobility Hubs has potential to result in the loss of habitats and disturbance/mortality of wildlife, including protected species. However, reductions in the number of trips undertaken by private vehicles within the centre of settlements would help reduce PM, NO_x and sulphur dioxide (SO_2) emissions from road transport, with beneficial impacts.	+/-	Potential impacts on habitats and wildlife as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	-/0?
Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	Potential for temporary and permanent impacts on townscapes and landscapes as a result of construction of infrastructure required to support proposed PnRs and Mobility Hubs.	-/0	▪ Sensitive design of new infrastructure, in collaboration with local councils, to ensure that existing landscape and townscape character is maintained and where practicable enhanced; and ▪ Potential impacts on landscape and townscape as a result of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	-/0
Avoid damage to, maintain and where appropriate enhance, cultural heritage resources and their setting.	Construction of new infrastructure required to support the proposed PnRs and Mobility Hubs could have an adverse impact on the setting of protected structures and result in the loss of truncation of known or unknown archaeological remains.	0/-	▪ Design of new infrastructure to be sensitive to the presence of known heritage assets; ▪ Potential impacts on known and unknown heritage as a result of construction of new infrastructure to be considered and mitigated	-/

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	Construction of new infrastructure required to support the proposed PnRs and Mobility Hubs. would likely require a degree of loss and/or sterilisation of soil resources and may disturb areas of ground contamination.	0/-	▪ Ensure new infrastructure does not conflict with IGHS sites. Ensure appropriate site specific geotechnical and contaminated land risk assessments are undertaken and any remediation recommendations adhered to; and ▪ Potential impacts on geological sites and soil resources resulting from construction of new infrastructure to be considered and mitigated through Environmental Impact Assessment (EIA) process down the line.	0
Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	Support for and/or implementation of measures which are likely to reduce the number of journeys made by private vehicle within settlement centres within the LSMA and/or support the use of low or zero emission vehicles could potentially lead to improvements in air quality through reducing in transport related emissions of air pollutants such as particulate matter and nitrogen oxides.	+/-	Whilst it is anticipated that measures would have a beneficial impact on air quality, the appropriate environmental assessment work must be undertaken to ensure that measures do not have a significant adverse effect on receptors sensitive to air quality in close proximity to the proposed PnRs and Mobility Hubs.	+/0
Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	Measures which seek to reduce the number of journeys made by private vehicle within settlement centres within the LSMA would likely lead to a reduction in noise pollution associated with road transport. However, newly developed PnRs and Mobility Hubs have potential to generate significant but localised noise pollution, depending on location and existing noise environment. It is anticipated that PnRs would likely be located outside of settlement centres within	+/-	Whilst it is anticipated that measures would have a beneficial impact on noise, the appropriate environmental assessment work must be undertaken to ensure that measures do not have a significant adverse effect on existing receptors sensitive to noise (Mobility Hubs and PnRs) or compromise the amenity of future development proposals (Mobility Hubs).	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
	lightly populated localities.			
Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	Measures that aim to reduce the number of private vehicles utilising the road network within the central areas of major settlements (e.g. PnRs, Mobility Hubs, Workplace Parking Levy, car free or low car standards for new development within 800m walking catchment of Limerick City centre) may contribute towards a reduction in waterbody pollution associated with highway run-off in these areas. Construction of new large-scale areas of hardstanding to form new PnRs and Mobility Hubs may negatively contribute to flood risk, depending on location and construction methodology.	?	Use of Sustainable Urban Drainage (SuDS) principles in design of new infrastructure. Site new infrastructure outside areas of pluvial flood risk.	0/+
Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	Measures aimed at reducing the use of private vehicles within larger settlements such as PnRs, Mobility Hubs and car free or low car standards for new development proposals will contribute towards a reduction in fossil fuel consumption within the LSMA. Indicative locations of PnRs show locations within greenfield sites, and some relatively small scale loss of agricultural land is considered likely.	+/0	Locate new infrastructure such as PnRs and mobility hubs on brownfield sites where practicable.	+/0
Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport	Measures designed to support modal shift towards low carbon transport modes such as public transport and walking/cycling will help minimise greenhouse gas (GHG) emissions associated with the transport sector in the LSMA. New infrastructure required to support PnRs	+/0	Ensure that construction methodology for new infrastructure is undertaken with consideration for the European Union (EU) waste hierarchy and in line with relevant Irish Green Building Council (IGBC) guidance.	+/0

SEO	Description of impact	Potential effect (pre-mitigation)	Suggested mitigation and/or enhancement opportunities	Residual effect (post-mitigation)
infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	and Mobility Hubs will result in carbon emissions during construction (both embodied and associated with construction plant and traffic) and operation (lighting, heating, electric gates etc).			
To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	Any new built infrastructure required to support the provision of PnRs and Mobility Hubs is vulnerable to future climate change, including changes in air temperature, precipitation rates and wind speeds.	?	Ensure that design of new infrastructure reflects likely worst case climate projections in terms of resilience to wind speeds, precipitation, flood risk and increases in air temperature over the full design life of the infrastructure.	+/0

Appendix D. Summary Assessment Matrices

Table D1 Likely significant effects of the draft LSMATS in the absence of mitigation

SEO		Strategy Element							Summary Assessment
		BusConnects	Cycling	Rail	Walking	Roads and Streets	Freight	Parking	
1	Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	+/0	+	+/0	+	+/-	+/-	+/-	+/0
2	Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	0	+/-	0	+	-/0	0	+/0	0
3	Prevent damage to, and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	+/0	+/-	-/0	+/-	–	+/-	+/-	+/-
4	Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	0	0	-/0	+/-	+/-	+/-	-/0	+/-
5	Avoid damage to, maintain, and where appropriate enhance, cultural heritage resources and their setting.	-/0	-/0	-/0	+/-	-/0	0/-	0/-	0/-
6	Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	-/0	-/0	-	0/-	-/0	0/-	0/-	0/-

SEO		Strategy Element							Summary Assessment
		BusConnects	Cycling	Rail	Walking	Roads and Streets	Freight	Parking	
7	Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits from reduction in air pollution.	+/0	+/0	0/+	0/+	-/0	+/-	+/-	+/-
8	Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	+/0	+/0	0/+	0/+	-/0	+/-	+/-	0/+
9	Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	-/0	+/-	-/0	0/+	-/0	+/0	?	-/0
10	Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	+/0	+/0	+/0	+	+/-	+/0	+/0	+/0
11	Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	+/0	+/0	0/+	0/+	-/0	+/0	+/0	+/0
12	To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	?	?	?	?	?	?	?	?

Table D2 Residual (post SEA mitigation) effects of the draft LSMATS

SEO		Strategy Element							Summary Assessment
		BusConnects	Cycling	Rail	Walking	Roads and Streets	Freight	Parking	
1	Protect and enhance quality of life in relation to transport while increasing accessibility to economic, employment and community facilities.	+/0	+	+/0	+	+/-	0/+	+/-	+/0
2	Avoid damage to recreation and amenity facilities through construction of new transport infrastructure and support and enhance access for tourism recreation.	+/0	+/-	+/0	+	-/0	0	+/0	+/0
3	Prevent damage to, and where appropriate enhance, terrestrial, aquatic and soil biodiversity, particularly EU and national designated sites and protected species.	+/0	+/-	-/0	+/0	-/0	+/-	-/0?	+/-
4	Safeguard the character and diversity of the Irish landscape and minimise the visual effects on sensitive, designated landscapes and public views.	0	+/0	-/0	+/0	-/0	+/-	-/0	+/-
5	Avoid damage to, maintain, and where appropriate enhance, cultural heritage resources and their setting.	0	0	-/0	+/0	-/0	0	-/	0
6	Avoid conflicts with geological sites of value. Minimise loss of soil resources and contribute towards the appropriate management of soil resources and quality.	0	0	-/0	0	-/0	0	0	0
7	Contribute to the mitigation of air pollution issues as a result of transport and optimise potential benefits	+/0	+/0	0/+	0/+	-/0	+/0	+/0	+/0

SEO		Strategy Element							Summary Assessment
		BusConnects	Cycling	Rail	Walking	Roads and Streets	Freight	Parking	
	from reduction in air pollution.								
8	Contribute to the mitigation of noise pollution issues as a result of transport and optimise potential benefits from reduction in noise pollution.	+/0	+/0	0/+	0/+	-/0	+/0	+/0	+/0
9	Prevent deterioration of the water quality status of surface water and groundwater bodies as appropriate to the WFD and avoid increasing risks from floods or increasing vulnerability to flood risk.	0		0/+	0/+	-/0	+/0	0/+	+/0
10	Promote the sustainable use of natural resources (including land), encourage energy efficiency, reuse, recycling while encouraging the effective use of existing infrastructure.	+/0	+/0	+/0	+	+/-	+/0	+/0	+/0
11	Minimise contributions to climate change (including greenhouse gas emissions) from construction of new/upgraded transport infrastructure or operation of existing and new transport networks. Contribute to the reduction in transport related GHG emissions through modal changes or new technologies.	+/0	+/0	0/+	0/+	-/0	+/0	+/0	+/0
12	To ensure that the resilience to climate change is designed for existing transport network and new network and promote improved environmental resilience to climate change.	+/0	+/0	+/0	+/0	+/0	+/0	+/0	+/0