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TII Publications

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Population and Human Health Assessment of Proposed National Roads - Standard

PE-ENV-01108

September 2024

PE Planning & Evaluation

Standards

About TII

Transport Infrastructure Ireland (TII) is responsible for managing and improving the country's national road and light rail networks.

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TII Publications

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1. Introduction

Transport Infrastructure Ireland (TII)'s primary function is to provide an integrated approach to the future development and operation of the national roads network and light rail infrastructure to provide high quality transport infrastructure and services, delivering a better quality of life and supporting economic growth throughout Ireland. TII produces and manages a wide range of standards and technical documentation related to its areas of responsibility. These, and other publications, are available to users through the TII Publications system website (tiipublications.ie/library).

1.1 Purpose of this Standard

Population and human health (PHH) effects are assessed as part of Environmental Impact Assessment (EIA) and shall be considered in TII's planning and development of national road infrastructure (including service areas, tolled roads and associated infrastructure). This Standard Document (SD) PE-ENV-01108 sets out the required approach for PHH assessment in accordance with EIA legislative requirements and relevant TII guidelines and standards. This SD (PE-ENV-01108) provides a robust and consistent approach, with a focus on proportionate assessment to protect and support healthy, equitable and cohesive communities. This SD (PE-ENV-01108), together with other relevant TII standards, also supports the delivery of TII's Sustainability Implementation Plan (SIP) (March 2024). In particular, the SD supports Principle 6 of the SIP – Create total value for society, which aims to *'Maintain and enhance the balanced delivery of economic, environmental and social value through robust planning, rigorous appraisal and decisions that prioritise sustainability.'*

This SD (PE-ENV-01108) sets out the requirements that shall be implemented in all PHH assessments, including:

- Provision of evidence-based information on PHH effects to decision makers during options selection and project determination, in accordance with the TII Project Management Guidelines (PMGs) and Project Appraisal Guidelines (PAGs).
- Robust and proportionate assessment of PHH effects resulting from proposed national road projects (national roads, motorway service areas, toll schemes, and any associated infrastructure) in accordance with the PMGs/PAGs and, where relevant, the EIA Directive.
- Incorporation of appropriate mitigation and enhancement measures to avoid or reduce significant adverse effects and, where possible, improve PHH outcomes.
- Input to and production of documents and deliverables to meet the requirements of the TII PMGs/PAGs, EIA Directive and other relevant legislation, guidelines and standards.

1.2 Terms and Definitions

The following verbal forms are used to describe the requirements and guidance set out in this SD (PE-ENV-01108).

- "Shall" or "will" indicates a requirement.
- "Should" indicates a recommendation.
- "May" indicates a permission.
- "Can" indicates a possibility or a capability.

Information marked as “Note” is for guidance and context to aid understanding of the associated requirement.

The following verbal forms are commonly used in health assessment to distinguish between the impacts on health determinants and effects on health, and have been applied in this SD:

- ‘Impact’ indicates a change to a community resource or health determinant exerted by a project.
- ‘Effect’ or ‘outcome’ indicates a change to the receptor population (e.g. change in health status) resulting from an impact of a project.

A comprehensive glossary of terms, abbreviations and acronyms is available in Section 6.

1.3 Using this Standard

This SD (PE-ENV-01108) is to be used on proposed TII national road projects. This SD is specific to the PHH topic and is informed by, and shall be used in conjunction with, existing TII Environmental Standards, Technical Documents and relevant Guidelines including (but not limited to):

- TII Project Management Guidelines (PMG) (TII, 2023)
- TII Project Manager’s Manual (PMM) for Major National Road Projects (TII, 2023)
- TII Project Appraisal Guidelines (PAG) (TII, 2024)

This SD is intended for use by suitably qualified professional practitioners with appropriate knowledge and experience of PHH assessment. It may also be used by Project Managers, environmental co-ordinators, designers and contractors.

This SD applies at PMG Project Phases 0 to 4. The application of this SD to different TII project thresholds and phases is described in Section 3. See further detail on implementation in Section 1.5.

1.4 Legislative Framework

EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU, aims to *‘ensure a high level of protection of the environment and human health, through the establishment of minimum requirements for EIA, prior to development consent being given, of public and private developments that are likely to have significant effects on the environment’*. The 2014 amended Directive introduced changes from the 2011 Directive, including the replacement of ‘Human Beings’ with ‘Population and Human Health’ and the addition of ‘Land’.

The Roads Act 1993, as amended, requires the mandatory Environmental Impact Assessment in respect of certain projects above prescribed thresholds, such as motorways. Any other 'proposed road development', must be screened for EIA. Environmental Planning of National Road and Greenway Projects (RE-ENV-07008) (TII, 2023) provides guidance on the application of environmental and planning law to TII projects throughout PMG Project Phases 0 to 5. General guidance on the scope and detail of an EIAR is available in the Guidelines on the information to be contained in EIARs (EPA, 2022). There are no statutory requirements covering the content of a PHH assessment but national guidance on health impact assessment (HIA) has been published by the Institute of Public Health (IPH) (see Section 2.4).

PHH assessment interacts with a range of environmental topics (see Section 2.2), each subject to legislation and guidance.

Some of these requirements, such as air quality and noise standards, relate to the protection of the population and public health. It is not the role of PHH assessment to ensure compliance with environmental topic-specific standards and regulatory requirements, as this is achieved through the relevant environmental topic assessment and mitigation measures. Details of environmental topic-specific requirements relevant to the PHH assessment are described in TII Standards, including Air Quality Assessment of Proposed National Roads - Standard PE-ENV-01107.

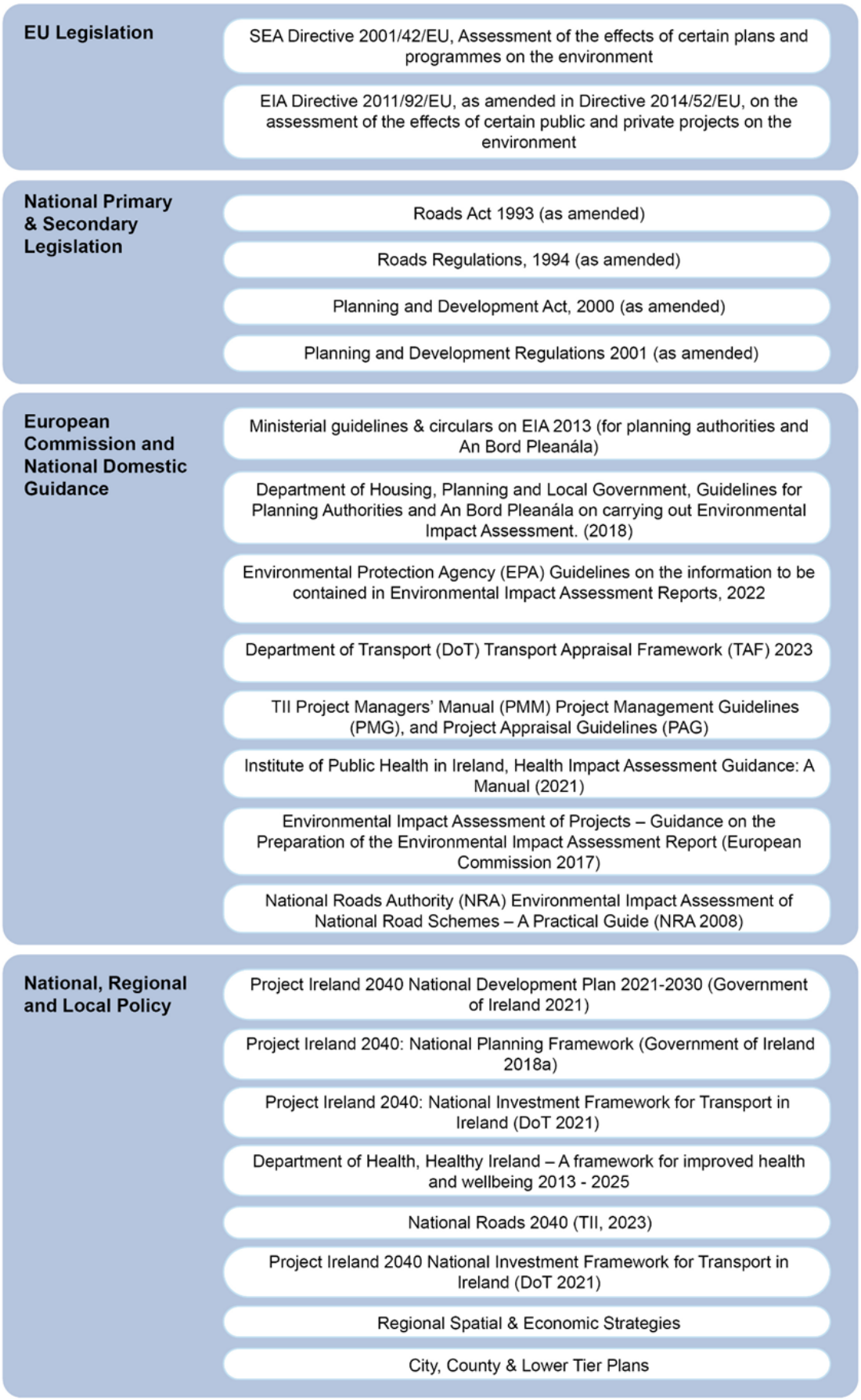


Figure 1.1 - Relevant legislation, policy and guidance

The key legislation, guidance and policy applicable to this SD (PE-ENV-01108) is shown in Figure 1.1 above. The documents listed in Figure 1.1 may over time become obsolete or superseded. It is the PHH practitioner's responsibility, when referencing these documents, to ensure they are current and relevant when undertaking PHH assessment.

1.5 Implementation of this Standard

This SD (PE-ENV-01108) shall be used in the planning, design and construction of national road projects that:

- Require approval under Section 51 of the Roads Act, 1993, as amended (proposed national road development subject to EIA).
- Require approval under Section 177AE of the Planning and Development Act, 2000, as amended (certain local authority development subject to Appropriate Assessment).
- Are subject to the procedure established under Section 179 of the Planning and Development Act, 2000, as amended, and Part 8 of the Planning and Development Regulations, 2001, as amended (known as the 'Part 8' procedure).

Where projects requiring approval under Section 51, Section 177AE or Part 8 have, at the date of publication of this SD, commenced planning and design and in particular where technical advisor contracts have been executed, this SD shall also be:

- Treated as advice and guidance.
- Employed to the greatest extent reasonably practicable.
- Applied in a proportionate manner, having regard to the characteristics and location of the project/maintenance works and the type and characteristics of potential impacts.

The procedures followed by TII and local authorities in the planning, design, implementation and management of proposed National Road Projects are specified in:

- The Roads Act, 1993, as amended
- TII's Environmental Planning of National Road and Greenway Projects RE-ENV-07008
- TII's Project Management Manual (PMM) for Major National Roads
- TII's Project Management Guidelines (PMGs)
- TII's Project Appraisal Guidelines (PAGs)

General guidance on the scope and detail of an EIAR is available in Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022). PHH assessment may be carried out:

- As part of the preparation of a statutory EIAR for developments above a certain threshold, or sub-threshold/minor projects if deemed necessary during the screening process, where the potential impact of the project on PHH are determined by the consenting authority likely to be significant.
- As a contribution to the assessment of development proposals and consent applications (e.g. 177AE, Part 8 projects).

In summary each project must be screened in terms of possible effects. When a project is not considered to be EIA development but has the potential to have adverse effects on the population and/or on human health, a proportionate assessment of any identified potential PHH effects shall be carried out in accordance with this SD. PHH assessment can also be carried where the Project Manager deems it prudent, for example due to specific local issues and sensitivities.

1.6 Requirements of the Competent PHH Assessment Practitioner

Directive 2011/92/EU, as amended by Directive 2014/52/EU, states that '*Experts involved in the preparation of environmental impact assessment reports should be qualified and competent.'* Article 5(3)(a) of the amended EIA Directive states *'the developer shall ensure that the environmental impact assessment report is prepared by competent experts'*. Competent expertise is not defined in the Directive.

It is the responsibility of developers to ensure, to the satisfaction of the consenting authority, that the practitioners who undertake assessments are expert, qualified and competent. This SD (PE-ENV-01108) requires that PHH assessments are carried by suitably qualified and competent practitioners with previous experience in this field. The assessment may be undertaken by a single PHH practitioner competent in both disciplines, or by separate practitioners. Judgements on the qualifications and experience needed shall be taken on a case-by-case basis, taking into account the nature, scale and complexity of the project. Information shall be presented to decision makers to demonstrate the competence of the practitioner(s) leading the PHH assessment.

The Institute of Environmental Monitoring and Assessment (IEMA) has published a Competency Statement for those involved in human health assessment, *Competent Expert for Health Impact Assessment including Health in Environmental Assessments - May 2024*. This sets out a framework of competency for various health assessment roles including Topic Lead and Contributor covering qualifications, professional membership and experience. This document states that *'Guide criteria indicative of competency, which are not a formal test, nor are they the only way competence can be established. They should not act as a barrier to high quality health assessments being undertaken'*.

While the legal requirement for expert, qualified and competent PHH professionals applies to projects requiring EIA, practitioners involved in the carrying out of PHH assessments in respect of any TII Project must demonstrate that they have the appropriated level of knowledge and experience. It is recommended that the PHH Practitioner(s) involved in the preparation of the EIAR and/or carrying out of the PHH assessment in respect of TII projects have the following qualifications, as a minimum:

- Honours degree (National Framework of Qualifications (NFQ) Level 8 (or equivalent level)) in a relevant discipline.
- An appropriate level of post-graduate experience undertaking population and/or human health assessments of development projects, considering the scale and complexity of the project.

It is also recommended that the following qualifications are considered:

- Qualifications, such as a master's degree (NFQ Level 9 (or equivalent level) in a relevant discipline.
- Chartered status or membership of a relevant professional body.

Judgements on competence shall be made with reference to the IEMA Competency Statement and the guidance provided in Table 1.1 below.

Table 1.1 - Examples (non-exhaustive) of evidence of practitioner competency

Evidence of competency	Examples	
	Population assessment practitioner	**Health assessment practitioner**
Academic qualifications	Honours degree (National Framework of Qualifications (NFQ) Level 8 or equivalent level); and/or Master's degree (NFQ Level 9 or equivalent level), in a relevant discipline such as: • Environmental sciences • Social sciences • Planning • Human geography	Honours degree (National Framework of Qualifications (NFQ) Level 8 or equivalent level); and/or Master's degree (NFQ Level 9 or equivalent level), in a relevant discipline such as: • Public health medicine • Biomedical and biological sciences • Environmental sciences • Human geography
Professional associations	Chartered Status or membership of a professional body that represents environmental and social assessment professionals. May include: • Institute of Environmental Management and Impact Assessment (IEMA) • Institute of Environmental Science (IES)	Chartered Status or membership of a professional body that represents, among others, HIA professionals. May include: • Institute of Environmental Management and Impact Assessment (IEMA) • Faculty of Public Health Medicine of Ireland, Royal College of Physicians of Ireland (FPHMI RCPI) • Chartered Institute of Environmental Health (CIEH)
Professional experience	Provide evidence of 5 or more years' relevant post-graduate professional experience, such as: • Undertaking population, community and/or socio-economic assessments for infrastructure and/or urban development projects. • Planning, including roles/ responsibilities relating to healthy design and placemaking, active travel or other relevant discipline. It is important to note that the minimum number of years' experience may change (upwards or downwards) depending on the project phase, size, nature, complexity, etc., of the project in question.	Provide evidence of 5 or more years' relevant post-graduate professional experience, such as: • Undertaking health assessments for infrastructure and/or urban development projects. • Public health, including roles/ responsibilities relating to wider determinants of health and healthy placemaking. • Planning, including roles/ responsibilities relating to healthy design and placemaking, active travel or other relevant discipline. It is important to note that the minimum number of years' experience may change (upwards or downwards) depending on the project phase, size, nature, complexity, etc., of the project in question.

2. Overview of Population and Human Health Assessment Process

2.1 Objectives

The objectives of the PHH assessment process are to:

- Ensure compliance with the relevant legislation such as the amended EIA Directive, Roads Act and the Planning and Development Act, for example to identify the likely significant effects of projects on PHH.
- Ensure compliance with the guidelines outlined within the TII PMGs, PAGs and other relevant guidelines and standards.
- Determine PHH baseline conditions and needs, and ensure these are considered in the option selection, planning and development of National Road Projects.
- Achieve robust and proportionate screening, scoping and assessment of likely significant PHH effects, focusing on key issues.
- Ensure that appropriate PHH mitigation measures are integrated into schemes to avoid and reduce significant adverse effects.
- Identify and consider enhancement measures to protect and/or improve the health and wellbeing of communities.
- Provide clear, evidence-based information to decision makers on the likely significant effects of schemes on PHH and reduce risk in the statutory process.

2.2 Topic Interactions

PHH is a broad topic encompassing a wide range of receptors and impacts. Many of these receptors and impacts are considered in other environmental topic assessments undertaken during the Phase 2 Options Appraisal and Phase 3 Evaluation of the proposed project. As such, PHH assessment is informed by outputs from other topics.

Figure 2.1 below illustrates the types of topics that are likely to inform a PHH assessment. It is not anticipated that all topics shown above will be relevant to the PHH assessment for all projects. The Scoping stage (see Section 3.3.4.2) will determine the relevant topics to be included on a project-by-project basis.

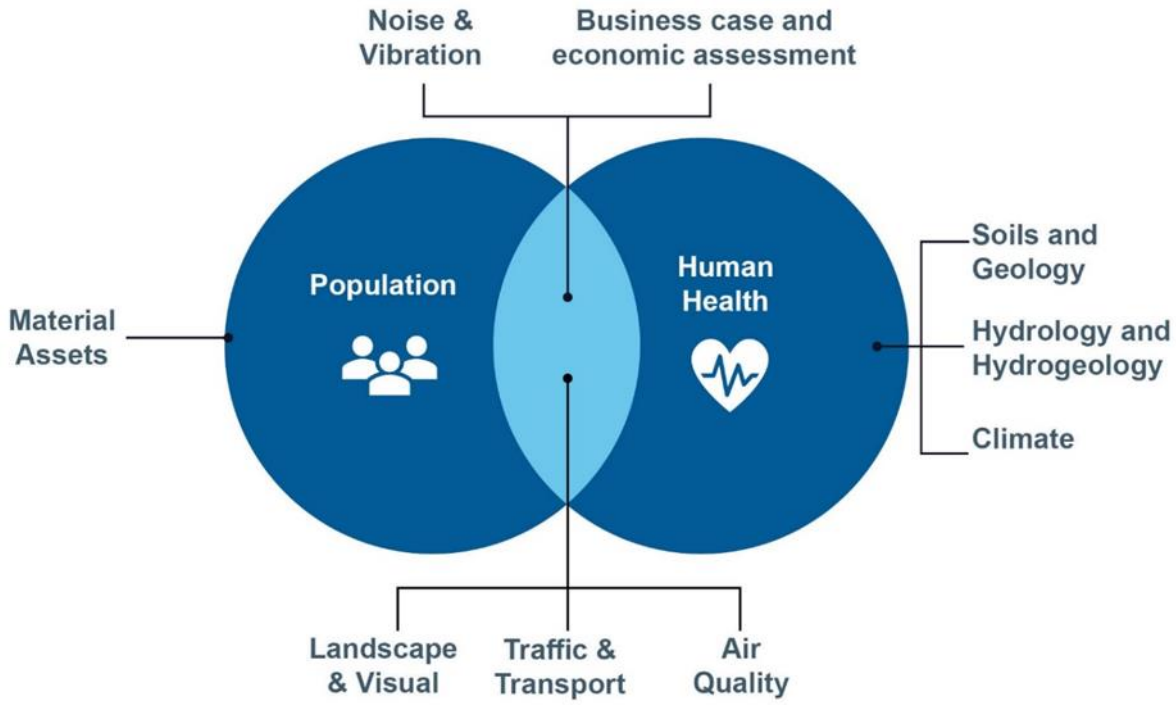


Figure 2.1 - Illustration of interactions between PHH and other assessments

2.3 Population Assessment Scope and Principles

TII National Road projects shall apply the population assessment approach and methodology described in this SD (see Sections 3 and 4). The approach and methodology in this SD are informed by relevant guidance on EIA and population assessment, including:

- European Commission (EC) (2017). Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report
- Environmental Protection Agency (EPA) (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- Design Manual for Roads and Bridges (DMRB). LA112 – Population and human health, Revision 1, January 2020
- Homes and Communities Agency (HCA) (2015). Calculating Cost per Job Practice Note (UK guidance)
- Homes & Communities Agency (2014). Additionality Guide. Available at HCA Policy Covers (publishing.service.gov.uk) (UK guidance)
- Transport Infrastructure Ireland Project Appraisal Guidelines for National Roads Unit 6.0 – Cost Benefit Analysis Overview, PE-PAG-02019

The population assessment shall focus on the following areas:

- Private property and housing
- Community land and assets
- Socio-economics, businesses and development land
- Non-motorised road users (NMU)

The assessment will identify impacts upon the assessment areas listed above which will include but is not limited to the following:

- Demolition of assets
- Land take
- Changes to amenity value
- Changes to accessibility including the potential for severance
- Changes in the length of journey for NMU's
- Employment generation

Agricultural land holdings are not included in the population assessment. Guidance on the assessment or impacts on Agriculture is included in PAG Unit 7.0 - Multi-Criteria Analysis (MCA). The National Roads Authority has also published Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes[1]. The document outlines the approach to be adopted in the consideration and treatment of geology, (inclusive of agricultural soils).

Journey time savings are not included in the population assessment. Guidance on the assessment of travel time is included in PAG Unit 7.0 – MCA. Specifically, the MCA sub-criteria include travel time (time saved) and journey reliability (travel time variance). The findings of these assessments will inform the consideration of accessibility and severance in the population assessment.

The EC Guidance on the Preparation of Environmental Impact Assessment Reports notes that socio-economic aspects of the population assessment should factor in aspects such as demography, infrastructure facilities, economic activities (e.g., fisheries) and recreational users of the area. It also outlines an expectation that a project's social and socio-economic implications are discussed. This should include employment generated or lost during construction, operation and decommissioning. This SD (PE-ENV-01108) provides guidance on calculating employment generation and Gross Value Added to the economy during construction.

A robust assessment of the population impacts of a project can help to ensure that the impact of a development on communities and the economy is fully understood and that any significant adverse impacts can be reduced while positive impacts can be emphasised. The range of potential impacts which shall be assessed are shown in Figure 2.2 below. This outlines a framework of issues to consider when assessing population impacts and effects. Each of these will be considered as part of this SD.

[1] National Roads Authority. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. Available at https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf Accessed on 17/07/2023

Figure 2.2 - Impacts to be considered in population assessment

Examples of the population effects arising from transport infrastructure projects may include the following (not exhaustive):

- Demolition or loss of land as a result of constructing new transport infrastructure. This may lead to the loss of residential properties or reduce the viability of businesses for example.
- Improved access to development sites allocated for employment and residential purposes as a result of new transport infrastructure. This may lead to more development in the surrounding areas should the development potential of these plots be realised.
- Noise and air emissions associated with road traffic may increase or decrease as a result of new road infrastructure by creating new traffic routes and diverting traffic from existing routes. Any changes could impact the amenity value of community land and assets whereby any perceptible changes may increase or decrease the likelihood of it being used.
- Road projects present an opportunity to enhance local connectivity for non-motorised users by providing additional crossing points across the carriageway and by providing new or improved active travel infrastructure. Adverse effects may result from severance of existing provisions which may create longer diversions routes for users of the provisions.

2.4 Human Health Assessment Scope and Principles

HIA Guidance

TII national road projects shall apply the health assessment approach and methodology described in this SD (see Sections 3 and 5). The approach and methodology have been informed by relevant guidance on EIA and HIA, including:

- European Commission (EC), (2017). Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report
- EPA, (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

- Health Impact Assessment Guidance: A Manual. Institute of Public Health (IPH), 2021
- Institute of Environmental Management and Assessment (IEMA) Guide to Effective Scoping of Human Health in Environmental impact Assessment, November 2022
- Institute of Environmental Management and Assessment (IEMA) Guide to Determining Significance for Human Health in Environmental Impact Assessment, November 2022
- Design Manual for Roads and Bridges (DMRB) LA112 – Population and human health, Revision 1, January 2020

These guidance documents establish the key concepts and principles of health assessment that are applied in this SD. These are described below, with further details provided in Section 5.

Definition of Health

The human health assessment shall be based on the definition of health as set out in the constitution of the World Health Organization (WHO), which defines health as *'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity'*.

Note on Mental Health

This Standard Document (SD PE-ENV-01108) does not provide separate guidance on assessing effects on mental and physical health outcomes. Mental health is included in the definition of health and as such its consideration is integral to the health assessment. Further information is provided in the sections below on health outcomes and health impact pathways.

Wider Determinants of Health

The human health assessment shall be based on the concept of the 'wider determinants of health'[2]. Figure 2.3 below illustrates how health is determined by individual characteristics, lifestyle factors, and the wider socio-economic, cultural and environmental conditions in which people live.

[2] Wider Determinants of Health, Office for Health Improvement and Disparities (accessed 2022) https://fingertips.phe.org.uk/profile/wider-determinants

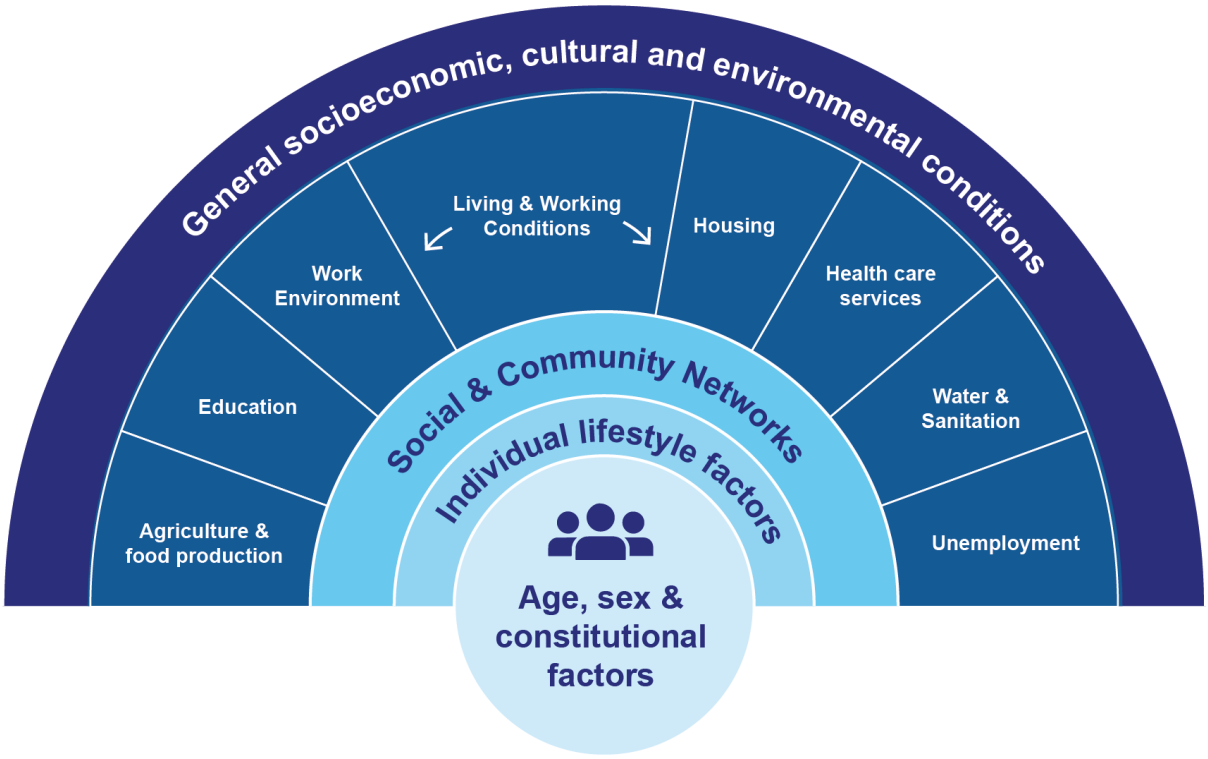


Figure 2.3 - Dahlgren and Whitehead model of health determinants[3]

The human health assessment will consider the likely impacts of road projects on the wider determinants of health. There is no definitive list of determinants to be included in a health assessment. General guidance on scoping, including a list (not exhaustive) of the wider determinants of health is provided in the IEMA Guide to Effective Scoping (see above). Figure 2.4 provides examples of the types of health determinants that may be impacted by a transport project. The assessment scope will be decided by the health assessment practitioner and should be proportionate and project-specific, focusing only on those impacts that have the potential to give rise to effects on population health and/or health inequalities.

[3] Image first published in: Dahlgren G, Whitehead M. 1991. Policies and Strategies to Promote Social Equity in Health. Stockholm, Sweden: Institute for Futures Studies.

Figure 2.4 - Examples of types of determinants considered in human health assessment

Health Outcomes / Effects

In the context of HIA, health outcomes (or effects) are defined as changes in the health status of a population as a result of a change brought about by a project or programme. These may include changes in mortality and morbidity, non-communicable disease, mental health, self-assessed health or quality of life. National priority outcomes are detailed in the Healthy Ireland Outcomes Framework[4]. Health outcomes are also referred to as health effects.

[4] Healthy Ireland Outcomes Framework. First Report: September 2022. Government of Ireland (2022)

The factors influencing any given health outcome are complex and inter-related. It is not necessarily the aim of a health assessment to predict specific, measurable health outcomes; rather the assessment should describe broadly the nature of health effects that are likely to arise, based on knowledge of associations and causal links between health determinants and health outcomes.

Health outcomes may be defined simply as positive or negative changes to physical and / or mental health, supported by a description of the type of health effects and how these are linked to the health determinant.

Examples of the types of health effects arising from transport infrastructure projects may include the following (not exhaustive):

- Improved access to employment sites and wider economic regeneration resulting from new transport infrastructure may lead to better access to secure, fulfilling employment and increased earnings. High quality employment is linked to improved mental health, including factors such as self-esteem and reduced stress. Indirect physical health benefits can arise as a result of increased access to healthy food and lifestyle choices, due to increased earnings.
- Road projects can affect access to a range of community facilities and essential services, including community and social networks, health and social services, education, basic needs such as food retail, sports and leisure facilities and green spaces. Access to these facilities is linked to a wide range of inter-related mental and physical health outcomes.
- Road traffic noise may be increased or decreased as a result of new road infrastructure creating new traffic routes and diverting traffic from existing routes. Noise is associated with a range of physical and mental health outcomes. The main outcomes are likely to be 'annoyance' (perceptions of general wellbeing and quality of life, enjoyment of indoor and outdoor spaces) and sleep disturbance. Long-term exposure to transport noise is also linked to specific health outcomes such as rates of acute myocardial infarction (AMI) or heart attacks, stroke and dementia.
- Emissions of air pollutants may be increased or decreased as a result of new road infrastructure creating new traffic routes and diverting traffic from existing routes. Air quality is associated with respiratory health and linked to metrics such as mortality and hospital admissions for respiratory and cardiovascular disease. It is also linked to a wide range of outcomes including chronic kidney disease, diabetes, cancer mortality rates, dementia, anxiety, depression and adverse pregnancy outcomes.
- Road projects can reduce the risk of injuries and fatalities by incorporating measures such as safer junction design, improved visibility, segregated cycle lanes, safer crossings, appropriate speed limits, smart technologies and the design of bridges and structures for suicide prevention.
- Road projects may improve opportunities for physical activity, for example by providing new or improved active travel infrastructure. Adverse effects may result from severance of existing active travel routes or green spaces, or indirect effects (positive or negative) on the quality of these assets from noise, visual and air quality impacts. Access to green space is associated with mental wellbeing, whilst physical activity is strongly linked to improved physical health (such as cardiovascular health and obesity) and mental wellbeing.

Health Impact Pathways

The identification of likely health effects is based on health impact pathways, or the routes by which an impact on a health determinant is transmitted to a receptor population, resulting in a health effect. This is illustrated in the examples shown in Figure 2.5 below.

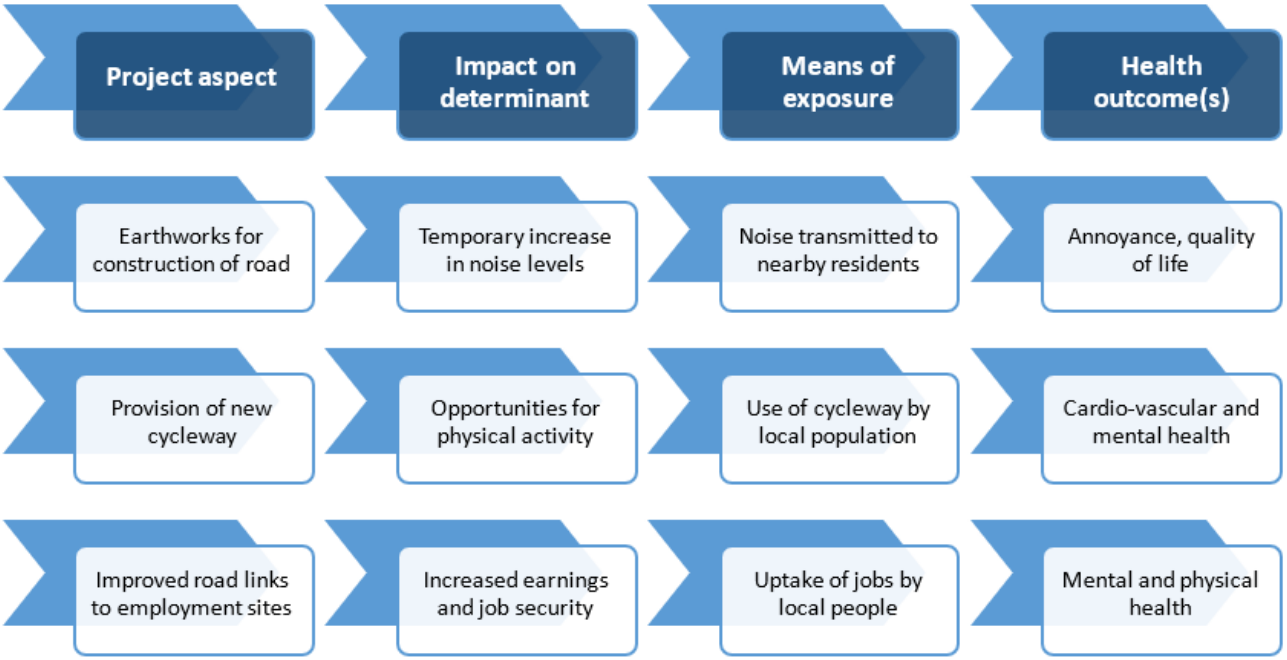


Figure 2.5 - Health Impact Pathways

Predictions about likely health effects shall be informed by evidence for the links between health determinants and health outcomes (see Section 5.4.5). The strength of scientific evidence varies, with strong causal links established in some areas and weaker associations in others. The strength of evidence shall not be taken as an indication of the importance of the health outcome.

Population Health

Population health refers to the health outcomes of a group of individuals, including the distribution of such outcomes within the group. Individual vulnerability varies widely and it is not practicable to identify effects on individuals. Therefore, the approach adopted for health assessment, and more generally within the field of public health, is to consider effects at a population level. The terms 'health effect' or 'health outcome' in this SD (PE-ENV-01108) refer to changes in population health, rather than individual health.

Health Equity

Health equity shall be considered in the human health assessment. This is defined by the Department of Health (DoH)[5] as follows: *'The principle of equity aims to minimise avoidable disparities in health, as well as the social determinants of health, between groups of people who have varying levels of social advantage. Equity provides all persons with a fair opportunity to attain their full health potential, to the greatest extent possible'*.

Health assessments shall consider impacts on health inequalities by analysing the distribution of impacts on health determinants across the study population and identify variations in the nature or intensity of impact on groups with different levels of social deprivation, or other relevant characteristics.

[5] Department of Health, Healthy Ireland – A framework for improved health and wellbeing 2013 - 2025

3. Application of PHH Assessment to TII Road Projects – Overview

This chapter provides an overview of the Project Thresholds, Phases, PMG and PAG process and deliverables, and the PHH assessment outputs required for each as part of this SD.

3.1 Project Thresholds

TII projects are classified as either Minor or Major Projects by project threshold value. This SD shall be applied in full to all proposed National Road projects where a statutory EIA is required (typically major projects). However, all projects (major and minor) must be screened in terms of possible effects and then shall be subject to a robust appraisal of PHH effects at an appropriate level of detail, taking into account their size and complexity. As such, this SD shall be applied in a manner proportionate to the likely significant PHH effects of the project. This shall be determined by the Project Manager and, during the relevant later phases, by the PHH practitioner(s). In general, the full extent of this SD does not apply to TII Projects of less than €5 million. Similarly, there are other road pavement and safety schemes which are not considered under TII PMGs, to which this SD will not apply.

3.2 TII Project Management Guidelines, Project Manager's Manuals and Project Appraisal Guidelines

TII's PMG, PMM and PAG provide a framework for a phased approach to the management of the development and delivery of national road projects. The assessments and deliverables required for different scales of TII Projects are described in these guidelines. The guidelines are applicable to all projects that are funded through TII and/or where TII is the Sponsoring Agency.

A key objective of the PMG, PMM and PAG is to ensure the efficient delivery of national roads in a manner which minimises adverse human and environmental effects, while maximising the benefits of the new road infrastructure and meeting legislative requirements. The guidelines align with the Department of Transport (DOT) Transport Appraisal Framework (TAF) and EU, national and local policy. The PMG, PMM and PAG follow a consistent, structured and standardised phased process to guide the project through planning, design, construction and implementation, as shown in Figure 3.1 below.

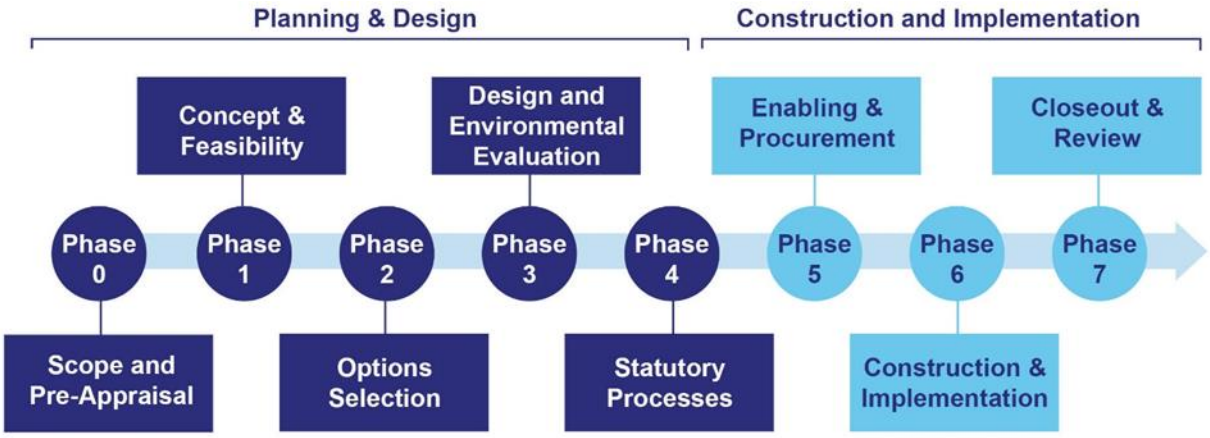


Figure 3.1 - TII PMG Project Phases

3.3 Project Appraisal Process

The PHH assessment activities and deliverables included in the project appraisal process at PMG Project Phases 0 – 3 are described below. Detailed, assessment-specific requirements and guidance for the PHH assessments respectively are provided in Sections 4 and 5.

3.3.1 Phase 0: Scope and Strategic Assessment

Phase 0 is carried out by the Project Manager and includes the following activities, which may require the consideration of PHH issues:

- Identify the need for the Project, in terms of addressing current or future problems and opportunities such as safety issues, journey time, the environment, journey time reliability, accessibility and social inclusion, severance, connectivity, employment, socio-economic factors, etc.
- Ensure that the project is aligned with current Sponsoring Agency and/or Approving Authority's strategic programmes and plans and with public policy and strategies.
- Set out high-level objectives for the Project, targeted at addressing the core problems and opportunities identified.
- Prepare a Project Outline Document (POD), including an Appraisal Plan setting out how PAG guidance will be applied at each project stage.

Phase 0 does not require input from a PHH practitioner. PHH issues should be considered by the Project Manager as described in Sections 4.1 and 5.1 of this SD.

3.3.2 Phase 1: Concept and Feasibility

The purpose of Phase 1 is to develop and assess the Strategic Options in terms of their ability to meet the project objectives and their feasibility taking into account constraints, risks and opportunities.

Depending on the nature, scale and potential complexity of the proposed project the following activities can be undertaken at Phase 1 by the Project Manager, or a suitability competent nominated person which can include a PHH practitioner(s):

- Review relevant local plans, programmes and policies relating to PHH issues.
- Map key constraints, such as residential areas, sensitive community resources (for example schools, hospitals and open spaces) and vulnerable populations (for example areas with high levels of social deprivation).
- Undertake stakeholder consultation with potential PHH related consultees such as community groups.
- Identify constraints, risks and opportunities in relation to PHH (for example risks of community severance or loss of green space, opportunity to improve access to employment for deprived areas).
- Provide inputs to the Project Objectives and the assessment of Strategic Options in terms of PHH, based on the identified constraints, risk and opportunities.
- Provide PHH inputs to the Feasibility Report.

PHH inputs at Phase 1 are described in further detail in Sections 4.2 and 5.2. The output of Phase 1 will be documented in the Feasibility Report.

3.3.3 Phase 2: Options Selection

The Phase 2 Options Selection will identify a Preferred Option through a structured, comparative appraisal of alternative options, to provide a best fit with the Project Objectives and Appraisal Criteria. The process is split into three distinct stages within the TII PAG, each requiring a greater level of assessment and appraisal as shown in Figure 3.2 below.

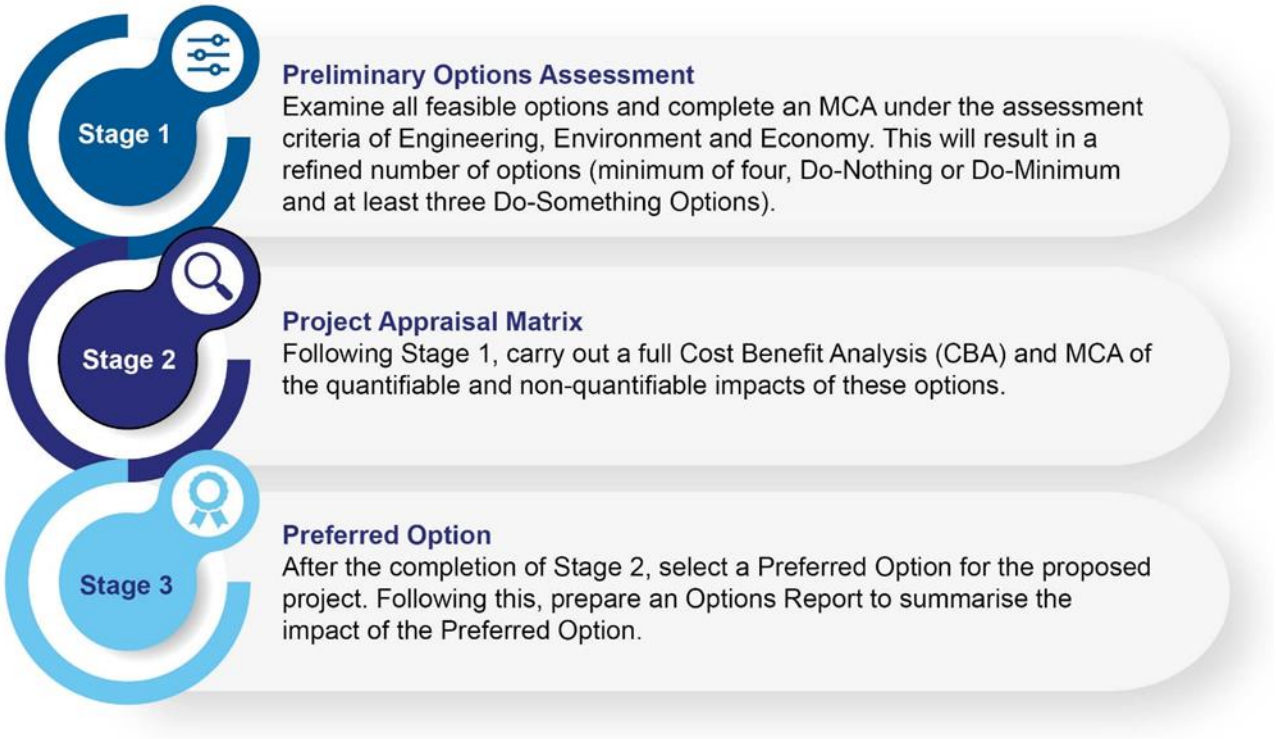


Figure 3.2 - Staged approach to Phase 2 Options Selection detailed in the PAG

Phase 2 will require inputs from the PHH practitioner(s) to ensure that construction and operational impacts on human health, people and property are considered in the selection of a Preferred Option.

Unit 7.0 of the PAG for National Roads provides guidance and methods to be used to conduct MCA assessments of options. Guidance is provided on the approaches and levels of detail required for projects of different scales and complexities.

The following key activities shall be undertaken by PHH practitioner(s) at Phase 2:

- Review and update as necessary the health baseline and policy review and confirm or amend the constraints, risks and opportunities identified at Phase 1.
- Undertake a scoping exercise to identify the Appraisal Criteria (if any) to be included in the MCA to address PHH risks and opportunities.
- Ensure that the MCA of the Preliminary Options considers all relevant PHH issues, as part of other topics' assessments and/or through a specific PHH assessment.
- Prepare PHH inputs to the Options Report.

PHH inputs at Phase 2 are described in further detail in Sections 4.3 and 5.3. The output of Phase 2 will be documented in the Options Report.

It is noted that, under the PAG (and the TAF), projects with an estimated costs of over €30m, will require a Transport and Accessibility Appraisal (TAA). Both the MCA (for projects under €30m) and TAA (for project over €30m) utilise the seven-point scale and similar assessment criteria.

As the TAA is an MCA process, for ease of reference in this SD the term MCA is used for the remainder of the document when referring to the Phase 2 Stage 2 option assessment. See PAG Unit 7 for further detail of MCA/TAA requirements.

3.3.4 Phase 3: Design and Environmental Evaluation

Phase 3 will require inputs from PHH practitioner(s) to undertake the assessment of the proposed project. The objective at Phase 3 is to undertake sufficient assessment to identify likely significant effects on PHH resulting from the construction and operation of the proposed project and to inform the development of the proposed project to promote positive outcomes for communities and reduce adverse effects. The PHH practitioner(s) shall refer to the questions in Table 3.5 of the EPA Guidelines, 2022 to ensure sufficient information has been provided to identify likely significant effects.

Where EIA is required, PHH shall be included as part of the scoping process and, where potential significant effects are identified, included in the EIAR. The PHH assessment shall satisfy the requirements of the EIA Directive (2014/52/EU) and the EPA Guidelines on Information to be included in EIA Reports.

The PHH assessment chapter of the EIAR will be divided into two distinct assessments: a population assessment and a human health assessment. For projects that do not require EIA, PHH assessment shall be undertaken where the potential effects are considered sufficiently important to be a material consideration in the planning decision. This decision will be taken by the Project Manager, with advice from PHH specialists where necessary.

Where PHH assessment is undertaken outside the EIA process, it will either form a standalone report or be compiled within a project-specific environmental report. On projects where an EIA is not required, the need for specific elements such as stakeholder engagement, assessment of significance, cumulative assessment and monitoring shall be determined by the PHH practitioner(s) and the Project Manager. In all cases, the objective of the assessment process shall be to identify likely PHH effects[6] and incorporate measures to mitigate adverse effects and/or enhance outcomes.

The key stages included in the Phase 3 PHH assessment for EIA projects are shown in Figure 3.3 below.

[6] It should be noted that the identification of likely significant effects would trigger a requirement for EIA under the EIA Directive (amended 2014).

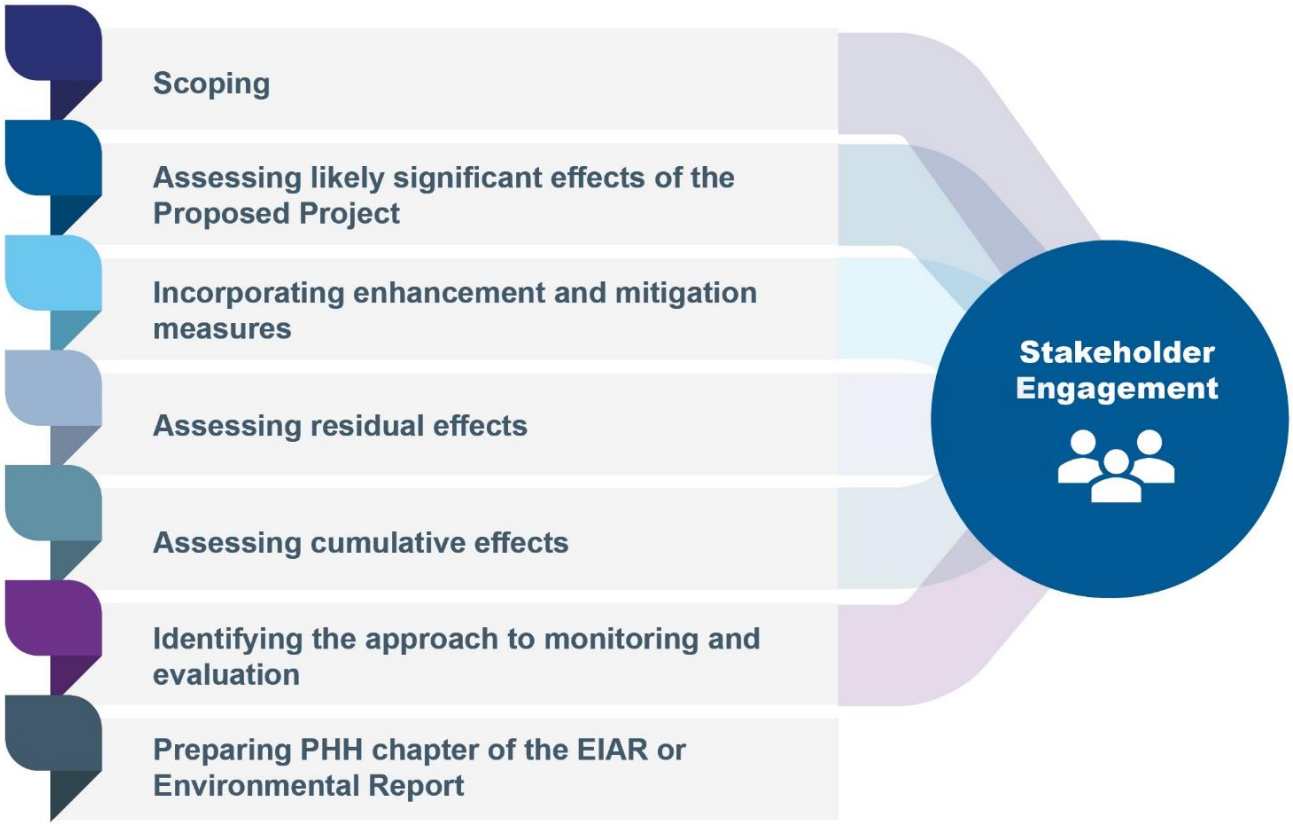


Figure 3.3 - Phase 3 PHH assessment process for EIA projects

3.3.4.1 Stakeholder Engagement

Once an application is submitted to the relevant authority such as An Bord Pleanála, statutory consultation is required with the public and specific organisations prescribed in the legislation (prescribed bodies). The standard practice for infrastructure projects that require EIA is to carry out pre-planning consultation with a wide variety of stakeholders to inform the design and assessment. The list of stakeholders will be specific to the project but will generally include prescribed bodies, relevant governmental organisations, public authorities, non-governmental organisations, local community groups, other relevant organisations, landowners and the general public. TII's Guide to the Implementation of Sustainability for TII Projects (GE-GEN-01101) provides a list of stakeholders and their potential role / project involvement. Stakeholder engagement is led by the Project Manager with support from topic specialists and guided by the public consultation steps set out in the PMG's and any statutory consultation requirements. The PHH practitioner(s) shall provide advice and inputs to facilitate effective engagement with PHH stakeholders. This shall include notifying the Project Manager of stakeholders to be included in the consultation process, raising any specific PHH information to be included in the consultation and responding to PHH issues raised by stakeholders. Consultation feedback shall be reviewed and shall inform the assessment where applicable. Changes made in response to consultation feedback shall be documented.

In some cases, it may be appropriate or necessary for the PHH practitioner(s) to engage directly with stakeholders on specific PHH issues. In such cases, prior agreement shall be obtained by the PHH practitioner(s) from the Project Manager, including details of the purpose of the consultation and issues to be discussed.

The PHH assessments are broad in scope and the issues covered in consultation may overlap with other topics such as air quality, noise, traffic and transport. The PHH practitioner(s) shall liaise with other topics where necessary to ensure a consistent approach and avoid duplication of consultation.

The use, storage and processing of any sensitive data provided by stakeholders shall comply with General Data Protection Regulation (GDPR) requirements[7].

Guidance on Effective Stakeholder Engagement

To ensure stakeholder engagement is as effective as possible the following guidance should be followed.

- Prior to engaging with stakeholders, the PHH practitioner should be familiar with the stakeholders' key goals, policies and reports.
- Stakeholders should be briefed in advance of meetings, to ensure they understand the scope and purpose of the meeting. This will help stakeholders understand what is needed and provide the correct expertise.
- Records should be kept of meeting minutes and actions. This will help to ensure actions are followed up and manage any shifting priorities resulting from stakeholder staff turnover.

3.3.4.2 Scoping

The scoping stage will define the scope and methodology for a robust and proportionate PHH assessment at Phase 3. This will identify any PHH issues to be included in the assessment and define key aspects of the methodology. For EIA projects, the scoping stage will determine the issues to be reported in the EIAR. The following activities shall be undertaken at the scoping stage:

- Review the available design and environmental information relating to the proposed project.
- Identify the likely impacts of the proposed project on receptors.
- Identify the potential significant PHH effects (arising from construction and operation) to be included in the assessment and exclude those issues where there is no likelihood of a significant effect occurring.
- Identify the information requirements from topic assessments and defined key topic interactions.
- Define key aspects of the assessment process such as the Zone of Influence (ZoI), baseline information to be included, stakeholders to be consulted and assessment methods to be employed.
- Consult with relevant PHH stakeholders to discuss the proposed scope of the assessment and identify further information on local resources, issues and sensitivities.
- Prepare the PHH aspects of the EIA Scoping Report, including a clear description, supported by evidence, of the rationale for scoping effects in or out or the EIAR.

In line with EPA Guidelines, the PHH practitioner(s) shall keep the scope of assessment focused on likely significant effects. This will include careful consideration of the pathways, direct and indirect, that can magnify effects through the interaction or accumulation of effects. For example, the potential for cumulative significant effects to arise from multiple non-significant effects.

[7] Information on data protection legislation is provided by the Data Protection Commission https://dataprotection.ie/en/who-we-are/data-protection-legislation

3.3.4.3 Assessment of Proposed Project

The PHH assessment process shall include the following activities:

- Where necessary, update baseline data collected at Phases 1 and 2 and update and refine the ZoI.
- Where necessary, update the review of relevant local public health programmes and policies undertaken at Phases 1 and 2.
- Undertake scoping to determine the potential PHH impacts to be included in the assessment.
- Undertake a site walkover (if deemed appropriate by the practitioner).
- Identify the potential impacts of the proposed project on population resources and determinants of health.
- Identify the affected receptors and evaluate their sensitivity.
- Assess likely significant effects on PHH.
- Provide recommendations to the design team to improve PHH outcomes. and undertake iterative assessment of embedded mitigation and enhancement measures.
- Undertake iterative assessment of the proposed project, including embedded mitigation and enhancement measures.
- Agree any additional mitigation and enhancement measures with the project team and specify how/when these will be delivered.
- Assess residual, cumulative and interactive effects.

Establishing the Significance of PHH Effects

The assessment of significance will be based on professional judgement by the competent PHH practitioner(s) and consider the magnitude of impact on a population resource or health determinant, and the sensitivity of the receptor. In accordance with EPA Guidelines[8], the assessment will consider the following factors:

- Magnitude and spatial extent of the effects
- Nature of the effects
- Transboundary nature of the effects
- Intensity and complexity of the effects
- Probability of the effects
- Expected onset, duration, frequency and reversibility of the effects
- Cumulation of the effects with the effects of other existing and/or approved projects
- Possibility of effectively reducing the effects

A narrative shall be provided to explain the rationale for the assessment. This will show the evidence used to inform the assessment of magnitude and sensitivity and explain any other factors or assumptions considered in the assessment.

[8] Environmental Protection Agency, Ireland. Guidelines on the Information to be contained in Environmental Impact Assessment Reports, 2022

An assessment matrix, such as that provided in the EPA Guidelines (Figure 3.4), may be used to guide the judgement of significance based on magnitude and sensitivity.

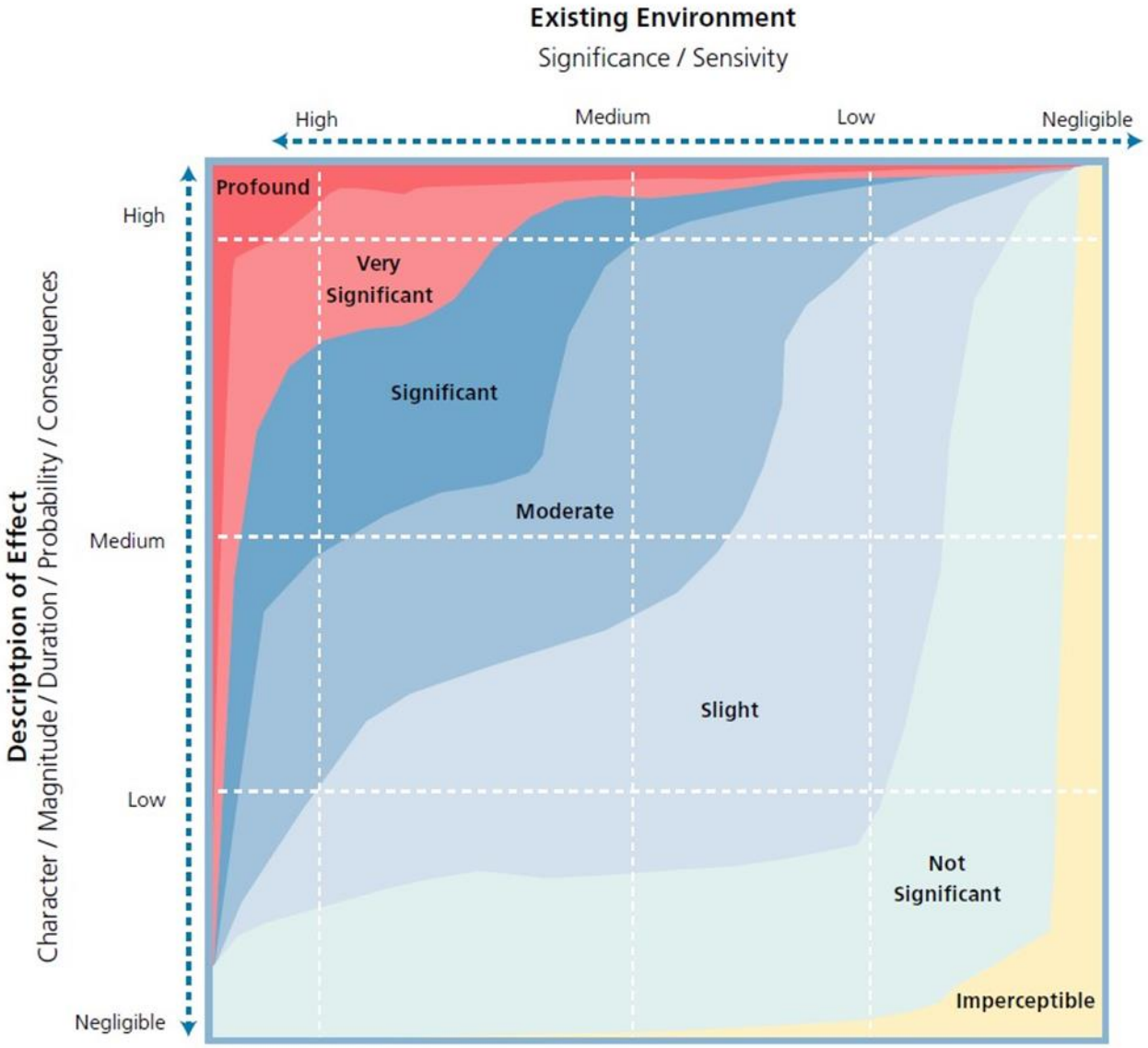


Figure 3.4 - Significance of Effect Matrix (EPA 2022)

Cumulative Effects

The assessment of cumulative effects will include existing or approved developments that are likely to give rise to significant effects on PHH receptors or introduce new PHH receptors.

3.3.4.4 Enhancement and Mitigation

TII is committed to delivering a better quality of life, supporting economic growth and respecting the environment and the six sustainability principles identified in the TII SIP are considered throughout the planning of its projects. A key purpose of the PHH assessment is to support this process by ensuring that enhancement and mitigation measures are incorporated into the design, in order that the project delivers positive PHH outcomes and reduces adverse effects. In accordance with the EIA Directive, a description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects shall be provided in the EIAR.

Enhancement and mitigation will be categorised into the following types:

- Embedded enhancement and mitigation: features of the project design adopted to improve outcomes and avoid or prevent adverse effects. Reported as part of the project description.
- Additional mitigation: committed measures to reduce or offset likely significant adverse effects that have not been removed through embedded mitigation. Reported as mitigation prior to the assessment of residual effects.
- Additional enhancement: committed measures to enhance PHH outcomes during the construction and operation of the proposed project. Reported as enhancement prior to the assessment of residual effects.

3.3.4.5 Monitoring and Evaluation

Where the EIAR concludes that there are likely significant adverse environmental effects after mitigation, projects must, in accordance with the EIA Directive, undertake proportionate monitoring of the predicted effects and any associated mitigation measures. The EIAR will describe proposals for proportionate monitoring of impacts that are predicted to give rise to significant adverse PHH effects.

Proposals for monitoring shall be determined by the PHH practitioner(s) in discussion with relevant topic specialists and the Project Manager. In accordance with government guidelines on EIA1, monitoring of PHH effects should be proportionate to the nature, location and size of the project and the significance of effects. Consideration of proportionality should take into account factors such as the cost and likely effectiveness of monitoring. In general, proportionate monitoring of PHH effects should focus on the impacts of the project on community resources or health determinants, rather than effects on receptors (people) as these are harder to measure with accuracy.

Definitions of success should be provided, against which the impacts can be measured. Monitoring proposals should include a requirement for the results to be reviewed by appropriately qualified personnel and should set out the circumstances under which remedial action may be required.

3.3.4.6 Deliverable/Output

A PHH assessment report shall be provided in the form of a standalone report or a chapter within a project-specific environmental report or EIAR.

Reporting shall follow a logical structure using comprehensive, concise and impartial text, and may be supported by illustrations and tables. A well-structured report will include details of the scope of assessment, methodology, baseline description, stakeholder engagement, identified significant PHH effects, cumulative effects, mitigation, and any assumptions or limitations associated with the assessment.

Spatial data mapping may be utilised to visually represent the locations of key receptors. Such mapping should display those receptors that have been assessed as being subject to significant effects.

Reports shall include copies of studies undertaken to inform the assessment, such as open space and land use condition surveys.

PHH inputs at Phase 3 are described in further detail in Sections 4.4 and 5.4.

3.4 Phase 4: Statutory Process

At Phase 4, statutory and non-statutory stakeholders can provide submissions, observations or objections to the proposed project, which must be considered by the consenting authority. This process is applicable to EIA and non-EIA projects. The purpose of the statutory process is to ensure that the proposed project is developed in accordance with planning and environmental legislation. This SD does not set out detailed requirements and guidance for Phase 4. However, the role of the PHH practitioner at Phase 4 is outlined below.

During the statutory process, the PHH practitioner(s) shall respond to third party submissions and participate in oral hearing(s) as required by the statutory processes. PHH-related inputs at Phase 4 are likely to include:

- Reviewing and drafting responses, where warranted, to PHH issues raised in submissions to the consenting process.
- Reviewing and drafting responses to any requests for further PHH-related information issued by the consenting authority.
- Reviewing and updating, where necessary, aspects of the PHH assessment.
- Drafting a PHH Statement of Evidence, where a public oral hearing is to be held, in relation to PHH aspects including the assessment findings and responses to submissions, etc.
- Taking part in oral hearing preparation meetings.
- Preparing a PHH Statement of Evidence.
- Presenting the Statement of Evidence at the public oral hearing and responding to any questions on PHH aspects direct from the public, other bodies, or the Inspector for the consenting authority.
- Reviewing and reporting on any PHH aspects addressed in the decision of the consenting authority (and Planning Inspector's report).

Depending on the outcome of the statutory process, additional mitigation measures and conditions of consent may need to be incorporated into the design and schedule of mitigation commitments, which may require input from PHH specialists.

For oral hearings, a brief of evidence may be required. Typically, this will include:

- Background of assessor, including role and description of competence as set out in Section 1.6.
- A high-level overview of the assessment process, referencing the EIAR.
- A high-level summary of the key findings of the assessment, referencing the EIAR.
- Responses to third party submissions, addressed by topic or location and referencing the EIAR where possible.
- Errata, including details of any errors or omissions identified within the original EIAR.

3.5 Phases 5 to 7: Enabling and Procurement, Construction and Implementation, Closeout and Review

Phases 5 to 7 comprise the appointment of contractors, the construction and implementation of the project in accordance with the design, specification, relevant standards and legislation, closeout of outstanding actions and post-project review. Implementation and monitoring of committed environmental and social mitigation and enhancement measures are undertaken during these Phases. This SD (PE-ENV-01108) is not applicable to Phases 5 to 7.

Inputs from PHH practitioner(s) may be undertaken at the request of the Project Manager during Phase 5 to 7. These may include activities such as those listed in Table 3.1 below.

Table 3.1 - Examples of PHH inputs at PMG Phases 5 to 7

Phase	Potential PHH inputs
Phase 5: Enabling and Procurement	In the case of a significant time lag during the statutory process, it may be necessary to update aspects of the Phase 3 PHH assessment.
	A review of the consenting authority's decision, including any conditions and schedule of commitments, may be necessary to identify PHH requirements and further develop PHH mitigation.
Phase 6: Construction and Implementation	A review of the procedures in place for delivering committed mitigation, enhancement and monitoring, to ensure it is consistent with the PHH commitments made at Phase 3.
	A review of the results of PHH monitoring and recommendations to address any issues identified.
Phase 7: Closeout and Review	At the completion of any major project, it is a requirement of the TII PMG that a post project review be carried out. This may include 'lessons learned' for the PHH aspects, such as: • Did the PHH mitigation and enhancement measures deliver the required outcomes set out in the EIAR? • Were there any unexpected PHH issues / outcomes that were not identified in the EIAR? Are there conclusions or lessons learned that are applicable to other projects or associated TII policies and guidelines in relation to PHH?

Where PHH mitigation measures include actions to be taken during Phase 6, Construction and Implementation, these should be secured through planning conditions or other mechanisms. Where monitoring of PHH impacts is proposed, the requirements for reviewing the results should be agreed with the Project Manager at Phase 3 and guidance on potential remedial action should be provided. Inputs by the PHH practitioner(s) at Phase 6 should be agreed with the Project Manager at Phase 3.

4. Application of Population Assessment to TII Road Projects

4.1 Phase 0

The Project Manager will oversee the production of a Project/Programme Outline Document (POD) during this phase. The Project Manager should consider population issues in relation to the following POD elements:

- Identifying Project Need
- Determining the strategic alignment of the Project / Programme with national and local policies
- Setting high level, objectives for the Project / Programme
- Setting out the Appraisal Plan (as part of the POD)

There is no requirement for input from a population assessment practitioner at Phase 0. On larger or more complex projects, advice from a population assessment practitioner may be sought at the Project Manager's discretion.

PAG Unit 2.1 - Project/Programme Outline Documents provides guidance on the structure and content of the POD and Table 4.1 below summarises the population issues that may be considered by the Project Manager during the preparation of the POD. The extent to which Population needs to be considered at this stage will depend on the scale and complexity of the Project / Programme. Many aspects relevant to Population are included within guidance under PAG Unit 2.1 - Project/Programme Outline Documents.

Table 4.1 - Consideration of Population in the Project Outline Document at PAG Phase 0

Element of Project Outline Document	Consideration of Population Issues
Project Need	The assessment of Project Need should consider the transport needs of communities, including their access to their homes, community land and assets, and jobs and services. The needs assessment should consider whether transport infrastructure (or lack thereof) and any problems with the same contributes to existing impacts on the population.
Strategic alignment with national and local policies	Alignment to relevant national, regional and local policies should be considered.
Setting Objectives	Objectives should aim to improve the life experience of communities through means such as improving transport connectivity, supporting economic regeneration, and reducing transport related environmental impacts. Consideration should be given to setting Objectives that seek to reduce existing social inequalities and support existing development plans. Note objectives relevant to population can be included across the range of criteria and there may not be a need to set population specific objective(s) under the local environment criteria.
Appraisal Plan	The Appraisal Plan should include population inputs as required, in line with this SD.

4.2 Phase 1 Concept and Feasibility

The purpose of Phase 1 is to develop and assess the feasibility of the Strategic Options, taking into account constraints, risks, opportunities and alignment with the Project Objectives. As described in Section 3.3.2, the activities undertaken at Phase 1 may be completed by the Project Manager or by a population assessment practitioner, depending on the nature, scale and complexity of the project . The following section is written on the basis of a population practitioner undertaking the relevant tasks. The practitioner shall undertake the tasks outlined in Table 4.2, at a level of detail proportionate to the PMG Project Phase and the scale and complexity of the project.

The level of detail presented at Phase 1 shall be proportionate to the level of analysis required at this stage and the project information available. Further detailed information gathering and assessment shall be undertaken as the project progresses through Phases 2 and 3. It is the responsibility of the population assessment practitioner at these phases to provide the appropriate level of analysis at each stage to inform the development of the project and provide a robust assessment.

Table 4.2 - Population approach and process for Phase 1

Population approach and process for Phase 1
Define the preliminary Zone of Influence (ZoI), based on judgement of the likely extent of effects on population resources
Generate an initial population baseline from which key receptors can be identified. This will be completed using publicly accessible data. Map key constraints, such as residential areas, sensitive community resources and vulnerable populations
Identify population risks, constraints and opportunities that could inform the development of the SMART Project Objectives.
Identify population risks, constraints and opportunities that input to the assessment of the feasibility of Strategic Options.
Include population inputs to the Feasibility Report, including a summary of how the Strategic Options align with any social (or population) related Project Objectives.

4.2.1 Identification of the ZoI

There are two study area types identified in the Feasibility Report, as described in PAG Unit 3.0 These are:

- Appraisal Study Area: the start and end points of the transport route for which a solution/intervention is being sought and the area of influence in which transport conditions could reasonably be expected to be influenced.
- Constraints Study Area: the physical, artificial, engineering and natural constraints in the area within which it is expected that options will be developed and examined.

The ZoI is the area that may be affected by changes as a result of the proposed project. The ZoI for population needs to have regard to a range of resources and receptors such as community and recreational resources, tourism assets, residential properties and commercial businesses and the potential to impact to the same. There is therefore a significant cross discipline nature to population in terms of the PAG appraisal criteria at Phase 1 and 2 and other environmental assessment factors at Phase 1 to 3. It is likely at Phase 1 that the population ZoI will align with the appraisal and constraint study areas. However, flexibility is required to allow identification of any potential impacts to receptors further afield.

The Population Practitioner should discuss with the Project Manager the extending of the appraisal and/or constraints study area in line with the population ZoI if that requirement is considered appropriate.

The preliminary population Zone of Influence (ZoI) will be defined at Phase 1 (this ZoI will be amended accordingly through Phases 2 and 3) based on professional judgement of the area where impacts on population resources may occur. This may comprise a single ZoI, or separate ZoIs for the Strategic Options, depending on the location(s) of the options. The population ZoI will be developed in parallel with, and informed by, the Appraisal Study Area and Constraints Study Area. This will be an iterative process, with the ZoI influenced by the emerging population constraints, risks and opportunities.

The ZoI shall be proportionate, aiming to capture the likely significant population effects whilst avoiding the need to collect large amounts of baseline population data. The size of the population study area will not influence the study areas or the extent of baseline data generated by other topics, for example air and noise. For the population appraisal, it is advised that 500m from the boundary of the area under consideration or required for the construction and operation of the proposed project is used as a starting point for defining the ZoI for impacts on private property and housing, community land and assets, NMUs, businesses and development land. However, this can be increased or decreased dependant on the receptors within the receiving environment, or effects on the wider road network included in the Appraisal Study Area. For example, construction of a bypass may divert traffic-related amenity impacts away from receptors, or access to a nationally important tourist destination 1km away may be affected by impacts on the road network. Likewise, if no sensitive receptors have been identified then the ZoI could be reduced. In all instances a justification of the ZoI shall be provided within the Feasibility Report and subsequent reporting at Phase 2 and 3.

The socio-economic element of the assessment will require a wider ZoI to capture the effects of the project. It is likely that this part of the assessment will be undertaken at a regional level to appropriately assess and report the wider economic benefits and disbenefits of the project.

4.2.2 Population Baseline and Spatial Mapping

Baseline data within the ZoI shall be collated to inform the appraisal of the project feasibility at Phase 1. Data should be obtained at Electoral Division (ED) or Small Area level where this is proportionate, to show variation across the ZoI. Where these boundaries extend outside the 500m study area it is for the population assessment practitioner to determine whether or not to include the data, based on the proportion of the ED / Small Area that falls within the ZoI and the receptors present.

Baseline data shall be relevant to the assessment scope and proportionate to the level of assessment at each phase. For Phase 1 it is assumed that the project team and the population assessment practitioner will predominantly utilise publicly available information. Where data is either not available or not considered proportionate at Phase 1, it shall be obtained as required during the baseline refinement processes at Phase 2 or Phase 3.

The gathering of baseline data should focus on those listed within Table 4.3, where indicative sources of information to populate the baseline section is outlined. This is not an exhaustive list and the population assessment practitioner should seek out additional sources where required during subsequent phases.

The population assessment practitioner shall liaise with the Project Manager and other topic specialists to ensure that baseline data collection is not duplicated and that consistent datasets are used across the MCA and later assessment phases.

Table 4.3 - Indicative data sources for the population baseline

Baseline Information	Likely Data Sources
Private property and housing: • The location and number of properties within the ZOI. • The location of residential development land and number of units within the ZOI.	• Geodirectory's GeoAddress Data • Prime2. • Aerial photograph. • Local Authority Development Plans • Project Ireland and National. • Development Plans.
Community land and assets: • The location of community land (e.g., common land, village greens, open green space, allotments, sports pitches etc). • The location of community assets (e.g., village halls, healthcare facilities, education facilities, religious facilities etc). • The level of existing accessibility restrictions/ severance to community land and assets within the ZOI. • The frequency of use of community land and assets within the ZOI.	• Geodirectory's GeoAddress Data • Prime2. • Aerial photography. • Central Statistics Office. • Local Authority Development Plans. • Project Ireland and National • Development Plans. • Open Space and Land Use Condition Survey. • Stakeholder engagement. • Pobal mapping • Economic & Social Research Institute publications'
Socio-economics, businesses and development land: • The location and number of businesses within the ZOI. • The location of tourism receptors within the ZOI. • The location of land allocated for development by local authorities and the number of future jobs it should generate. • The level of existing accessibility restrictions/ severance to development land and businesses within the ZOI. • Existing planning, economic and regeneration plans and strategies. • Labour supply, employment levels and unemployment levels within the ZOI.	• Geodirectory's GeoAddress Data. • Prime2. • Aerial photography. • Central Statistics Office. • Local Authority Development Plans. • Project Ireland and National Development Plans. • Stakeholder engagement. • Economic & Social Research Institute publications'
Non-motorised road users: • The type, location and extent of NMU provision (e.g., public rights of way, National Trails, canals, greenways, blueways etc) within the ZOI. • The frequency of use of the NMU provision within the ZOI.	• Sport Ireland Outdoors. • Local authority data sets. • Traffic and transport survey results (inclusive of NMU traffic counts and origin/destination of users where practicable).

4.2.3 Constraints Mapping

Once the baseline data has been gathered it can be spatially represented on constraints mapping, to demonstrate where the receptors of concern are located within the ZoI. Data shall be represented clearly, for example by using multiple figures where the density of receptors could make mapping difficult to interpret. The project and ZoI shall be shown on all mapping.

Constraints mapping at Phase 1 provides visual information on the location of key constraints to inform the Feasibility Study and highlight key issues and opportunities. Many of the baseline information data sources can be spatially represented on a constraints plan, which will be done so where possible.

Figure 4.1 below provides an example the types of receptor data sets that should be represented on the constraints mapping and how they can be grouped together (assuming data sets are available).

At Phase 1 the receptors can be grouped into broad categories for simplicity of identifying key receptor locations in broad terms. As the Project progresses through the phases the data will be refined and represented in greater granularity. For example, at Phase 1 all community land can be grouped together under one heading as can community buildings and assets. As the Phases progress they will be broken down into each of their individual use classes.

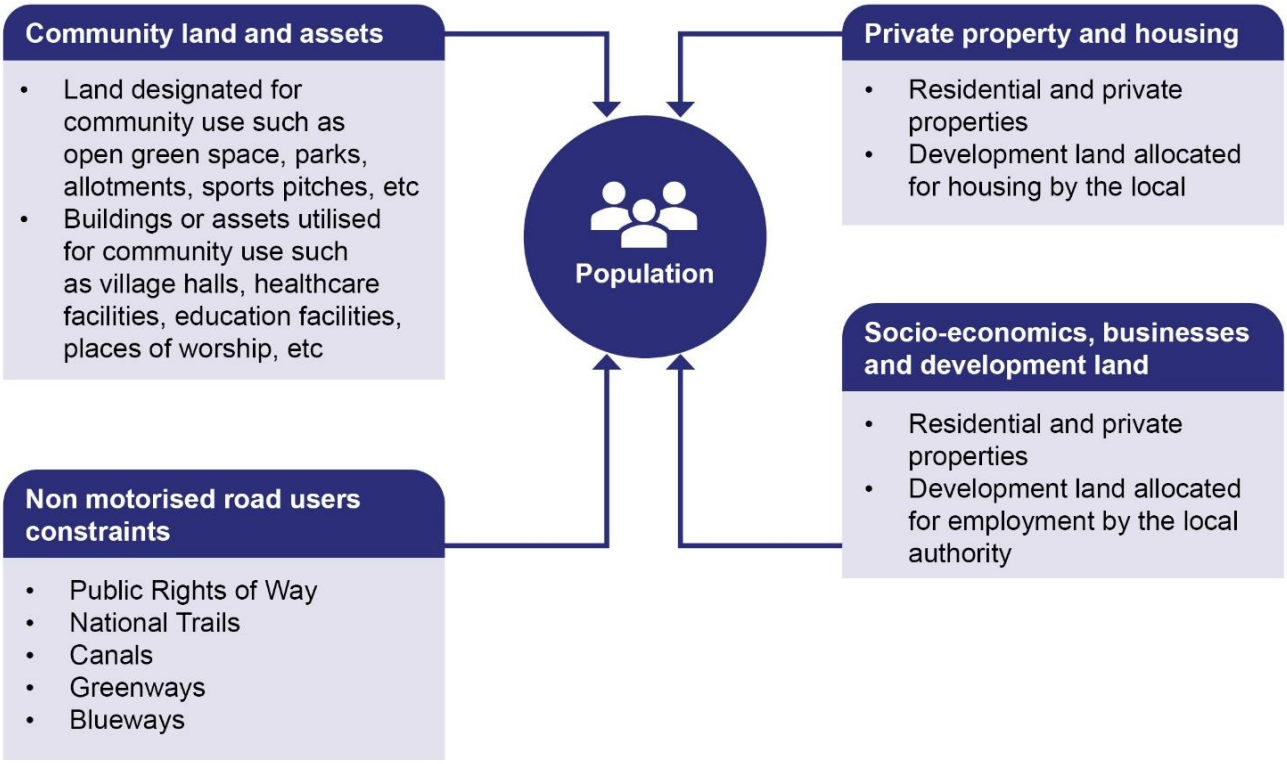


Figure 4.1 - Receptor data sets to be shown on the population constraints plan

4.2.4 Identification of Population Constraints, Risks and Opportunities

The Project team and, as required, the population assessment practitioner shall identify the population constraints, risks and opportunities presented by the project, taking into account the following information, where available:

- The location and number of properties potentially at risk of being impacted and the location of residential development land that could be affected by the Project.
- The location of community land potentially at risk of being impacted.
- The location and number of businesses (and associated jobs) at risk of being impacted.
- The location of land allocated for development by local authorities. This would be established through understanding the local authorities' development plans and aspirations for their constituency.
- The type, location and extent of NMU provision on the affected transport route(s).

- Any relevant information from other topics and Project documentation.

Example issues, constraints, risks and opportunities to be considered at Phase 1 are illustrated in Figure 4.2.

Figure 4.2 - Illustrative examples of population issues, constraints, risks and opportunities

4.2.5 Input to SMART Project Objectives

The Objectives identified at Phase 0 shall be reviewed and developed into SMART Project Objectives at Phase 1. In many cases it is likely that population issues will be captured in the wider SMART Project Objectives, which will be assessed by other MCA topics. The population assessment practitioner at the request of the Project Manager can input to the development of the SMART Project Objectives and ensure that these address the relevant population constraints, risks and opportunities.

In some cases, it may be appropriate to set specific SMART Project Objective(s) in relation to population risks or opportunities, which will be assessed by the population practitioner. This decision shall be taken by the population assessment practitioner and the Project Manager, based on the identified health risks, constraints and opportunities identified at Phase 1.

Where relevant, SMART Project Objectives shall be developed by the population assessment practitioner and agreed with the Project Manager. Overlaps with other Project Objectives should be avoided. The SMART Project Objectives shall focus on reducing adverse impacts, e.g. from land take, and/or promoting benefits to population resources including, where relevant:

- Private property and housing
- Community land and assets
- Socio-economics, businesses and development land
- Non-motorised road users (NMU)

4.2.6 Consideration of Population during the Assessment of Strategic Options

Population inputs to the assessment of Strategic Options at Phase 1 shall be proportionate to the scale and complexity of the project. Where no specific SMART Project Objectives have been identified for the population topic, the population assessment practitioner shall not input directly into the MCA; however, any risks or opportunities relating to population resources shall be highlighted to the Project Manager and as required carried forward to Phase 2.

Where specific SMART Project Objective(s) have been identified for the population topic, the practitioner shall assess the performance of the Strategic Options against these Objective(s) under the environmental criteria within the MCA. The MCA for the Phase 1 Strategic Option Assessment uses a three-point colour scoring system as described in PAG Unit 7.0 – Multi Criteria Analysis. The population assessment practitioner can advise the Project Manager on the application of this scale in relation to population related objectives. Guidance is provided in Table 4.4 below.

Table 4.4 - Consideration of population effects in the application of MCA three-point colour scoring

Score	Examples of issues to be considered in Population assessment (where relevant to a Project Objective)
Green: Strategic Option meets the requirements of the Project Objective	Option avoids or reduces existing issues likely to be causing adverse impacts to communities' ability to lead fulfilling lives, such as access to and use of homes, employment and social infrastructure. Option created new opportunities, or improves accessibility of homes, employment and social infrastructure. Option improves the amenity value of homes, employment and social infrastructure. Option enables the realisation of new developments on allocated land.

Score	Examples of issues to be considered in Population assessment (where relevant to a Project Objective)
Yellow: Strategic Option partially meets the requirements of the Project Objective	Option slightly reduces existing issues likely to be causing adverse impacts to communities' ability to lead fulfilling lives, such as access to and use of homes, employment and social infrastructure. Option may slightly/partially improve amenity value of homes, employment and social infrastructure. Option may reduce some barriers to the realisation of new developments on allocated land.
Red: Strategic Option does not meet the requirements of the Project Objective	Option worsens accessibility of homes, employment and social infrastructure. Option introduces new impacts on the amenity value of homes, employment and social infrastructure. Option creates barriers to the realisation of new developments on allocated land.

Where options are given a yellow or red rating for Project Objectives, the population assessment practitioner shall consider the potential for mitigation measures to reduce adverse impacts and improve alignment with the relevant Project Objectives. Any opportunities to further improve the performance of the Strategic Options, including those identified as green, shall also be highlighted.

Population text shall be provided for the Feasibility Report. This shall include, where relevant, a summary of the assessment of Strategic Options against population-specific SMART Project Objectives, as well as sign-posting to population issues considered across the wider MCA.

4.2.7 Stakeholder Engagement

Section 4.4.3 provides an indicative list of statutory and non-statutory consultees that may be consulted during Phase 1 to 3. The population assessment practitioner shall identify and communicate to the Project Manager any relevant stakeholders to be included in the consultation process and provide information to inform the consultation. Consultation responses relating to issues affecting people and property shall be reviewed by the population assessment practitioner and shall inform the population assessment in Phases 1 to 3.

Phase 1 Population Outputs

The population inputs for the Phase 1 Feasibility Report shall include:

- A description of the population ZoI and baseline, comprising summary text supported by data and mapping. This will include cross-referencing to other topic baseline information and Project documentation where relevant (baseline data should not be duplicated).
- Input to the Feasibility Report to ensure that any relevant baseline receptors and constraints are mapped, where required.
- A description of the population constraints, risks and opportunities with reference to supporting information such as the population baseline, other topic information, local development plans, policies and strategies.
- A description of the population risks and opportunities identified, with recommendations to reduce the risk of negative population outcomes and/or support positive population outcomes during the ongoing development of the project.
- Input to the assessment of the performance of the Strategic Options against the Project Objective(s) relevant to people and property, using the three-point colour scoring system.
- An over-arching summary of the feasibility of the Strategic Options in terms of population, with recommendations to reduce risks of negative effects and/or support beneficial effects during the ongoing development of the project.

4.3 Phase 2 Options Selection

The Phase 2 Options Selection will identify a Preferred Option through a structured, comparative appraisal of alternative options. The aim of the population appraisal is to ensure that issues with the potential to affect population receptors are considered in the selection of a Preferred Option. The activities undertaken by the population assessment practitioner at Phase 2 are summarised in Section 3.3.3.

The population assessment practitioner shall undertake the tasks outlined in Table 4.5, at a level of detail proportionate to the scale and complexity of the project. Relevant guidance (around ZoI and baseline data gathering) provided for Phase 1 (in Section 4.2) is also applicable at Phase 2.

Table 4.5 - Population assessment approach and process for Phase 2

Population Approach and Process for Phase 2
Stage 1 – Preliminary Options Assessment (if required)
Update and refine Phase 1 population baseline and policy information.
If any changes to the Phase 1 baseline and policy are identified, review and update as necessary the population constraints, risks and opportunities and the ZoI.
Undertake a scoping exercise to identify the population receptors and corresponding appraisal criteria (if any) to be considered in the Preliminary Options Assessment.
Input to the Multi-Criteria Analysis (MCA) process.

Population Approach and Process for Phase 2
Provide population inputs to the Stage 1 report/process, including a summary of how potential population effects have been considered in the assessment of Preliminary Options.
Stage 2 – Project Appraisal Matrix
Update and refine the Phase 2 Stage 1 information where necessary. If any changes to the Phase 2 Stage 1 information are identified, review and update as required the population constraints, risks and opportunities and the ZoI.
Undertake a scoping exercise to consider the potential population effects of the Preliminary Options and identify the population criteria required to be included in the assessment.
Undertake a gap analysis of the MCA appraisal criteria to identify overlaps and avoid duplication. Identify any additional appraisal criteria needed to ensure consideration of potential population effects is embedded within the MCA.
Provide inputs to the MCA process and completion of Appraisal Matrices.
Provide population inputs to the Stage 2 report/process. This shall include a summary of how potential population effects have been considered in the assessment of Preliminary Options and a commentary on the overall performance of each option.
Stage 3 – Selection of Preferred Option
Update and refine the Stage 2 information where necessary. Identify any changes to the Stage 2 conclusions with regard to population.
Provide population inputs to the Stage 3 report/process. This shall include a high-level summary of the Preferred Option in terms of its population impacts (both positive and negative) and its alignment with population-related Project Objectives.
Document the option process in terms of Population in the Options Report.

4.3.1 Phase 2, Stage 1 – Preliminary Options Assessment

4.3.1.1 Updating Phase 1 information

The population assessment practitioner shall ensure that the assessment of options at Phase 2 is based on up to date information, whilst also making best use of information collected at Phase 1. The need to update Phase 1 information will be determined by the practitioner and the Project Manager.

If a reasonable period of time has elapsed between the completion of Phase 1 and the commencement of Phase 2 (for example one year), it may be necessary to update the data utilised to complete the population assessment undertaken at Phase 1, for example the review of baseline receptors and local policy.

If there have been significant changes to the nature, scale or location of the proposed project since the completion of Phase 1, it may be necessary to review the issues, constraints, risks and opportunities at Phase 2.

If new Strategic Options have been introduced or new population receptors are identified, the ZoI areas shall be reviewed and updated as necessary, as described in Section 4.2.1.

Additional data (such as address data or employment numbers for businesses) can be sourced from third parties (such as the Central Statistics Office or the GeoDirectory GeoAddress data) at Phase 2, providing more detail to inform key decisions that could differentiate between the Strategic Options.

4.3.1.2 Preliminary Options Assessment

The population assessment practitioner shall identify the scope of the Stage 1 Preliminary Assessment (if required) by considering the potential impacts on population resources and identifying the relevant appraisal criteria included in the Preliminary Options MCA. For example, these may include:

- Engineering
  - Land and property impacts including allocated land
  - Safety
- Environment
  - Air quality
  - Noise
  - Landscape & visual
- Economy
  - Wider economic impacts
  - Transport quality and reliability.

The population effects of the Preliminary Options shall be assessed based on the relevant MCA findings. The assessment will include:

- Effects on population resources resulting from changes to engineering, environmental and economic conditions, compared to the Do Nothing / Do Minimum scenario.
- Consideration of population risks and opportunities associated with the Preliminary Options and their performance in meeting the relevant Project Objectives.

To avoid double counting in the MCA, the seven-point scoring used in the Phase 2 options appraisal shall not be applied to the Stage 1 population assessment. However, the qualitative assessment of population effects can be considered within other criteria scoring as appropriate and can be documented under the environment criteria at stage 1 in the Options Report.

Phase 2, Stage 1 Population Outputs

The population practitioner shall provide inputs to the Options Report, including:

- If required, further refined population baseline information, new receptors, or updated information from relevant technical reports since the completion of Phase 1
- Description (text / mapping) of ZoI for each proposed option
- Description (text / mapping) of the receptor populations present in the ZoI for each option, including vulnerable populations and receptors
- Commentary on the positive and negative population effects of the Preliminary Options

4.3.2 Phase 2, Stage 2 – Options Assessment (Project Appraisal Matrix)

4.3.2.1 Scoping of the Population Options Appraisal

A scoping exercise shall be undertaken to identify the population appraisal criteria to be included in the Stage 2 Project Appraisal Matrix. The population assessment practitioner shall be responsible for defining a robust, proportionate scope, focusing on the issues most likely to affect population receptors during construction and operation. The aim shall be to avoid duplication with other appraisal criteria and add value to the option selection process.

The population appraisal criteria will be project-specific, taking into account the nature and scale of the project, its location, and the issues, constraints, risks and opportunities. The criteria should focus on opportunities to improve the provisions and environment for population receptors as well as avoiding adverse effects. Issues that are common to all options, or where there is insufficient information to evaluate the effects at Phase 2, should be scoped out.

Population is a broad topic based on multiple sub-topics as outlined in Section 2.3. Due to the nature of the elements considered within the assessment there is a degree of overlap with other appraisals included in the Phase 2 MCA. As noted in TAF Module 7 - Detailed Guidance on Appraisal Techniques, it is important for those appraising an option to avoid double counting through specific impacts being captured by multiple criteria. All categories of criteria included in the MCA (see box below) have the potential to overlap with the population appraisal.

Multi-Criteria Analysis (MCA) / Transport and Accessibility Appraisal (TAA) criteria

PAG Unit 7 – Multi-Criteria Analysis and TAF Module 7 - Detailed Guidance on Appraisal Techniques provide guidance for the detailed appraisal of Preliminary Options for schemes with estimated costs of below and above €30 million. The guidance identifies seven primary criteria to be included in the MCA of transport project options:

- Economy -Transport User Benefits and Other Economic Impacts
- Accessibility Impacts
- Social Impacts
- Land Use Impacts
- Safety Impacts
- Climate Change Impacts
- Local Environmental Impacts

To avoid double counting, the population appraisal shall not duplicate appraisal criteria included elsewhere in the MCA. As shown in Figure 4.3 below, population appraisal scoping will comprise an initial scoping stage to identify a comprehensive and proportionate list of potential population impacts and effects, followed by a gap analysis of the MCA. Any impacts and effects that are included elsewhere in the MCA shall be eliminated from the population appraisal scoring, resulting in a list of population-specific appraisal criteria.

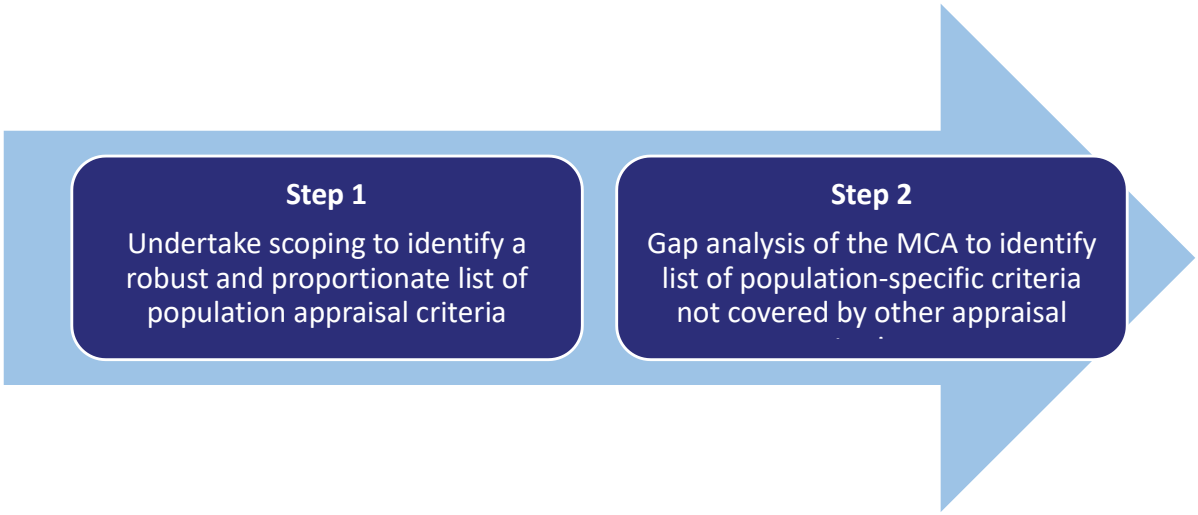


Figure 4.3 - Staged approach to identifying population-specific appraisal criteria

Table 4.6 provides illustrative examples of the types of population-specific appraisal criteria that may be considered in defining the scope of the population options appraisal. The likely impacts of the Preliminary Options during both the construction and operational phases should be considered.

Table 4.6 - Illustrative examples of MCA and population appraisal criteria

Relevant population issue	Population appraisal criteria	
	MCA criteria covered in other topics (not scored in the population appraisal)	**Population-specific criteria (scored in the population appraisal)**
Impacts to private property and housing	MCA Local Environmental Impact Appraisal: Noise • Change (+/-) in exposure to traffic noise at sensitive receptors (e.g. residential, schools, hospitals, nurseries, care homes). (Refer to Noise appraisal) MCA land use impact connection to zoned lands as part of national and regional planning. Loss of land designated for future housing development.	• Impacts of demolition and land loss as a result of the construction phase. • Change in amenity at sensitive receptors due to alterations in the local environment (i.e. decreased noise or emissions).
Impacts to socio-economics development land and businesses	• Change (+/-) in access to employment sites. MCA Accessibility impact appraisal • Change (+/-) in access to employment sites. MCA Social impact appraisal • Change (+/-) in exposure to traffic noise at sensitive receptors (e.g. residential, schools, hospitals, nurseries, care homes). (Refer to Noise appraisal)	• Impacts of demolition and land loss as a result of the construction phase. • Loss of land designated as future employment land development. • Impacts on businesses resulting from change in amenity due to alterations in the local environment (i.e. decreased noise or emissions).

Relevant population issue	Population appraisal criteria	
	MCA criteria covered in other topics (not scored in the population appraisal)	**Population-specific criteria (scored in the population appraisal)**
	MCA Local Environmental Impact Appraisal: Noise • Loss of land designated as future employment land development. MCA land use impact connection to zoned lands as part of national and regional planning.	• Impacts to tourism receptors due to land loss, demolition or alterations to accessibility (both positive and negative).
Impacts to community land and assets 	• Access to services in terms of the mode of transport and the relative percentage change for those within a 30min walk/cycle/public transport. MCA Accessibility Impact Appraisal • Change (+/-) in exposure to traffic noise at sensitive receptors (e.g. residential, schools, hospitals, nurseries, care homes). (Refer to Noise appraisal) MCA Local Environmental Impact Appraisal: Noise	• Severance of access to and from community land and assets either permanently or temporarily. • Change in amenity value of land and assets due to alterations in the local environment (i.e. decreased visual amenity).
Impacts to NMUs 	N/A as accessibility to facilities, services and employment is covered within existing MCA framework but impact of severance and diversion is not.	Potential for severance of or diversion of NMU provisions

The following checklist of questions should be considered when deciding on the population-specific impact appraisal criteria to be scoped in at Phase 2:

- Is there a potential impact (+ / -) on a population receptor resulting from the option(s)?
- Can adverse effects be avoided by good practice mitigation measures?
- Does the impact affect a Project Objective, issue, risk or opportunity identified at Phase 1?
- Is there sufficient information available to assess the impact at Phase 2?
- Is the impact common to all options or is it likely to differ between the options?
- Is the impact covered by appraisal criteria included elsewhere in the MCA?

4.3.2.2 Options Assessment and Project Appraisal Matrix

The population assessment of the Preliminary Options at Stage 2 will comprise:

- Appraisal and scoring of the Preliminary Options against any population-specific appraisal criteria identified at the scoping stage.
- A commentary on the effects of each option on population, taking into account the various population related MCA criteria.

If the Scoping exercise and gap analysis has identified specific population appraisal criteria that are not covered in other MCA topic assessments, the population assessment practitioner shall undertake an assessment of the Preliminary Options against these criteria.

PAG Unit 7 provides an approach for the appraisal of options using a 7-point MCA scoring scale used to evaluate and rank project options against defined appraisal criteria. As described in the Scoping section above, to avoid duplication, criteria that are covered in other MCA topics shall not be scored in the population appraisal.

Where scores are assigned to population-specific appraisal criteria, these will be based on professional judgement, drawing on data and evidence, and will consider the following factors:

- The likely magnitude or scale of impact on a population receptor.
- The sensitivity of the population(s) exposed to the impact.
- The likelihood of the impact to result in a significant effect.
- Whether the option supports or hinders the delivery of local and national population policies and project objectives.

Table 4.7 below sets out guidance for assigning MCA scores 1 to 7 for the population impact appraisal. No guidance is given on the scale of impact that should be considered 'major' or 'minor', nor on the size of population that should be considered as 'large' or 'small'.

The competent practitioner shall use Professional judgement when taking into account the scale of the project and the type of impact being considered. It is likely in any given analysis that the impact in question will span the scoring categories, and therefore a judgement shall be made as to the most relevant score in each case.

The assessment of population effects shall be documented under the Local Environment criteria in the Options Report. Consideration can be given to the use of an appendix for larger assessment reporting requirements.

Table 4.7 - PAG MCA Seven-Point Scale

MCA Seven Point Scale	Population Assessment Guidance
7 – Highly positive	The option would result in potentially significant positive effects on population receptors in the area. This for example could be through improvements to accessibility or increased provisions for local receptors or the opening up of development land to an extent which would be regionally or nationally beneficial.

MCA Seven Point Scale	Population Assessment Guidance
6 – Positive	The option would not result in a potentially significant positive effect upon population receptors. However, the option has the potential for moderate effects that would still be perceptible by the impacted receptor due to improvements in one or more key characteristics, features or accessibility.
5 – Low positive	The option would not result in a potentially significant positive effects upon population receptors. The effect would be perceptible however, it is a discernible change in attribute or qualities, but the functioning of the receptor would remain albeit to a better quality than the status quo.
4 – Neutral	The option would not result in any noticeable changes to population receptors and their characteristics, features or accessibility within the ZoI.
3 – Low negative	The option would not result in a potentially significant negative effects upon population receptors. The effect would be perceptible however it is a discernible change in attribute or qualities, but the functioning of the receptor would remain albeit to a less quality than the status quo.
2 – Negative	The option would not result in a potentially significant negative effect upon population receptors. However, the option has the potential for moderate effects that would still be perceptible by the impacted receptor due to partial loss of or damage to key characteristics or features. This could for example be partial removal or substantial amendment to access or acquisition of land compromising viability of a receptor.
1 – Highly negative	The option would result in potentially significant negative change. The effect could result in a non-compliance with national and or local policy and/or impact upon a receptor to an extent that it has the potential to prevent the option from progressing. This would be a 'show-stopper'.

4.3.3 Phase 2 Population Outputs

Phase 2, Stage 2 Population Outputs

The population assessment practitioner shall provide inputs to the Options Report, including:

- If required, further refinement of population baseline information, new receptors, updated information from policies or technical reports since the completion of Phase 2, Stage 1
- Summary of the assessment scoping and gap analysis
- Appraisal and scoring of any population-specific MCA criteria
- Commentary on the overall positive and negative population effects of the Preliminary Options, including consideration of their impacts on achieving population-related Project Objectives, and any recommendations for measures to improve outcomes associated with specific Options.

4.3.4 Phase 2, Stage 3 – Preferred Option

The population assessment practitioner shall engage with the Project Manager and relevant topic specialists to identify any changes to the population assessment that may have arisen between Stages 2 and 3 and which may affect the findings of the Stage 2 Options Assessment. If necessary, the appraisal should be updated in response to such changes.

Phase 2, Stage 3 Outputs

The population assessment practitioner shall prepare inputs to the Options Report, including:

- Any updates to the population assessment resulting from changes arising since the completion of Phase 2, Stage 2.
- A summary of the likely significant population effects of the Preferred Option, including its impacts on achieving population-related Project Objectives and recommendations for mitigating adverse effects or enhancing positive outcomes.

4.4 Phase 3 Design and Environmental Evaluation

The purpose of Phase 3 is to assess and identify likely significant population effects resulting from the construction and operation of the proposed project. The activities undertaken by the population assessment practitioner at Phase 3 are outlined in Table 4.8. Relevant guidance provided for Phases 1 and 2 (in Sections 4.2 and 4.3) is also applicable at Phase 3. the assessment should be proportionate to the size and scale of the project and the sensitivity of the receptors.

Table 4.8 - Population approach and process for Phase 3

Population approach and process for Phase 3
Update and refine the Phase 2 population information as necessary. This includes confirming the geographic extent of the ZoI to ensure that it encompasses the areas in which population effects can be reasonably expected to occur.
Collate and analyse the baseline information needed to inform the population assessment, making best use of information used at Phase 2.
Undertake a scoping exercise to identify the potentially significant population effects to be included in the assessment.
Provide population inputs to the PHH chapter of the EIA Scoping Report.
Provide inputs to the public consultation exercise and if required undertake direct consultation with stakeholders, such as the owners and operators of impacted resources.
Undertake an assessment to identify the likely significant population effects arising from the construction and operation of the proposed project.
Identify mitigation measures to reduce adverse effects and improve outcomes.
Assess the likely significant residual effects following the implementation of agreed mitigation.
Identify and agree proposals for monitoring of population effects.
Provide population inputs to the PHH chapter of the EIAR or other planning related documents.

4.4.1 Scoping

The scoping stage will consider the potential impacts arising from the construction and operation of the proposed project to identify any potential receptors that could be affected. If no plausible impacts can be identified for population receptors, then the assessment can be scoped accordingly. For example, if there are no residential receptors community land or assets at risk of impacts within the ZoI then they can be scoped out of the assessment.

During Scoping, and all subsequent stages of the EIA, a reasonable worst-case scenario should be assessed. Committed mitigation measures embedded into the design that would avoid or reduce potential population effects will be considered within the scoping assessment.

Data will be gathered for the following baseline elements with further information on these provided in Section 4.4.2:

- Private property and housing.
- Community land and assets.
- Socio-economics, businesses and development land.
- NMU.

The initial baseline analysis will provisionally assess the sensitivity of the receptors it has identified. Guidance for this is provided within Table 4.8 and evidence should be presented to validate why that sensitivity category has been applied to the receptors,

4.4.2 Baseline and Population Profile

The baseline information collated at Phases 1 and 2 will be reviewed and updated, and additional data collected where necessary to inform the more detailed assessment at Phase 3. The indicative types of data to be collected to form the baseline for population are described in Table 4.3.

Publicly available baseline data sources are identified in Section 4.2.2. Data should be obtained at Electoral Division (ED) or Small Area level where this is proportionate, to show variation across the ZoI. Where these boundaries extend outside the 500m study area it is for the practitioner to determine whether or not to include the data, based on the proportion of the ED / Small Area that falls within the ZoI and the receptors present.

The baseline section will establish and record the local receptors within the ZoI with supporting evidence provided as an audit trail of where the information was obtained (e.g., stating the sources of data used such as GeoAddress, the use of Ordnance Survey mapping, site surveys, traffic and transport survey results etc).

The process for developing the population baseline shall comprise the following phases:

- Reviewing baseline data gathered at Phases 1 and 2 to identify any new receptors and ensure the sensitivity previously assigned remains applicable.
- Spatial data mapping.
- Consultation (where required to inform assessment conclusions).
- A site walkover (if deemed appropriate by the population practitioner).

Publicly available data should be used, where available, to inform frequency of use of community land and assets and tourist assets.

Where necessary to inform the baseline scenario and assessment conclusions in the absence of available information, targeted consultation and surveys should be undertaken to:

- Obtain frequency/use data for community land, assets and tourism assets.
- Obtain frequency/use data for NMU activity.
- Determine the condition of community land and assets.
- Data collection and surveys shall be proportionate and appropriate.

Where residential receptors have been identified within the permanent and temporary land take areas, a residential impact assessment shall be completed on a property-by-property basis using the template provided in Appendix A.

Where community and open spaces have been identified within the ZoI, a condition survey shall be undertaken using the template provided in Appendix B.

Table 4.9 provides guidance on how to assign sensitivity to receptors within the ZoI. The table should be used as guidance and where professional opinion is applied to upgrade or downgrade a sensitivity away from the guidance, justification of the rationale should be provided within the assessment report.

Table 4.9 - Population receptor sensitivity guidance

Receptor sensitivity	Receptor category	Description
High	Private property and housing	• Existing private property or land allocated for housing located in a town or city where the existing population is expected increase significantly by 2040 relative to the target outlined in the Project Ireland 2040 National Planning Framework; • Existing housing and land allocated for housing (e.g., strategic housing sites) covering a large area of land in comparison to other land uses within the ZoI.
	Community land and assets	• Alternatives are only available outside the Local Authority area. • The level of use is very frequent (e.g. daily). • The land and assets are used by the majority of the community.
	Socio-economics, businesses and development land	• Existing employment sites (excluding agriculture) and land allocated for employment (e.g., strategic employment sites) covering a large area of land in comparison to other land uses within the ZoI. • Specialist businesses, workforces or economies that are at risk and have no capacity to experience the impact without incurring a significant socio-economic loss (or gain) of an economic resource, or employment.
	NMUs	• National trails and routes likely to be used for commuting, recreation and social use that record frequent (daily) use. Such routes connect communities with employment land uses and other services with a direct and convenient NMU route. Little / no potential for substitution. • Regional trails and routes (e.g., promoted circular walks) likely to be used for recreation and social use or to a lesser extent commuting, that record frequent (daily) use. limited potential for substitution. • Routes regularly used by vulnerable users such as the elderly, school children and people with disabilities, who could be disproportionately affected by small changes in the baseline due to potentially different needs. • The population practitioner should take into account the location, crossing facilities and amenity value when establishing sensitivity of NMU provisions. This applies to all sensitivity categories.
Medium	Private property and housing	• Existing private property or land allocated for housing located in a town or city where the existing population is expected increase moderately by 2040 relative to the target outlined in the Project Ireland 2040 National Planning Framework ;

Receptor sensitivity	Receptor category	Description
		• Existing housing and land allocated for housing (e.g., strategic housing sites) covering a moderate area of land in comparison to other land uses within the ZoI.
	Community land and assets	• Alternative facilities are only available in the wider Local Authority area. • The level of use is frequent (e.g. weekly). • The land and assets are used by most of the community.
	Socio-economics, businesses and development land	• Existing employment sites (excluding agriculture) and land allocated for employment (e.g., strategic employment sites) covering a moderate area of land in comparison to other land uses within the ZoI. • Businesses, workforces or economies that are at risk and that have little or no capacity to experience the impact without incurring a significant socio-economic loss (or gain) of an economic resource, or employment.
	NMUs	• Public rights of way and other routes close to communities which are used for recreation and social purposes (e.g., dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational/social journeys.
Low	Private property and housing	• Proposed development on unallocated sites providing housing with planning permission/in the planning process.
	Community land and assets	• Alternative facilities are readily available and accessible at a local level within the wider community. • The level of use is infrequent (monthly or less frequent). • The land and assets are used by the minority of the community.
	Socio-economics, businesses and development land	• Existing employment sites (excluding agriculture) and land allocated for employment (e.g., strategic employment sites) covering a small area of land in comparison to other land uses within the ZoI. • Businesses, workforces or economies that have an adequate capacity to experience the impact without incurring a significant socio-economic loss (or gain) of an economic resource, or employment.
	NMUs	• Routes which have fallen into disuse through past severance, or which are scarcely used because they do not currently offer a meaningful route for either utility or recreational/social purposes.

Receptor sensitivity	Receptor category	Description
Negligible	Private property and housing	• N/A
	Community land and assets	• No or limited severance or accessibility issues. • Alternative facilities are available within the same community. • The level of use is very infrequent (a few occasions yearly). • The land and assets are used by the minority of the community.
	Socio-economics, businesses and development land	• N/A
	NMUs	• N/A

4.4.3 Engagement with Population Sector Stakeholders

TII's Project Managers' Manual for Major National Road Projects[9] defines stakeholders as prescribed bodies, the public, delivery stakeholders, local authorities, Government Departments and landowners affected by the project. TII National Roads – Active Travel Planning[10] defines stakeholders as the public and the local community.

The list of stakeholders will be specific to the project, but it will generally include the specifically prescribed bodies, governmental organisations, public authorities, non-governmental organisations, local community groups, other relevant organisations, landowners and the general public. These wider stakeholders may often be referred to as non-statutory consultees.

Engaging with stakeholders is a key part of the assessment process as it helps to establish the baseline information, identify any key receptors from a local perspective and provides an opportunity for the exchange of knowledge between the stakeholder and the population practitioner regarding potential local nuances that may affect how the assessment is undertaken. The list of prescribed bodies will vary, depending on the planning route.

Guidance on Stakeholders that may require consultation

An indicative list of statutory and non-statutory consultees that should be consulted in relation to the population assessment includes (but is not limited to):

- Relevant Local Authorities and Regional Assemblies.
- An Taisce.
- The Heritage Council.
- Failte Ireland.
- Health and Safety Authority.
- The Economic & Social Research Institute.
- Sport Ireland.
- National Transport Authority.
- Department of Transport.
- Inland Fisheries Ireland and various Government Departments (such as the Department of Housing, Local Government and Heritage which covers both the National Parks and Wildlife Service (NPWS), the National Monuments Service (NMS) and the Department of Agriculture, Food and Marine).
- Community representatives (e.g., residents/neighbourhood associations)
- Leaders of local interest groups (e.g. anglers, cyclists, walkers, sports and equine).
- Any potentially affected businesses within the ZoI.
- The owners or operators of potentially affected community resources (e.g. schools, places of worship, community centres).

[9] Transport Infrastructure Ireland, Project Managers' Manual for Major National Road Projects PE-PMG-02042, 2019
[10] Transport Infrastructure Ireland, National Roads - Active Travel Planning PE-PMG-02045, 2021

4.4.4 Assessment of Significant Population Effects

The assessment of significant effects will be both a quantitative and qualitative assessment, supported by available evidence. The population assessment shall take a step-by-step approach to making judgements about significance, combining judgements about the sensitivity of the receptor and the magnitude of the impact. In making judgements on significance, the population assessment practitioner shall:

- Identify the current and future baseline within the ZoI and establish the sensitivity of the receptors.
- Identify potential sources of effects throughout the project life cycle, including construction and operation (based on the agreed assessment year).
- Identify the nature of the effects including whether they are direct or indirect, short, medium or long term, temporary or permanent and noting any seasonal or daily difference (i.e. night or day effects) where appropriate. Effects will include:
    - Direct effects (i.e., as a direct result of the development, including demolitions and land take).
    - Indirect or secondary effects (an effect triggered by a direct effect, including those identified by other topics, or resulting from an associated development secondary to the main development).
    - Cumulative (because of the addition of many small effects, including cumulative effects of other projects, to create larger, more significant effects).
- Identify any additional mitigating requirements over and above those which have been embedded into the design or stated as being required under any other environmental specialism (e.g. air quality or noise and vibration).
- Identify the significance of residual population effects in accordance with the EPA assessment matrix in Figure 3.4, stating whether or not the effect is positive, negative or neutral as well as short/medium/long term and noting any differences in seasonality or day/night effects, where appropriate.

The magnitude of impact upon all population receptors shall be reported in accordance with the criteria outlined in Table 4.10. It should be noted that the impact does not need to satisfy all criteria identified within each box. If the impact meets the criteria of one or more impact levels the population practitioner shall make a judgement as to the most relevant category, representing a reasonable worst case.

In regard to NMU impacts, any diversion routes or changes in length should take into account the amenity value of the surrounding landscape. For example, a slightly longer diversion by a more scenic route could qualify for a lower magnitude of impact. The opposing rationale applies for shorter diversions or changes in length via areas of less amenity value. Cross references to other topics which account for amenity such as landscape, air quality and noise should be made where relevant. The traffic and transport topics should also be referred to.

When considering whether or not there is a change in the amenity quality or integrity of population receptors, the population practitioner will take into consideration the effects reported in other topics assessments. For example, any significant changes to traffic and transport, air quality, noise and landscape which impact on population receptors, will be assessed within the context of how that effect alters the characteristics of the population receptor in question.

Table 4.10 provides criteria for assessing the magnitude of impacts and is applicable to both construction and operational impacts.

Table 4.10 - Population Assessment magnitude of impact criteria

Magnitude of impact	Environmental Impact criteria for construction or operation				
	Private property and housing	**Development land and businesses**	**Community land and assets**	**Socio-economics (as a subset of socio-economics, development land and businesses)**	**Non-motorised road users**
High	• The permanent loss of a resource, or loss of key characteristics that makes it unviable. • Introduction (adverse) or removal (beneficial) of severe severance giving rise to a permanent, material change in accessibility.			• A material change in net economic output relative to the economic output of the geographical area in and around the ZoI. • A material contribution to employment levels relative to the available employment within the geographical area in and around the ZoI. For example, where the ZoI incorporates parts of an urban conurbation this could be more than 500 jobs	• The complete stopping up of a route (unless there are mitigating circumstances e.g., in agreement with the Local Authority due to existing safety concerns). • An increase or decrease in the length of the journey which has the potential to encourage or deter the use of the NMU provision for a substantial proportion of users. Judgements should consider relevant factors such as the local setting, how the NMU provision is used (e.g. primarily recreational or to access community resources and services), the scale of increase/decrease relative to the total length of the route and the availability of alternatives. • Changes to the quality of the route which are likely to encourage or deter its use for a substantial proportion of users. For example, the provision or removal of crossing points and/or substantial changes to perceived safety or amenity value, taking into account the findings of interrelated topics such as landscape, air quality and noise.

Magnitude of impact	Environmental Impact criteria for construction or operation				
	Private property and housing	**Development land and businesses**	**Community land and assets**	**Socio-economics (as a subset of socio-economics, development land and businesses)**	**Non-motorised road users**
Medium	• Partial loss of/damage to key characteristics, features or elements, e.g. partial removal or substantial amendment to access or area of land, compromising viability of the asset. • Introduction (adverse) or removal (beneficial) of severe severance giving rise to a limited / moderate change in accessibility which may be permanent or temporary. During construction this would be for a substantial period, for example at least two years,.			• A noticeable change in net economic output relative to the economic output of the geographical area in and around the ZoI. • A noticeable contribution to local employment levels relative to the available employment within the geographical area in and around the ZoI. For example, where the ZoI incorporates parts of an urban conurbation this could be between 100 and 500 jobs.	• An increase or decrease in the length of the journey which has the potential to encourage or deter the use of the NMU provision by a small proportion of users. Judgements should consider relevant factors such as the local setting, how the NMU provision is used, the scale of increase/decrease relative to the total length of the route and the availability of alternatives. • Changes to the quality of the route which are likely to encourage or deter its use by a small proportion of users. For example, changes to crossing points and/or amenity value, taking into account the findings of interrelated topics such as landscape, air quality and noise.
Low	• A discernible change in attributes, quality or vulnerability; minor loss of, or alteration to, one or more key characteristics, features or elements. For example, amendment to access or acquisition of land resulting in minor changes to operating conditions. • Introduction (adverse) or removal (beneficial) of severance, whilst retaining adequate accessibility provision. During construction this would be for a notable period, for example at least one year.			• A discernible change in net economic output relative to the economic output of the geographical area in and around the ZoI. • A discernible change in net employment relative to the available employment within the geographical area in and around the ZoI. For example, where the ZoI incorporates parts of an urban conurbation this could be less than 100 jobs.	• A discernible increase or decrease in the length of the journey, which is not likely to encourage or discourage its use or change the way in which it is used. • A discernible change to the quality of the NMU provision, which is not likely to encourage or discourage its use or change the way in which it is used.

Magnitude of impact	Environmental Impact criteria for construction or operation				
	Private property and housing	**Development land and businesses**	**Community land and assets**	**Socio-economics (as a subset of socio-economics, development land and businesses)**	**Non-motorised road users**
Negligible	• Very minor loss of or alteration to one or more characteristics, features or elements. For example, acquisition of non-operational land or buildings not directly affecting the viability of the asset. • Very minor introduction (adverse) or removal (beneficial) of severance whilst retaining ample accessibility provision. • No noticeable difference in the provision of private property, local facilities or services.			• No measurable wider socio-economic effects within the local area. • No measurable change in net number of jobs at the local level.	• No noticeable increase or decrease in the length or quality of NMU provision.

No guidance is given on the scale of impact that should be considered to result in a 'substantial', 'noticeable' or 'discernible' change, since these judgements may vary depending on the specific circumstances in each case. Professional judgement shall be used, and the assessment of magnitude shall be supported by clear narrative text describing the rationale.

Following the identification of the effects, it is important to distinguish clearly between significant and non-significant effects. Whether effects are deemed significant is dependent on consideration of the following criteria:

- The sensitivity of the receptor.
- The susceptibility of the receptor to the type of change or development being proposed.
- The magnitude of the impact.
- The size and scale of the effect (complete loss of a landscape element or a minor change).
- The geographical extent of the area which will be influenced by the change.
- The duration of the effect and its reversibility.

The significance of the effect is determined by considering the magnitude of the effect and the quality of the baseline environment affected by the proposed project.

The sensitivity of population resources can vary from 'negligible' to 'high', and likewise, magnitude of effect can vary from 'negligible' to 'high', see Section 3.4.

4.4.5 Construction Employment Generation Calculation Guidance

The following sections describe the methodology to be adopted in order to calculate direct employment and indirect or induced employment during construction. It should be read in conjunction with Appendix C which details example calculations of how the methodology is applied.

4.4.5.1 Direct Employment Calculation

The following section outlines how to calculate direct employment with an example calculation provided at the end of the section.

The first step is to identify the Capital Expenditure (CAPEX) of the project. Using labour coefficients from the Homes and Communities Agency (HCA) Calculating Cost per Job Best Practice Note , it is possible to estimate the number of direct construction jobs that could be supported by the proposed project over the course of the construction phase.

The labour coefficient to be utilised for the calculation of direct employment is 13.9, according to Table 3 of the HCA[11] guidance. This coefficient indicates that 13.9 Full Time Equivalent (FTE) construction workers would be required over one year to deliver £1m of construction works, in 2011 prices. The average exchange rate for British Sterling to the Euro in 2011 was 1.1527 according to the Office of National Statistics[12]. The labour coefficient value to be used in the calculation requires the British HCA guidance to be adjusted, to convert from British Sterling to Euros. The adjusted labour coefficient value is 12.06 FTE construction workers over one year to deliver €1m of construction works. This value is to be used for all calculations.

[11] Homes and Communities Agency (HCA), (2015); Calculating Cost per Job Practice Note
[12] Average Sterling exchange rate: Euro XUMAERS - Office for National Statistics (ons.gov.uk)

The HCA guidance and research was based on 2011 capital costs and as such the present day construction cost must be converted to 2011 prices. For example, to convert capital costs from 2023 prices to 2011 prices, the CAPEX would be adjusted for general inflation in Ireland between the two years, using inflation data for Ireland from the International Monetary Fund. Inflation rates can be indexed to the base year of 2011, and today's cost estimate was converted using the following calculation:

- [(Inflation Index 2011 / Inflation Index 2023) * Current Price Cost]

If the CAPEX has been estimated in any year other than 2023, the practitioner would swap that years inflation index value into the formula to replace that of 2023.

The calculated CAPEX value of the project at 2011 prices is then divided by the labour coefficient previously identified as 12.06 to quantify the gross employment generated during construction. This value can then be divided by the number of construction years (if known) to establish annual employment generation.

An example direct employment calculation is provided in Appendix C.

4.4.5.2 Deflation Value Calculation

Deflation value calculations are a way to update 2011 consumer price indexes to prices reflective of the present day. The following table displays data from the IMF[13]. It shows the Consumer Price Index from 2011 to 2023 in terms of percentage year-on-year changes, and Index values which can be used to determine prices changes between two given years.

This is a key step to understanding the potential gross employment calculation, which is the next step in the calculation process. The assessor should note that the current year values will have to be updated depending on the time of writing.

Table 4.11 - Consumer Price Index Values

Year	Consumer Price Index (CPI)	Index value
2011	1.20%	100.0
2012	1.90%	101.9
2013	0.50%	102.4
2014	0.30%	102.7
2015	0.00%	102.7
2016	-0.20%	102.5
2017	0.30%	102.8
2018	0.70%	103.5
2019	0.90%	104.5
2020	-0.50%	103.9

[13] World Economic Outlook (April 2023) - Inflation rate, average consumer prices (imf.org)

Year	Consumer Price Index (CPI)	Index value
2021	2.40%	106.4
2022	8.10%	115.1
2023	5.00%	120.8

The deflation value is calculated by dividing the base year by the current year. For the purposes of this example, it would be: 100 / 120.8 which equals 0.83. Meaning to convert 2023 CAPEX values to a 2011 prices the CAPEX is multiplied by 0.83.

Therefore 2023 CAPEX value in 2011 prices:

- [(Inflation Index 2011 / Inflation Index 2023) * Current Price Cost].
- [(100 / 120.8) * 500million].
- = €413,907,285.

4.4.5.3 Gross Employment Calculation

Gross employment calculations allows assessors to estimate the potential employment generation of a Scheme in isolation from any external factors.

To do so first we must divide the deflated CAPEX value by 1 million as the labour coefficient is per €1 million to get an adjusted CAPEX value.

- 413,907,285 / 1million
- =413.907.

Adjusted CAPEX / HCA labour coefficient = gross employment generation

- 413,907,285 / 12.06
- = 4,992 gross workers over a five-year construction period
- This means that 998 workers would be required each year over the five-year construction period as 4992 / 5 = 998.
- Note: this is the same 998 workers working every year, it does not mean that 998 new positions are created each year.

4.4.5.4 Indirect and Induced Employment Calculation

Additionality factors[14], (i.e. leakage, substitution, displacement and multiplier effects) are then applied to the gross employment generation figure to calculate the net employment generation at either a sub-regional or regional level. The Homes and Community Agency (HCA) Additionality Guide[15] provides the values to be applied to the gross employment generation.

[14] Additionality factors are used help understand the net employment generation. They consist of: leakage which accounts for the proportion of the benefit felt elsewhere; economic multipliers which account for the further activity/employment beyond the project (indirect supply chain effects, or induced effects from employees direct spending); displacement/substitution which show how much benefit is being offset by reductions of benefit (e.g., employment) elsewhere; and deadweight, which accounts for that which would have occurred anyway (without the project).
[15] Homes & Communities Agency. (2014). Additionality Guide. Available at HCA Policy Covers (publishing.service.gov.uk) Accessed on 13/06/2022

This guidance document is from the United Kingdom, but it is considered best practice in economic modelling and will therefore be utilised due to the absence of an Irish equivalent.

The factors are applied to the gross employment value (which is calculated as per the previous step) to account for factors such as increased use of the local supply chain (multiplier effect), increased local spending (induced), replacement of existing jobs (substitution). Depending on the size of the ZoI that is defined for the Project.

The Practitioner will select appropriately select whether to use the sub-regional or regional values for the additional factors as described in the HCA guidance. The selection of whether to use sub-regional or regional will be based on the size of the ZoI (i.e. if the ZoI is of a regional or greater scale then the regional values for additionality will be applied).

An example construction phase net employment calculation is provided in Appendix C.

4.4.5.5 Economic Output (Gross Value Added) Employment Calculation

The construction phase of a project will contribute to the wider economy by generating additional Gross Value Added (GVA). GVA is a measure of the difference between what is produced as an output (goods and services) and the inputs (such as raw materials and semi-finished products) used in the production of the output. It represents the additional value that is added through economic activity. In order to calculate the GVA of a project the GVA per construction worker in the most recent full calendar year is multiplied the net employment generated. An example GVA calculation is provided within Appendix C.

4.4.5.6 Reporting of Operational Phase Benefits and Disbenefits

PAG Unit 6.0[16] looks at the Cost Benefit Analysis Overview with specific guidance on assessing wider economic impacts, which include changes in productivity, output and employment as a result of an investment in transport infrastructure. It is a robust and established methodology used to quantify the benefit and disbenefits of the project.

The outputs of the Cost Benefit Analysis Overview can be summarised and incorporated into the operational socio-economic assessment where practicable.

The steps previously described to identify receptor sensitivity, magnitude of impact and significance of effect will be followed when reporting operational phase socio-economic benefits.

4.4.6 Mitigation and Enhancement Approach

The following broad mitigation hierarchy shall be implemented during design and assessment to reduce the potential population effects:

- Avoidance and prevention:
  - Identify alternative design/route options that avoid the requirement to compulsorily purchase property, land and asset.
  - Identify alternative design/route options that avoid introducing or worsening severance and avoid reducing NMU provision/increasing journey times.
- Reduction

[16] Transport Infrastructure Ireland Project Appraisal Guidelines for National Roads Unit 6.0 – Cost Benefit Analysis Overview, PE-PAG-02019, October 2016

  - Minimise impacts on population receptors by selecting options that avoid land take from the most sensitive receptors/aspects of receptors thereby maintaining viability.
  - By altering design options to minimise severance to communities and disruption to NMUs.
- Remediation
  - Where it is not possible to avoid or reduce a significant adverse effect, e.g., where community sports pitches have to be acquired to facilitate construction, provide equivalent facilities as close to the original location as possible.

The focus of the approach in regard to mitigation should be to avoid and prevent impacts. For population receptors this is the easiest and most cost effective way to avoid adverse effects. As such avoiding population receptors all together or reducing the impact (e.g. through minimising land take and ensuring access is maintained) during the design stage is the most effective form of mitigation.

Where construction phase impacts are unavoidable different documents could be produced as part of the EIAR to aid the mitigation of effects upon population receptors. This includes the production of a Construction Environmental Management Plans (CEMP) and a community engagement plan.

The purpose of the CEMP is to set out the management actions that need to be implemented to mitigate the environmental effects of the proposed project and to demonstrate compliance with relevant environmental legislation. Example measures to be included in the CEMP for population are the requirement for or details of additional signage to community or business receptors that may be temporarily restricted or altered, information on how NMU management will occur, information for how construction traffic management will occur and any specific receptor-based construction phase requirements which are essential in order to avoid likely significant effects should be outlined in the CEMP.

The CEMP could contain a Construction Traffic Management Plan where the following information could be provided:

- Requirements for temporary alternative access to residential areas, community facilities and businesses.
- Details of planned carriageway and local road closures, including proposed stakeholder and community engagement protocols in advance of closures.
- Details of proposed diversion routes and durations of use.
- Details of significant events and seasonal traffic and proposals for how these will be managed during the works.
- Details of measures such as diversions and signage to minimise disruption for NMUs.
- Details of proposed engagement with stakeholders, community groups and individual properties, facilities and businesses affected by the proposed traffic management and advice for the public regarding ways to raise complaints or request information.

A Community Engagement Plan could also be produced in order to mitigate impacts upon the community during construction. The plan will contain requirements to or details of:

- An approach for delivering joined up communications and engagement.
- Proposals for recording communications and engagement with identified stakeholder groups.

- Details for delivery of stakeholder and community focused communications and engagement.
- Details of engagement channels means of contact with the Project during construction.
- Details of how engagement will be regularly evaluated and improved where possible.

Other mitigation measures applicable to the population assessment may arise from other relevant assessments such as landscape, air quality and noise. The EIAR population chapter should include a high-level summary of this process and the role of both embedded and additional mitigation in avoiding or reducing adverse population effects.

Additional mitigation measures may be proposed to reduce residual adverse population effects and/or enhance population outcomes. Examples of additional population mitigation and enhancement measures during construction may include:

- Providing additional NMU provisions and crossing points beyond any standard design specifications to enhance accessibility for NMU's.
- Increasing signage and connections to and from tourist or community land and assets.
- Enhancing planting and providing acoustic screening for population receptors to enhance their amenity value.

4.4.7 Monitoring of Population Effects

As described in Section 3.3.4.5, monitoring should be proportionate to the nature, location and size of the project and the significance of its effects. In general, monitoring requirements for population receptors will be captured within the plans described within Section 4.4.6 Mitigation and Enhancement.

Duplication of monitoring requirements for effects associated with other environmental topics shall be avoided.

Where monitoring of population impacts is proposed, a protocol for reviewing results and responding to findings shall be included, including guidance on any potential remedial action to be taken.

Phase 3 Population Outputs

The population assessment practitioner shall prepare inputs to the PHH chapter of the Scoping Report, including (but not necessarily limited to):

- A high-level summary of the resources and receptors within the ZoI and key health constraints, risks and opportunities associated with the proposed project.
- A summary of stakeholder engagement undertaken during the scoping stage, including details of the points raised by stakeholders and responses.
- A description of the potential population effects scoped in the to the assessment.
- Narrative to explain the rationale for any potential effects scoped out.
- An outline of the proposed methodology for undertaking the population assessment.

The population assessment practitioner shall prepare inputs to the PHH chapter of the EIAR, including (but not necessarily limited to):

- A description of the assessment methodology, including the process followed, the assessment criteria used to assess significance and any limitations and assumptions.
- A description of the ZoI for the population assessment, with an explanation of the information and assumptions used to define this.
- A fully referenced description of the baseline information that has informed the assessment.
- A summary of stakeholder engagement, including issues raised during the scoping stage and discussions with consultees and owners / occupiers of impacted resources.
- A summary of embedded mitigation (agreed mitigation that forms part of the proposed development).
- A description of the likely significant effects resulting from the construction and operation of the proposed project. For each effect, the following information shall be provided:
  - An assessment of the impact on a business or resource and its users.
  - An assessment of the sensitivity of the receptors.
  - An assessment of impact significance, based on the assessment matrix (see Figure 3.4) and accompanied by narrative text.
- A description of any additional mitigation and enhancement measures to reduce adverse effects and/or promote beneficial effects, including details of how these measures will be secured.
- An assessment of residual effects following the implementation of secured mitigation and enhancement measures.
- Proposals for monitoring population effects.
- Other information required by the EIAR Manager, such as an assessment of cumulative and interactive effects.

5. Application of Human Health Assessment to TII Road Projects

5.1 Phase 0

The Project Manager will oversee the production of a Project/Programme Outline Document (POD) during this phase. The Project Manager should consider health issues in relation to the following POD elements:

- Identifying Project Need
- Determining the strategic alignment of the Project / Programme with national and local policies
- Setting high level, objectives for the Project / Programme
- Setting out the Project Appraisal Plan

There is no requirement for input from the human health assessment practitioner at Phase 0. On larger or more complex projects, advice from a human health assessment practitioner may be sought at the Project Manager's discretion.

PAG Unit 2.1 - Project/Programme Outline Documents provides guidance on the structure and content of the POD and Table 5.1 below summarises the health issues that may be considered by the Project Manager during the preparation of the POD. The extent to which health needs to be considered at this stage will depend on the scale and complexity of the Project / Programme.

Table 5.1 - Consideration of Human Health in the Project Outline Document at PAG Phase 0

Element of Project Outline Document	Consideration of Human Health
Project Need	The assessment of Project Need should consider the transport needs of communities, including those in areas of high social deprivation. The needs assessment should consider whether transport infrastructure (or lack thereof) and the problems with the same contributes to existing impacts on factors affecting health and wellbeing, such as: • Lack of adequate transport infrastructure, restricting economic growth and access to employment • Community severance resulting from lack of adequate transport infrastructure, restricting connectivity within and between communities and access to essential services • Physical severance of communities due to the presence of linear transport infrastructure • Adverse environmental conditions caused by transport infrastructure, such as road traffic emissions The potential for the project to improve the health and wellbeing of communities by influencing the wider determinants of health should be considered. For example, this may be achieved by: • Reducing existing transport impacts such as severance and emissions • Stimulating economic regeneration in areas of high unemployment and social deprivation

Element of Project Outline Document	Consideration of Human Health
	• Connecting deprived communities with employment sites and essential services • Improving provision for active travel and access to green space
Strategic alignment with national and local policies	Alignment with relevant national, regional and local health policies should be considered. This may include health-related policies within County and City Development Plans, and national plans and strategies such as: • Department of Health, Healthy Ireland Strategic Action Plan • Department of Health, Healthy Ireland Outcomes Framework • Department of Health, National Physical Activity Plan • Department of Transport, National Sustainable Mobility Policy • Department of the Environment, Climate and Communications, Clean Air Strategy • RSA, Our Journey Towards Vision Zero, Ireland's Road Safety Strategy 2021-2030
Setting Objectives	Objectives should aim to improve the wellbeing of communities through means such as improving transport connectivity, increasing active travel opportunities, supporting economic regeneration and reducing transport-related environmental impacts. Note objectives relevant to human health can be included across the range of criteria and there may not be a need to set human heath specific objectives under the local environment criteria. Consideration should be given to setting Objectives that seek to reduce existing social and health inequalities.
Project Appraisal Plan	The Project Appraisal Plan should include health inputs as required, in line with this SD.

5.2 Phase 1 Concept and Feasibility

The purpose of Phase 1 is to assess the feasibility of all Strategic Options, taking into account constraints, risks, opportunities and alignment with the Project Objectives. As described in Section 3.3.2, the activities undertaken at Phase 1 may be completed by the Project Manager or by a health assessment practitioner, depending on the nature, scale and complexity of the project. The following section is written on the basis of a human health assessment practitioner undertaking the relevant tasks. The practitioner shall undertake the tasks outlined in Table 5.2, at a level of detail proportionate to the PMG Project Phase and the scale and complexity of the project.

The level of detail presented at Phase 1 shall be proportionate to the level of analysis required at this stage and the project information available. Further detailed information gathering and assessment shall be undertaken as the project progresses through Phases 2 and 3. It is the responsibility of the practitioner to provide the appropriate level of analysis at each stage to inform the development of the project and provide a robust assessment.

Table 5.2 - Human health assessment approach and process for Phase 1

Human Health Phase 1 Approach
Define the preliminary ZoI for the Strategic Options based on a judgement of the likely extent of effects on human health.
Undertake a review of Public Health Policies and Programmes relevant to the project and applicable within the ZoI area.
Collate and analyse social and health baseline data and map key health constraints within the ZoI. Identify sensitive populations and vulnerable groups
Identify health risks, constraints and opportunities and provide input to the setting of SMART Project Objectives.
Input to the assessment of the feasibility of Strategic Options taking into account constraints, risks, opportunities and alignment with the Project Objectives.
Provide human health inputs to the Feasibility Report, including a summary of how the Strategic Options align with Project Objectives and identification of key health related constraints, risks and opportunities.
Provide inputs to the stakeholder engagement process (through Phases 1 to 3). Ensure that issues of health and health equity are clearly communicated and that relevant organisations are consulted.

5.2.1 Zone of Influence

There are two type of study area outlined under the PAG at Phase 1: the appraisal study area and the constraints study area (See Section 4.2.1). The ZoI is the area that may be affected by changes as a result of the proposed project. The ZoI for human health needs to have regard to a range of potential to impact such as air quality, noise, access and/or changes to opportunities for physical activity. Like population there is a significant cross discipline nature to human health in terms of the PAG appraisal criteria at Phase 1 and 2 and other environmental assessment factors at Phase 1 to 3. It is likely at Phase 1 that the population ZoI will align with the appraisal and constraint areas however flexibility is required to allow identification of any potential impacts to receptors further away. The Human Health Practitioner should discuss with the Project Manager the extending of the appraisal and/or constraints study area in line with the human health ZoI if that requirement is considered appropriate.

A preliminary Zone of Influence (ZoI) shall be defined at Phase 1 (this ZoI will be amended accordingly through subsequent Phases 2 and 3), based on professional judgement on the areas where potential impacts on health determinants are likely to occur. This may comprise a single ZoI, or separate ZoIs for the Strategic Options, depending on the location of the options. The ZoI shall be proportionate, aiming to capture the likely health effects whilst avoiding the need to collect large amounts of baseline data. The health assessment practitioner shall take the following steps to define the ZoI:

- Review the ZoIs for the relevant environmental, economic and transport MCA topics.
- Discuss the likely geographic extent of impacts with relevant topic specialists.
- Consider the context; for example, a dense urban location versus a more open, less populated rural location.
- Take a robust, proportionate view of the likely geographic extent of the environmental, economic and transport impacts of the Strategic Options that have the potential to influence health and health inequalities.

Due to the broad nature of the Human Health topic, it may be necessary to identify different ZoIs for different types of health determinant, as illustrated in Table 5.3.

For example, the ZoI may include a corridor 500m from the boundary of each option, plus additional areas such as within the boundaries of settlements along the route or affected parts of the road network, where the likely scale of impact has the potential to give rise to health effects. Where relevant, a local authority or regional-level ZoI may also be included to capture wider social and economic effects. A proportionate ZoI at Phases 1 and 2 shall focus on those areas where the impacts of the options are likely to differ.

Table 5.3 - Illustrative ZoI for human health assessment

Health ZoI	Geographic area	Health determinants impacted (indicative examples)
Local ZoI	Specified distance (e.g. 500m) from the project study area. Area in which the physical impacts of the project are expected to occur.	Community and lifestyle • Crime and personal safety: improved lighting and visibility • Road safety: changes to junction layouts, crossing facilities or speed limits Socio-economic factors • Land and property: loss of residential / community land and property Environmental conditions • Visual amenity: impact of vegetation clearance and new infrastructure • Green space: direct (loss of land) and indirect (amenity) impacts on public green space Climate resilience • Flooding: design measures to reduce risk of road closure during flood events
	Defined locations such as settlements or road links outside the specified distance above. Areas where indirect impacts are expected to occur, for example due to changes in transport connectivity or traffic flows.	Community and lifestyle • Health and social infrastructure: improved access to education and health services • Community severance: reduced journey times between settlements Environmental conditions • Air quality: changes in traffic flows and air emissions • Noise: changes in traffic flows and noise emissions
Wider ZoI	District or regional level. Area where wider socio-economic impacts are expected to occur.	Socio-economic factors: • Education and training: Apprenticeships during construction phase • Employment and income: Employment during construction, business connectivity and economic regeneration

During the course of the assessment, potential health effects may be identified in locations outside the ZoI. For example, at subsequent phases traffic modelling may identify changes to flows on parts of the road network, giving rise to impacts on noise, air quality or community severance. A flexible approach shall be taken in order that new impacts outside the initial ZoI can be considered in the health assessment.

5.2.2 Review of Public Health Policies and Programmes

The health assessment practitioner shall undertake a high-level review of key public health policies and programmes applicable within the ZoI. This shall include relevant local health and wellbeing plans and strategies, and health-related policies within County and City Development Plans. The review should identify information on local priorities for protecting and improving health and reducing health inequalities. The purpose of the review is to inform the health-related issues, risks and opportunities for the project. The review should be proportionate, focusing on issues that are relevant to the scope of the project.

5.2.3 Human Health Baseline

The baseline data collected at Phases 1 to 3 shall be determined by the health assessment practitioner. Baseline data shall be relevant to the assessment scope and proportionate to the level of assessment at each phase. Different types and levels of data may be collected for the local and wider ZoIs, proportionate to the nature and distribution of potential effects in each area.

The purpose of the health baseline at Phase 1 is to provide high-level information on constraints and opportunities relating to the Strategic Options. The baseline should include information on existing health determinants (i.e. The social, economic and environmental conditions in which people live) within the ZoI and identify key community assets that support health and wellbeing. The health practitioner should take a proportionate approach, focusing on information relevant to the project and its potential health effects and having regard to the early nature of the project development.

Baseline information shall include the following types of information, at a level proportionate to the assessment:

- Published data on the social and health characteristics of the population within the ZoI.
- Information on existing environmental conditions relevant to health. This will be obtained primarily from other MCA topics, such as:
    - Traffic: existing severance caused by congestion and delays, road traffic accident hotspots.
    - Noise: designations such as Quiet Areas and Important / Priority Areas identified in Noise Action Plans.
    - Air quality: Existing exceedances of air quality standards.
- Socio-economic conditions and the locations of human health receptors, obtained from the population assessment (see Table 4.2). For example:
    - Private property and housing: residential properties.
    - Community land and assets: public rights of way, green space, health services, schools and colleges, care homes, sports and leisure facilities, community centres, village halls, places of worship etc.
    - Socio-economic data: employment and unemployment levels.

Data should be obtained at Electoral Division (ED) or Small Area level where this is proportionate, in order to show variation across the ZoI. Where these boundaries extend outside the 500m study area it is for the practitioner to determine whether or not to include the data, based on the proportion of the ED / Small Area that falls within the ZoI and the receptors present.

Baseline information from other environmental topics shall not be reproduced in full but should be summarised with cross referencing to detailed information presented elsewhere.

Guidance on the Collection and use of Baseline Data

A large amount of Census data is freely available online. It is not necessary to include all available datasets in the baseline; data should be selected by the health assessment practitioner to be relevant to the scope of the assessment.

Much of the data on health outcomes is published at the National level. This includes metrics such as self-reported health, long-term conditions, mental health status, deaths where causes include mental and behavioural disorders, levels of physical activity and body mass index. National-level data does not provide specific information about the study population and, in general, should not be included in the baseline.

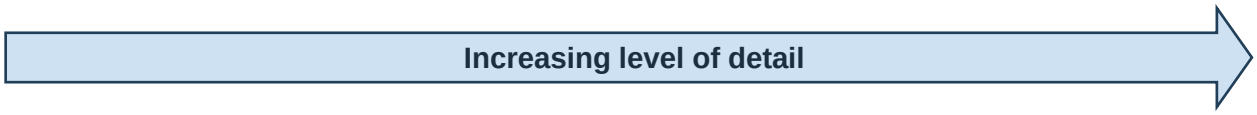
Localised data, such as Electoral Division or Small Area data, should be used where available to provide detailed information on the study population and show variations across the ZoI. National and regional comparisons should be provided alongside local data to aid interpretation.

Where information on health status is not available at the local level, this may be inferred based on available information. For example, a population with a high level of social deprivation is likely to have below average health outcomes. Any assumptions and uncertainties shall be clearly stated.

Where health effects are distributed across a wide geographic and cannot be mapped to individual communities, such effects from regional economic regeneration, a proportionate approach should be used. In such cases, presenting a large volume of Small Area data is unlikely to inform the assessment. It should, however, be noted that there is likely to be significant geographic variation in health and social indicators, which is not shown in regional averages.

There are no agreed thresholds to determine at what point health and social indicators vary significantly from the average. When interpreting the data, the health assessment practitioner should use professional judgement and explain any statements made about the relative health status and sensitivity of the population with reference to the data.

Figure 5.1 shows the geographic scales at which baseline datasets may be provided. The smallest geographic areas are Electoral Division (around 1,000 people) and CSO Small Area (around 200 people), which provide the most detailed information to inform a health assessment.



Type of area	Regions / NUTS 3 Regions[17]	Administrative Counties	Constituencies	Area of Residence	Local Electoral Areas	Electoral Divisions	Small area
Number of areas nationally	8 / 9	32	39	49	166	3,440	18,641

Figure 5.1 - Geographic boundaries used in health datasets

Demographic, social and public health Census datasets are published by the Central Statistics Office (https://data.cso.ie/). Table 5.4 identifies datasets that may be relevant to inform the human health baseline. The datasets listed are not exhaustive and the health practitioner may identify other relevant datasets be used in the baseline.

Table 5.4 - Examples of Census Datasets published by the Central Statistics Office

Baseline information	Geographic area
Demographic data	
Total population	Local Electoral Area
Population density	Electoral Division
Population by age group	Electoral Division
Population by sex	Administrative County
Population by sex and age	Small Area
Resident population by ethnic or cultural background	Small Area
Population usually resident and present by ethnicity	State
Family units with children by size and age of children	Small Area
Social and economic data	
Population by sex and social class	Small Area
Population aged 15 years and over by principal economic status and sex	Small Area

[17] The Nomenclature of Territorial Units for Statistics (NUTS) were created by Eurostat in order to define territorial units for the production of regional statistics across the European Union. https://www.cso.ie/en/methods/informationnotefordatausersrevisiontotheirishnuts2andnuts3regions/

Baseline information	**Geographic area**
Housing tenure (owned, local authority rental, landlord rental)	Administrative County
Percentage of Housing Assistance Payment and Rent Supplement Properties	Local Authority
Population aged 15 years and over by age education ceased	Small Area
Population aged 15 years and over by sex and highest level of education completed	Small Area
Number of households with cars	Electoral Division / Small Area
Number of households with cars	Small Area
Persons at work or unemployed by occupation and sex	Small Area
Persons at work or unemployed by industry and sex	Small Area
Health data	
Deaths from respiratory disease	Area of Residence
Diseases and mortality rates attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease	Area of Residence
Persons with disability by sex	Small Area
Carers by sex	Small Area
Population by general (self-rated) health and sex	Small Area
Frequency of walking, cycling or using public transport instead of driving	NUTS3 Region

Pobal

https://www.pobal.ie/

Pobal provides free social Geographical Information System (GIS) data at various levels down to Small Area. Interactive maps are available, including:

- Social deprivation mapping using a seven-point scale from 'extremely disadvantaged' to 'very affluent' https://maps.pobal.ie/WebApps/DeprivationIndices/index.html
- General data mapping showing characteristics such as primary-only / tertiary education, unemployment, lone parents and local authority rentals on a five-point scale, by % population. https://maps.pobal.ie/WebApps/GeneralData/index.html

Lenus

https://www.lenus.ie/ / https://www.lenus.ie/discover

Lenus is a repository for Irish research in health and social care. It provides County Health Profiles, showing dashboards summarising of key public health facts, age profiles, deprivation, death rates for principal causes, and a 'spine chart' of health indicators with national comparisons.

Health Service Executive

https://www.hse.ie/eng/services/list/5/publichealth/publichealthdepts/health-intelligence/

The HSE's Intelligence Unit publishes Regional Population Profiles for the six HSE Health Regions. This information can be viewed in the Health Atlas Finder at smaller geographies including. Primary Care Team (PCT, around 10,000 people), Electoral Division (ED, around 1,000 people) and CSO Small Area (SA, around 200 people). This gives a much more granular and local view of the population.

5.2.4 Constraints Mapping

Constraints mapping at Phase 1 will provide visual information on the location of key constraints to highlight key issues and opportunities and inform the Feasibility Study.

Social deprivation mapping shall be used to provide a visual overview of existing social inequalities and indicate disparities in health across the population in the ZoI, as illustrated in Figure 5.2. Other demographic, health or social data available at Electoral Division / Small Area level may also be mapped where this is identified as being relevant to the assessment.

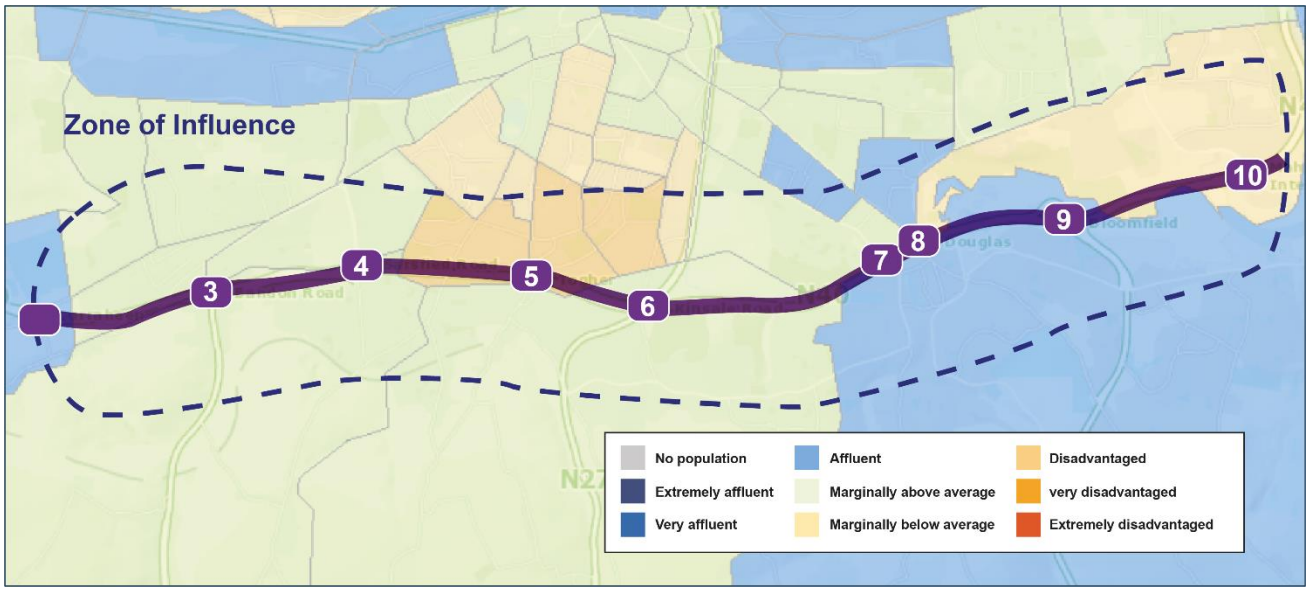


Figure 5.2 - Illustrative example of Social Deprivation mapping for health ZoI[18]

The environmental constraints mapped by other environmental topics may be relevant to the human health study and should be cross referenced where relevant. Figure 5.3 below illustrates the some of the mapped constraints that may be produced other topics and are potentially relevant to human health.

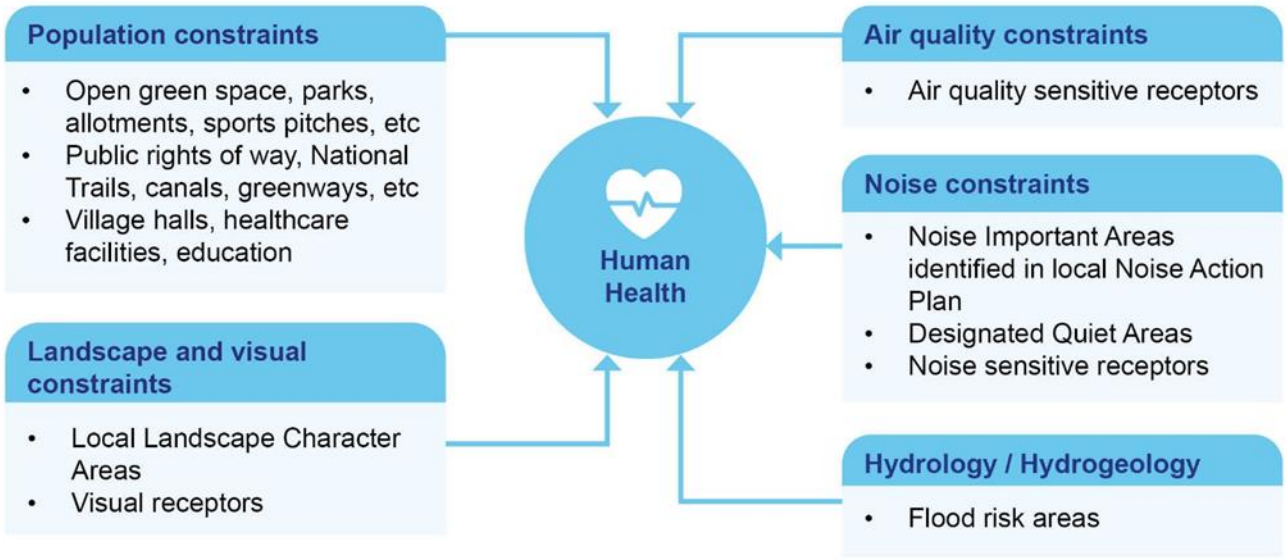


Figure 5.3 - Examples of mapped topic constraints relevant to human health

5.2.5 Identification of Sensitive Receptor Populations

The Human Health assessment practitioner shall consider the sensitivity of the population in the ZoI and identify sensitive areas and vulnerable groups. The characteristics of the population may vary across the ZoI. Therefore, the identification of sensitive receptor populations shall reflect the differences across geographic areas and sections of the community.

[18] Mapping available at https://maps.pobal.ie/

Table 5.5 below provides examples of the types of characteristics that can make certain groups more sensitive to health effects and the datasets that can be used to identify these characteristics. Guidance on identifying vulnerable groups can also be found in the IPH HIA Guidance, Table 09. Scoping tool for population groups[19]. As well as population datasets, the presence of community resources and services used by people with certain characteristics can indicate that these groups are present within the ZoI and are potentially impacted by the project.

Table 5.5 - Examples of the characteristics of vulnerable groups

Population group	Datasets / resources	Sensitivity
People in areas with high levels of social deprivation	Dataset – Pobal deprivation index Dataset – Population by social class Support services such as Family Resource Centres	Healthy life expectancy is linked to social deprivation. People in more deprived areas live on average shorter lives and have poorer health. This is linked to the conditions in which people live and work and covers a wide range of factors including personal finances, environmental conditions, crime rates, education and housing.
People on low incomes or financially insecure	Dataset – Population by principal economic status Support services such as Family Resource Centres	People on a low incomes are more likely to experience poor health because they have fewer resources available to them to stay healthy and experience more stress, which impacts health. Secure employment is known to have a positive physical and mental health benefit and therefore unemployed people are more likely to experience poor health. People on low incomes are likely to be less resilient to changes in their environment as they lack the financial resources to enable them to adapt to change.
People in insecure or poor-quality housing	Dataset – Housing tenure Dataset – Percentage of Housing Assistance Payment and Rent Supplement Properties	People in poor quality housing are more likely to experience poor mental and physical health as a result of unfavourable living conditions, including issues such as overcrowding, damp and mould. People living with uncertainty over their long-term housing security experience more stress, which impacts health. People in social rented housing lack control over where they live and are less able to make choices or adapt when their circumstances change.
Older people	Dataset – Population by age group Care homes	As people age, movement and reactions generally become slower and hearing loss becomes more likely. Older people are more likely to be at risk from injury and may be anxious about crossing the road safely or about the neighbourhood setting in general.

[19] Health Impact Assessment Guidance: A Manual. Institute of Public Health (IPH), 2021

Population group	Datasets / resources	Sensitivity
		This can lead to barriers to older people participating in outdoor activities, especially walking, which can adversely affect their health. Older people are generally more reliant on health and social care services and other social infrastructure in their local area. They are less likely to drive and more likely to use bus services.
Children and adolescents	Dataset – Population by age group Nurseries, schools, colleges, youth clubs, parks and playgrounds Family Resource Centres	Children and adolescents are more sensitive than adults to air pollution, noise and other environmental factors, which can adversely affect their healthy development. Young people are more likely to be pedestrians and require freedom to move between their home, school, and recreational activities. They lack the experience and judgement of adults whilst interacting with traffic and public spaces and are more at risk from road traffic accidents.
People without access to a car	Dataset – Number of households with cars Bus services and other public transport	People without cars are more dependent on social infrastructure and community facilities in their local area and are more likely to be users of public transport. People without cars are also more likely to have other characteristics that can make them vulnerable to poor health, such as low income or older age.
People with poor health status	Dataset – Lenus County Health Profiles Dataset – Population by general (self-rated) health Diseases and mortality rates attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease	People with existing poor health status are likely to be more vulnerable to changes that can put their health at risk. For example, adverse changes in air quality are more likely to impact a person who is chronically ill with impaired lung function, or a person who has asthma. Noise can cause hypertension and cardio-vascular problems. People who already have these conditions can be more vulnerable to increases in noise. People with mental health conditions such as anxiety and depression are likely to be more sensitive to changes in their local environment. People with existing health conditions are generally more reliant on health and social care services. They are less likely to drive and therefore more likely to be pedestrians or to use public transport services.
People with a disability	Dataset – Persons with disability	People with a disability are more likely to experience adverse effects from changes to their local environment, for example because of reduced mobility or visual impairment.

Population group	Datasets / resources	Sensitivity
		They are also more likely to be reliant on local health and social care services.
Communities in areas with existing adverse environmental conditions	MCA environmental baseline data Population data on public rights of way and community space	People in areas with high levels of noise or air pollution are more likely to have their existing health compromised and are more likely to experience adverse health effects from an increase in pollution. People in areas with a deficit of green space or poor walkability are more likely to experience adverse effects from direct or indirect impacts on green space or pedestrian and cycle routes.
People in the Traveller community	Dataset – Population usually resident and present in the State, by ethnicity Dataset – Irish Travellers per 1,000 population	Romany and Traveller people experience significantly higher prevalence of long-term illness, disability and physical and mental health problems, and lower life expectancy. Roadside living is common in these communities, making them more vulnerable to road traffic accidents.

5.2.6 Identification of Health Risks, Constraints and Opportunities

The health assessment practitioner shall identify the health constraints, risks and opportunities presented by the project, taking into account the following information:

- The existing health characteristics, sensitivities and needs of the population within the ZoI.
- Existing inequalities in social deprivation and health outcomes across the ZoI.
- Existing environmental conditions relevant to health in the ZoI.
- Existing transport connectivity in the ZoI.
- Services and community resources present in the ZoI.
- Local health protection and improvement priorities, as set out in relevant public health plans and strategies.

The issues considered shall encompass the existing health status of the population and the wider determinants of health, including any relevant lifestyle, social, economic and environmental factors. An indicative list of health determinants is shown in Figure 2.4.

Due to the broad scope of human health assessment, the health practitioner shall liaise with other topic specialists and review topic outputs as necessary to identify potential health risks and opportunities. This may include the population, social, noise, air quality, landscape and visual, traffic and transportation, economic and road safety specialists. Examples of the types of constraints, risks and opportunities that should be considered are illustrated in Figure 5.4.

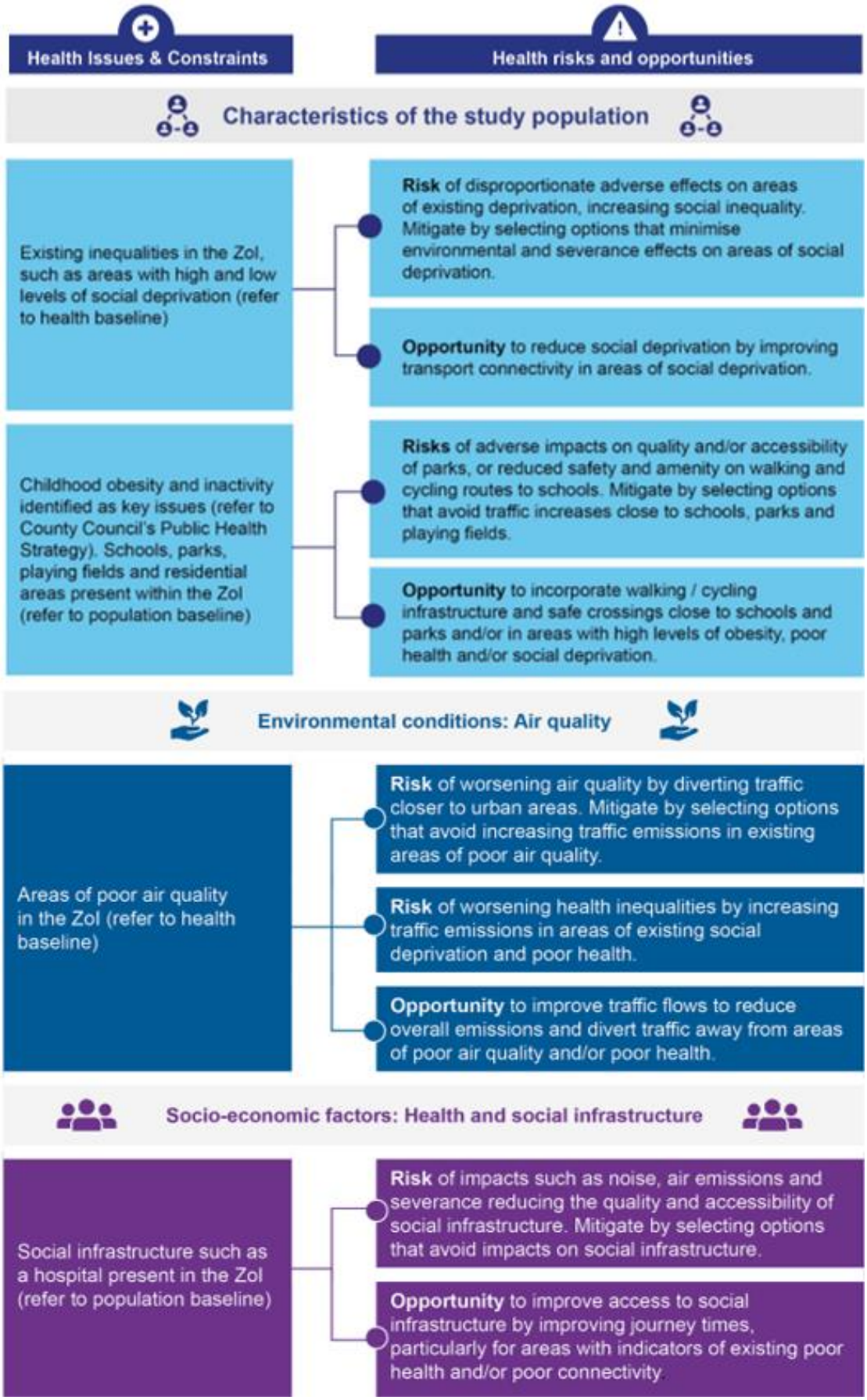


Figure 5.4 - Illustrative examples of potential health constraints, risks and opportunities

5.2.7 Input to SMART Project Objectives

The Objectives identified at Phase 0 shall be reviewed and developed into SMART Project Objectives at Phase 1. In many cases it is likely that issues relevant to health will be captured in the wider SMART Project Objectives, which will be assessed by other MCA topics. If required, the health assessment practitioner may input to the development of these SMART Project Objectives, to ensure relevant health risks and opportunities are addressed.

In some cases, it may be necessary to set specific SMART Project Objective(s) for the health topic, which will be assessed by the health assessment practitioner. This decision shall be taken by the health assessment practitioner and the Project Manager, based on the identified health risks, constraints and opportunities identified at Phase 1.

SMART Project Objectives for human health should avoid focussing on health outcomes that cannot be measured in the Options Assessment; rather they should focus on health determinants that are likely to be impacted by the Strategic Options, and particularly on disadvantaged populations and vulnerable groups. Overlaps with other Project Objectives should be avoided. Illustrative examples of SMART Project Objectives for human health are provided in Table 5.6 below.

Table 5.6 - Examples of possible Human Health SMART Project Objectives

Health issues, risks and/or opportunities identified	Examples of SMART Project Objectives for Human Health
Areas of high social deprivation and corresponding poor health in the ZoI. Significant variation in social deprivation and health across the ZoI. Potential for redistribution of environmental impacts (e.g. air quality and noise) as a result of new road alignment.	Improve health equity by reducing traffic-related noise and air emissions in areas of high social deprivation.
Existing areas of high social deprivation and poor health correspond with existing traffic congestion and lack of transport connectivity.	Provide opportunities for health improvement in areas of high social deprivation by reducing journey times by road from these areas to employment sites, town centres and green spaces.
High proportion of children and families in the ZoI population. ZoI includes schools, playgrounds and a children's centre.	Improve wellbeing for children and young people by improving access to educational, healthcare and play facilities and reducing traffic-related noise, air emissions and severance effects at these facilities.
Wide range of issues identified in the ZoI including high levels of social deprivation, existing poor health, high proportion of older people and people with disabilities, high unemployment, poor air quality, high levels of traffic noise, poor transport connectivity.	Support health improvement by improving transport connectivity, improving environmental conditions and providing a safer and more accessible environment for vulnerable road users.

5.2.8 Consideration of Human Health during the Assessment of Strategic Options

Human health inputs to the assessment of Strategic Options at Phase 1 shall be proportionate to the scale and complexity of the project. Where no specific SMART Project Objectives have been identified for the human health topic, the health assessment practitioner shall not input directly into the MCA; however, any health risks or opportunities shall be highlighted to the Project Manager and as required carried forward to Phase 2.

The health assessment practitioner shall be responsible for ensuring that any relevant health issues are considered in the Feasibility Study, including through other MCA topic assessments where appropriate.

Where specific SMART Project Objective(s) have been identified for the human health topic, the health assessment practitioner shall assess the performance of the Strategic Options against these Objective(s) under the environmental criteria within the MCA. The MCA for the Phase 1 Strategic Option Assessment uses a three-point colour scoring system as described in PAG Unit 7.0 – Multi Criteria Analysis. The human health assessment practitioner can advise the Project Manager on the application of this scale in relation to health-related objectives. Guidance is provided in Table 5.7 below.

Table 5.7 - Consideration of Human Health in the Application of Three-Point Colour Scoring

Score	Examples of issues to be considered in Human Health assessment (where relevant to Project Objective)
Green: Strategic Option meets the requirements of the Project Objective	Option avoids or reduces existing issues likely to be causing adverse health effects, such as exposure to traffic emissions or community severance. Option creates new opportunities for health promoting activities such as active travel or improved access to green space. Option reduces health inequalities by reducing impacts on or providing benefits to vulnerable and disadvantaged communities.
Yellow: Strategic Option partially meets the requirements of the Project Objective	Option slightly reduces existing issues likely to be causing adverse health effects, such as exposure to traffic emissions, community severance etc. Option may help to support health promoting activities such as active travel or improved access to green space. Option has no impact on health inequalities.
Red: Strategic Option does not meet the requirements of the Project Objective	Option increases, or has no positive impact on, existing issues likely to be causing adverse health effects, such as exposure to traffic emissions or community severance. Option reduces opportunities for health promoting activities such as active travel or access to green space. Option increases health inequalities through adverse impacts on vulnerable and disadvantaged communities.

Where options are given a yellow or red rating for SMART Project Objective(s) relevant to human health, the practitioner shall consider the potential for mitigation measures to reduce adverse impacts and improve alignment with the relevant Project Objective(s). Any opportunities to further improve the performance of the Strategic Options, including those identified as green, shall also be highlighted.

Human health text shall be provided for the Feasibility Report, explaining how health has been addressed in the study. This shall include, where relevant, a summary of the assessment of Strategic Options against human health-specific SMART Project Objectives, as well as signposting to health determinants considered across the wider MCA.

5.2.9 Stakeholder Engagement

The health assessment practitioner shall identify and communicate to the Project Manager any health stakeholders to be included in the consultation process and provide information on health issues to inform the consultation. Consultation responses relating to health and wellbeing shall be reviewed by the health assessment practitioner and shall inform the human health assessment in Phases 1 to 3.

Consultation on the human health assessment in Phases 1 to 3 may include (and need not be limited to) the following health sector stakeholders:

- Public Health team(s) within the relevant local authorities.
- Institute of Public Health.
- Health Service Executive (HSE) National Environmental Health Service
- HSE Public Health - Area Director(s) of Public Health[20].

HSE Area Directors of Public Health fulfil the function of Medical Officers of Health and as such are required to *'inform themselves as respects all influences affecting or threatening to affect injuriously the public health in the county'*[21]. Consultation with Area Directors of Public Health shall therefore be undertaken on all projects with the potential to impact PHH.

Phase 1 Human Health Outputs

Inputs for the Phase 1 Feasibility Report, shall include:

- A description of the human health ZoI(s) and baseline conditions within these areas, supported by data and mapping. This will include cross-referencing to other topic baseline information where relevant (baseline data should not be duplicated).
- A description of health constraints, risks and opportunities with reference to supporting information such as the health baseline, local health policies and strategies and information provided by other topics.
- Input to the assessment of the performance of the Strategic Options against the Project Objective(s) relevant to human health, using the three-point colour scoring system.
- An over-arching summary of the feasibility of the Strategic Options in terms of health and health equity, with recommendations to reduce risks of negative health outcomes and/or support positive health outcomes during the ongoing development of the project.

5.3 Phase 2 Options Selection

The purpose of the Phase 2 human health assessment is to ensure that issues with the potential to affect human health outcomes and health equity are considered in the comparative appraisal of alternative options and selection of a preferred option. The activities undertaken by the health assessment practitioner at Phase 2 are summarised in Section 3.3.3. Phase 2 is split into three distinct stages within the TII PAG.

[20] Contact details for Public Health in each HSE Health Region available at: https://www.hse.ie/eng/services/list/5/publichealth/publichealthdepts/contact%20us/contact-details.html
[21] S.I. No. 128/1949 - Heath (Duties of Officers) Order, 1949

The human health assessment practitioner shall undertake the tasks outlined in Table 5.8, at a level of detail proportionate to the PMG Project Phase and the scale and complexity of the project. Relevant guidance provided for Phase 1 (in Section 5.2) is also applicable at Phase 2.

Table 5.8 - Human health assessment approach and process for Phase 2

Stage 1 – Preliminary Options Assessment (if required)
Update and refine Phase 1 human health baseline and policy information.
If any changes to the Phase 1 information are identified, review and update as necessary the health constraints, risks and opportunities and the ZoI.
Undertake a scoping exercise to identify the relevant determinants of health, and corresponding appraisal criteria, to be considered in the Preliminary Options Assessment.
Input to the Multi-Criteria Analysis (MCA) process.
Provide human health inputs to the Phase 2 Stage 1 report/process, including a summary of how health and health equity have been considered in the assessment of Preliminary Options.
Stage 2 – Project Appraisal Matrix
Update and refine the Phase 2 Stage 1 information where necessary. If any changes to the Phase 2 Stage 1 information are identified, review and update as required the health constraints, risks and opportunities and the ZoI. (See Section 5.3.1.1).
Undertake a scoping exercise to consider the potential health effects of the Preliminary Options and identify the health appraisal criteria required to be included in the assessment.
Undertake a gap analysis of the MCA appraisal criteria to identify overlaps and avoid duplication. Identify any additional appraisal criteria needed to ensure health and health equity issues are embedded within the MCA.
Provide inputs to the MCA process and completion of Appraisal Matrices.
Provide human health inputs to the Phase 2 Stage 2 report/process. This shall include a summary of how health and health equity have been considered in the assessment of Preliminary Options and a commentary on the overall health performance of each option.
Stage 3 – Selection of Preferred Option
Update and refine the Stage 2 information where necessary. Identify any changes to the Stage 2 conclusions with regard to health and health equity.
Provide human health inputs to the Phase 3 Stage 3 report/process. This shall include a high-level summary of the Preferred Option in terms of its impacts (both positive and negative) on health and health equity and its alignment with health-related Project Objectives.
Document the option process in terms of Human Health in the Options Report.

5.3.1 Phase 2, Stage 1 – Preliminary Options Assessment

5.3.1.1 Updating Phase 1 Information

The health assessment practitioner shall ensure that the assessment of options at Phase 2 is based on up to date information, whilst also making best use of information collected at Phase 1.

The Phase 1 information shall be reviewed to ensure that it reflects the most recent published health and social data, relevant baseline information from other topics, current policy on health protection and improvement, and any new receptors (e.g. as a result of planning consents). The need to update Phase 1 information will be determined by the health assessment practitioner in discussion with the Project Manager. Updates may include (but are not necessarily limited to) the following:

- If a reasonable period of time has elapsed between the completion of Phase 1 and the commencement of Phase 2 (for example one year), public health policies and strategies and health baseline data shall be reviewed and updated as necessary, in line with the approaches described in Sections 5.2.2 to 5.2.5.
- If new Strategic Options have been introduced or new human health receptors are identified, the ZoI areas shall be reviewed and updated as necessary. Information on defining the ZoI is provided in Section 5.2.1.
- If ZoI areas have changed, collation, analysis and mapping of baseline data for new ZoI areas shall be undertaken as described in Sections 5.2.3 to 5.2.5.
- If there have been changes to health policies, identification of new receptors, or significant changes to the Strategic Options, the health risks, constraints and opportunities and SMART Project Objectives identified at Phase 1 shall be reviewed and revised as necessary (see Sections 5.2.6 and 5.2.7). The Project Manager shall be notified of any changes.

These principles shall also apply to the updating of health information at subsequent project stages.

5.3.1.2 Preliminary Assessment

The human health assessment practitioner shall identify the scope of the Stage 1 preliminary health assessment by considering the potential impacts on health determinants and identifying the relevant appraisal criteria included in the Preliminary Options Multi Criteria Analysis (MCA). For example, these may include:

- Engineering:
  - Land and property impacts.
  - Safety.
- Environment:
  - Air quality.
  - Noise.
  - Landscape & visual.
- Economy:
  - Wider economic impacts.
  - Transport quality and reliability.

The health effects of the Preliminary Options will be assessed, based on:

- Changes to health-related engineering, environmental and economic conditions compared to the Do Nothing / Do Minimum, based on the relevant MCA findings; and
- Consideration health risks and opportunities associated with the Preliminary Options and their performance in meeting the relevant Project Objectives.

Each Preliminary Option may give rise to a mixture of positive and negative effects on different appraisal criteria, resulting in a mixture of beneficial and adverse health effects. As there is no method for weighting effects, the practitioner shall provide a professional judgement on the overall effect of each option on health outcomes and health equity, setting out the balance of positive and negative effects. Judgements shall take into account the sensitivity of the affected populations and the distribution of effects across areas of social deprivation and/or vulnerable groups.

To avoid double counting in the MCA, the seven-point scoring used in the Phase 2 options appraisal shall not be applied to the Stage 1 human health assessment. However, the qualitative assessment of health effects can be considered within other criteria scoring as appropriate and can be documented under the environment criteria at Stage 1 in the Options Report.

Phase 2, Stage 1 Human Health Outputs

The health assessment practitioner shall provide inputs to the Options Report, including:

- If required, further refined health baseline information, new health receptors, updated human health policies or reports since the completion of Phase 1.
- Description (text / mapping) of ZoI for each proposed option.
- Description (text / mapping) of the receptor populations present in the ZoI for each option, including vulnerable populations and receptors.
- Commentary on the positive and negative effects of the Preliminary Options on health and health inequalities.

5.3.2 Phase 2, Stage 2 – Options Assessment (Project Appraisal Matrix)

5.3.2.1 Scoping of the Human Health Options Appraisal

A scoping exercise shall be undertaken to identify the human health appraisal criteria to be included in the Stage 2 Project Appraisal Matrix. The health practitioner shall be responsible for defining a robust, proportionate scope, focusing the issues most likely to affect health outcomes and inequalities and adding value to the option selection process.

The determinants of health are wide-ranging and overlap with other appraisals included in the MCA (see box below). As noted in TAF Module 7 - Detailed Guidance on Appraisal Techniques, it is important for those appraising an option to avoid double counting through specific impacts being captured by multiple criteria.

Multi-Criteria Analysis (MCA) / Transport and Accessibility Appraisal (TAA) Criteria

PAG Unit 7 – Multi-Criteria Analysis and TAF Module 7 - Detailed Guidance on Appraisal Techniques provide guidance for the detailed appraisal of Preliminary Options for schemes with estimated costs of below and above €30 million. The guidance identifies seven primary criteria to be included in the MCA of transport project options:

- Economy -Transport User Benefits and Other Economic Impacts (PAG 7 unit only)
- Accessibility Impacts.
- Social Impacts.
- Land Use Impacts.
- Safety Impacts.
- Climate Change Impacts.
- Local Environmental Impacts.

The likely impacts of the Preliminary Options on health determinants during both the construction and operational phases shall be considered. To avoid double counting, the human health appraisal shall not duplicate appraisal criteria included in other MCA. Scoping shall comprise an initial exercise to identify relevant appraisal criteria for the health assessment, followed by a gap analysis of the MCA to eliminate duplication, as shown in Figure 5.5 below. The result will be a list of appraisal criteria specific to the human health assessment.

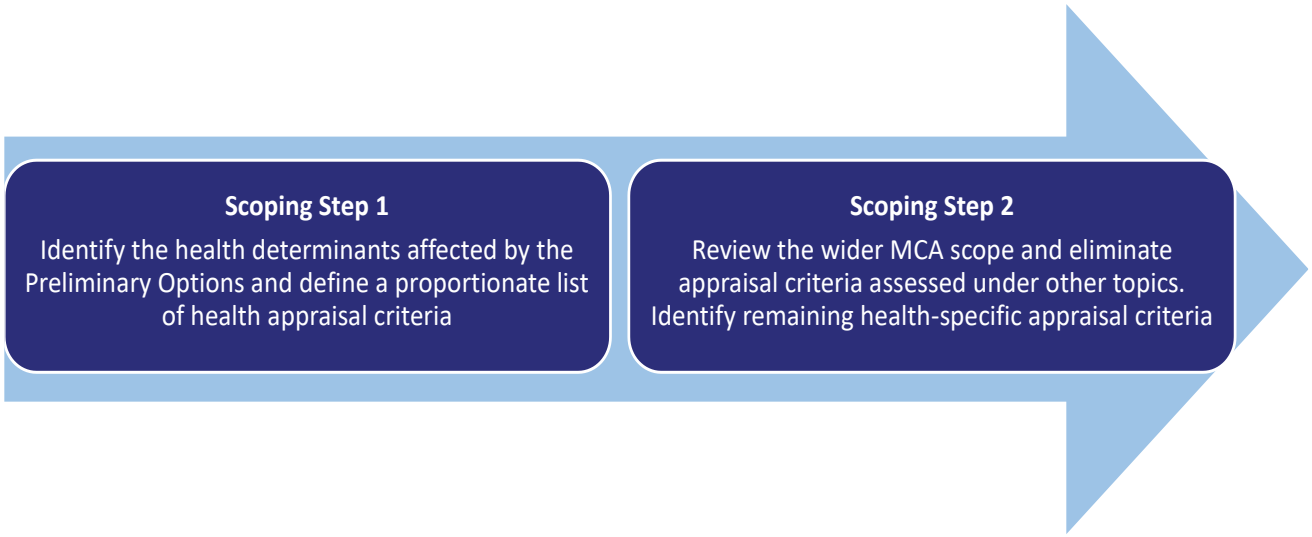


Figure 5.5 - Approach to identifying health-specific appraisal criteria

It is probable that most health determinants identified in Step 1 will be addressed under other MCA topic appraisal criteria. Where gaps are identified, the human health practitioner shall inform the Project Manager and ensure that the appropriate criteria are added in to the MCA, either as part of other topics' appraisals or as a specific health appraisal.

The human health appraisal scope shall include consideration of the distribution of positive and negative impacts on health determinants across different vulnerable groups and communities. The Social Impact Criteria will consider transport connectivity impacts on socially disadvantaged geographic areas and vulnerable user groups (see PAG Unit 7.0). However, the distribution of the wider environmental and economic effects should also be considered in order to understand the effects of the Preliminary Options on health equity (see guidance in Appendix D). Scoping shall ensure that the distribution of effects on health determinants are considered in the MCA whilst avoiding any duplication between the Social and human health assessments. Table 5.9 provides illustrative examples of the types of health-specific appraisal criteria that may be considered in the human health options appraisal.

Table 5.9 - Illustrative examples of MCA and human health appraisal criteria

Health determinants	Examples of appraisal criteria	
	MCA criteria scored in other topic assessments	**Health-specific MCA criteria**
Community and lifestyle		
Access to basic community facilities 	Social Impact appraisal • Access to urban centres and basic community facilities. • Access to community facilities for people in areas of social deprivation. • Access to community facilities for vulnerable groups such as children, people with impaired mobility or people without access to a car.	N/A
Personal safety 	Safety Impact Appraisal • Safety of routes (e.g. traffic flows, safe crossing points, visibility and lighting).	Safety of routes (e.g. traffic flows, safe crossing points, visibility and lighting) in areas with high levels of social deprivation, crime and /or high accident rates.
Opportunities for physical activity 	Accessibility Appraisal • Access to, recreational and sports facilities. Local Environmental Impact Appraisal: Population • Loss of recreational and sports facilities due to land take. • Severance and diversion of public footpaths and cycleways	Access to recreational facilities in areas with poor health and/or social deprivation. Access to walking and cycling routes in areas with poor health and/or social deprivation and / or close to schools and colleges.
Socio-economic factors		
Land and property 	Local Environmental Impact Appraisal: Population • Involuntary relocation of residents	Involuntary relocations in areas of social deprivation and/or high proportion of social housing.
Access to health and social infrastructure 	Social Impact Appraisal • Access to health services. • Access to health services from areas of existing poor health and/or social deprivation. • Access to health services for people in areas of social deprivation.	N/A

Health determinants	Examples of appraisal criteria	
	MCA criteria scored in other topic assessments	**Health-specific MCA criteria**
	• Access to health services for vulnerable groups such as children, people with impaired mobility or people without access to a car.	
Employment and income 	Accessibility Impact Appraisal • Access to employment sites. Social Impact Appraisal • Access to employment sites from areas of existing poor health and/or social deprivation. Transport User Benefits and Wider Economic Impacts • Improvement in labour market participation • Inward investment opportunities generated • Urban regeneration opportunities created	Wider economic benefits for areas of existing social deprivation and high unemployment
Environmental conditions		
Air quality 	Local Environmental Impact Appraisal: Air Quality • Exposure to air emissions (NOx and particulates) • Exposure to air emissions at vulnerable receptors (e.g. schools, hospitals, nurseries, care homes)	Exposure to air emissions (NOx and particulates) in populations with poor health and / or high levels of social deprivation.
Noise 	Local Environmental Impact Appraisal: Noise • Exposure to traffic noise Exposure to traffic noise at sensitive receptors (e.g. schools, hospitals, nurseries, care homes).	Exposure to traffic noise in populations with poor health and / or high levels of social deprivation.
Green space 	Accessibility Appraisal • Access to green space. Local Environmental Impact Appraisal: Population • Loss of green space due to land take.	Access to green space in areas with poor health and/or social deprivation.

Health determinants	Examples of appraisal criteria	
	MCA criteria scored in other topic assessments	**Health-specific MCA criteria**
Climate resilience		
Flooding 	Local Environmental Impact Appraisal: • Hydrology • Flood risk	N/A

Human health appraisal criteria should be project-specific and proportionate, taking into account the nature and scale of the project, its location and the constraints, risks and opportunities identified at earlier stages. The criteria should focus on opportunities to improve health outcomes as well as avoiding adverse effects.

The following questions can be used to guide decisions on scoping the MCA health appraisal criteria:

- Is there a potential impact (+ / -) on a health determinant and a population likely to be exposed to the change?
- Does the impact have the potential to improve or worsen health inequalities between different social groups?
- Is the impact likely to differ between the Project Options?
- Is there sufficient information to assess the impact at Phase 2?
- How does the impact relate to the Project Objectives, constraints, risks and opportunities identified at Phase 1?
- Is the impact already assessed under other MCA appraisal criteria?

5.3.2.2 Options Assessment and Project Appraisal Matrix

The Human Health assessment of the Preliminary Options at Stage 2 will comprise:

- Appraisal and scoring of the Preliminary Options against any health-specific appraisal criteria identified at the scoping stage; and
- A summary (not scored) of the overall performance of the options against appraisal criteria relevant to health across the MCA.

If the Scoping exercise and gap analysis has identified specific health appraisal criteria that are not covered in other MCA topic assessments, the health assessment practitioner shall undertake an assessment of the Preliminary Options against these criteria.

Where health-specific appraisal criteria have been identified in relation to the distribution of effects across socially disadvantaged areas and vulnerable groups, the human health practitioner shall refer to the guidance contained in Appendix C.

PAG Unit 7 provides a 7-point MCA scoring scale to evaluate and rank project options against defined appraisal criteria. Guidance on applying the MCA seven-point scale to health-specific appraisal criteria is provided in Table 5.10 below. Where the impact in question spans the scoring categories, a judgement shall made as to the most relevant score.

Table 5.10 - Guidance on applying MCA seven-point scale to health-specific appraisal criteria

MCA seven-point scale	Human Health Assessment Guidance
7 – Highly positive	The option would give rise to a potential major positive impact on the health determinant in question, which would affect a large and/or highly sensitive population. Additionally, the option may have the following effects in relation to the appraisal criterion: • Strongly support the delivery of local health policies, opportunities and / or Project Objectives relating to the health determinant in question; • Avoid adverse effects on, or provide benefits to, vulnerable groups; or • Be likely to directly result in the narrowing of existing health inequalities.
6 – Positive	The option would give rise to a positive impact on the health determinant in question, which would affect a moderate or large population of moderate sensitivity. The option may also have the following effects in relation to the appraisal criterion in question: • Support the delivery of local health policies, opportunities and / or Project Objectives relating to the health determinant in question; • Reduce adverse effects on, or provide benefits to, vulnerable groups; or • Help to narrow existing health inequalities.
5 – Low positive	The option has the potential to have a small or localised positive impact on the health determinant in question, which would affect a small or moderate sized population. The option is not likely to influence the delivery of health policies or Project Objectives relating to the health determinant in question, nor to affect vulnerable groups or health inequalities.
4 – Neutral	The option would not be likely to result in any noticeable changes to health determinants and/or any changes would affect a very small number of people. The option is not likely to influence the delivery of health policies or Project Objectives relating to the health determinant in question, nor to affect vulnerable groups or health inequalities.
3 – Low negative	The option has the potential to have a small or localised negative impact on the health determinant in question, which would affect a small or moderate sized population. The option is not likely to influence the delivery of health policies or Project Objectives relating to the health determinant in question, nor to affect vulnerable groups or health inequalities.
2 – Negative	The option would give rise to a negative impact on the health determinant in question, which would affect a moderate or large population of moderate sensitivity. The option may also have the following effects in relation to the appraisal criterion in question:

MCA seven-point scale	Human Health Assessment Guidance
	• Hinder the delivery of local health policies and / or Project Objectives relating to the health determinant in question; • Increase health risks; or • Worsen health inequalities and/or adverse effects on vulnerable groups.
1 – Highly negative	The option would give rise to a major negative impact on the health determinant in question, which would affect a large and/or highly sensitive population. Additionally, the option may have the following effects in relation to the appraisal criterion in question: • Prevent or hinder the delivery of local health policies and / or project objectives relating to the health determinant in question; • Increase health risks; or • Worsen health inequalities and/or adverse effects on vulnerable groups.

The sensitivity of the receptor population shall be evaluated using health baseline information such as social deprivation and health data, the prevalence of vulnerable groups such as children and older people, and the presence of community resources or key services such as schools, hospitals, care homes etc in the ZoI.

No guidance is given on the scale of impact that should be considered ‘major’ or ‘minor’, nor on the size of population that should be considered as ‘large’ or ‘small’, since these judgements may vary depending on the scale of the project and the type of impact being considered. Professional judgement shall be used, and the scoring shall be supported by qualitative statements describing the rationale for the scores given.

5.3.2.3 Summary of Overall Health Effects

The human health assessment practitioner shall undertake a qualitative appraisal of the overall performance of each Preliminary Option in terms of its human health effects. This shall be based on:

- Changes to conditions affecting health compared to the Do Nothing / Do Minimum, based on the MCA findings (both health-specific and relevant wider MCA criteria); and
- Consideration of the impacts of the Preliminary Options on addressing identified health risks, opportunities and Project Objectives.

Each Preliminary Option may give rise to a mixture of positive and negative effects on different appraisal criteria, resulting in a mixture of beneficial and adverse health effects. As there is no method for weighting effects, the practitioner shall provide a professional judgement on the overall effect of each option on health outcomes and health equity, setting out the balance of positive and negative effects. Judgements shall take into account the sensitivity of the affected populations and the distribution of effects across areas of social deprivation and/or vulnerable groups.

Health-specific MCA will be scored as described in 5.3.2.2 above. However, to avoid duplication, the overall health assessment of Preliminary Options shall not be scored. .A commentary shall be provided to explain the rationale for the assessment, to inform the option selection process and demonstrate how human health and health equity have been considered across the MCA. The commentary should highlight opportunities to enhance potential health outcomes or mitigate potential adverse health effects, where relevant.

The assessment of human health effects shall be documented under the Local Environment criteria in the Options Report. Consideration can be given to the use of an appendix for any larger assessment reporting requirements.

Phase 2, Stage 2 Human Health Outputs

The health assessment practitioner shall provide inputs to the Options Report, including:

- If required, further refined health baseline information, new health receptors, updated human health policies or reports since the completion of Phase 2, Stage 1.
- Summary of the Human Health scoping and gap analysis.
- Appraisal and scoring of any health-specific MCA criteria identified at scoping.
- Commentary on the overall positive and negative effects of the Preliminary Options on health and health inequalities, including consideration of impacts on achieving health-related Project Objectives.
- Description of any recommended measures to mitigate adverse effects or improve health outcomes in relation to specific Preliminary Options.

5.3.3 Phase 2, Stage 3 – Preferred Option

The human health assessment practitioner shall engage with the Project Manager and relevant topic specialists to identify any changes to the health assessment that may have arisen between Stages 2 and 3, and which may affect the findings of the Stage 2 Options Assessment. If necessary, the Stage 2 human health appraisal may be updated in response to such changes.

Phase 2, Stage 3 Human Health Outputs

The health assessment practitioner shall prepare inputs to the Options Report, including:

- Any updates to the Human Health assessment resulting from changes arising since the completion of Phase 2, Stage 2.
- A summary of the likely effects of the Preferred Option on health and health equity, including its impacts on achieving health-related Project Objectives and recommendations for mitigating adverse effects or enhancing positive health outcomes.

Mental Wellbeing During Options Selection

The Options Report and EIAR will focus on effects during the construction and operational phases of a project. However, the Option Selection Process itself has the potential to cause adverse effects on mental wellbeing, such as increased stress, in the communities affected by the Preliminary Options. This is due to concern about potential impacts on, for example, land and property, environmental conditions or community severance. Adverse effects may commence when the details of the Preliminary Options are published. Those affected will include people living within or close to the boundaries of the Preliminary Options, including those that are later discounted.

Adverse effects on wellbeing shall be reduced as far as practicable by:

- Timely public consultation, taking on board feedback from communities in the Option Selection Process and demonstrating that this has been done.
- Providing clear, transparent information on the likely effects of the Preliminary Options and commitments to mitigation measures and any compensation schemes in place, thereby increasing understanding and reducing the risk of misconceptions that may contribute to stress.
- Ensuring that project information is provided in an accessible format, with consideration given to groups who may be harder to reach, for example due to a language barrier or lack of access to the internet.

5.4 Phase 3 Design and Environmental Evaluation

During Phase 3, the human health assessment shall be led by a competent human health assessment practitioner. Guidance on assessing competence is provided in Section 1.6. The purpose of Phase 3 is to assess the likely significant human health effects resulting from the construction and operation of the proposed project. The human health assessment practitioner shall undertake the tasks outlined in Table 5.11, at a level of detail proportionate to PMG Project Phase 3 and the scale and complexity of the project. Relevant guidance provided for Phases 1 and 2 (in Sections 5.2 and 5.3) is also applicable at Phase 3.

Table 5.11 - Human health approach and process for Phase 3

Human health approach and process for Phase 3
Update and refine the Phase 2 human health information as necessary. This includes confirming the geographic extent of the ZoI to ensure that it encompasses the areas in which health effects can be reasonably expected to occur.
Collate and analyse the baseline information needed to inform the human health assessment, making best use of information used at Phase 2.
Undertake a scoping exercise to identify the potentially significant health effects to be included in the assessment.
Provide human health inputs to the Human Health chapter of the EIA Scoping Report.
Provide health inputs to the public consultation exercise and undertake direct consultation with health sector stakeholders as required.
Carry out a high-level review of evidence relating to the health determinants scoped into the assessment, to show how these are related to potential health outcomes.

Human health approach and process for Phase 3
Undertake an assessment to identify the likely significant effects on health arising from the construction and operation of the proposed project.
Identify mitigation to reduce adverse health effects and improve health outcomes.
Assess the likely significant residual effects following the implementation of agreed mitigation.
Identify and agree proposals for monitoring of health outcomes or the precursors to health outcomes.
Provide human health inputs to the Human Health chapter of the EIAR.

5.4.1 Zone of Influence

The local and wider ZoIs for the proposed project will be confirmed at Phase 3. This will be determined by the health assessment practitioner and should include the area in which the project is expected to give rise to impacts on health determinants and where receptor populations are present. The ZoIs for other topics, such as Traffic, Air Quality and Noise, will provide an indication of the geographic extent of impacts on health determinants. As a guide, the local ZoI may include an area up to 500m from the boundary of the Project, plus additional areas where impacts are likely to occur, such as within the boundaries of settlements along the route.

Where possible the ZoI should follow the boundaries of the geographic areas for which baseline data is published, such as Electoral Division (ED) or Small Areas. However, the primary consideration in setting the ZoI boundary shall be the geographic extent of likely health effects. Where no potential health effects are identified (e.g. where there are no sensitive receptors), the ZoI boundary may be reduced to avoid including additional baseline data.

The wider ZoI used to assess health effects associated with wider socio-economic effects should be defined by local authority or regional boundaries, in line with the corresponding population ZoI.

5.4.2 Stakeholder Engagement

The health assessment practitioner shall identify health stakeholders to be included in the Phase 2 consultation and liaise with the Project Manager with regard to any specific health information to be included in the consultation material. Relevant consultation responses will be reviewed by the health assessment practitioner, and the health appraisal may be amended in response to stakeholder feedback.

Engagement with health sector stakeholders will take place at the scoping stage to agree the scope of the human health assessment and obtain information on local health issues and priorities. Further engagement will take place during the assessment stage to provide an opportunity for stakeholders to comment on the development of the Project and potential health mitigation and enhancement measures.

The list of prescribed bodies will vary, depending on the planning code. A recommended list of consultees includes:

- Local authorities.
- Health and Safety Authority.
- Health Services Executive.
- Environmental Protection Agency (EPA).

Engagement with other groups and organisations may be undertaken, particularly where these represent disadvantaged communities or vulnerable groups identified in the ZoI. Examples of local stakeholders may include:

- Voluntary organisations/agencies.
- Local health and social care representatives.
- Local community groups.
- Owners or managers of impacted resources, such as medical facilities or care homes.

The population assessment also includes engagement with affected community groups, community representatives and local interest groups (see Section 4.4.3), which may also inform the health assessment. The health assessment practitioner shall ensure that there is no duplication of consultation between the human health topic and other assessment topics, such as the population, noise or air quality assessments.

Public consultation will be undertaken at the project level. The human health assessment practitioner shall engage with the Project Manager and/or the team responsible for coordinating public consultation to ensure that potential health impacts, mitigation and enhancement measures are clearly conveyed to the public.

This will encourage respondents to raise potential health issues and concerns and may help to reduce anxiety relating to the potential effects of the project.

5.4.3 Phase 3 Health Baseline

Baseline data collected at Phases 1 and 2 will be used to inform the assessment at Phase 3 and will be updated as required. Details of the types and sources of baseline data are described in Section 5.2.3.

Further detailed baseline information on health determinants will be available at Phase 3 as topics such as noise, air quality, traffic and transport and population refine and update their baseline data. Available data on health determinants will be reviewed and cross referenced in the health baseline, including:

- Community land and assets, including frequency/use data (see population baseline Sections 4.2.2 and 4.4.2.
- Air quality and noise baseline survey data.
- Landscape and visual baseline surveys.
- Traffic flows and NMU counts on the existing road network.
- Safety information associated with the existing affected transport network, including roads and pedestrian / cycle routes.

Additional health baseline information may be obtained through public consultation feedback and engagement with local health stakeholders undertaken at Phase 3.

As described in Section 5.2.3, the health baseline data presented shall be proportionate and relevant to the scope of the health assessment. Its purpose is to inform the assessment by:

- Enabling the sensitivity of the receptor population to be evaluated
- Identifying health inequalities and vulnerable groups

- Identifying existing issues and opportunities with regard to existing determinants of health

In most cases, surveys will not be undertaken specifically to inform the health baseline, although survey data from other topic baseline assessments may be used. (Also see mental wellbeing surveys box, Section 5.3.2.1)

5.4.4 Scoping

The human health scoping stage will identify the likely significant health effects to be included in the assessment. A list of health determinants that may be included in the assessment is provided in Section 2.4.

The human health assessment practitioner will be responsible for defining a proportionate assessment scope, encompassing the likely significant effects of the project on population health and excluding issues where there is no plausible health effect.

Scoping will be based on source – pathway – receptor relationships. The health practitioner shall consider whether there is a plausible theoretical link between a source (e.g. an impact on a health determinant) and a receptor population. If there is no source – pathway – receptor link, then the health determinant in question should be scoped out of the assessment.

- A 'source' is a change to a health determinant resulting from the construction or operation of the project.
- A 'pathway' is the means by which the change is transmitted to a receptor or receptors.
- A 'receptor' is a population with the potential to experience a health effect as a result of its location, sensitivity or behaviour (e.g., use of a resource).

Known committed mitigation, such as controls to be included in a CEMP, should be taken into account when applying the source – pathway – receptor approach. A precautionary approach should be applied where there is insufficient information to rule out a plausible health effect. Figure 5.6 provides illustrative examples of this approach.

Source Project Element	Effect on Health Determinant(s)	**Pathway** Means of Transmission	**Receptor** Sensitive Population	
Provision of improved cycle routes and crossings	Improved opportunities for physical activity, safety and connectivity ✓	Local community will experience improved cycling provision ✓	New routes and crossings will be used by the local community ✓	Scope in ←
Earthworks and construction of foundations	Ground contamination – potential mobilisation of contaminants ✓	Contamination contained through required mitigation measures in Environmental Management Plan ✗	Users of public footpath alongside construction site and residents of nearby housing ✓	Scope Out →
Land take required to construct project	Green space and physical activity – loss of land from playing fields ✓	Local community will experience reduced access to this resource ✓	Playing fields are used by local community and sports clubs ✓	Scope in ←

Figure 5.6 - Illustration of source-pathway-receptor approach

Some health determinants, such as water quality and ground contamination, are controlled by legislation to protect human health. In such cases, a project must demonstrate that health impacts will be avoided through the application of mitigation measures to prevent transmission of harmful substances to human receptors. The Statutory Process ensures that projects are developed in accordance with environmental legislation. The human health assessment practitioner shall liaise with the relevant topic specialists to identify where the means of transmission (pathway) will be blocked by legally required mitigation, in order to scope out such impacts from the human health assessment at an early stage.

Scoping judgements will be based on information available at the scoping stage. The information considered may include:

- Predictions of the likely magnitude, frequency and duration of impacts on health determinants.
- Size and sensitivity of the receptor population likely to be exposed to impacts.
- Nature and severity of potential health outcomes, based on knowledge of links between health determinants and health outcomes.
- Local health needs, policies and programmes.
- Known health issues, risks and opportunities.

Potential impacts on health determinants arising during the construction and operational phases of the proposed project shall be considered. Impacts that do not have the potential to lead to significant health effects shall be scoped out to ensure a proportionate assessment scope. Where impacts are scoped out, a clear justification shall be provided, with reference to relevant evidence demonstrating that one of more of the required elements (source, pathway or receptor) is absent and therefore the is no potential for a health effect to occur.

A robust scoping study can help to reduce public concern about the potential health effects of the project and reduce the risk of challenge in the Statutory Process. To support this, a preliminary assessment of scoped out issues may be presented at the scoping stage to help explain why there are no potential significant health effects.

5.4.5 Review of Evidence

For those issues included in the assessment scope, evidence for links between impacts on health determinants and mental or physical health outcomes shall be reviewed and summarised. This will underpin the assessment of health effects by establishing the types of health outcomes that are likely to occur as a result of the project impacts.

Secondary literature, such as literature reviews and reports by government and public bodies, should be referred to where possible rather than primary research papers, as secondary literature better reflects the scientific consensus. Previous evidence reviews may be used as a starting point and updated and tailored to the assessment scope.

The level of detail and certainty of evidence varies between health determinants, from clear causal links to specific health outcomes, to weaker associations with general mental and/or physical health and wellbeing. The strength of evidence indicates the degree of certainty in the assessment but should not be taken as an indicator of the importance of a health effect.

5.4.6 Assessment of Health Effects

For human health assessment undertaken as part of an EIA, an assessment of the likely significance of effects is required in accordance with the EIA Directive (2014/52/EU) (see Section 1.4).

For projects that are not subject to EIA there is no requirement to assess significance; in these cases the process described in this section shall be followed at a level appropriate to the nature and scale of the project and the likely scale of impacts. This will be determined by the health assessment practitioner and agreed with the Project Manager.

The general approach to assessing significance, including a Significance of Effect Matrix, is described in Section 3.3.4.3. For human health effects, significance will be determined by the health assessment practitioner, based on:

- The magnitude of change (positive or negative) to a health determinant.
- The sensitivity of the receptor population and distribution of effects within the population, including vulnerable groups.
- The nature and severity of potential health outcomes, supported by evidence (see Section 5.4.5).
- Relevant contextual factors such as regulatory standards, stakeholder views, public perceptions, local health policies and programmes.

The assessment will include health effects during both the construction and operational phases of the proposed project. The assessment will consider the extent to which existing health inequalities are increased or reduced by the Project. The distribution of effects across different population groups will be considered, based on the geographic location of impacts relative to sensitive residential populations and services and amenities used by vulnerable groups. Guidance on the assessment of distributional impacts is provided in Appendix D.

Information on public concerns and perceptions expressed during public consultation and stakeholder engagement should be taken into account in the assessment, where relevant. The assessment should recognise that public concern relating to a Project and its impacts can result in adverse health outcomes such as increased stress, or behavioural changes such as reduction in the number of people walking on routes affected by increased traffic, due to safety concerns.

Criteria for assessing impact magnitude and population sensitivity are set out in Tables 5.12 and 5.13. These criteria are indicative and may be adapted by the health assessment practitioner to suit the needs of the assessment.

It is likely that the magnitude / population sensitivity characteristics will fall within more than one category as shown in tables below. It is the responsibility of the health assessment practitioner to make a reasoned judgement on the category that best fits the assessment and to provide a clear rationale in the assessment report.

An assessment matrix, as shown in Section 3.3.4, will be used to determine the significance of health effects based on magnitude and sensitivity. The matrix is a tool to assist with judgement and there are no defined cut-off points between categories. The point at which an impact changes category is a professional judgement and a rationale, with reference to relevant evidence, must be provided in the assessment report.

5.4.6.1 Assessing the Sensitivity of Receptor Populations

The assessment of sensitivity of a receptor population will be based on information contained in the health baseline. Other information may also be considered, such as stakeholder feedback. A commentary will be provided explaining how the sensitivity of a population has been determined, with reference to baseline information and other evidence.

Receptor populations will be located within the ZoI but will not necessarily include the whole of the ZoI population.

They will be defined on an individual basis for each identified impact on a health determinant. Depending on the nature and scale of the impact in question, the receptor population may comprise, for example:

- Users of a specific community resource.
- Residents of one or more ED or Small Area.
- Residents of a particular neighbourhood or settlement.
- The population within a local authority or regional area.

Sensitivity will be considered in relation to the specific impact in question. For example, a community may have high levels of social deprivation and therefore high sensitivity to changes in connectivity to employment and essential services. The same community may have several large parks and green spaces in close proximity, resulting in low sensitivity to health effects from changes in access to green space.

Table 5.12 below provides indicative criteria that can be used to establish sensitivity, based on IEMA guidance[22]. It is likely in any given analysis that the impact in question will span the sensitivity categories and therefore a judgement shall made as to the most relevant category in each case.

Table 5.12 - Health receptor sensitivity – indicative criteria

Sensitivity category	Indicative criteria
High	High levels of deprivation (including pockets of deprivation); reliance on a resource shared between the population and the project, existing wide inequalities between the most and least healthy; high levels of anxiety or concern (about project impacts) within the community; high proportion of people within community have disabilities preventing them from participating in daily activities; high proportion of dependents within the community requiring a lot of care; people with very poor health status; and/or people with very low capacity to adapt to changes in health determinants.
Medium	Moderate levels of deprivation; few alternatives to a resource shared between the population and the project, existing widening inequalities between the most and least healthy; moderate levels of anxiety or concern (about project impacts) within the community; moderate proportion of people within community have disabilities limiting (but not preventing) daily activities; moderate proportion of dependents within the community requiring a lot of care; people with poor health status; and/or people with limited capacity to adapt to changes in health determinants.
Low	Low levels of deprivation; many alternatives to a resource shared between the population and the project, existing narrowing inequalities between the most and least healthy; low levels of anxiety or concern (about project impacts) within the community; low proportion of people within community have disabilities limiting (but not preventing) daily activities; low proportion of dependents within the community requiring a lot of care; people with fair health status; and/or people with fair capacity to adapt to changes in health determinants.

[22] Institute of Environmental Management and Assessment (IEMA) Guide to Effective Scoping of Human Health in Environmental impact Assessment, November 2022

Sensitivity category	Indicative criteria
Very Low / Negligible[23]	Very low levels of deprivation; no shared resource between the population and the project, existing narrow inequalities between the most and least healthy; support for the project within the community; limited number of people within community have disabilities limiting (but not preventing) daily activities; independent people (not a carer or dependent); people with good health status; and/or people with high capacity to adapt to changes in health determinants.

5.4.6.2 Assessing the Magnitude of Impacts on Health Determinants

Assessments of the magnitude of impacts on health determinants are likely to be based in part on other EIA topic assessments.

Magnitude of impact relates to the scale, exposure, frequency and duration of a change (either positive or negative) to a health determinant that occurs during the construction or operation of a project. The size of population exposed to the change is also relevant to the assessment of impact magnitude. For example, a high magnitude of impact (such as noise) on a small group of individual receptors may not translate to a high magnitude of change at the local population level.

Table 5.13 below provides indicative criteria that can be used to establish the magnitude of impacts on health determinants during both construction and operation of the proposed project, based on IEMA guidance[22]. It is likely in any given analysis that the impact in question will span the magnitude categories, and therefore a judgement shall made as to the most relevant category in each case. For example, a permanent impact may not have a high magnitude, if the scale of exposure and health consequences are limited.

Table 5.13 - Magnitude of health impact criteria

Magnitude category	Indicative criteria
High	High exposure or scale, permanent or long-term duration; continuous event; severity of impact related to changes in morbidity (physical or mental health) for very severe illness/injury outcomes; majority of the population affected; substantial changes to service quality that impacts health outcomes
Medium	Medium exposure or scale; medium-term duration, frequent event; severity of impact related to moderate change in quality of life; large minority of the population affected, moderate changes to service quality that impacts health outcomes
Low	Low exposure or scale; short-term duration, occasional event; severity of impact related to limited change in quality of life; small minority of the population affected, limited changes to service quality that impacts health outcomes
Negligible	Negligible exposure or scale; very short-term duration, one off frequency event; severity of impact related to negligible change in quality of life; very few people affected, no changes to service quality that impacts health outcomes

[23] The least sensitive category is defined in the IEMA Guidance as ‘Very Low’ and in EPA Guidance as ‘Negligible’. These terms may be considered to be equivalent.

5.4.6.3 Assessing Combined Impacts

Increased health effects may arise from a combination of impacts on health determinants such as traffic flows, noise, air emissions, visual impacts and/or severance. Combined impacts may be compounding, leading to an overall change that is greater than the sum of the individual impacts. Where there are two or more types of significant impact on health determinants in an area containing sensitive populations or receptors, the potential for increased health and wellbeing effects associated with combined impacts should be considered.

5.4.6.4 Assessing Health Outcomes from Exposure to Harmful Substances or Emissions

Exposure to emissions arising from the construction and operation of transport projects is likely to be a key issue and a source of public concern. Emissions of traffic-related noise and air pollutants are particularly relevant. Water and ground contamination is controlled by legislation to ensure the protection of human health and is therefore generally scoped out of the Human Health Assessment (see Section 5.3.2.3).

Health outcomes resulting from changes in exposure to harmful emissions may be assessed qualitatively using the method described in the previous section, or quantitatively using established exposure-response relationships. The method used shall be determined by the health assessment practitioner and should be proportionate to the risk of adverse health effects.

The assessment, qualitative or quantitative, of health outcomes should be based on residual effects, taking account of known mitigation measures (such as noise barriers) that will reduce exposure to harmful emissions. The health assessment of exposure to emissions should add value to the environmental assessment rather than repeating the conclusions of other topics. Impacts on health equity should also be considered (see Guidance in Appendix D).

Qualitative Assessment of Health Effects of Transport Emissions

Health-based objective levels for noise and air pollutants are set out in legislation[24]. Baseline levels of environmental noise and pollutant concentrations may exceed the objectives in some areas and it is not always practicable to limit the impacts of a project to within the objective levels at all receptor locations. Noise affects quality of life (e.g. annoyance and sleep disturbance) and physiological health outcomes such as heart disease and air pollution affects respiratory health.

The air quality and noise assessments undertaken for an EIA are based on predicted changes in pollutant levels/concentrations at representative sensitive receptors. As described in Section 2.4, health assessment is concerned with effects at population level rather than individual receptor level. Receptor-based assessments can provide information to inform qualitative judgements about likely effects on health and wellbeing at the population level. For example, if there are no significant noise and air quality impacts, or impacts on a small number of isolated receptors, it may be judged that changes in population exposure are very small. A larger number of impacts in a densely populated area may suggest a material change in exposure at the population level.

Changes (positive or negative) in noise and air emissions, as well as other factors such as visual quality, can result in noticeable changes in environmental amenity and may influence quality of life for the community as a whole. For example, minor or localised changes in amenity can:

- Affect the enjoyment of outside spaces such as parks, private gardens and public spaces, influencing the mental wellbeing benefits derived from spending time in these spaces.

[24] Air quality legislation available at: https://airquality.ie/information/air-quality-standards. Noise legislation available at: https://www.epa.ie/our-services/monitoring--assessment/noise/noise-guidelines/

- Deter or encourage beneficial behaviours such as walking, cycling and the use of public open spaces.
- Influence people's levels of satisfaction with their neighbourhood, affecting quality of life.
- Influence local property values leading to financial implications and associated effects on mental wellbeing.

When considering environmental amenity impacts at the population level, the health practitioner may make judgements about likely changes in environmental conditions across the wider area, including the public realm, based on the predicted impacts on individual sensitive receptors in the environmental topic assessments. For example, if a public space is close to receptors impacted by noise, there may be noticeable changes to the noise environment in the public space. Both significant and non-significant impacts may indicate a perceptible change in noise levels in the local area. The health practitioner shall discuss all judgements with the topic specialists.

The health practitioner shall liaise with the population practitioner to ensure a consistent approach in the assessment of amenity impacts. However, the assessment of significance of health effects need not correspond to population effects, since not all amenity impacts affecting community land and assets will lead to a health effect.

Quantitative Assessment of Health Effects of Transport Emissions

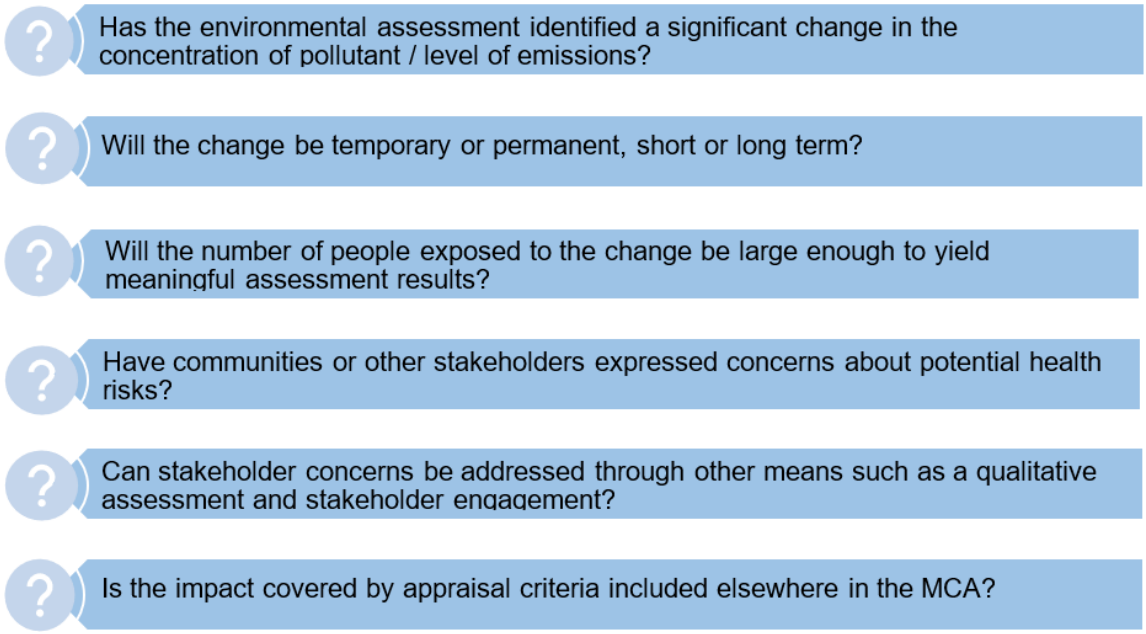
Quantitative health impact data is not needed for a robust assessment of health effects arising from air and noise emissions in all cases. In general, if the likely health effect can be reliably established through qualitative assessment and is not considered significant, it will not be proportionate to undertake a quantitative assessment of health outcomes.

For major projects that will result in significant changes to population exposure (either increased or decreased), it may be necessary and proportionate to quantify the health effects. Other considerations in the decision on whether to undertake quantitative assessment may include public concern or stakeholder feedback.

The health assessment practitioner shall consider whether the magnitude of impact (i.e. the change in pollutant concentration or emission level and the number of people exposed) is likely to yield meaningful results. For small changes in exposure, the change in health outcome identified is likely to be smaller than the degree of certainty in the assessment methodology and therefore the assessment will not be informative. In general, for a reliable assessment of change in health outcomes the size of the exposed population would be in the thousands or tens of thousands.

It may be possible to reliably quantify changes in health outcomes where there is permanent, substantial change (positive or negative) in pollutant concentrations or noise levels affecting a large population (e.g. numbering in the thousands). This may apply to major projects that result in a large shift in the location transport emissions, for example a bypass that diverts traffic away from a densely populated urban area.

The following questions should be considered when deciding whether to undertake a quantitative assessment of health effects:



Where quantitative assessment is undertaken, this should generally be done at the project-wide level, since applying concentration response functions to small populations at the local level is likely to give less reliable results.

There is no accepted threshold to define the level of change in a health outcome that will give rise to a significant effect in EIA terms. The health assessment practitioner shall make a professional judgement on the significance of effect, based on the assessment guidance provided in this SD.

Specific guidance on quantitative assessment of health outcomes arising from transport noise and air emissions is provided below.

Quantifying the Health Effects of Transport Noise

It is possible to quantify the effects on health resulting from long term exposure of a population to transport noise using established exposure-response relationships for specific health outcomes.

EPA Research on Environmental Transport Noise and Health[25] provides a detailed methodology for assessing the following health outcomes:

- Annoyance.
- Sleep Disturbance.
- Cardiovascular Disease.

The steps applied in the assessment are as follows:

- Noise contour outputs are used to define the geographical scope of population affected by changes in transport noise at defined levels.
- Address data is used to assist in the identification of residential property locations and numbers within the noise contours.
- Exposure-response relationships are used to calculate the changes in health outcomes resulting from changes in exposure to noise.

[25] Murphy, E., Faulkner, J., CacDomhnaill, C., Lyons, S., Nolan, A., Douglas, O. Environmental Transport Noise and Health: Evidence from Ireland (Noise–Health). EPA Research Report, 2022.

- Health outcomes are valued in terms of Disability-Adjusted Life Years (DALYs).

The EPA report does not identify exposure-response functions but recommends that the latest relative risk data should be acquired from the WHO publications. For example, a WHO systematic review published in 2018 provides exposure-response relationships between exposure to road traffic noise and the proportion of people with a validated measure of health outcome, for a range of health outcomes including annoyance, sleep disturbance and cardiovascular disease.

The Amended Environmental Noise Regulations (2021)[26] also provides a detailed assessment methodology, including dose-effect relations, for calculating the impact of exposure to road noise on the above health outcomes.

Quantifying the Health Effects of Air Pollution

Evidence shows associations between exposure to air pollutants from transport sources and adverse health outcomes, most notably premature mortality and hospital admissions linked to long-term exposure to PM_{10}, $PM_{2.5}$ and NO_2. The WHO Air Quality Guidelines[27] provide concentration response functions (CRFs) for mortality and hospital admissions associated with these pollutants.

A methodology for assessing health outcomes is provided in Public Health England (now Office for Health Improvement and Disparities) guidance on Estimating Local Mortality Burdens Associated with Local Particulate Air Pollution[28]. The steps applied in the assessment are as follows:

- Air quality dispersion modelling is used to determine the change in air pollutant concentrations resulting from traffic-related emissions at all human receptor locations in the air quality study area.
- The average population at each residential property in the air quality study area is estimated using available data on property counts and total population within an area.
- Modelled concentrations at each property location are multiplied by the average population at each property to derive population-weighted concentrations for the do-something and do-minimum scenarios. The results of these multiplications are summed over all locations and divided by the total population to give the total population-weighted average concentrations (PWAC) for do-something scenario and do-minimum scenario, and hence the change resulting from the project.
- Baseline data is obtained on annual rates per 100,000 population of the relevant health outcomes (e.g., mortality, respiratory hospital admissions, cardiovascular hospital admissions) at local authority level and annual cases in the air quality study area population are calculated.
- Exposure-response coefficients are used to calculate the fraction of the health outcome attributable to the increased exposure (Attributable Fraction). This is then applied to the base data to calculate the change in health outcomes.

[26] S.I. No. 663/2021 - European Communities (Environmental Noise) (Amendment) Regulations 2021 (Amendment of Second Schedule “Assessment Methods for Harmful Effects” to the Principal Regulations
[27] WHO global air quality guidelines. Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide, World Health Organization, 2021
[28] Estimating Local Mortality Burdens Associated with Local Particulate Air Pollution, Public Health England, 2014

Health Effects of Exposure to Harmful Emissions below EIA Significance Thresholds

Environmental assessment topics concerned with potentially harmful emissions are based on established thresholds above which impacts on human receptors are considered to be significant. For example, air quality assessment results are compared against the Air Quality Limit Values defined in the Ambient Air Quality Standards Regulations (2022) in order to determine significance (see Air Quality Assessment of Proposed National Roads – Standard – PE-ENV-01107).

The thresholds used to determine significance in EIA do not represent the levels at which the onset of health effects occurs. For example, health effects from noise and air pollution are known to occur below these thresholds, as set out in:

- Air Quality damage cost update 2023. Report for Defra, January 2023
- Environmental Noise Guidelines for the European Region, WHO, 2018).

EIA thresholds represent an established and widely accepted level at which effects are considered to be significant in EIA terms.

It is not possible to predict the risk of adverse health outcomes for an individual at any level of exposure, since exposure-response thresholds are based on population data. Sensitivity varies widely and changes in environmental conditions, such as noise levels, below the EIA threshold levels may increase the risk of adverse health outcomes for some individuals. However, the risk to health for individuals or small groups of people (e.g. residents of impacted properties) affected by impacts below the EIA significance thresholds is likely to be low and not expected to give rise to significant effects on population health.

A quantitative assessment of health effects from large-scale, long-term changes in population exposure to emissions, as described above, will be based on the total change in exposure, including at levels below EIA significance levels. This will give a prediction of the total change in burden of disease in the population but will not provide information on the risk to individuals.

5.4.7 Assessing Significance of Human Health Effects

The significance of health effects shall be assessed in line with EPA Guidelines (see Section 3.3.4.3). The assessment matrix (Figure 3.4) shall be used as a guide in forming a judgement of significance based on the magnitude of impact and sensitivity of the receptor population (Table 5.12 and Table 5.13). Other contextual information may be taken into account, such as the policy context or views of stakeholders, and this shall be stated in the assessment narrative.

For each individual health effect, the following information shall be provided:

- A description of the impact on a health determinant and the project aspect giving rise to this impact, with information on the nature and duration of the impact.
- A description of the population exposed to the impact, including any vulnerable groups.
- An assessment of the magnitude of impact and the sensitivity of the receptor population exposed to the impact, applying the assessment criteria (Table 5.12 and Table 5.13).
- A narrative explaining how the conclusion on significance has been reached in each case, including any contextual information.

5.4.8 Health Mitigation and Enhancement

The human health assessment will be an iterative process, whereby preliminary assessment findings are fed back to the design team and/or relevant EIA topics to ensure that potential adverse effects are avoided or reduced where practicable through design refinements and/or EIA mitigation.

These measures will not be reported as mitigation in the EIAR, as they will form part of the Project design. Examples of these embedded mitigation measures may include:

- Project options selection process to prevent disproportionate adverse effects on a vulnerable community or receptor.
- Inclusion of physical design features to reduce adverse effects on a vulnerable community or receptor, such as landscape planting or barriers.

Health mitigation measures may arise from the health assessment and/or other relevant assessments such as population, air quality and noise. The EIAR human health chapter should include a high-level summary of this process and the role of embedded mitigation in avoiding or reducing adverse health effects.

Additional mitigation measures may be proposed to reduce residual adverse health effects and/or enhance health outcomes. Examples of additional human health mitigation and enhancement measures may include:

- Strategies to help reduce health inequalities by encouraging the use of new transport links by disadvantaged social groups.
- Measures to help target construction benefits to the local community, including vulnerable groups such as the long-term unemployed, through training, apprenticeships and supporting local supply chains.
- Measures to facilitate effective communication with local communities throughout the construction phase, including advanced notice of impacts (e.g. noisy activities or traffic diversions) and a clear complaints procedure.
- Detailed design measures to improve safety, such as safe design of structures prevent suicides, improved crossings to reduce risks to pedestrians and cyclists or speed limits close to sensitive receptors such as schools.

5.4.9 Monitoring of Impacts Relating to Health Effects

Where significant health effects are identified, recommendations shall be made for monitoring during project delivery and operation. Proposals for monitoring will be determined by the PHH practitioner(s) in discussion with relevant topic specialists and the Project Manager.

As described in Section 3.3.4, monitoring shall be proportionate to the nature, location and size of the project and the significance of effects. In general, it is not recommended that health outcomes (e.g. levels of disease, obesity, life expectancy etc) are monitored, due to practical difficulties in collecting this data and attributing any observed changes in health outcome to a particular project or intervention. Detailed studies with the power to demonstrate causality will not be proportionate in terms of their cost and resource requirements. Therefore, recommendations for monitoring health effects should generally address the precursors to health outcomes, including:

- Environmental conditions such as air quality and noise levels (with cross referencing to other EIA topics).
- Behavioural and lifestyle factors such as uptake of employment and training opportunities, usage of active travel routes, etc.

Where monitoring is proposed, a protocol for reviewing results and responding to findings shall be included, including guidance on any potential remedial action to be taken.

Phase 3 Human Health Outputs

The health assessment practitioner shall prepare inputs to the human health chapter of the Scoping Report, including:

- A high-level summary of the receptor population within the ZoI and key health constraints, risks and opportunities associated with the proposed project.
- A summary of stakeholder engagement undertaken during the scoping stage, including details of the points raised by stakeholders and responses.
- A description of the health determinants scoped in the to the human health assessment.
- Rationale for scoping out any potential health effects based on the source-pathway-receptor model.
- An outline of the proposed methodology for undertaking the human health assessment.

The health assessment practitioner shall prepare inputs to the human health chapter of the EIAR, including:

- A description of the human health assessment methodology, including the process followed, the assessment criteria used to assess significance and any limitations and assumptions.
- A description of the human health ZoI with an explanation of the information and assumptions used to define this.
- A fully referenced description of the baseline information that has informed the assessment.
- A summary of stakeholder engagement, including issues raised during the scoping stage and how consultation responses from the public and health stakeholders have been considered in the human health assessment.
- A summary of published evidence demonstrating links between the relevant health determinants and health outcomes.
- A summary of embedded mitigation (agreed mitigation that forms part of the proposed development).
- A description of the likely significant effects on human health resulting from the construction and operation of the proposed project.
- A description of any additional mitigation and enhancement measures to reduce adverse health effects and/or improve health outcomes, including details of how these measures will be secured.
- An assessment of residual health effects following the implementation of secured mitigation and enhancement measures.
- Proposals for monitoring health precursors and outcomes.
- Other information required by the EIAR Manager, such as an assessment of cumulative and interactive effects.

6. Glossary and Acronyms

The following definitions describe how terminology should be interpreted in the context of this SD (PE-ENV-01108).

Term	Definition
Approving Authority	The administrative body in local or national government responsible for providing the decision over whether or not planning is granted.
Capital Expenditure (CAPEX)	The total cost to acquire and build an asset, such as a road.
Determinants of health	Biological, behavioural, socio-economic, cultural or environmental factors which contribute to the health status of individuals or populations
Equity in health	The absence of, or reduction in, avoidable disparities in health status and/or the social determinants of health, between groups of people with varying levels of social advantage.
Health	A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity (Constitution of the World Health Organisation).
Health authority	The local, regional or national health department that, by reason of its specific health competencies and responsibilities, is likely to be concerned by the health effects of a project.
Health inequalities	Avoidable disparities in health status and/or the social determinants of health, between groups of people with varying levels of social advantage.
Health outcomes	In the context of HIA, health outcomes are defined as changes in the health status of a population as a result of a change brought about by a project or programme. These may include changes in mortality and morbidity, non-communicable disease, mental health, self-assessed health or quality of life.
Gross Value Added (GVA)	Estimates of regional gross value added (GVA), which is the value generated by any unit engaged in the production of goods and services.
Mental health	A state of mental well-being that enables people to cope with the stresses of life, realise their abilities, learn well and work well, and contribute to their community.
Multi-Criteria Analysis (MCA)	The practice of assessing options against a set of objectives or criteria in order to identify a preferred set of options, or single option.
Non-motorised user (NMU)	Pedestrians, cyclists and equestrians, including people with disabilities and other mobility impaired users (e.g. people with luggage, with children, or pregnant women) (TII, 2017).
Population	A group of people with shared characteristics. This could be the entire population of an area, or a population defined by relevant characteristics that make them more vulnerable to a proposal change, such as age, socio-economic status, or use of a particular resource.

Term	Definition
Population health	The health outcomes of a group of individuals, including the distribution of such outcomes within the group (American Journal of Public Health, 2003).
Project	For the purposes of this report, a Project is defined as any TII-funded Road or Public Transport Improvement Project/Development Proposal which is subject to the requirements of the TII PMG. (TII, 2022).
Project Manager	The person assigned responsibility for the planning, execution, and delivery of a Project.
Public health	The science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals (Journal of Public Health, 2011).
Receptor	An individual, group or asset that receives an impact or effect.
Road Authority	The organisation which will be responsible for the maintenance of the road or thoroughfare after construction.
Significant effect	An effect that is judged to be worthy of attention by decision makers. Determined through informed, expert judgement about what is important, desirable or acceptable with regard to changes triggered by the project in question. The use of 'significance' in this SD is distinct from 'statistical significance'. Statistical significance is routinely used in scientific analysis to refer to whether the effects are real rather than chance occurrences,
Stakeholders	The people involved in or affected by a project, drawn from public, private and/or voluntary sectors and the communities or groups affected. (A glossary for health impact assessment, Journal of Epidemiology & Community Health, 2003).
TII Project Phases	Defined project stages according to TII. These are: Phase 0 (Scope), Phase 1 (Concept and Feasibility), Phase 2 (Options Selection), Phase 3 (Design and Environmental Evaluation), Phase 4 (Statutory Processes), Phase 5 (Enabling and Procurement), Phase 6 (Construction and Implementation) and Phase 7 (Close out and Review).
Vulnerable groups	Groups who are made vulnerable by the situations and environments they are exposed to (as opposed to any inherent weakness or lack of capacity). This includes groups of people who may be more likely to be exposed to a change in a health determinant, or to experience health effects as a result of exposure. Consideration of vulnerable groups will take into account: • how an impact on a health determinant is shown (in scientific literature) to affect a particular section of the community; • whether the affected community is already facing existing deprivation (social, economic or environmental) that could serve to intensify or change the impact(s) of the proposed project; and characteristics such as age, health conditions, or other physical or mental characteristics that make people more likely to be exposed to adverse impacts resulting from the proposed project.

Term	Definition
Wellbeing	A positive, rather than neutral, state that may be described as 'feeling good and functioning well'. Encompasses both physical and mental wellbeing.
Wider determinants of health	Wider determinants, also known as social determinants, are a diverse range of social, economic and environmental factors which impact on people's health (Office for Health Improvement and Disparities).
Zone of Influence (ZoI)	The ZoI is a defined study area around the total footprint of the project whereby receptors within this area could be subject to impacts and effects.

Acronyms used in this SD are listed in the table below.

Acronym	In Full
CAPEX	Capital Expenditure
CEMP	Construction Environmental Management Plans
CIEH	Chartered Institute of Environmental Health
CPI	Consumer Price Index
CRFs	Concentration response functions
DOH	Department of Health
DOT	Department of Transport
DALYs	Disability-Adjusted Life Years
DMRB	Design Manual for Roads and Bridges
EC	European Commission
ED	Electoral Division
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
FPHMI	Faculty of Public Health Medicine of Ireland
FTE	Full Time Equivalent
GDPR	General Data Protection Regulations
GIS	Geographical Information Systems
GVA	Gross Value Added

Acronym	In Full
HCA	Homes and Community Agency
HIA	Health Impact Assessment
HSE	Health Service Executive
IEMA	Institute of Environmental Management and Assessment
IES	Institute of Environmental Sciences
IPH	Institute of Public Health
MCA	Multi-Criteria Analysis
NFQ	National Framework of Qualifications
NMU	Non-motorised user
NMS	National Monuments Service
NPWF	National Parks and Wildlife Service
PAG	Project Appraisal Guidelines
PCT	Primary Care Team
PHH	Population and Human Health
PMG	Project Management Guidelines
PMM	Project Manager's Manuals
POD	Project/Programme Outline Document
PWAC	Population-weighted average concentrations
RCPI	Royal College of Physicians of Ireland
SA	Small Area
SD	Standard Document
SIP	Sustainability Implementation Plan
TAA	Transport and Accessibility Appraisal
TAF	Transport Appraisal Framework
TII	Transport Infrastructure Ireland
WHO	World Health Organization
ZoI	Zone of Influence

Appendix A - Residential Impact Assessment Template

The following Appendix provides an assessment sheets for assessing the impacts to residential buildings which are subject to demolition or land loss as a result of a proposed project. The purpose of the assessment is to establish the effects as a result of the project during construction or operation. The name of the residents or owners will not be disclosed due to General Data Protection Regulations (GDPR).

Construction Residential Impact Assessment Template

Residential building name or first line of address	
Location or full address	
Resource Type	
Resource Sensitivity and rationale	
Impact (e.g. permanent land loss/demolition, temporary land take) State duration (short term, long term, permanent)	
Magnitude if impact and rationale	
Significance of effect and rationale	
Proposed mitigation	
Residual effect	

Operational Residential Impact Assessment Template

Residential building name or first line of address	
Location or full address	
Resource Type	
Resource Sensitivity and rationale	
Impact (e.g. land take, amenity or access impact)	
Magnitude if impact and rationale	
Significance of effect and rationale	
Proposed mitigation	
Residual effect	

Appendix B - Open Space and Land Use Condition Survey Template

The following Appendix provides an exemplar survey sheet for the consultant to utilise when assessing the condition of open spaces and land use. The purpose of the survey is to establish the use and sensitivity of open spaces and land use identified within the ZoI in order to inform the providing of the population bassline and subsequent assessment of effects.

Data classification	Site data	Data classification	Site data
Name of Site		Owner and operator of Site (if known)	
Location / address		Size (hectares)	
OS Grid Reference		Nearest settlement	
Site access – pedestrian and/or vehicular		Number and location of access points	
Catchment of use (neighbourhood, town, metropolitan, sub-regional)		Environmental Designations	
Awards/standards		Management/stakeholders, other groups/organisations and interested parties (e.g. NPWS, Local Authority, Coillte, an Taisce, Irish Wildlife Trust, Local Charitable Group)	
Surrounding linked features (i.e., immediate connection to other community assets)			

Facilities on Site	Yes / No / N/A	Site Photo	Description and comment on quality	Features for protected groups i.e., wheelchair access, step free, baby changing facilities
Children's play area (including water play, adventure play and skate park)				
Cultural or heritage asset (e.g., public art, stately home, sculpture)				
Multi use games area				
Woodland				
Nature Reserve				
Urban Farm or animals				
Other sports facility (specify sports type)				
Café/pub/restaurant				
Signage and wayfinding				
Visitor centre/ education facility				
Benches/seating/picnic area				
Car park (including number of disabled and mother and baby spaces) and cycle spaces				
Lakes/water/ponds				

Facilities on Site	Yes / No / N/A	Site Photo	Description and comment on quality	Features for protected groups i.e., wheelchair access, step free, baby changing facilities
Toiles/changing rooms/baby changing facilities, including if accessible for wheelchair				
Used for organised events?				

Condition Survey	
Graffiti and vandalism	
Management and maintenance	
Quality of seating	
Overall quality of facilities on site	
Lines, markings and posts (if assessing a sports facility)	
Overall cleanliness	
Welcoming (gateway entrances, signage, accessibility for user types)	
Security (CCTV, sense of security, natural surveillance, presence of wardens/police)	

Appendix C - Construction Employment Calculation Examples

C.1 Example Construction Phase Direct Employment Calculation

For the purposes of the example it is assumed that the 2023 CAPEX for the project construction is €500 million over a five year construction period.

- Construction CAPEX = €500 million.
- Construction period = Five years.
- Labour coefficient = 12.06 workers per €1million, if work is completed over one year.

C.2 Example Construction Phase Net Employment Calculation

Table C1 states the additionality values that have been applied to the example construction phase net employment calculations for a Project at a regional level.

Table C1 - Additionality factors to be applied to the example net employment generation calculations

Additionality factor	Value	Evidence for the selection of additionality value
Leakage	10.4%	See row 'Regeneration through physical infrastructure' on Table 4.2 of HCA Guidance.
Substitution	37.4%	See row 'Regeneration through physical infrastructure' on Table 4.7 of HCA Guidance.
Displacement	2.2%	See row 'Regeneration through physical infrastructure' on Table 4.9 of HCA Guidance.
Multiplier Effect	2.7	See row 'Construction' on Table 4.11 of HCA Guidance Document.

- Net employment generation per annum = Gross jobs per annum * (1-leakage%) * (1-substitution%) * (1-displacement%) * multiplier effect
- =998 * (1-14.1) * (1-38.7) * (1-2.2) * 2.7.
- 1,478 net employment generation.

C.3 Example Economic Output (GVA) Calculation

Using 2023 as the assessment year the GVA according to the EU[29] the construction industry in Ireland during 2022 had a value of €10,709.9 million with 163,200 workers within the sector in 2022 according to the CSO[30].

The practitioner will have to check these values to ensure the latest figures are being utilised in their assessment.

In 2022 the GVA per worker in construction:

[29] Eurostat. 2023. Dataset - Gross value added and income by A*10 industry breakdowns.
[30] Central Statistics Office. 2023. https://data.cso.ie/table/QLF03

- = GVA of sector / number of workers.
- = 10,709.9 million / 163,200.
- = €65,624 GVA per construction worker.

To calculate the economic output of the project the GVA per worker of Ireland is multiplied by the net employment generated.

- €65,624 * 1,478.
- €96,992,272 GVA per annum over the five-year construction period.

The steps previously described in Section 4.4.4 to identify receptor sensitivity, magnitude of impact and significance of effect, will be followed when reporting construction phase employment generation.

As previously stated, the information contained within the wider business case will also identify direct and significant effects on local economies.

The wider business case is related to, but differs from, this assessment in that it predicts overall benefits to the output of the regional and national economy whereas this assessment provides a reasonable worst-case assessment of impacts for the purpose of EIA. If the business case reports anticipated construction employment generation, a cross comparison between the results of the calculation and the business case should be undertaken. Whichever reports the lowest value should be utilised in the assessment to ensure a conservative outlook for employment generation is maintained which promotes the requirement to assess the worst-case scenario.

Appendix D - Guidance on Distributional Impact Assessment and Health Inequalities

D.1 Guidance on Distributional Impact Assessment and Health Inequalities

D.1.1 Introduction

Health inequalities are differences in health outcomes resulting from differences in the socio-economic or environmental conditions that people live in. Health equity is a fundamental principle of public health improvement, which aims to minimise avoidable disparities in health between groups of people who have varying levels of social advantage[31].

Vulnerable groups are those whose health is more likely to be affected because their characteristics or circumstances mean they are either more likely to be exposed to an impact, or more likely to experience a health effect resulting from exposure. Disadvantaged groups are a subset of vulnerable groups and include people whose health and wellbeing are compromised by the social, economic and/or environmental conditions in which they live. People with certain characteristics may be considered more vulnerable because they are over-represented in disadvantaged groups. For example, older people may be more likely to have health problems or impaired mobility, to live in isolated areas and/or be without a car, and people from minority ethnic groups may be more likely to live in areas of high social deprivation.

Impacts on disadvantaged groups and vulnerable groups can be identified by looking at the distribution of positive and negative impacts on health determinants across different geographic areas and social groups. This appendix provides guidance on the assessing health inequalities at PMG Project Phase 2, Options Appraisal, and Phase 3, Design and Evaluation.

The assessment of health inequalities includes the following key stages:

- Define the scope of the assessment, by identifying:
  - Disadvantaged and/or vulnerable groups present in the study area.
  - Likely significant impacts on health determinants that have the potential to differentially affect different geographic areas and/or social groups.
- Map the location of disadvantaged / vulnerable groups and/or resources used by these groups.
- Map the spatial distribution of positive and negative impacts across the study area and looking at the characteristics of the populations and resources present in these areas.
- Consider potential non-spatial factors that may result in differential effects, such as cost, accessibility and cultural factors.
- Using quantitative data on the distribution of impacts, qualitatively assess effects on health inequalities and vulnerable groups.
- Identify recommendations. For a PMG Phase 2 options appraisal, the preferred options(s) to reduce health inequalities or reduce adverse effects should be identified. For a Phase 2 options appraisal or a Phase 3 assessment of the preferred scheme, recommendations may be made for mitigation and enhancement measures to improve the performance of the scheme. For EIA, proposed mitigation should be appropriately secured.

[31] Department of Health, Healthy Ireland – A framework for improved health and wellbeing 2013 - 2025

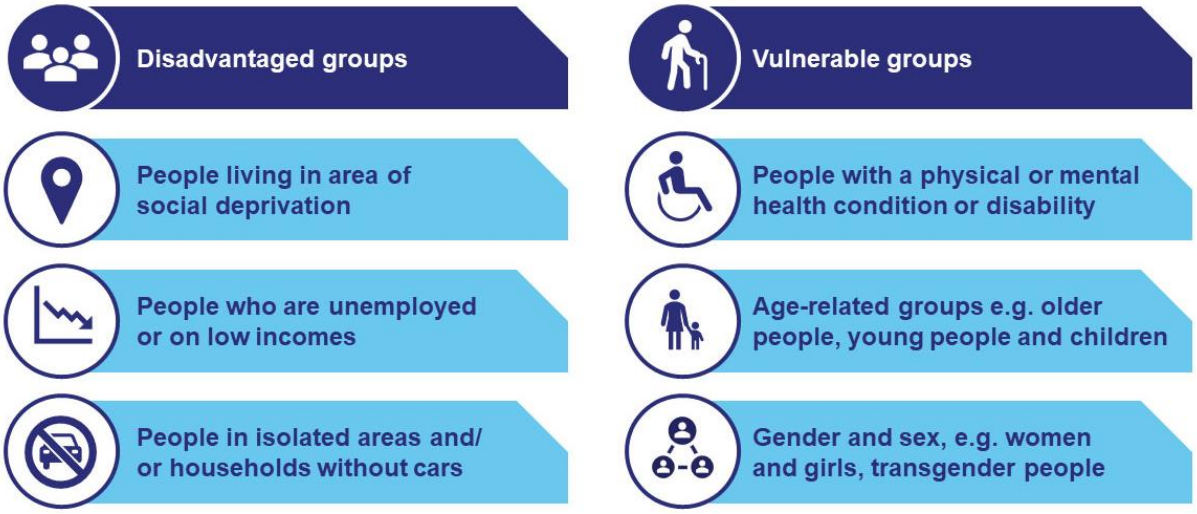
The guidance contained in this appendix should be applied by the health assessment practitioner in a proportionate manner, focusing on likely impacts on at a level relevant to the nature and scale of project and the PMG Project Stage.

D.1.2 Identifying Disadvantaged and Vulnerable Groups

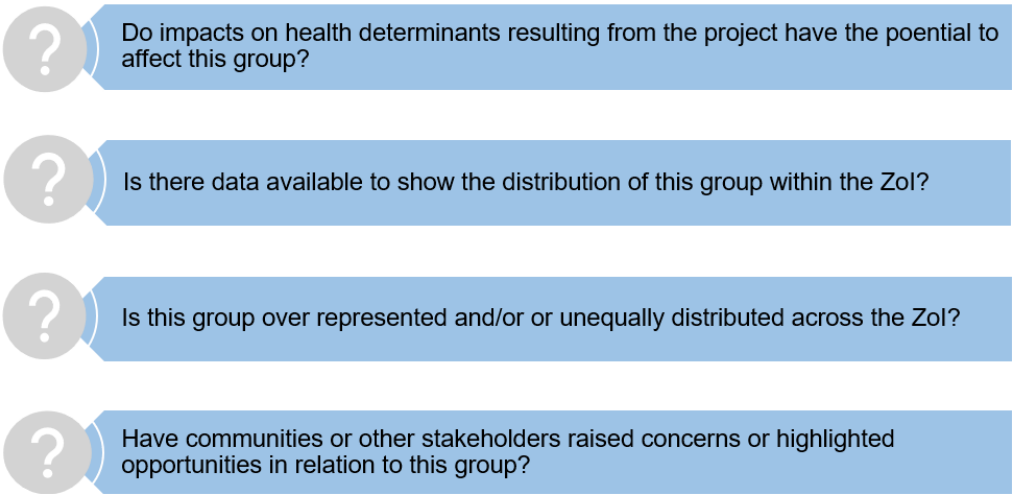
Sources of data on vulnerable and disadvantaged groups are described in Section 5.2.3 of this SD (PE-ENV-01108).

Social deprivation is a determinant of health and wellbeing, with a strong correlation between higher levels of social deprivation, poor health and reduced life expectancy, and may be considered as a proxy for existing health inequalities. Because of this correlation, and the availability of disaggregated social deprivation mapping, impacts on people living in areas of high social deprivation are likely to be considered in the assessment of health inequalities.

Where relevant, the practitioner may also consider other data relating to groups of people who are vulnerable or disadvantaged and who may potentially be disproportionately impacted. Examples of such disadvantaged or vulnerable groups may include (but are not limited to) those listed below.



In deciding which groups to include in the assessment, the health assessment practitioner should consider the following questions:



In addition to the resident population, trip attractors may indicate the presence of vulnerable or disadvantaged groups in the study area. Examples of services and community resources used by groups who are potentially vulnerable or disadvantaged are shown in Table D.1 below.

Table D.1 - Examples of community facilities used by vulnerable or disadvantaged groups

Examples of trip generators	Examples of potentially vulnerable or disadvantaged users
Nurseries, schools and colleges	Children and young people
Community / family support centres	Children and young people, single parents, people on low incomes
Care homes	Older people, people with physical or learning disabilities, people with physical or mental health conditions
Hospitals and medical centres	Older people, people physical or mental health conditions
Parks and playgrounds	Children and young people, older people
Local shops and services	Households without cars, older people
Places of worship, cultural centres	Minority ethnic groups, older people
Bus and public transport services, active travel routes	Households without cars, people on low incomes, older people, children and young people

D.1.3 Identifying Relevant Impacts on Health Determinants

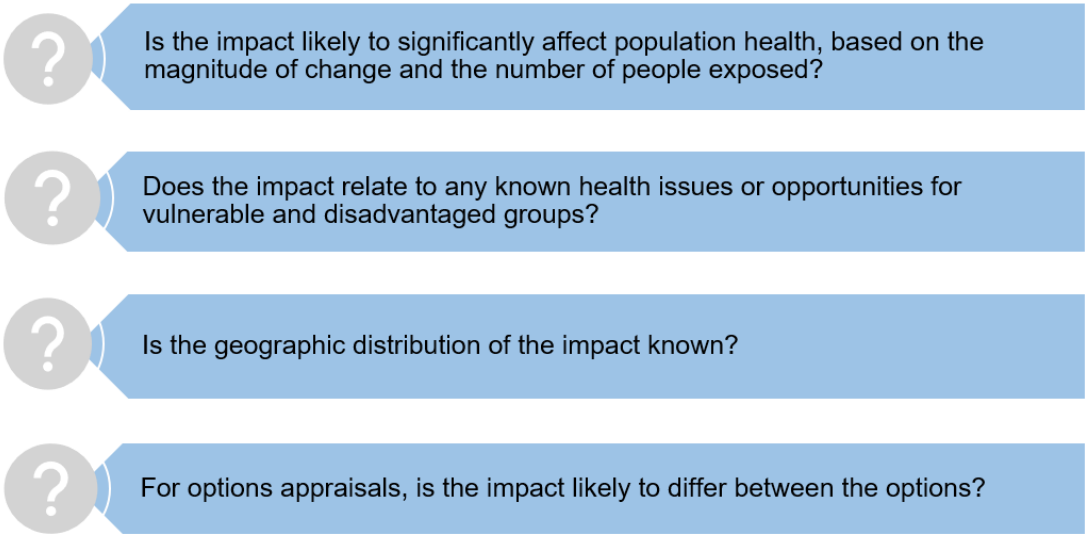
Impacts on health inequalities may arise as a result of impacts on environmental, economic and/or social determinants of health. The assessment will draw on impacts identified by other topics. Table D.2 below provides examples of impacts on determinants of health that may be assessed at Phases 2 and 3.

Table D.2 - Examples of Relevant Impacts Assessed by Other Topics

Indicative health determinants	Examples of impacts assessed by other topics that may affect health inequalities	
	PMG Phase 2 MCA	PMG Phase 3 EIAR
Income, employment and education	Transport User Benefits and Other Economic Impacts: wider economic impacts *(may not be location-specific)* Population: impacts on local businesses, employment impacts, and impacts on educational facilities	Population: impacts on local businesses, employment impacts, and impacts on educational facilities
Access and connectivity	Transport User Benefits and Other Economic Impacts: travel time, transport costs and journey reliability impacts Accessibility Impacts: accessibility of community facilities, health and social services, jobs and transport hubs	Transport Assessment: traffic and transport impacts Population: access to community land and assets, public rights of way

Indicative health determinants	Examples of impacts assessed by other topics that may affect health inequalities	
	PMG Phase 2 MCA	**PMG Phase 3 EIAR**
Safety	Safety Impacts: impacts on the safety of existing roads, junction layouts, pedestrian and cycle provision, lighting, visibility and signage	Transport Assessment: predicted changes in accident rates and improvements to road layouts and pedestrian / cycle provision
Physical activity	Population Appraisal: parks and public open space, sport and leisure facilities, assets used by walkers, cyclists and horse riders	Population: impacts on parks and public open space, sport and leisure facilities, assets used by walkers, cyclists and horse riders
Living and Working Conditions	Local Environmental Impacts: air quality, noise, visual impacts	Air quality: impacts on sensitive health receptors Noise: impacts on sensitive health receptors Landscape and visual: visual / lighting impacts on residential areas and community facilities

In deciding which impact(s) to focus on, the health assessment practitioner should consider the following questions:



D.1.4 Avoiding Duplication

The health assessment practitioner should liaise with topic specialists to avoid duplication of distributional analysis and/or double counting of impacts. For example, the MCA appraisal of Social Impact at PMG Phase 2 considers the distribution of transport benefits across different social groups. Guidance on Social Impact appraisal is provided in TAF Module 7 (see box below). To avoid duplication, this analysis should be excluded from the human health assessment at.

TAF Module 7 – Detailed Guidance on Appraisal Techniques

Guidance on MCA Social Impact Appraisal – Distributional Analysis of Transport Benefits

Transport projects can affect different deprived or vulnerable groups. Those belonging to such groups often reside in areas that are either remote or economically disadvantaged. Transport impacts, including improved access to critical social services and improved access to employment, can improve the wellbeing and economic welfare of individuals in communities. Some of the groups for which accessibility impacts which should be specifically considered under this criterion include:

- Those with mobility difficulties, physical or intellectual impairments, and the elderly, including their carers, who may not have an accessible alternative mode of transport.
- Those with hidden disabilities, including for example those on the autism spectrum and those with dementia, who may need extra time and delicate understanding to ensure they are safely cared for.
- Those in lower income groups or from disadvantaged social and economic backgrounds.
- Members of household where there is no car ownership.
- Parents and carers with children, particularly those using strollers and buggies and who are particularly reliant on public transport.

Assess the Distribution of Impacts

The health assessment practitioner should undertake the following steps to assess the distribution of impacts:

- Using Geographical Information Systems (GIS), map the distribution of disadvantaged and vulnerable groups across the study area. This may be based on data from the Pobal Deprivation Index and/or relevant health and social datasets (see Table 5.4 of this SD). Data should be mapped at the most detailed level available, e.g. Electoral Division or Small Area level, to show the variation across the study area.
- Where relevant, map the locations of sensitive receptors such as services and amenities used by vulnerable groups.
- Obtain outputs from the relevant topic assessments showing the distribution of positive and negative impacts across the study area.
- Overlay impacts onto mapping of vulnerable and disadvantaged group(s). Where possible, extract data from GIS to show the distribution of impacts across different population groups.

The distributional assessment should not necessitate the production of additional data by other assessment topics. Existing quantitative assessment outputs should be used and the health practitioner should liaise with topic specialists regarding the availability and format of datasets. Where topics have undertaken a high-level, qualitative assessment, these findings may also be considered in the distributional assessment.

The distribution of impacts may be shown on mapping and or/ tables showing the positive and negative impacts affecting different population groups.

D.1.5 Assessment of Effects on Health Inequalities

Impacts on health equity and vulnerable groups should be assessed using professional judgement, informed by quantitative and qualitative information on the likely distribution of impacts across different groups. In addition to the spatial distribution of impacts, the practitioner should consider other factors such as financial, safety or accessibility issues that may affect the ability of different groups to access benefits or increase the risk of adverse effects.

The proposed project / project options may give rise to a range of impacts on different groups, resulting in a mixture of effects on health inequalities. As there is no method for weighting effects, the practitioner should provide a professional judgement on the overall effect on health inequalities.

The assessment should take account of local issues and context, including the extent of existing health and social inequalities in the study area and issues affecting disadvantaged groups such as poor connectivity, lack of green space or high unemployment.

A clear narrative should be provided, supported by mapping and data, setting out the positive and negative effects on different groups and describing the impacts on health inequalities and identifying any priority areas. Limitations in the availability of data inputs and assumptions made in the assessment should be described.

D.1.6 Worked Example

An example assessment of impacts on health inequalities is provided below. This example considers the distribution of noise, air quality and population impacts across populations with different levels of social deprivation.

This worked example shows an analysis undertaken at PMG Phase 2 – Options Selection, as part of Stage 2 – Project Appraisal Matrix. A similar approach may be adopted for the assessment of the Preferred Option at PMG Phase 3. Likewise, a similar approach may be used to assess the distribution of impacts on other health determinants, where the location of impact can be predicted.

D.1.6.1 Scheme Description

The assessment considers three options identified at PMG Phase 2, Stage 2 Preliminary Options assessment. These are:

- Pink Option: Online improvements to an existing N-Road through town centre.
- Yellow Option: Bypass to the north of the town
- Green Option: Bypass to the south of the town

The Preliminary Options are shown in Figure D.1.

A transport assessment model has been developed and this has confirmed that there are no significant changes to traffic flows across the wider road network as a result of any of the Preliminary Options.

D.1.6.1.1 Step 1 – Scope of Assessment

The vulnerable / disadvantaged groups considered in the worked example are:

- People living in areas of high social deprivation (a proxy for poor health).

The impacts on health determinants considered in the worked example are:

- Community assets potentially affected by land take, or changes to amenity, accessibility and severance, including, community facilities (such as village halls, youth clubs and leisure facilities) health services, schools, colleges, nurseries and nursing homes.
- Air quality, based on property counts of existing sensitive receptors within 0-50m of the potential road footprint (option corridor).
- Traffic noise, based on the potential number of properties likely to be exposed to traffic noise levels above 60 dBL_{den} and hence require noise mitigation, and (for bypass options) predicted noise reduction on the existing alignment.

D.1.6.1.2 Step 2 – Data and Inputs

Table D.3 below shows an example of data that may be to identify vulnerable / disadvantaged groups and examples of quantitative and qualitative topic assessment outputs selected that may be used in the assessment of distributional effects. Any limitations in the data are described. Assessment inputs should be identified by the health assessment practitioner, depending on the scope of the assessment and availability of data (see Table D.2).

Table D.3 - Illustrative assessment inputs

Receptor / Impact	Datasets / other inputs
Vulnerable or disadvantaged groups	
People living in areas of high social deprivation	Dataset: Pobal Deprivation Index Small Area data
Impacts on health determinants	
Community assets	Dataset: GIS dataset compiled for the Population assessment from GeoAddress Data, aerial photography and walkover surveys. Negatively impacted receptors are identified in the Population assessment. These are sensitive receptors potentially impacted by land take, severance or amenity impacts.
Air quality	GIS dataset of sensitive air quality receptor compiled from Population data. Potentially negatively impacted receptors are identified in the Air Quality assessment as are sensitive receptors within 50m of carriageway, for routes with a predicted change in traffic flow of +/- >10%. Positive impacts comprise reductions in traffic emissions along the existing alignment resulting from the bypass options. Qualitatively assessed in air quality assessment.
Noise	GIS dataset of sensitive noise receptors compiled using Population data. Negatively impacted receptors are identified in the Noise assessment. These are sensitive receptors exposed to traffic noise levels above 60 dB L_{den} a as a result of the scheme options. Positive impacts comprise noise reductions along the existing alignment resulting from the bypass options. Predictions are provided at four Traffic Reference Links (A-D) and do not show the detailed distribution of impacts along the route.

D.1.6.1.3 Step 3 – Impact Distribution

The locations of impacted receptors have been overlaid onto Pobal Deprivation Index data in GIS to show the distribution of impacts across populations with different levels of social deprivation. See Figure D.1.

As shown in Table D.4, data has been extracted from GIS to show the distribution of impacts on health determinants across communities in the following Pobal Deprivation Index categories present in the study area:

- Marginally affluent
- Marginally disadvantaged to disadvantaged
- Very disadvantaged to extremely disadvantaged

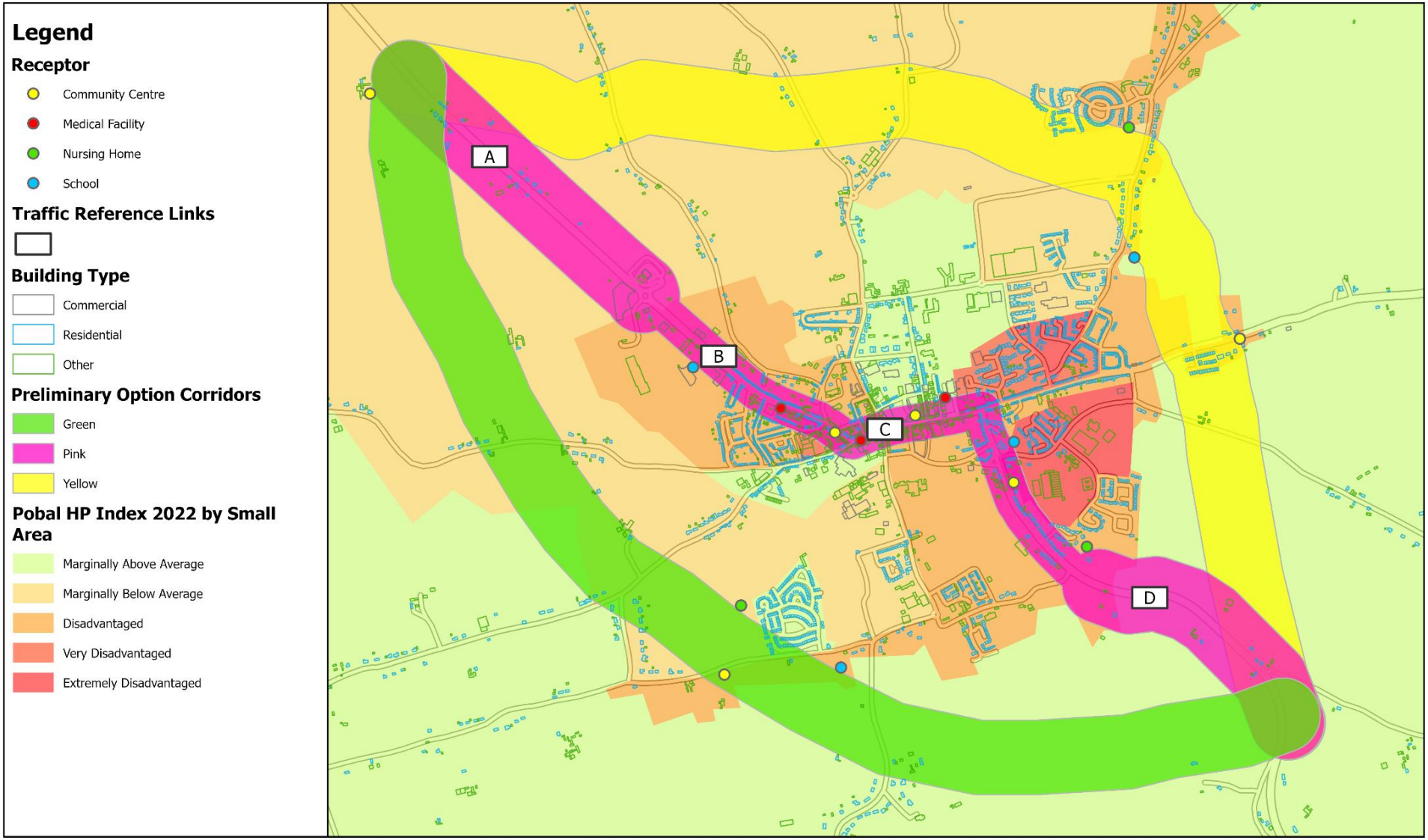


Figure D.1 - Preliminary Option Corridors and Receptors

Table D.4 - Distribution of Impacts

Option Corridor	Negative impacts						Positive impacts	
	Population – community assets				Air quality (receptors within 50m)	Noise receptors >60dBLden (change)	Reduction in emissions on existing alignment	Reduction in noise on existing alignment (dB)
	Community facilities	Medical facilities	Schools / colleges	Nursing homes				
Do Minimum	-	-	-	-	45	88	-	-
	-	-	-	-	48	115		
	-	-	-	-	89	195		
Total					182	398		
Pink (online upgrades)	1	2			(0)	(0)	-	-
	1		1	1	(0)	(+12)		
	2	1	1		(0)	(+20)		
Total					(0)	(+32)		
Yellow (northern bypass)	1		1		(+13)	(+9)	Reduction in emissions (not quantified)	A: - 2; B: - 4 C: - 2; D: - 3
	1			1	(+44)	(+22)		
					(0)	(0)		
Total					(+57)	(+31)		

Option Corridor	Negative impacts						Positive impacts	
	Population – community assets				Air quality (receptors within 50m)	Noise receptors >60dBLden (change)	Reduction in emissions on existing alignment	Reduction in noise on existing alignment (dB)
	Community facilities	Medical facilities	Schools / colleges	Nursing homes				
Green (southern bypass)					(+19)	(+5)	Reduction in emissions (not quantified)	A: - 4; B: - 6 C: - 3; D: - 4
	2		1	1	(+24)	(+7)		
					(0)	(0)		
Total					(+43)	(+12)		

Marginally affluent
Marginally disadvantaged / disadvantaged
Very disadvantaged / extremely disadvantaged

D.1.6.1.4 Step 4 – Assessment of Effects on Health Inequalities

Pink Option (Online Upgrades)

Community Assets

There are 10 sensitive community receptors within 50m of the Pink Option including four community facilities, three medical facilities, two educational facilities and one nursing home. Four of these are located in very / extremely disadvantaged areas and a further 3 are within marginally disadvantaged/ disadvantaged areas. These assets are currently impacted by the existing road. Existing traffic congestion causes severance for drivers, cyclists and pedestrians and generates noise and air emissions. The Pink Option would have the following potential impacts on community assets:

- Adverse construction impacts, such as severance from lane closures and amenity impacts from noise and air emission and visual intrusion.
- Adverse impacts due to potential land take and relocation.
- Positive impacts on access for drivers during operation due to reduced traffic congestion resulting from online improvements.
- Positive or negative impacts on access for pedestrians and cyclists during operation, depending on traffic speeds, pedestrian crossings, cycle lanes and traffic management measures.
- Increased traffic noise during operation, resulting in potential amenity impacts.

Noise and Air Quality

The Pink Option would reduce congestion along the existing road alignment compared with the Do Minimum. There are 182 sensitive air quality receptors within 50m of the existing road and 398 sensitive receptors exposed to traffic noise levels above 60 dB Lden as a result of the existing road. The majority properties impacted by the existing road are in areas ranging from marginally to extremely disadvantaged.

The Pink Option would not result in any >10% changes to traffic flows and therefore the air quality assessment has not predicted any positive or negative impacts. Changes to noise emissions are predicted along the route, resulting from changes in traffic flow and speed. This would result in an estimated 32 additional properties exceeding the design goal of 60dBLden and requiring mitigation. Of these, 12 are in marginally disadvantaged / disadvantaged areas and 20 are in very / extremely dis-advantaged areas.

Yellow Option (Northern Bypass)

Community Assets

The Yellow Option would avoid potential adverse construction impacts on community receptors in disadvantaged areas along the Pink Option corridor. It would also have potential positive impacts on these receptors during operation, due to improved access and amenity resulting from a reduction in through traffic.

There are four sensitive community receptors within 50m of the Yellow Option, including two community facilities, one educational facility and one nursing home. These receptors are located in marginally affluent and marginally disadvantaged areas and are not currently impacted by severance or amenity impacts from major roads. None are located in very / extremely disadvantaged areas.

Impacts on community assets along the Yellow Option corridor may include:

- Adverse construction and operational impacts, including severance and impacts on environmental amenity.
- Adverse impacts due to potential land take and relocation.
- Adverse operational impacts, including severance resulting from the presence of the new road infrastructure and adverse effects on environmental amenity.

Noise and Air Quality

The Yellow Option would divert traffic from the existing road onto a bypass around the north side of the town, reducing air and noise emissions close to sensitive receptors along the existing road. Air emissions have not been quantified but are expected to reduce significantly. Noise levels at the four AADT modelling locations are predicted to reduce by 2 to 4 dB, resulting in a negligible to minor long-term reduction in noise levels at sensitive receptors along the existing road. The majority of receptors benefitting from improved noise and air quality along the existing road are in areas ranging from marginally to extremely disadvantaged.

Receptors along the route of the Yellow Option would be newly exposed to air and noise emissions from traffic on the northern bypass. There are 57 sensitive air quality receptors within 50m of the potential route, of which the majority (44) are in marginally disadvantaged to disadvantaged areas and 13 are in marginally affluent areas. 31 properties are predicted to exceed the design goal of 60dBLden and would require noise mitigation, of which 22 are in marginally disadvantaged / disadvantaged areas and 9 are in marginally affluent areas.

Green Option (Southern Bypass)

Community Assets

The Green Option would avoid potential adverse construction impacts on community receptors in disadvantaged areas along the Pink Option corridor. It would also have potential positive impacts on these receptors during operation, due to improved access and amenity resulting from a reduction in through traffic.

There are four sensitive community receptors within 50m of the Green Option, including two community facilities, one educational facility and one nursing home. These receptors are located in marginally disadvantaged areas and are not currently impacted by severance or amenity impacts from major roads. None are located in very / extremely disadvantaged areas.

Impacts on community assets along the Green Option corridor may include:

- Adverse construction and operational impacts, including severance and impacts on environmental amenity.
- Adverse impacts due to potential land take and relocation.
- Adverse operational impacts, including severance resulting from the presence of the new road infrastructure and adverse effects on environmental amenity.

Noise and Air Quality

The Green Option would divert traffic from the existing road onto a bypass around the south side of the town, reducing air and noise emissions close to sensitive receptors along the existing road. Air emissions have not been quantified but are predicted to reduce as a result of the >10% reduction in traffic flows. Noise levels at the four AADT modelling locations are predicted to reduce by 3 to 6 dB, resulting in a minor to moderate long-term reduction in noise levels at sensitive receptors along the existing road. The majority of receptors benefitting from improved noise and air quality along the existing road are in areas ranging from marginally to extremely disadvantaged.

Receptors along the route of the Green Option would be newly exposed to air and noise emissions from traffic on the southern bypass. There are 43 sensitive air quality receptors within 50m of the potential route, of which 24 are in marginally disadvantaged to disadvantaged areas and 19 are in marginally affluent areas.

12 properties are predicted to exceed the design goal of 60dBLden and would require noise mitigation, of which 7 are in marginally disadvantaged / disadvantaged areas and 5 are in marginally affluent areas.

D.1.6.1.5 Step 5 – Conclusions and Recommendations

The Pink Option is similar to the Do-Minimum Option, with traffic continuing to use the existing route through the densely populated town centre, where the majority of receptors are located in marginally to extremely deprived areas. The Pink Corridor also contains the highest number of community assets, most of which are located in marginally to extremely deprived areas. This option would increase exposure to traffic noise at some receptors but is not expected to significantly impact air quality. The Pink Option is the least preferred in terms of health inequalities as communities with high levels of social deprivation are disproportionately exposed to adverse impacts on health determinants during construction and operation.

Both the Yellow and Green Options would reduce existing traffic noise and air emissions for disadvantaged communities along the existing road and avoid construction impacts in these areas. While the bypass options would introduce new receptors, they would result in a more equal distribution of negative construction and operational impacts across socially advantaged and disadvantaged areas compared to both the Do-Minimum and the Pink Option, reducing health inequalities.

The Green Option is marginally preferred over the Yellow Option as fewer receptors would be newly exposed to negative impacts. However, it is noted that the Green Option results in potential negative impacts on two community assets located in marginally disadvantaged / disadvantaged areas.

Should the Pink Option be taken forward, it is recommended that mitigation and enhancement measures are included along the existing road alignment to reduce health inequalities. This may include measures such as improved pedestrian and cycle provision, planting and street improvements, and noise mitigation such as secondary glazing for receptors with noise levels above 60dBL_{den}, including those already exceeding this level as a result of existing traffic along the route.

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