



ENVIRONMENTAL IMPACT STATEMENT – METRO NORTH

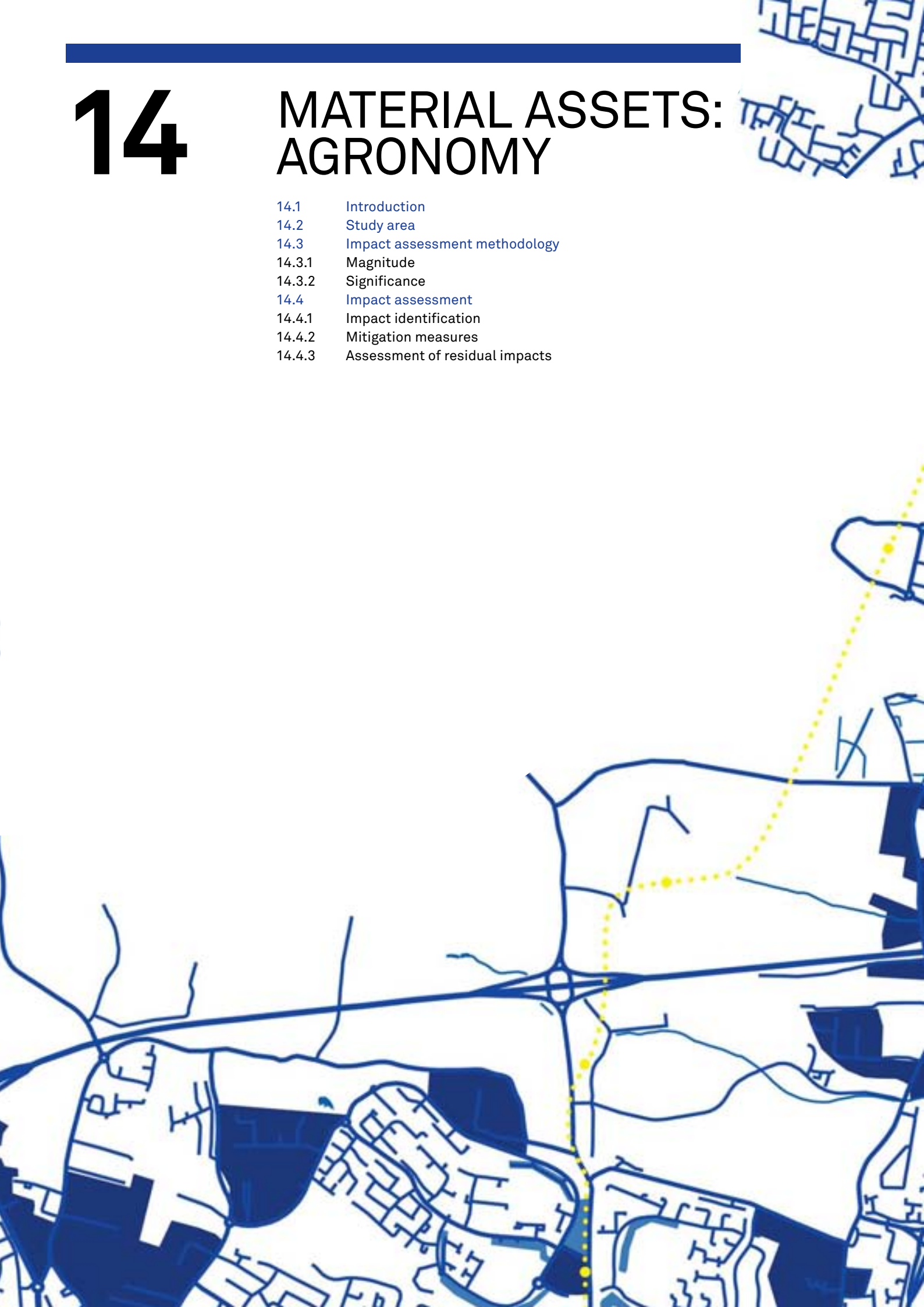
BELINSTOWN TO SWORDS STOP

AREA MN101 (PART 4 – CHAPTER 14 to 18)
VOLUME 2 – BOOK 1 OF 7

14

MATERIAL ASSETS: AGRONOMY

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This chapter of the EIS evaluates the potential for impacts on agronomy to occur due to the construction and operation of the proposed scheme in Area MN101.

14.1 INTRODUCTION

This chapter of the EIS evaluates the potential for impacts on agronomy to occur due to the construction and operation of the proposed scheme in Area MN101.

14.2 STUDY AREA

The study area for this assessment is set out in Table 14.1.

Table 14.1 Study area

Criteria	Area of Agricultural Land Directly Affected
Farms directly affected by the proposed scheme are illustrated on maps (Baseline Agronomy) included in Volume 3, Book 1 of 2.	192 ha

14.3 IMPACT ASSESSMENT METHODOLOGY

The source and type of all potential impacts is described in Section 14.4.1. Mitigation measures to be put in place are defined in Section 14.4.2. Mitigation measures are defined for any adverse impacts that are deemed to be of medium or greater significance prior to mitigation. The extent to which mitigation is needed increases as the significance of the impact increases. The residual impact of each impact is then evaluated in Section 14.4.3 in terms of magnitude and significance.

14.3.1 Magnitude

The magnitude of the impact takes into account the type and range of impact that will occur as well as the duration over which the impact will occur. The criteria for assessment of impact magnitude are set out in Table 14.2.

Table 14.2 Criteria for assessment of impact magnitude

Criteria	Impact magnitude
<ul style="list-style-type: none"> - A large proportion of the land lost - A large proportion of the land severed - Permanent loss of farm buildings or water sources - Impact would cause a change in farming enterprise 	very high
<ul style="list-style-type: none"> - A large proportion of the land lost - A medium proportion of land severed - Farm buildings or water sources may be affected but can be replaced - Impact would not cause a change in farming enterprise but would require high degree of operational changes 	high
<ul style="list-style-type: none"> - A medium proportion of the land lost - A small proportion of land severed or no severance - Farm buildings or water sources may be affected but can be replaced - Impact would not cause a change in farming enterprise but would require significant operational changes 	medium
<ul style="list-style-type: none"> - A small proportion of the land lost - A small proportion of land severed or no severance - Farm buildings or water sources may be affected but can be replaced - Impact would cause a minor change in the day to day operation of farms 	low
<ul style="list-style-type: none"> - A small proportion of the land lost - A small proportion of land severed or no severance - No impact on operation of farms 	very low

14.3.2 Significance

The significance of the impact is defined by evaluating the magnitude of the impact and the functional value of the affected receptor. The targets of the impact in this assessment are the individual farms directly affected by the proposed scheme. Therefore an impact which affects a farm with a low functional value will not be as significant as a similar impact which affects a farm with a high functional value.

14.4 IMPACT ASSESSMENT

14.4.1 Impact identification

The elements of the proposed scheme that will act as sources of impact on agronomy include the following:

All permanent above ground built structures associated with the proposed scheme, earthworks, cuttings and embankments, the catenary system and supporting structures, the depot and Park & Ride facilities, construction compounds, substations, ventilation shafts, light metro vehicles (LMVs), lighting, noise mitigation structures, ancillary roads and access ways and tunnel portals.

The main potential types of impacts to agricultural enterprises during the construction and operational phases are:

Land-take

Any reduction in land area can potentially reduce the viability and productivity of farms within the study area. The land-take required will result in the loss of farm yards, buildings and access roads. The level to which land-take affects the viability of an individual farm is not solely dependent on the amount of land removed, but is also dependent on factors such as quality of the land taken, total area of the holding, type of enterprise and whether the land-take results in severance or permanent reduction and damage of land access, farm structures or water sources. Land will be required during the construction phase for construction compounds.

Severance

Increasing the segmentation of a farm can potentially increase the long-term fixed and variable costs associated with running the farm and therefore can potentially reduce the viability of farms.

Disturbance: traffic, noise, lighting, dust, other

The day-to-day operation of farms in the study area will be disrupted due to increased levels of construction traffic in the local road network and possible traffic diversions. Changes in the traffic regime can also be expected to occur during the operational phase. Water and electricity supplies may also be temporarily disrupted. Increased levels of noise and dust may occur as a result of construction traffic and excavation works. Sudden noise sources which may be associated with construction may cause farm animals to take flight and possibly harm themselves or other farm animals. Land drainage systems may be blocked on a temporary basis.

14.4.2 Mitigation measures

Land-take

- Minimise the land-take requirements so that only lands required for the proposed scheme are taken.
- Mitigation works will not be carried out on lands outside the areas encompassed by the Compulsory Purchase Order (CPO). However land owners who lose wells as a result of the proposed scheme will drill replacement wells in their own land if a satisfactory replacement is not available. Land owners may also have to build additional farm facilities (e.g. cattle retaining and testing pens) on their own land if land is severed.
- Land owners will be paid for the land taken, which will allow them to replace the lost land if they wish to do so.
- Land taken on a temporary basis during the construction phase will be reinstated by agreement and returned to the relevant land owners.

Severance

- All severed land parcels will be accessible either via the local road network or via accommodation access roads provided as part of the overall proposed scheme.
- Where existing water and electricity supplies to fields or farm yards are severed, the supply will be reinstated by provision of ducting where possible. Alternatively, where ducting is not feasible an alternative water source or electricity supply will be made available. If an alternative water source is not available, the farmer will drill a well on his own land.
- Land owners may have to build additional farm facilities (e.g. cattle retaining and testing pens) on their severed land.

Disturbance: noise, dust, other

- The contractor will liaise with land owners prior to the finalisation the design of the proposed scheme. Any issues predicted to occur as a result of disturbance caused during the construction works will be addressed as part of ongoing consultation with the land owners.
- A key contact will be appointed by the contractor during the construction phase to facilitate communications between affected landowners and the contractor. Good communication with farmers will facilitate the organisation of farm enterprises by farmers, so that vulnerable livestock are kept as far away as possible from the construction work during critical times. Liaison between the contractor and farmers during the works will also minimise difficulties caused by the restriction of access to severed land parcels.
- Boundary fencing will be erected to delineate the site boundary and prevent disturbance to adjacent land.
- The contractor will be informed of the location of particularly sensitive areas, such as farms with horses.
- The land owner will be provided with access to all severed land during the construction of the proposed scheme where this is possible. Where this access is temporarily disrupted the land owner will be notified in advance. If the land owner can not access his severed land because of works being carried out for the proposed scheme, temporary gates across fenced areas will be provided.
- Disrupted electricity and water supplies shall be restored within 12 hours or else alternative supplies shall be provided by way of generators or water tankers. The contractor shall minimize impacts on water quality. This shall be done by way of a programme of mitigation measures for surface water sources as described in the Surface Water chapters of this EIS (Volume 2, Chapter 11).

- The contractor shall minimise impacts on agricultural land due to construction noise. This shall be done by way of a programme of mitigation measures for noise and vibration control as described in Volume 2, Chapter 4 and Chapter 5. The contractor will notify all land owners in advance if particularly noisy activities are to be carried out and are likely cause impulsive, loud noises. It may be necessary to house animals in this situation or move to a suitably quiet, well fenced part of the farm. If a land owner wishes to remove sensitive livestock (e.g. mares in foal to high valued sires) the contractor shall provide alternative stabling facilities outside the affected area.
- The contractor will employ measures to prevent the spread of dust and mud onto adjoining lands. These measures are set out in the Air and Climatic Factors Chapter Volume 2, Chapter 12. Typically, the impact of dust on agricultural grazing livestock is not significant. However, if exceptional cases occur, livestock will be moved from the affected area at the expense of the contractor.
- If soil disturbance occurs, the contractor shall ensure that all top soil is reinstated to facilitate successful crop establishment. Reinstatement shall ensure that the land is level, adequately drained and shall not contain stones or gravel or other materials imported onto the site for the construction of the scheme. The agronomy assessment assumes that it will take some years for this land to reach its production potential. It is also assumed that this production potential will be permanently lower than its original state due to compaction and disturbance of soil.
- The drainage design of the proposed scheme will intersect any existing field drains and carry the drainage water to a suitable outfall.

Some of the lands may not be retained in agricultural use subsequent to the development of the scheme. In these areas mitigation measures listed above may not be carried out in agreement with land owners.

14.4.3 Assessment of residual impacts

14.4.3.1 Project scenario: construction phase

There are 192 ha of agricultural land within Area MN101 directly affected by the proposed scheme of which 100% has a high functional value. Although 192 ha of agricultural land is directly affected by the proposed scheme there will also be indirect impacts on farmers who use the local road network to access outlying land or to access services. These indirect impacts will occur due to changes in the local road network and due to changes in traffic volumes. These indirect impacts are of Very low magnitude and are not considered to be significant. Agricultural lands within Area MN101 account for 55% of the total agricultural area directly affected by the proposed scheme.

Table 14.3 Summary details of individual farms in the study area.

Farm id (Refer to Baseline Agronomy maps included in Volume 3, Book 1 of 2 for location of land parcels)		1	2	3	4
Area (ha) of affected farm		43	29	35	85
Type of Farm Enterprise		Part of a larger tillage farm. Total tilled area approx 200 ha. Winter cereals grown.	Part of a larger tillage farm with adjoining land to the east of M1 motor way. Total tilled area approx 71 ha. Cereals, potatoes and vegetables grown.	Total area of the farm is 35ha, which is used for winter cereals and 0.6 ha of glass houses.	Single farm let out on a short term basis to a dairy & beef farmer, a beef & sheep farmer and a tillage farmer. Other lands owned in this area are not agricultural.
Land type and quality	Soil Association	38	38	38	38
	Land quality	Good quality	Good quality	Good quality	Good quality
% of total Agricultural lands within the proposed scheme		12.3%	8.3%	10%	24.2%
Land taken (ha)	Permanent/residual	13.03	11.05	14.93	4.28
	Temporary	0	0	15.11	6.58
% land taken	Permanent/residual	30%	41%	42.7%	5.0%
	Temporary	0%	0%	43.2%	7.7%
Severance		No	No	Yes	Yes
% land severed (of the area remaining)	Permanent/residual	0%	0%	14%	44.9%
	Temporary	0%	0%	14.1%	42.1%
Nature of impact (before mitigation) (Refer to Baseline Agronomy maps included in Volume 3, Book 1 of 2 for location of land parcels)		Very high construction phase and residual impact from land loss.	Very high construction phase and residual impact from land loss.	Very high construction phase and residual impact from land loss and medium construction phase and residual impact from severance.	The construction phase impact from land loss is medium and the construction phase impact from severance is low. Low residual impact from land loss and medium residual impact from severance.
Magnitude of impacts	Permanent/residual	very high	very high	very high	medium
	Temporary	very high	very high	very high	medium
Functionality		4 – High	4 – High	4 – High	4 – High
Significance of impacts	Permanent/residual	High	High	High	Medium
	Temporary	High	High	High	Medium

	1	2	3	4
Recommended mitigation measures (see notes 1 - 4)	As per 1 - 5 below.	As per 1 - 5 below. Maintain access during construction period.	As per 1 - 5 below. Access to severed land to be maintained via public road network.	As per 1 - 5 below. Access to severed land to be maintained via public road network.

Recommended mitigation measures;

1. Restore affected access points to lands remaining after construction is completed;
2. Restore water and power supplies to lands remaining after construction is completed;
3. Provide livestock handling facilities;
4. Fence off all construction areas;
5. Re-instate temporary land-take.

Land-take

Approximately 66ha of agricultural land will be required for the proposed scheme. Of this 21.6 ha are required for construction compounds and traffic diversions and will be returned to the land owners when construction is completed. The area of land in the study area will be reduced by 34% during construction. One farm yard will be directly affected and the entrance lane to a farm yard will be severed.

The potential magnitude of impact on agriculture due to land loss during the construction phase would be very high if mitigation was not put in place and the functionality of the study area is high therefore this impact would be considered to be of High significance. The mitigation measures to be put in place are set out in Section 14.4.2. When these mitigation measures are taken into consideration, the magnitude of construction phase impact is very high and significance of the construction phase impact remains high. This impact cannot be completely mitigated.

Severance

During the construction phase severance will affect 62.5% of the agricultural area and will create 2 new land segments in the study area – an increase of 50% in segmentation. Approximately 36ha will be severed during the construction phase - 28.5% of the remaining agricultural area.

The potential magnitude of impact on agriculture due to severance would be very high if mitigation was not put in place and the functionality of the agricultural land within the study area is high therefore this impact would be considered to be of High significance. The mitigation measures to be put in place are set out in Section 14.4.2. Access via the public road network will allow agriculture to continue in the study area but due to the nature of the severance impact, and in the absence of direct access across the proposed scheme, the magnitude of construction phase severance impact is high and is considered to be of High significance. This impact cannot be completely mitigated.

Disturbance: traffic, noise, lighting, dust, other

During the construction phase there will be temporary disruption to the day to day operation of farms due to construction traffic and possible temporary disruption of access and water and power supplies to parts of the farm. Noise sources in this area during construction include the construction works, construction traffic and construction compounds. The predominant enterprise in the area is arable (70% of the agricultural area). These enterprises are less sensitive to disturbance due to lighting, interrupted water supplies and interrupted farm access. Farm animals are considered to be of low sensitivity to continuous noise sources and noise/dust/lighting does not typically lead to a reduction in animal performance or crop growth. Impulsive or sudden loud noises can potentially have an adverse impact on breeding livestock depending on the time of the year. The magnitude of the construction phase impact would be high if mitigation was not put in place and would be considered to be of High significance. Mitigation measures to be put in place with respect to noise and other disturbance sources (e.g. dust) are described in Section 14.4.2. When these measures are taken into account, the magnitude of the impact is medium and is considered to be of Medium significance.

14.4.3.2 Project scenario: operational phase

Land-take

Approximately 44 ha of agricultural land will be required for the operation of the proposed scheme. The area of land in the study area will be permanently reduced by 23%. One farm yard will be directly affected and the entrance lane of a yard will be severed. The farm yard buildings are replaceable and alternative access to farm yards will be provided.

The magnitude of impact on agriculture due to land-take would be very high if mitigation was not put in place and the functionality of the farmland within the study area is high therefore this impact would be considered to be of High significance. The mitigation measures to be put in place are set out in Section 14.4.2. Land acquired during the construction phase will be restored to a state which is as close as possible to their original state. After considering mitigation the magnitude of residual impact is very high and is considered to be of High significance. This impact cannot be completely mitigated.

Severance

Severance will permanently affect 31% of the agricultural area and will create 4 new land segments in the study area giving a permanent increase of 100% in segmentation. Approximately 39 ha will be severed due to the construction of the proposed scheme - 31% of the remaining agricultural area.

The potential magnitude of impact on agriculture due to severance would be very high if mitigation was not put in place and the functionality of the farmland within the study area is high therefore this impact would be considered to be of High significance. The mitigation measures to be put in place are set out in Section 14.4.2. Access via the public road network will allow agriculture to continue where intended in the study area. After considering mitigation the magnitude of residual impact from severance is Medium and is considered to be of Medium significance. This impact cannot be completely mitigated.

Disturbance: traffic, noise, lighting, dust, other

Noise sources and light emissions in this area during operation include the road traffic metro vehicles, the stops, Park & Ride area and the depot.

Mitigation measures to be put in place with respect to noise/lighting/dust are set out in Section 14.4.2. When these measures are taken into account, the magnitude of these impacts is considered to be medium. The predominant enterprise in the area is arable (70% of the agricultural area). These enterprises are less sensitive to disturbance due to lighting, interrupted water supplies and interrupted farm access. Farm animals are considered to be of low sensitivity to continuous noise sources and noise/dust/lighting does not typically lead to a reduction in animal performance or crop growth. The residual impact is of very low magnitude and therefore not considered to be significant.

There will be some increases in traffic along local road networks adjoining Park & Ride facilities but in general traffic volumes along the scheme will reduce and the residual impact on agriculture from changes in traffic volumes is assessed to be not significant.

Disturbance of drainage

The proposed scheme will generate storm water run off and intersect land drainage and surface water run off from adjoining lands.

The potential magnitude of impact on agriculture due to disruption of drainage would be medium if mitigation was not put in place and the functionality of the study area is high therefore this impact would be considered to be of Medium significance. The mitigation measures to be put in place are set out in Section 14.4.2. When these mitigation measures are taken into consideration, the magnitude of the impact reduces to very low and the impact is not significant.

Impacts on water sources and water quality impacts during operational phase

Water is a necessary resource for agriculture in the study area as a potable supply for livestock, for spraying crops and for washing equipment and produce. Assuming alternative water sources will be maintained and provided the magnitude of impact on water sources from the operation of the scheme is assessed to be very low and not significant.

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MATERIAL ASSETS: ARCHAEOLOGY, ARCHITECTURAL HERITAGE AND CULTURAL HERITAGE

- 15.1 Introduction
- 15.2 Study area
- 15.3 Impact assessment methodology
 - 15.3.1 Magnitude
 - 15.3.2 Significance
- 15.4 Impact assessment
 - 15.4.1 Impact identification
 - 15.4.2 Assessment of potential impacts prior to mitigation
 - 15.4.3 Mitigation measures
 - 15.4.4 Assessment of residual impacts

This chapter of the EIS describes the potential impacts on Archaeology, Architectural Heritage and Cultural Heritage, which may arise due to activities associated with the construction and operation of the proposed scheme in Area MN101.

15.1 INTRODUCTION

This chapter of the EIS describes the potential impacts on Archaeology, Architectural Heritage and Cultural Heritage, which may arise due to activities associated with the construction and operation of the proposed scheme in Area MN101. Cultural heritage comprises archaeology and architectural heritage and also includes environmental aspects that are dealt with in other chapters of the EIS including the Human Beings, Landscape and Visual and Soils and Geology chapters of this EIS (Volume 2, Chapters 2-7, 9 and 13 respectively).

Archaeology and architectural heritage all refer to traces of human activity in the physical environment inherited from past generations, maintained in the present and preserved for the benefit of future generations. Elements of archaeology and architectural heritage are not restricted by size and as such individual finds, buildings, or whole sites can be considered important to cultural heritage.

Preservation of archaeology and architectural heritage is deemed important as heritage that survives from the past is often unique and irreplaceable, important to the study of human history, and can serve an important component in a country's tourist industry.

The Environment Impact Assessment Directive of the European Union (EU) requires that potential impacts on archaeology, architectural heritage and cultural heritage are examined. As such this chapter of the EIS examines the impact that the proposed scheme may have on archaeology, architectural and cultural heritage. Impacts on other aspects of cultural heritage are examined in the other chapters of the EIS described previously.

The proposed mitigation measures for archaeological impacts have been further developed and detailed in an Archaeology Strategy document for the proposed scheme. This provides a base from which to plan the execution of the works. The overall approach to archaeological mitigation as detailed in the Archaeological Strategy has been agreed with Department of Environment, Heritage and Local Government (DoEHLG) and Dublin City Council (DCC). This strategy document is live and will continue to evolve with the project through the detailed design and construction phase of the project.

15.2 STUDY AREA

The study area for this assessment is set out in Table 15.1.

Table 15.1 Study area

Criteria	Width of corridor (on either side of the alignment)
Designated features of archaeological and architectural heritage	250m in areas of undeveloped Greenfield 100m in developed areas
Areas of archaeological potential	50m around proposed tunnelled sections
Properties of architectural merit	Properties that are to be impacted upon by the proposed alignment and which occur within the study area detailed above.
Townland boundaries	Townland boundaries intersected by the proposed alignment occurring within the study area detailed above

15.3 IMPACT ASSESSMENT METHODOLOGY

The impact assessment methodology in this chapter is set out in a number of steps:

- Impact identification;
- Assessment of potential impacts pre-mitigation;
- Derivation of mitigation measures;
- Assessment of residual impacts.

The source and type of all potential impacts is described in Section 15.4.1. The impact that would occur if mitigation were not put in place is evaluated in Section 15.4.2 in terms of magnitude and significance. Mitigation measures to be put in place are defined in Section 15.4.3. Mitigation measures are defined for any adverse impacts that are deemed to be of medium or greater significance prior to mitigation. The extent to which mitigation is needed increases as the significance of the impact increases. The residual impact of each impact is then evaluated in Section 15.4.4 in terms of magnitude and significance.

15.3.1 Magnitude

The criteria used to assess the different impacts associated with this scheme are shown in Table 15.2.

Table 15.2 Criteria for assessment of impact magnitude

Criteria	Impact magnitude
<ul style="list-style-type: none"> - Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where an archaeological site is completely and irreversibly destroyed by a proposed development. - An impact that obliterates the architectural heritage of a structure or feature of national or international importance. These effects arise where an architectural structure or feature is completely and irreversibly destroyed by the proposed development. Mitigation is unlikely to remove adverse affects. 	very high
<ul style="list-style-type: none"> - An impact which, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about the archaeological feature/site. - An impact that, by its magnitude, duration or intensity alters the character and/or setting of the architectural heritage. These effects arise where an aspect or aspects of the architectural heritage is/are permanently impacted upon leading to a loss of character and integrity in the architectural structure or feature. Appropriate mitigation is likely to reduce the impact. - A beneficial effect that permanently enhances or restores the character and/or setting of the architectural heritage in a clearly noticeable manner. 	high
<ul style="list-style-type: none"> - A Medium direct impact arises where a change to the site is proposed which though noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises where an archaeological feature can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible. - An impact that results in a change to the architectural heritage which, although noticeable, is not such that alters the integrity of the heritage. The change is likely to be consistent with existing and emerging trends. Impacts are probably reversible and may be of relatively short duration. Appropriate mitigation is very likely to reduce the impact. - A beneficial effect that results in partial or temporary enhancement of the character and/or setting of the architectural heritage and which is noticeable and consistent with existing and emerging trends. 	medium
<ul style="list-style-type: none"> - An impact which causes changes in the character of the environment which are not high or very high and do not directly impact or affect an archaeological feature or monument. - An impact that causes some minor change in the character of architectural heritage of local or regional importance without affecting its integrity or sensitivities. Although noticeable, the effects do not directly impact on the architectural structure or feature. Impacts are reversible and of relatively short duration. - A beneficial effect that causes some minor or temporary enhancement of the character of architectural heritage of local or regional importance which, although positive, is unlikely to be readily noticeable. 	low
<ul style="list-style-type: none"> - An impact on the archaeological heritage capable of measurement but without noticeable consequences. - An impact on architectural heritage of local importance that is capable of measurement but without noticeable consequences - A beneficial effect on architectural heritage of local importance that is capable of measurement but without noticeable consequences. 	very low

15.3.2 Significance

The significance of impacts is assessed in consideration of the magnitude of the impact and the importance and sensitivity (functional value) of the baseline environment. Functional value is set out in the Baseline Archaeology, Architectural Heritage and Cultural Heritage chapter of this EIS (Volume 1, Chapter 23).

15.4 IMPACT ASSESSMENT

15.4.1 Impact identification

The potential for impacts on archaeology, architectural heritage and cultural heritage has been assessed in consideration of the Environmental Protection Agency (EPA) Guidelines on the preparation and content of EISs (EPA, 2002 & 2003) and the National Roads Authority (NRA) Guidelines for the assessment of Archaeological Heritage Impacts of National Road Schemes (NRA, 2005).

15.4.1.1 Archaeology

Direct impacts on the archaeological heritage can be defined as follows:

- A change that will detract from or permanently remove an archaeological monument or site from the landscape;

Indirect impacts on the archaeological heritage can be defined as follows:

- A change that does not affect the archaeological heritage;
- A change that improves or enhances the setting of an archaeological monument.

15.4.1.2 Architecture

Direct impacts on the architectural heritage can be defined as follows:

- Total loss of structure or grounds - demolition of buildings or features or removal of demesne land;
- Partial loss of structure or grounds - part removal of buildings or feature or part removal of demesne land;
- Severance - interruption of linked features such as gardens, outbuildings or lodges;
- Reunification of structures – removal of severance caused by existing development;

Indirect impacts on the architectural heritage can be defined as follows:

- Visual Intrusion - development encroaching on established views of buildings, structures or landscapes, the disruption or destruction of designed vistas, light intrusion (dealt elsewhere);
- Degradation of setting - changes in the original landscape, townscape or garden setting of a building or structure;
- Degradation of amenity - loss of amenity, especially where an historic house is open to the public;
- Enhancement of setting – changes in the original landscape, townscape or garden setting of a building or structure;
- Enhancement of amenity – improvement of amenity, especially where the historic house opens to the public

15.4.2 Assessment of potential impacts prior to mitigation

15.4.2.1 Project scenario: construction phase

The principle source of impacts on features of archaeological, architectural and cultural heritage is ground disturbance. Ground disturbance can occur at the construction compounds, during site clearance, utilities removal, sub-surface site investigation, demolition, site excavation and ground preparation. Heritage constraint features that may potentially be impacted upon by ground disturbance during the construction phase of the project are set out in Table 15.3.

Table 15.3 Assessment of impacts (direct effects) associated with ground disturbance during construction

Impact		
Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN101_ C01	HC#1-7 (Belinstown)	- The construction of the depot and associated facilities will have an impact on any surviving archaeological deposits.
	Recorded Monuments	- The magnitude of these impacts prior to mitigation is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.
MN101_ C02	HC#412 (Belinstown)	- The construction will directly impact on this boundary. This impact will result in the total loss of the boundary.
	Townland boundary	- The magnitude of this impact prior to mitigation is very high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN101_ C03	HC#413 (Lissenhall Little)	- The construction will directly impact on this boundary. This impact will result in the total loss of the boundary.
	Townland boundary	- The magnitude of this impact prior to mitigation is very high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN101_ C04	HC#9 (Lissen Hall)	- The construction of the alignment and Construction Compound #2 (Option 1) will sever the avenue to Lissen Hall, a protected structure, impact on the curtilage of the house and affect its setting.
	Protected Structure	- The magnitude of these impacts prior to mitigation is high and the impact affects an area of very high functional value so the impact is considered to be of High significance
MN101_ C05	HC#414 (Balheary Demesne)	- The construction will directly impact on this boundary. This impact will result in the total loss of the boundary.
	Townland boundary	- The magnitude of this impact prior to mitigation is very high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN101_ C06	HC#11 (Balheary Demesne/ Lissenhall Great).	- Consists of two bridges with a raised embankment with buttressed cut stone retaining wall on the west side between them.
	Protected Structures	- Both bridges are protected structures and a recorded archaeological monument. Ground works will impact on the embankment, the walls of which will be removed. An arch of unknown date will also be removed. The 5-arched bridge spanning the Broad Meadow River will be impacted upon by structural works to enable it to carry the Light Metro Vehicles (LMVs). These works will impact on the original fabric of the structure.
	Recorded Monument	- Overall the magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.

The proposed scheme can also potentially impact on the appearance of a structure or a streetscape. This usually involves the imposition of new structures or developments which can be seen as visually intrusive and therefore detracting from (or enhancing) the appearance of the area or structure. The impacts (Indirect effects) can be both positive as well as negative. Heritage constraint features that may be subject to visual impacts are set out in Table 15.4.

Impacts (Direct effects) may also occur in areas of undeveloped land through which the alignment passes and where the study has not identified any archaeological remains. Areas in which these impacts may occur are set out in Table 15.5.

Table 15.4 Assessment of potential visual impacts (Indirect effects)

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN101_ C07	HC# 11 (Balheary Demesne/ Lissenhall Great).	Construction compound 2 (Option 2) will impact on the visual integrity of the bridge, which is a protected structure and RMP site.
	Protected Structures	Overall the magnitude of these impacts is medium and the impact affects an area of very high functional value so the impact is considered to be of Medium significance.
	Recorded Monument	

Table 15.5 Assessment of potential unknown impacts (direct effects) during construction

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN101_ C08	Belinstown to Lissenhall Bridge.	The magnitude and significance of impacts in this area cannot be assessed based on existing information because these areas are Greenfield undeveloped areas.
	Lissenhall Bridge to Seatown Roundabout.	

15.4.2.2 Project scenario: operational phase

The development can also potentially impact on the appearance of a structure or a streetscape. This usually involves the imposition of new structures or developments which can be seen as visually intrusive and therefore detracting from (or enhancing) the appearance of the area or structure. The impacts (Indirect effects) can be both positive as well as negative. Heritage constraint features that may be subject to visual impacts are set out in Table 15.6.

Vibration impacts (Direct effects) may affect the integrity of a structure, particularly an historic structure. The operation of LMV's on or directly beneath structures may lead to damage to historic buildings should the vibrations become too severe. It is unlikely that archaeological layers would be impacted in the same way (see Volume 2, Chapter 5, MN101: Vibration Impact Assessment). Heritage constraint features that may be subject to vibration impacts are set out in Table 15.7.

Table 15.6 Assessment of potential visual impacts (Indirect effects) during operation

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN101_ 001	HC# 11 (Balheary Demesne/Lissenhall Great).	The construction of a permanent way, walls and other associated features necessary for the metro vehicles will impact on the visual integrity of the bridge.
	Protected Structures	Overall the magnitude of these impacts prior to mitigation is medium and the impact affects an area of very high functional value so the impact is considered to be of Medium significance.
	Recorded Monument	

Table 15.7 Assessment of potential vibration impacts (Direct effects) during operation

Impact Ref	Affected Area/ Feature	Impact assessment prior to mitigation
MN101_002	HC#11 (Balheary Demesne/Lissenhall Great).	Consists of two bridges with a raised embankment with buttressed cut stone retaining wall on the west side between them.
	Protected Structures	The metro vehicles are to run on these structures during operation and there is potential for vibrational impacts to occur.
	Recorded Monument	Overall the magnitude of these impacts is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.

15.4.3 Mitigation measures

Mitigation measures are only defined for any impacts that are deemed to be of Medium significance or greater. The extent to which mitigation is needed increases as the significance of the impact increases.

The mitigation measures that are to be put in place are detailed in this section.

Table 15.8 Mitigation of potential impacts (direct effects) associated with ground disturbance, as set out in Table 15.3

Impact Ref	Affected Area/ Feature	Mitigation measures
MN101_C01	HC#1-7 (Belinstown).	Archaeological assessment followed by excavation should any deposits be shown to be present. When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
	Recorded Monuments	
MN101_C02	HC#412 (Belinstown)	Drawn sections and photographic survey of the boundary prior to removal. When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
	Townland boundary	
MN101_C03	HC#413 (Lissenhall Little).	
	Townland boundary	
MN101_C04	HC#9 (Lissen Hall)	Sensitive landscaping specifically designed to minimise the impact of the severance of the house from its avenue and surrounding demesne. When this mitigation measure is taken into consideration, the magnitude of the impact decreases to medium.
	Protected Structure	
MN101_C05	HC#414 (Balheary Demesne).	Drawn sections and photographic survey of the boundary prior to removal. When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
	Townland boundary	
MN101_C06	HC#11 (Balheary Demesne/Lissenhall Great).	Consists of two bridges with a raised embankment with buttressed cut stone retaining wall on the west side between them.
	Protected Structures	Archaeological assessment (including non-invasive geophysical investigation using ground probing radar), full measured, drawn & photographic record of all structures & walls and excavation, should any archaeological deposits be shown to be present. When this mitigation measure is taken into consideration, the magnitude of the impact remains at very high.
	Recorded Monument	

Table 15.9 Mitigation of potential visual impacts (indirect effects) during construction

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN101_ C07	HC#11 (Balheary Demesne/ Lissenhall Great).	Construction compounds will be kept clean and tidy at all times. Site hoarding that is sympathetic to the surrounding landscape will be used to minimise the visual impact of the site.
	Protected Structures	When this mitigation measure is taken into consideration, the magnitude of the impact decreases to low.
	Recorded Monument	

Table 15.10 Mitigation of potential unknown impacts (direct effects) during construction

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN101_ C08	Belinstown to Lissenhall Bridge.	This stretch of undeveloped green field land requires standard archaeological assessment including geophysical survey and test excavation. Detailed excavation will be required should any archaeological deposits be shown to exist.
	Lissenhall Bridge to Seatown Roundabout.	When this mitigation measure is taken into consideration, the magnitude of the impact is deemed to be very low.

Table 15.11 Mitigation of potential visual impacts (indirect effects) during operation

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN101_ 001	HC#11 (Balheary Demesne/ Lissenhall Great).	Mitigation will involve sensitive design of above ground structures in order to lessen the impact on the protected structure. When this mitigation measure is taken into consideration, the magnitude of the impact remains at medium.
	Protected Structures	
	Recorded Monument	

Table 15.12 Mitigation of potential vibration impacts (direct effects) during operation

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN101_ 002	HC#11 (Balheary Demesne/ Lissenhall Great).	Vibration reduction measures will be designed to reduce impact and protect the structures. When this mitigation measure is taken into consideration, the magnitude of the impact will reduce to medium
	Protected Structures	
	Recorded Monument	

15.4.4 Assessment of residual impacts

A summary of the residual impacts associated with the scheme is provided in Table 15.13

Table 15.13 Summary assessment of residual impacts

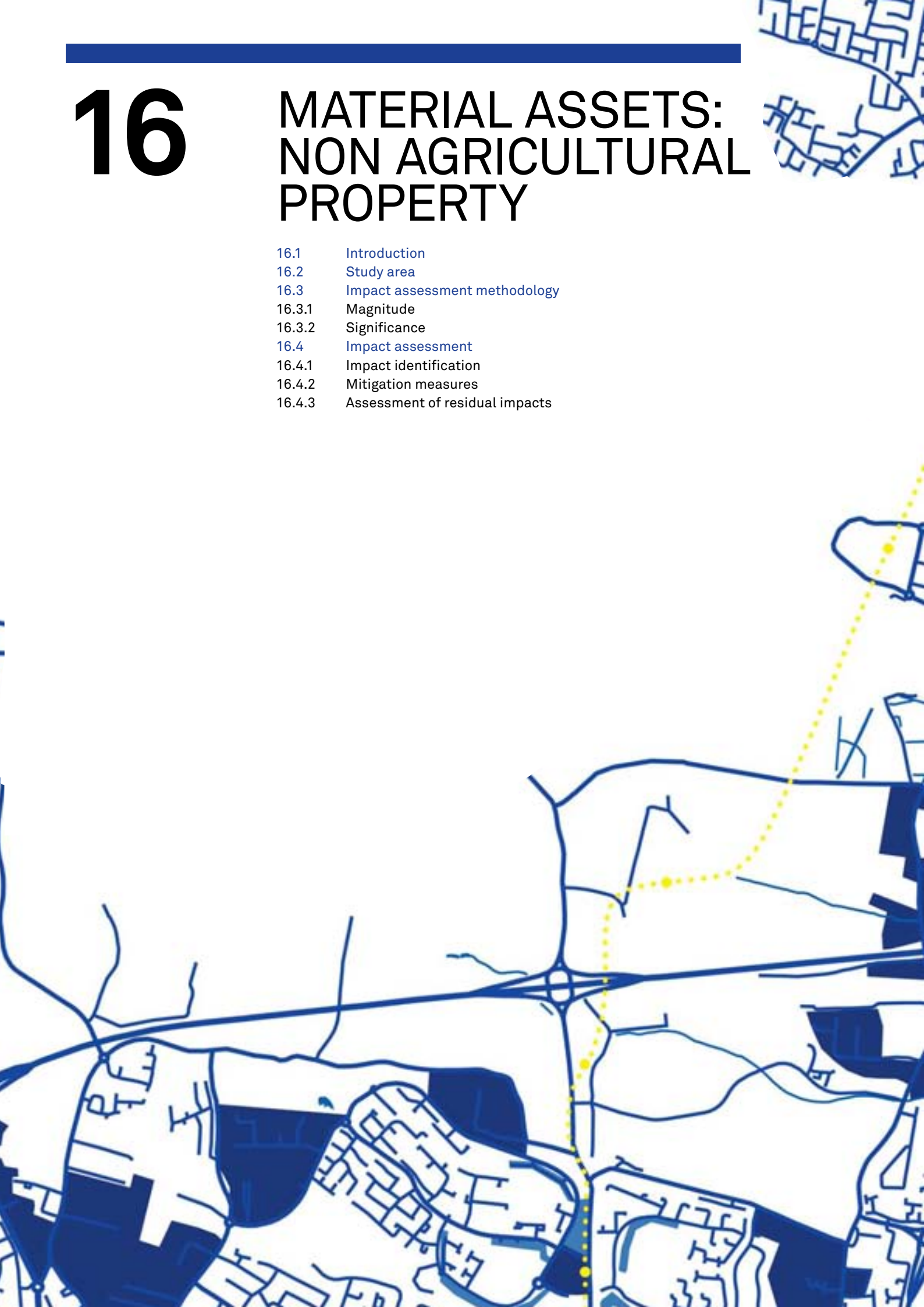
Impact Ref #	Affected Area/ Feature	Impact type	Magnitude of impact taking into account mitigation	Functional value of area affected	Significance of impact taking into account mitigation
Construction					
MN101_ C01	HC#1-7 (Belinstown). Recorded Monuments	Ground disturbance	very low	very high	Very low
MN101_ C02	HC#412 (Belinstown) Townland boundary	Ground disturbance	very low	high	Very low
MN101_ C03	HC#413 (Lissenhall Little). Townland boundary	Ground disturbance	very low	high	Very low
MN101_ C04	HC#9 (Lissen Hall) Protected Structure	Ground disturbance	medium	very high	Medium
MN101_ C05	HC#414 (Balheary Demesne). Townland boundary	Ground disturbance	very low	high	Very low
MN101_ C06	HC#11 (Balheary Demesne/ Lissenhall Great). Protected Structures Recorded Monument	Ground disturbance	very high	very high	Very high
MN101_ C07	HC#11 (Balheary Demesne/ Lissenhall Great). Protected Structures Recorded Monument	Visual impact	low	very high	Low
MN101_ C08	Belinstown to Lissenhall Bridge. Lissenhall Bridge to Seatown Roundabout.	Potential unknown	very low	medium	Very low
Operation					
HC#11	(Balheary Demesne/ Lissenhall Great). Protected Structures Recorded Monument	Visual	medium	very high	Medium
		Vibration	medium	very high	Medium



16

MATERIAL ASSETS: NON AGRICULTURAL PROPERTY

- 16.1 Introduction
- 16.2 Study area
- 16.3 Impact assessment methodology
 - 16.3.1 Magnitude
 - 16.3.2 Significance
- 16.4 Impact assessment
 - 16.4.1 Impact identification
 - 16.4.2 Mitigation measures
 - 16.4.3 Assessment of residual impacts





This chapter of the EIS evaluates potential impacts on non agricultural property arising from the construction and operation of the proposed scheme in Area MN101.

16.1 INTRODUCTION

This chapter of the EIS evaluates potential impacts on non agricultural property arising from the construction and operation of the proposed scheme in Area MN101.

16.2 STUDY AREA

All of the properties to be impacted upon as part of the proposed scheme are located within 50m of the alignment. The study area is therefore limited to 50m either side of the proposed alignment.

16.3 IMPACT ASSESSMENT METHODOLOGY

The source and type of all potential impacts is described in Section 16.4.1. Mitigation measures to be put in place are defined in Section 16.4.2. The residual effect of each impact is then evaluated in Section 16.4.3 in terms of magnitude and significance.

16.3.1 Magnitude

The criteria used to assess the impacts associated with this proposed scheme are shown in Table 16.1.

Table 16.1 Criteria for assessment of impact magnitude

Criteria	Impact magnitude
Any impact on non agricultural property where the use of the property cannot continue	very high
Not applicable	high
Any impact on non agricultural property where the use of the property can continue (in some cases, after temporary disruption)	medium
Not applicable	low
Not applicable	very low

16.3.2 Significance

The significance of all impacts is assessed in consideration of the magnitude of the impact and the functional value of the property upon which the impact has an effect. Impacts are evaluated in terms of five classes of significance: Very high, High, Medium, Low or Very low.

16.4 IMPACT ASSESSMENT

16.4.1 Impact identification

Impacts on non agricultural property occur due to land-take associated with the proposed scheme.

Three types of impact are assessed in this chapter:

- Non agricultural properties to be demolished (in whole or in part);
- Non agricultural properties to be acquired on a temporary basis;
- Non agricultural properties to be acquired on a permanent basis.

All temporary and permanent land-take on private property is shown on the property drawings that accompany the Railway Order application.

In some cases, acquisition of properties is undertaken to reduce the potential for negative impacts on residents during construction. In this context, the acquisition of properties is considered to be a mitigation measure (as well as an impact) and is assessed as such in other appropriate EIS chapters e.g. Noise, Vibration and Archaeology, Architectural Heritage and Cultural Heritage.

16.4.2 Mitigation measures

In cases where footbridges are to be demolished, alternative pedestrian crossing facilities will be provided prior to demolition taking place such that no significant disruption of individuals will occur. The magnitude of the residual impact is therefore assumed to reduce to low.

In cases where parts of properties are occupied, access to the remaining unoccupied parts will be maintained where it is possible and safe to do so. Protection such as hoarding will be used to ensure that the boundary of any construction sites are maintained and damage does not occur outside of this boundary. Where damage cannot be avoided, it will be repaired. Reinstatement of any natural boundaries will be carried out upon completion of the construction phase.

Mitigation measures to reduce any potential impacts on property due to vibration, ground settlement, dust or changes in visual amenity are addressed in the Vibration chapters (Volume 2, Chapter 5), the Soil and Geology chapters (Volume 2, Chapter 9), the Air and Climatic Factors chapters (Volume 2, Chapter 12) and the Landscape and Visual chapters (Volume 2, Chapter 13) of this EIS respectively,

In addition to the above mitigation measures, in a number of cases, where demolition of properties is to occur, RPA has offered compensation however, in Area MN101 no properties are to be demolished. Where appropriate, compensation is payable to owners of property that is acquired land in accordance with the general compulsory purchase code. Appropriate compensation will also be payable to owners of property that is subject to temporary acquisition. Compensation will be provided through the CPO process. In light of the above mitigation measures and in all cases where compensation is agreed, the magnitude of the impact is assumed to reduce to medium.

No mitigation measures are required with respect to the operational phase of the proposed scheme.

16.4.3 Assessment of residual impacts

16.4.3.1 Project scenario: construction phase

A number of non agricultural properties are to be acquired in this area. These properties are shown in Table 16.2.

16.4.3.2 Project scenario: operational phase

Existing and planned future properties within this area will benefit from their location and close proximity to a new permanent public transport and upgraded road system. Experience of the effects of the Luas Red and Green lines on house prices along these lines would indicate the residential property values and land values generally in the study area should also increase due to a positive 'Luas effect'. A property market analysis report from the estate agent Douglas Newman Good (DNG, 2005), indicated a Luas effect on house prices in the Tallaght area, and stated that 'an analysis of property price increases along the two Luas lines to Tallaght and Sandyford confirms that those properties within a five minute walk of a Luas station have seen higher increases in value than other comparable properties with no immediate access to the tram system'. More specifically, the report states that in Dublin 24, properties close to a Luas stop increased on average by 54% between January 2002 and January 2005 whilst the average increase was 37% in areas not within easy walking distance of a stop, a differential of 17%. The impact on property values in proximity to the proposed scheme is therefore likely to be positive. In general, operation of the proposed scheme is therefore assumed to have a positive impact on property by increasing the attractiveness of areas and strengthening the overall property market in the vicinity of the proposed scheme.

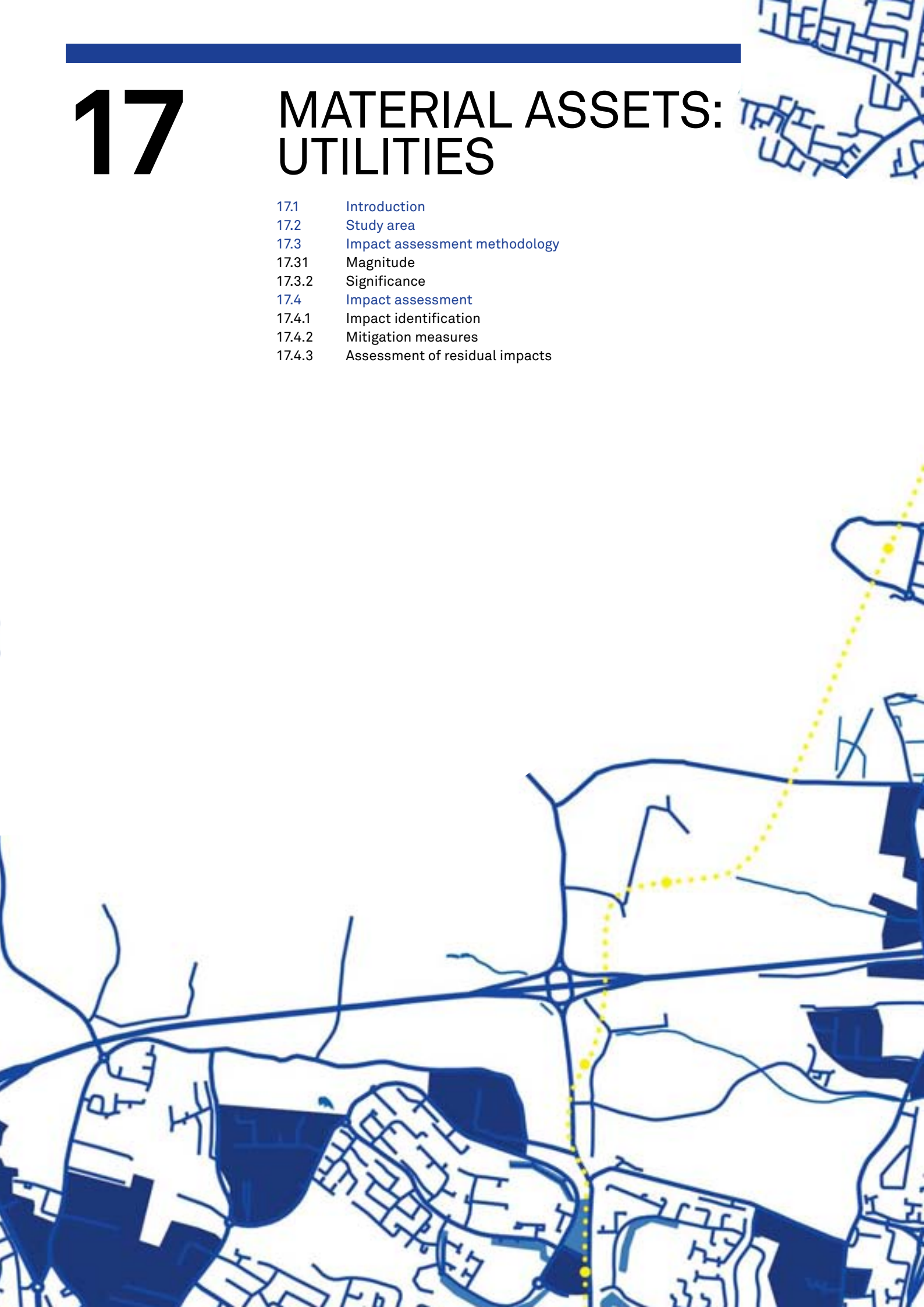
Table 16.2 Non agricultural properties to be impacted upon during the construction phase

Property	Functional value	Impact	Mitigation measure	Residual impact magnitude	Residual impact significance
Land behind cottage immediately north of Lissenhall Bridge	very high	Temporary and permanent acquisition of land to allow for a new road.	Compensation	medium	Medium significance
Footbridge over the R132 north of Estuary Roundabout	very high	Demolition of the existing footbridge.	Provision of alternative pedestrian crossing facilities in agreement with Fingal County Council prior to demolition of the existing bridge	low	Low significance
Footbridge over the R132 north of Seatown Roundabout	very high	Demolition of the existing footbridge.	Provision of alternative pedestrian crossing facilities in agreement with Fingal County Council prior to demolition of the existing bridge	low	Low significance
Industrial area east of R132 between Seatown and Malahide Roundabouts	very high	Temporary and permanent acquisition of land and removal of a sign to allow for: road widening; entrance upgrade; attenuation pond; and new substation	Compensation and relocation of the sign	medium	Medium Significance
Footbridge over the R132 between Seatown and Malahide Roundabouts	very high	Demolition of existing footbridge and permanent acquisition of land to allow for the erection of a new footbridge.	Provision of temporary crossing facilities and the footbridge will be rebuilt	low	Low significance
Footbridge over the R132 south of Malahide Roundabout	very high	Demolition of existing footbridge and permanent acquisition of land to allow for the erection of a new footbridge.	Provision of temporary crossing facilities and the footbridge will be rebuilt	low	Low significance
Lands to the east of the R132 (development lands) south of Malahide Roundabout	very high	Temporary and permanent acquisition of land to allow for road widening and a new substation.	Compensation and reinstatement of road surface	medium	Medium significance

17

MATERIAL ASSETS: UTILITIES

- 17.1 Introduction
- 17.2 Study area
- 17.3 Impact assessment methodology
- 17.3.1 Magnitude
- 17.3.2 Significance
- 17.4 Impact assessment
- 17.4.1 Impact identification
- 17.4.2 Mitigation measures
- 17.4.3 Assessment of residual impacts



This chapter of the EIS evaluates the potential impacts on utilities, which may arise due to activities associated with the construction and operation of the proposed scheme in Area MN101.

17.1 INTRODUCTION

This chapter of the EIS evaluates the potential impacts on utilities, which may arise due to activities associated with the construction and operation of the proposed scheme in Area MN101.

This chapter specifically refers to impacts on over and underground utility infrastructure such as water, gas, electricity, sewers, surface water drainage and telecommunications. It includes an evaluation of the impacts associated with protection, diversion and relocation of utility services equipment and plant in the vicinity of surface running tracks, stops, tunnels, ventilation shafts and other areas associated with the proposed scheme. Any impacts due to electromagnetic interference are addressed in the Radiation and Stray Current chapter of this EIS (Volume 2, Chapter 6). Indirect impacts that may occur due to the activities and potential disruption caused during utilities diversions are addressed in other chapters of the EIS. Examples include the Traffic chapters of this EIS (Volume 2, Chapter 7).

17.2 STUDY AREA

The study area for this chapter is approximately 84m either side of the centre line of the track alignment.

17.3 IMPACT ASSESSMENT METHODOLOGY

Due to the extensive footprint and geographical extent of the proposed scheme and its associated structures, impacts on utility services are unavoidable. Early recognition of the type and level of impact makes it possible to provide suitable mitigation measures to minimise service disruption. The source and type of all potential impacts are described in Section 17.4.1.

Mitigation measures to be put in place are defined in Section 17.4.2. Mitigation measures are defined for any adverse impacts deemed to be of medium or greater significance. The extent to which mitigation is needed increases as the significance of the impact increases. The residual impact is then evaluated in Section 17.4.3 in terms of magnitude and significance.

17.3.1 Magnitude

The criteria used to assess the different impacts associated with the proposed scheme are shown in Table 17.1.

17.3.2 Significance

The significance of impact is assessed in consideration of the magnitude of the impact and the functional value of the utility service upon which the impact has an effect.

Table 17.1 Criteria for assessment of impact magnitude

Criteria	Impact magnitude
Long-term disruption of service e.g. for more than one week; Relevant stakeholders are notified at short notice or not at all prior to disruption taking place; and/or The level of service provided by the original utilities infrastructure is not reinstated.	very high
Long-term disruption of service e.g. for a week; Relevant stakeholders are notified at short notice prior to disruption taking place; The level of service provided by the original utilities infrastructure is reinstated.	high
Medium-term disruption of service e.g. for up to two days; Relevant stakeholders are notified prior to disruption taking place; The level of service provided by the original utilities infrastructure is reinstated or improved.	medium
Short-term disruption of service e.g. for several hours; Relevant stakeholders are notified prior to disruption taking place; The level of service provided by the original utilities infrastructure is reinstated or improved.	low
No disruption of the existing level of service.	very low

17.4 IMPACT ASSESSMENT

17.4.1 Impact identification

Activities related to construction and installation of the following components of the proposed scheme may have impacts on utility services:

- Stops, tracks, depot, Park & Ride, substations, ventilation shafts, landscaping bunds, ancillary roads and access ways, cut and cover tunnel sections, tunnels and tunnel portals;
- Earthworks, such as cuttings and embankments;
- Construction compounds.

Two types of impacts are recognised to occur: temporary and permanent.

17.4.1.1 Temporary Impacts

Temporary impacts are typically associated with the construction phase of the proposed scheme. These impacts are short-term in nature and are required to facilitate construction. Direct impacts occur where utilities are located in whole or in part within the footprint of the proposed scheme.

17.4.1.2 Permanent Impacts

Permanent impacts are long-term impacts which are expected to persist over the lifetime of the proposed scheme.

17.4.2 Mitigation measures

Utilities infrastructure ensures reliable provision of power (electricity/gas), water and other amenity services in accordance with service level agreements. RPA recognises the importance of ensuring that disruption to any utility service is minimised and where necessary, depending on the service level agreement, alternative measures are to be taken to ensure continuity of the service whilst diverted.

The importance of continuity of service to consumers within Area MN101 is recognised. Utility services within the study area have been identified; extensive consultations have taken place with stakeholders including Statutory Undertakers, Local Authorities and other relevant parties. Reviews of relevant existing service networks and civil infrastructure have been carried out to identify potential impacts on existing service networks.

A schedule of proposed utility diversions has been prepared which identifies infrastructure requiring diversion and includes information on the type and size of each utility. This schedule also identifies the necessary mitigation measures required by the utility company and the contractor to facilitate the implementation of works. A summary of this schedule specific to Area MN101 is provided in Table 17.2.

Utility drawings have been prepared by digitally transferring data from the existing drawings of Statutory Undertakers into computer aided drawing (CAD) format. Because of potential inaccuracies and errors in these records, the information is supplemented by an extensive survey of the proposed scheme using invasive and non-invasive methods of underground service mapping in order to verify the positions of buried apparatus.

To ensure that the operation of the proposed scheme is not affected by future utility maintenance or diversion activities, utility services will generally be diverted away from the track. All utilities that cross the track or the proposed scheme infrastructure will be protected or lowered, relocated or diverted as necessary and spare capacity may be provided for future maintenance or expansion.

All works will be carried out in ongoing consultation with the relevant Statutory Undertakers and Local Authority representatives and will be in compliance with their requirements (including health and safety) and relevant codes of practice. Agreement will be reached prior to any works taking place and relevant design documentations prepared. The works will be coordinated and programmed in consultation with the relevant undertaker to minimise impact. The contractor will be responsible for design and co-ordination of utility diversionary works.

17.4.3 Assessment of residual impacts

17.4.3.1 Construction phase

The utility works in area MN101 include, but are not limited to the diversion of water mains of varying diameters and materials, gas mains (local distribution) of varying diameters and materials, drainage pipes (surface water, sewage, and combined systems) of various diameters, alteration of manholes, duct systems for telecommunications providers, street lighting, traffic lighting and signals, cable TV operators and ESB (local distribution and high voltage), including miscellaneous chambers as detailed in Table 17.2. The works also include any alterations to service connections to individual properties necessitated by the diversion of the associated main utility services.

During the construction phase, if mitigation measures were not put in place the impacts on utility services would be of high magnitude. All utility services are considered to be of very high functional value and therefore if mitigation were not put in place, the significance of the impacts would be high to very high. However, if the mitigation measures described in Section 17.4.2 are put in place, the magnitude of the impact decreases to very low and therefore is not considered to be significant.

Table 17.2 Impacts and mitigation measures

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
BT Ireland - Telecoms	2x100 Duct	59	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	2x110 Duct	147	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
NTL - Telecoms	1 WAY	46	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	Unknown	334	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
ESB Transmission	1x38 KV Overhead Line	26	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
	1x38 KV	50	Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
Gas Distribution	90 PE 4 bar	34	Decommission/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	125 PE 4 bar	195.5	Decommission/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	250 PE 4 bar	615.8	Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
ESB Distribution	1 Way 1 x LV	73	Decommission Permit to dig system and liaison with service provider	Temporary (low)	Low
	2 Way 1 x LV, 1 x MV	4	Decommission/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	10 KV overhead Cable	48	Decommission/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	3 x 1/185 XLP	126	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
	4x185XLP 3x1/70XLP 70 3x1/25XLP		Decommission Permit to dig system and liaison with service provider	Temporary (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
	3 x 125/ 185 XLP	347	Decommission Permit to dig system and liaison with service provider	Temporary (low)	Low
FCC Water	6' CI	18	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	6' uPVC	34	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	12' AC	27	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
	30' CO	365	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	150mm CI	14	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	150 uPVC	29	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
FCC Drainage	150mm Surface	36	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
	225mm Surface	644	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	300mm Surface	161	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	375mm Surface	882	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	450mm Surface	358	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	600mm Surface	783	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	675mm Surface	222	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
	750mm Surface	16	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	225mm Foul	56	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	255mm Foul	42	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	300mm Foul	603	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	355mm Foul	421	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	375mm Foul	585	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	600mm Foul	22	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	To be confirmed	39	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
Eircom - Telecoms	1x100 CD	207	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	1x100 PP	50	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	2x100 PP	50	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	4x100 PP	3	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	9x100PP	926	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	TBC	56	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low
	2 Way 1x100 CD/4x100 PP	6	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
	4x100 PP/1x100 CD	60	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short term (low)	Low

17.4.3.2 Operational phase

Provided that the mitigation measures specified in Section 17.4.2 are implemented, the operation of the scheme will not impact on utility services.

18

INTERRELATIONSHIPS, INTERACTIONS AND CUMULATIVE IMPACTS

- 18.1 Introduction
- 18.2 Methodology
- 18.3 Cumulative impacts



Section 39(2)(b) of the Railway Infrastructure Act, 2001 specifies that an environmental impact statement must contain a description of the inter-relationship between the likely significant impacts on the aspects of the environment listed in Section 39.

18.1 INTRODUCTION

Section 39(2)(b) of the Railway Infrastructure Act, 2001 specifies that an environmental impact statement must contain a description of the inter-relationship between the likely significant impacts on the aspects of the environment listed in Section 39.

The purpose of this chapter is to illustrate the key inter-relationships that exist between the various affected environmental topics. Cumulative impacts due to the proposed scheme are considered. Cumulative or combined impacts due to the combination of the proposed scheme and other projects in the same area are also examined. This includes cumulative impacts (impacts which accumulate over space or time to generate a larger overall impact), cross-media impacts and other impact interactions.

European guidelines state why this is an important process:

'An impact which directly affects one environmental medium may also have an indirect impact on other media (sometimes referred to as cross media impacts). This indirect effect can sometimes be more significant than the direct effect.' (E.C. 1999)

For example, in some cases, changes in noise or vibration levels may have a profound effect on human beings. Whilst the additional noise may not constitute a significant increase when using simple assessment methods, vulnerable groups of individuals may be indirectly affected.

'Visual intrusion may also have an indirect impact on the amenity value of sites of historical interest. Again, in the absence of the analysis of indirect impacts, visual intrusion may not be considered as significant. However, the indirect impacts may be considered as being substantial' (E.C. 1999).

18.2 METHODOLOGY

Impact interactions and inter-relationships have been considered throughout the EIA process and in the preparation of the individual impact chapters (Volume 2) so that it can take into account the broader picture of how the proposed scheme may affect the various environmental media.

All environmental topics are interlinked to a degree such that interrelationships exist on numerous levels. A summary matrix has been developed to identify key interactions that exist with respect to this specific project. As such, does not represent a form of relative assessment of impacts and other interactions are recognised to exist and have been addressed in individual chapters of the EIS. The matrix that has been developed is presented as Figure 18.1.

Human Health	Human Health	Human Beings: Landuse	Human Beings: Socio-Economics	Human Beings: Noise	Human Beings: Vibration	Human Beings: Radiation and Stray Current	Human Beings: Traffic	Air and Climatic Factors	Groundwater	Surface Water	Soil and Geology	Landscape and Visual	Flora and Fauna	Material Assets: Agronomy	Material Assets: Archaeology, Architectural Heritage and Cultural Heritage	Material Assets: Utilites	Material Assets: Non Agricultural Property
Human Beings: Landuse																	
Human Beings: Socio-Economics																	
Human Beings: Noise																	
Human Beings: Vibration																	
Human Beings: Radiation and Stray Current																	
Human Beings: Traffic																	
Air and Climatic Factors																	
Groundwater																	
Surface Water																	
Soil and Geology																	
Landscape and Visual																	
Flora and Fauna																	
Material Assets: Agronomy																	
Material Assets: Archaeology, Architectural Heritage and Cultural Heritage																	
Material Assets: Utilites																	
Material Assets: Non Agricultural Property																	

Figure 18.1
Impacts
Interaction and
Interrelationship
Matrix

The consideration of impact interactions and potential cumulative impacts has been addressed during the preparation of the EIA in each of the individual impact chapters. A very diverse range of interactions has been considered as part of this EIA including, but not limited to the examples described in Table 18.1.

Table 18.1 Key Impact interactions and interrelationships

Interaction	Description
Human Health, Air & Climatic Factors and Traffic	<p>Impacts on air quality may occur due to emissions of dust from construction compounds. Impacts on air quality may also occur due to changes in traffic levels and thus exhaust emissions. In some cases, particularly during the construction phase, both impacts occur at the same location. The potential for interactions was therefore considered, particularly when defining the relevant mitigation measures and carrying out the assessment of potential impacts on human health.</p> <p>The potential for traffic emissions to have an indirect impact on climate (in terms of climate change) has also been considered.</p>
Human Health, Noise and Traffic	Noise impacts may occur due to construction or operation activities. Noise impacts may also occur due to changes in traffic levels. In some cases, particularly during the construction phase, both impacts occur at the same location. The potential for interactions was therefore considered, particularly when defining the relevant mitigation measures and carrying out the assessment of potential impacts on human health.
Vibration and Archaeology, Architectural Heritage and Cultural Heritage	The potential for vibration impacts on features of architectural, archaeological or cultural importance has been considered and appropriate measures have been defined.
Groundwater, Soil and Geology and Surface Water	There are direct and physical links between surface water, groundwater, soils and geology. The impacts of the scheme are therefore considered in the chapters that support all three environmental topics in recognition of the fact that impacts to one component of this complex system may have knock-on, indirect effects on other components.
Landscape and Visual and Flora and Fauna	Mitigation measures for landscape impacts and ecological impacts were considered when defining the Landscape Insertion Plans (Volume 2, Chapter 13) in order to ensure that interactions between impacts were considered in an appropriate manner. In many cases, the mitigation measures that have been defined serve the dual purpose of mitigating both landscape and ecological impacts.
Landuse and Socio-economics	Impacts on commercial landuses can often have a knock-on effect in terms of socio-economics. Interactions between the two environmental topics were therefore considered to ensure that both direct and indirect impacts were considered and appropriate mitigation measures put in place.
Traffic and Socio-economics	Traffic impacts and mitigation measures have the potential to impact on socio-economic activity. The potential for indirect impacts of this nature has been considered when defining appropriate mitigation measures.
Landuse, Landscape and Visual and Archaeology, Architectural Heritage and Cultural Heritage	Cultural heritage comprises elements of the landscape which are important to individuals. Landscape elements which are important to individuals may include man-made buildings, traditional landuse, natural environmental features or features of archaeological or architectural importance. Impacts on all of these aspects of cultural heritage are considered in the relevant chapters of this EIS.
Water, Soil and Geology and Flora and Fauna	Direct physical links exist between these topics and potential impacts on surface water or soils were therefore also considered in the Flora and Fauna chapters of this EIS (Volume 2, Chapter 8).

Interaction	Description
Landuse, Non Agricultural Property and Agronomy	Land-take can have an impact on landuse, property and agricultural lands. Changes in landuse affecting Agronomy and Non Agricultural Property have been assessed as part of the EIA and are described in Volume 2, Chapters 14 and 16 respectively.
Soil and Geology and Human Health	The key issue here is radon emissions. The potential for radon emissions from disturbed/excavated soil and geology to have an impact on human health has been considered and appropriate mitigation measures have been established.

18.3 CUMULATIVE IMPACTS

Cumulative impacts occur when the addition of single impacts from a number of individual schemes results in compounding effects. Cumulatively, these impacts may be significant if they occur close together in terms of location and time.

The scheme will inevitably cause a degree of disruption during the construction phase, as with most major transport infrastructure projects. Next to disruption the construction equipment and hoardings are likely to be very visible. Drivers and public transport users may also experience delays during temporary road diversions. The combination of these construction effects is likely to heighten any overall sense of disruption felt by those living and working close to the route of the scheme.

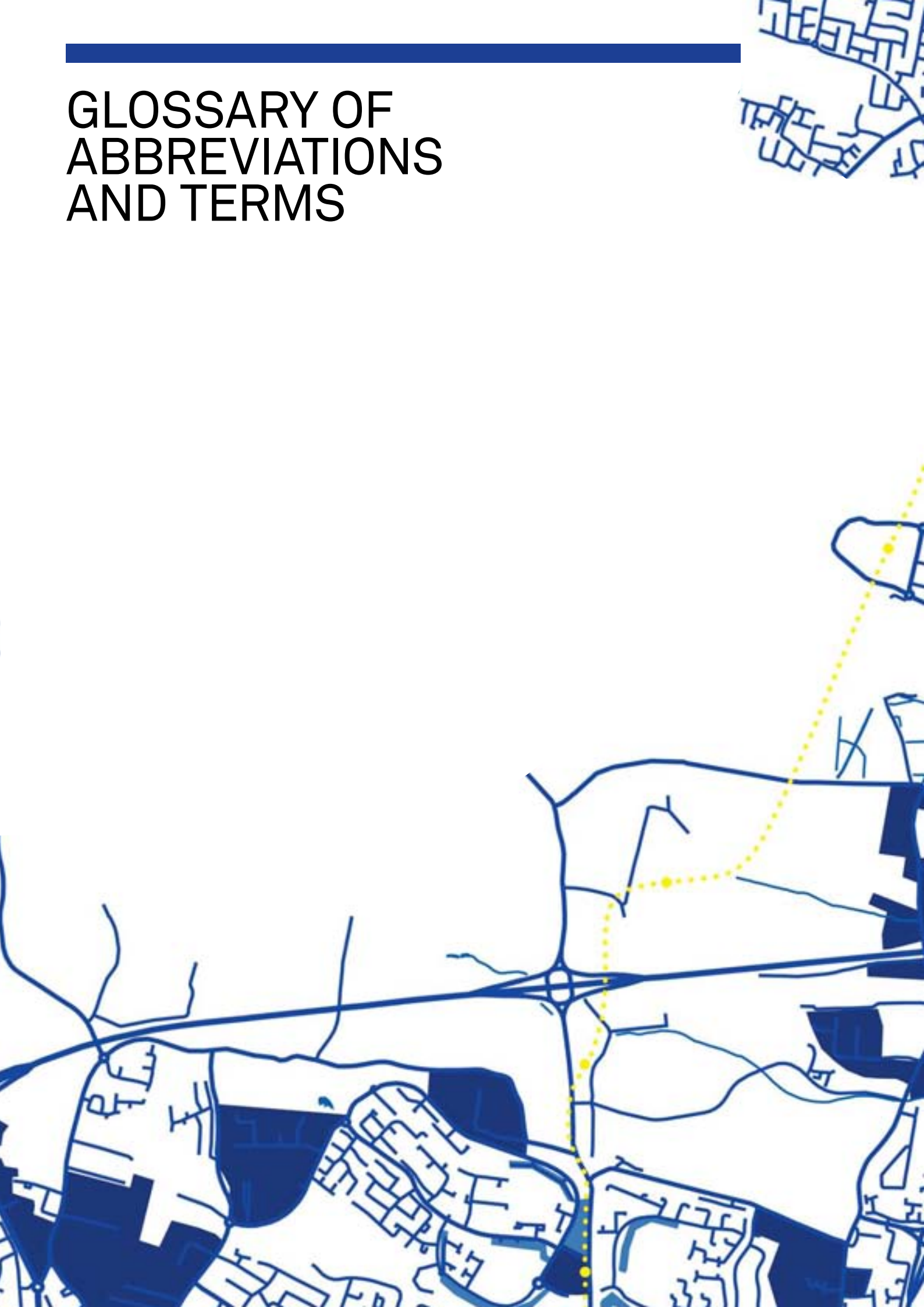
During the construction phase of the scheme, several other projects are likely to take place within the study area. A review of planning applications has been undertaken (as described in the Baseline Landuse chapter of this EIS (Volume 1, Chapter 10)) to identify such developments. Examples include, but are not limited to:

- the Irish Rail Interconnector project;
- the development of Dublin Airport;
- the Luas BX Line;
- the Marlborough Bridge across the River Liffey;
- the extension of Mater Hospital.

The development of schemes such as those listed above has the potential to cause cumulative impacts. In some cases, the timeframe within which the other developments will occur is not yet clearly defined. However, consultation has been undertaken with proponents of these other projects to ensure that the potential for cumulative impacts is considered and appropriate mitigation measures are put in place where relevant. Considerations in this regard were undertaken in relation to the Landuse, Socio-economics, Noise, Traffic and Air and Climatic Factors of this EIS (Volume 2, Chapters 2, 3, 4, 7 and 12 respectively). The means by which cumulative impacts are assessed is clearly defined, where relevant, in all chapters of the EIS.

Given the urban location of the proposed scheme, cumulative impacts arising due to other major construction projects are inevitable. Impacts of this nature have been assessed where possible and must be considered by the planning authority in exercising their development control function for future developments in the local area.

GLOSSARY OF ABBREVIATIONS AND TERMS



1 GLOSSARY OF ABBREVIATIONS

Acronym	Definition
AADT	Annual Average Daily Traffic (total annual traffic flow divided by 365)
AAP	Area Action Plan
AD	Anno Domini (Medieval Latin: 'in the year of our lord') a designation used to number years in the Julian and Gregorian calendars.
AEC	Areas of Ecological Constraint
ALSAA	Aer Lingus Sports and Athletics Association
AP	Aerial Photograph
At-grade	At public carriageway level (as opposed to tunnel or elevated).
BAP	Biodiversity Action Plan
BOD	Biological Oxygen Demand
BRE	Building Research Establishment
BRL	Ballymun Regeneration Ltd.
CBA	Cost Benefit Analysis
CCVM	City Centre Vissim (Micro-simulation) Models
CIRIA	Construction Industry Research and Information Association
CLR	Contaminated Land Report
CRDS	Cultural Resource Development Services Ltd.
cSAC	Candidate Special Area of Conservation
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CPO	Compulsory Purchase Order
CRT	Cathode Ray Tube
CSO	Central Statistics Office
DART	Dublin Area Rapid Transit
dB (Decibel)	The basic unit for sound measurement. Decibels are measured on a linear scale which defines a logarithmic amplitude scale, thereby compressing a wide range of amplitude values into a small set of numbers
dB(A)	A frequency weighting applied to sound measurements which approximates to the frequency response of the human ear
DC	Direct current
DCC	Dublin City Council
DCU	Dublin City University
DEIS	Delivering Equality of Opportunity in Schools
DIT	Dublin Institute of Technology
DMRB	Design Manual for Roads and Bridges, UK
DoE	Department of Environment (in the UK)
DoEHLG	Department of Environment, Heritage and Local Government (in Ireland)
DoT	Department of Transport
DTI	Dublin Transportation Initiative
DTO	Dublin Transportation Office
DTOTM	Dublin Transportation Office Traffic Model
DTS	(Environmental) Desktop Study

Acronym	Definition
EA	Environmental Agency (UK)
ED	Electoral Division
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EM	Electromagnetic
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EPA	Environmental Protection Agency
ERFB	Eastern Regional Fisheries Board
ERSA	European Regional Science Association
ESB	Electricity Supply Board
EU	European Union
FAQ	Frequently Asked Questions
FCC	Fingal County Council
FTE	Full-time employment
GAA	Gaelic Athletic Association
GAC	Generic Assessment Criteria
GDA	Greater Dublin Area
GPO	General Post Office
GQRA	Generic Quantitative Risk Assessment
GRP	Glass Reinforced Plastic
GSI	Geological Survey Ireland
HAP	Habitat Action Plan
HC#	Heritage Constraint Number
HGV	Heavy Goods Vehicle
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
InfraCo	Infrastructure Company appointed to design, construct and operate the proposed scheme
IPPC	Integrated Pollution Prevention and Control
IR	Irish Rail
kph	Kilometres per hour
L_{Aeq}	The equivalent continuous noise level. The notional steady dB(A) level that would produce the same A-weighted sound energy level as the actual, time varying sound, over a stated period
L_{A10}/L_{A90}	The noise levels in dB(A) that are equalled or exceeded for the 10%/90% of the sample time
L_{Amax}	Maximum peak noise level
LAP	Local Area Plan
LGV	Light Goods Vehicle
LI	Landscape Institute
LLCA	Local Landscape Character Areas

Acronym	Definition
LMV	Light Metro Vehicle
LRT	Light Rail Transit
Luas	Dublin's Light Rail Transit system
LV	Low Voltage
MGI	Main Ground Investigation
Mitigation	Measures designed to avoid, reduce or remedy adverse impacts
MID	Mobility Impaired/ Disabled
MNEC	Metro North Economic Corridor
MNTM	Metro North Traffic Model
MRP	Molybdate-Reactive Phosphate
NAQIA	National Air Quality Information Archive UK
NCCS	National Climate Change Strategy
NCT	National Car Test
NDP	National Development Plan
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NMI	National Museum of Ireland
NML	Noise Monitoring Location
NMS	National Monuments Services
NO ₂	Nitrogen Dioxide
NO _x	Nitrous Oxides
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NSS	National Spatial Strategy for Ireland
OCS	Overhead Catenary System
OPW	Office of Public Works
OS	Ordnance Survey
OSI	Ordnance Survey of Ireland
PAH	Polycyclic aromatic hydrocarbon
PCU	Passenger Car Units
P&R	Park & Ride
PE	Polyethylene
PM ₁₀	Particulate Matter with diameter of a less than 10 microns
PM _{2.5}	Particulate Matter with diameter of a less than 2.5 microns
pNHA	Proposed Natural Heritage Area
ppb	Parts per billion
PPG	Pollution Prevention Guidelines
ppm	Parts per million
PPP	Public Private Partnership
pteg	Passenger Transport Executive Group
Public Utilities	Water supply, drainage, gas, electricity, telecommunications systems as controlled operated and maintained by statutory bodies such as local authorities, Bord Gais etc.
QBC	Quality Bus Corridor

Acronym	Definition
RAPID	Revitalising Areas by Planning, Investment and Development
RMP	Record of Monuments and Places
RPA	Railway Procurement Agency.
RPG	Regional Planning Guidelines
RPGDA	Regional Planning Guidance for the Greater Dublin Area
RPS	Record of Protected Structures
SAC	Special Area of Conservation
SGVs	Soil Guideline Values
SMR	Sites and Monuments Record (of the Department of Arts, Heritage, Gaeltacht and the Islands)
SO ₂	Sulphur Dioxide
SPA	Special Protected Areas
SSG	St. Stephen's Green
Spp.	Species
SUDS	Sustainable Urban Drainage System
SVM	Swords Vissim Models
TAG	Transport Analysis Guidance
TBM	Tunnel Boring Machine
TCD	Trinity College Dublin
TD	Teachta Dála (Member of Parliament)
TPH	Total Petroleum Hydrocarbons
UCD	University College Dublin
µg/m ³	Micrograms per cubic metre
UHI	Urban Heat Island
UK	United Kingdom
VOC	Volatile Organic Compound
WWTP	Waste water treatment plant

2 GLOSSARY OF TERMS

Term	Definition
Agronomy	The science of agriculture (soil management, land cultivation, and crop production).
Alignment	The position of the proposed schemes tracks relative to the surrounding topography.
Alignment design detail	Information pertaining to the various positions along the alignment.
Alternative route option	Route options which were considered other than the route decided upon.
Alternatives	The EIA Regulations giving effect to the 1985 and 1997 EIA Directives require an outline of the main alternatives studies by the road authority and an indication of the main reasons for its choice, taking into account the environmental effects. Alternatives typically relate to alternative routes, alternative designs and alternative processes (NRA).
An Bord Pleanála	An Bord Pleanála was established in 1977 under the Local Government (Planning and Development) Act, 1976 and is responsible for the determination of appeals and certain other matters under the Planning and Development Acts, 2000 to 2006, and with appeals under the Building Control Act, 1990, the Local Government (Water Pollution) Acts, 1977 and 1990 and the Air Pollution Act, 1987.
Aquifer	A water-bearing layer of soil, sand, gravel, or rock that yields water.
Archaeological Assessment	An archaeological assessment is the investigation of known, suspected or previously unidentified monuments, sites or areas of archaeological potential in order to assess the impact which the proposed development may have on them. Each assessment should contain a description of the archaeology known to survive in the development area and of the types of archaeological features, not yet identified, which could possibly exist in that location. These should be evaluated in terms of the impact of the proposed works on known or predicted archaeology. Assessments may indicate that archaeological test excavation is required. The assessment procedure also proposes a strategy designed to deal with the possible adverse effects of the development works on archaeology.
Archaeological Excavation	Archaeological excavation is the systematic recording and removal of layers of soil, deposits, structures and artefacts by a qualified archaeologist. As excavation is destructive by its nature it must be carried out with meticulous care so that all information, whether its relevance is immediately obvious or not, will remain available after the site has completely disappeared. This is why it is termed preservation by record. Post-excavation analysis e.g. radio carbon dating, conservation of archaeological finds, the proper storage of archaeological objects and publication of the results of the excavation are all integral parts of the process.
Archaeological Monitoring	Archaeological monitoring involves an archaeologist being present in the course of the carrying out of development works (which may include conservation works), so as to identify and protect archaeological deposits, features or objects which may be uncovered or otherwise affected by the works.
Archaeological site	This encompasses all upstanding and buried archaeological monuments, deposits, and features which pre-date the year 1700AD. All monuments which are listed in the Sites and Monuments Record of the Department of Arts, Heritage, Gaeltacht and the Islands (formerly OPW). All sites described and mapped by the SMR has the full protection of National Monuments legislation (1937-1995).
Archaeological Test Excavation	Archaeological test excavation is excavation of confined strips or areas of a site in order to establish the presence or absence of archaeology and to determine its nature and extent.
At-grade section	A section of the proposed scheme at ground level (as opposed to tunnel or elevated).

Term	Definition
Baseline environment	Environmental conditions that currently exist and against which any future changes can be assessed.
Baseline studies	Work done to determine and describe the baseline environmental conditions against which any future changes can be measured or predicted and assessed.
Bored tunnel	Tunnel constructed using the tunnel boring machine.
British and Irish Archaeological Bibliography	An online database containing datasets covering publications from AD 1695 to the present day on archaeology and the historic environment, historic buildings, maritime and industrial archaeology, environmental history, and the conservation of material culture - with a geographical focus on Britain and Ireland.
Brownfield	In town planning, Brownfield land is an area of land previously used or built upon or land that is or was occupied by a permanent structure, which has become vacant, underused or derelict and has the potential for development.
Building / Structure of Architectural Merit	A building or Structure which has no legal protection that is, in the opinion of the authors of the EIS, to be of architectural merit and therefore included in the study. N.B. Please see criteria for their inclusion in the archaeological chapters of this EIS.
Census of Ireland	A census of the population of the whole of Ireland, occurring every four years between 1821 and 2006.
Central median	Parcel of land between two carriageways.
Civil Survey letters	A detailed survey of landuse and land ownership in Ireland undertaken by the English Government in 1641.
Conservation Area	An area where the architectural design and scale of these areas is of sufficient importance to require special care in dealing with development proposals and works by the private and public sector alike.
Construction compounds	Site where construction equipment is to be stored and construction operation is to be managed from.
Construction phase	The period of time over which the scheme will be constructed.
Contamination	The act of contaminating or polluting; including (either intentionally or accidentally) unwanted substances or factors.
Culvert	A channel or conduit for passing water under a road or embankment.
Cumulative effects	The effect on the environment which results from the incremental impact of an action when added to other past, present or reasonably foreseeable actions regardless of what agency or person undertakes such actions.
Cumulative impacts	Impacts that occur as a result of the addition of the incremental impact of an action to other past, present or reasonably foreseeable actions.
Cut and cover techniques	The method of constructing tunnels.
Cut and cover tunnel	A tunnel that is excavated from the 'top down' (i.e. from the surface) and then covered over to reinstated the surface.
Demography	The study of the size, growth, and age and geographical distribution of human populations, and births, deaths, marriages, and migrations.
Dewatering	The removal of water.
Direct effects	The effects that will occur as a direct result of the project.
Do-minimum scenario	The scenario that would exist in the future if the project were not to go ahead.
Dublin Transportation Office (DTO)	Statutory agency which provides transport and landuse advice to organisations operating in the Greater Dublin Area.

Term	Definition
Eastern Regional Fishing Board (ERFB)	The statutory body responsible for maintaining and improving environmental quality and developing and protecting the fisheries resource in the eastern region of Ireland.
Ecosystem	A community of different plant and animal species interacting with one another and with their non-living environment.
EIA regulations	Collective name for the various statutory instruments through which the EC Council Directive on Environmental Assessment (Directive 85/337/EC as amended by Directive 97/11/EC) was implemented in Ireland.
Electoral Divisions (EDs)	The smallest administrative area for which population statistics are published.
Elevated section	A section of the scheme that is raised off the surface i.e. viaduct.
Environmental Impact Assessment (EIA)	<p>The systematic, reproducible and interdisciplinary identification, prediction and evaluation, mitigation and management of impacts from a proposed development and its reasonable alternatives.</p> <p>The process of examining the environmental effects of the proposed scheme development – from consideration of environmental aspects at design stage through to preparation of an Environmental Impact Statement, evaluation of the EIS by the competent authority and the subsequent decision as to whether the development should be permitted to proceed, also encompassing public response to that decision.</p>
Environmental Impact Statement (EIS)	A statement of the effects, if any, which proposed development, if carried out, would have on the environment. This document presents the findings of the EIA to the decision-makers and the public.
Environmental Protection Agency (EPA)	Ireland's statutory body for the balanced and sustainable protection and management of the environment.
EPA Q-value	An Environmental Protection Agency classification concerning the biological status of a watercourse.
European Union (EU)	The economic and political union established in 1993 after the ratification of the Maastricht Treaty by members of the European Community, which forms its core.
Fáilte Ireland	Established under the National Tourism Development Authority Act, 2003, it provides strategic and practical support to develop and sustain Ireland as a high - quality and competitive tourist destination.
Fauna	All of the living animals.
Flora	All of the plants.
Functional Value	A term used to express the combined consideration of importance, sensitivity and existing adverse effects.
Geological Survey Ireland (GSI)	Founded in 1845 it is responsible for providing geological advice and information, and for the acquisition of data for this purpose.
Geotechnical investigation	Investigations performed by geotechnical engineers or engineering geologists to obtain information on the physical properties of soil and rock around a site to design earthworks tunnels, underground structures and foundations for the proposed scheme and for repair of distress to earthworks and structures caused by subsurface conditions.
Greater Dublin Area	The Greater Dublin Area comprises the Dublin and Mid-East Regions. The constituent counties are: Dublin County Borough and the Counties of Dun Laoghaire-Rathdown, Fingal, and South Dublin (Dublin Region) together with the counties of Kildare, Meath and Wicklow (Mid-East Region).
Greenbelt	A policy or landuse designation used in landuse planning to retain areas of largely undeveloped, wild, or agricultural land surrounding or neighbouring urban areas.

Term	Definition
Greenfield	Clean, undeveloped land.
Greenhouse gases	Components of the atmosphere that contribute to the greenhouse effect. Greenhouse gases include water vapour, carbon dioxide, methane, nitrous oxide, and ozone. The majority of greenhouse gases come mostly from natural sources but are also contributed to by human activity.
Groundborne noise	Sound that passes through the ground and is audible at the surface.
Groundwater	Groundwater is the water beneath the surface that can be collected with wells, tunnels, or drainage galleries, or that flows naturally to the earth's surface via seeps or springs. Groundwater is the water that is pumped by wells and flows out through springs.
Groundwater flow	Movement of water beneath the ground surface facilitated by the types of subsurface materials, faulting and bedding, the slope and hydrological characteristics of the materials and the amount and location of water.
Habitat	The physical and living environment in which an organism or community of organisms live.
Hayes's Indices	A catalogue of all the articles, poems and reviews (apart from short notices) in the periodicals published in Ireland, which contain material likely to be of value for research whatever the intellectual or cultural activity.
Hydrocarbon pollution	The contamination of an environment with substances consisting only of carbon and hydrogen atoms.
Hydrological impacts	The effect on the water systems, river, lakes, groundwater, etc.
Impacted receptors	Those who are likely to experience a change in their environment as a result of the scheme.
Indirect effects	Effects that occur due to the project indirectly.
Indirect impact	Impacts on the environment which are not a direct result of the project, often produced away from the project or as a result of a complex pathway.
In-stream impacts	Impacts which occur within a watercourse.
Irish Rail Interconnector	A connection with a proposed 5.2 km underground line, connecting the Docklands and Hueston Station.
Landuse	The use or activities which occur within particular areas
Launch sites	The locations from which the tunnel boring machines are to be launched.
Light rail	Rail transport systems used to convey light or rapid speeds.
Linear scheme	A scheme that is linear in spatial design.
Long-term effects	Effects that will persist long into the future.
Luas	Dublin's light rail transport system.
M50	A C-shaped orbital motorway transport route around Dublin.
Magnitude of Impacts	Takes into account the quality, type and range of impact that will occur as well as the duration over which the impact will occur.
Medium-term effects	Effects that will persist for some time into the future, but will not be permanent.
Mining techniques	The methods used to extract soil from the ground.
Mitigation	The purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment.
Mitigation measures	Measures taken to avoid, reduce and, if possible, remedy significant adverse effects.

Term	Definition
Modal share	The proportion of population that uses each mode of transport for their routine journeys.
Modal shift	The decision by people to discontinue using one particular mode of transport and to move to another for their routine journeys.
Monitoring	The repetitive and continues observation measurement and evaluation of environmental data to follow changes over a period of time, also used to assess the efficiency of control measures. Monitoring is the regular observation and recording of activities taking place in a project or programme. It is a process of routinely gathering information on all aspects of the project.
National Heritage Area (NHA)	An area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection.
National Monument	Section 2 of the National Monuments 1930 Act provides that 'national monument' 'means a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic, or archaeological interest attaching thereto....., and the said expression shall be construed as including, in addition to the monument itself, the site of the monument and the means of access thereto and also such portion of land adjoining such site as may be required to fence, cover in, or otherwise preserve from injury the monument or to preserve the amenities thereof'.
National Roads Authority (NRA)	Ireland's statutory body for securing the provision of a safe and efficient network of national roads.
Negative effect	A result of the project that has made the situation worse than before.
Negative impact	A change that reduces the quality of the environment.
Non-statutory bodies	Organisations not established at the behest of Government.
Non-technical summary	Information for the non-specialist reader to enable them to understand the main environmental impacts of the proposal without reference to the main environmental impact statement.
NO _x	Nitrogen Oxides.
Open Space	Includes all areas of public realm, parks and squares, as well as incidental areas of open spaces peripheral to development and open space specific to residential development.
Operational phase	The period of time over which the proposed scheme will be in operation.
Overhead cantenary system (OCS)	The system through which power is supplied to Metro.
Park & Ride sites	Facilities at public transport stops that allow commuters to leave their personal vehicles in a car park and transfer to a bus, rail system (rapid transit, light rail or commuter rail) or carpool for the rest of their trip.
Permanent effects	Effects that are non-reversible and will persist indefinitely.
pH Index	A measure of the acidity or alkalinity of a solution. The pH scale commonly in use ranges from 0 to 14.
Phase 1 Habitat Survey	Standard ecological field survey methodology to identify, record and map the key habitats and species, in line with the Heritage Council's 2000 Guidelines. Recognised methodology used for collating information on the habitat structure of a particular site.
Positive impact	A result of the project that has made the situation better than before.
Proposed National Heritage Area (pNHA)	An area that is potentially considered important for the habitats present or which holds species of plants and animals whose habitat needs protection.
Proposed scheme	The Metro North development proposals subject to the Railway Order.

Term	Definition
Public realm	The space between and within buildings that are publicly accessible, including streets, squares, forecourts, parks and open spaces.
Public Utilities	Water supply, drainage, gas, electricity, telecommunications systems as controlled operated and maintained by statutory bodies such as local authorities, Bord Gais etc.
R132	A relatively new regional road that passes through Balbriggan and Swords and terminates at a junction with the N1 in Whitehall.
Railway infrastructure	Any land, buildings, structures, equipment, systems, vehicles, services or other thing used in connection with, or necessary or incidental to, the movement of passengers or freight by railway.
Railway Order	The authorisation given by An Bord Pleanála for a railway project to commence construction.
Railway Procurement Agency (RPA)	The independent statutory body responsible for securing the provision of, or provide, such light railway and metro infrastructure as may be determined from time to time by the Minister for Transport.
RAPID (Revitalising Areas by Planning, Investment and Development)	An initiative that is led by the Department of Community, Rural and Gaeltacht Affairs to focus investment into the most concentrated areas of disadvantage in the country.
Receiving environment	The extent of the existing environment within which the project is to be developed and any area that may be impacted upon as a result of the project.
Receptor	Any element in the environment which is subject to impacts.
Records of Monuments and Places (RMP)	A database of all archaeological monuments in the state compiled by the Archaeological Survey of Ireland.
Register of Historic Monuments (RHM)	The name, location and a brief description of all the historic monuments and archaeological areas in State compiled by the National Monuments Service of the Department of the Environment, Heritage and Local Government.
Residual impact	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Retained cut	A cutting that is excavated but is not covered over after, generally the sections of the alignment where the proposed scheme descends to and rises e.g. from underground tunnels.
Risk	The likelihood of a specific effect occurring within a specified period or in specified circumstances.
Route option	Prior to decision on the route of the proposed scheme there were various route options that were considered.
Royal Historical Society Bibliography	An authoritative guide to what has been written about British and Irish history from the Roman period to the present day. The Bibliography is hosted by the Institute of Historical Research, which is part of the University of London.
Severance	The separation/reduction in separation of population from facilities and services they use within their communities.
Scope	The spatial and temporal extent which the environmental impact assessment is to be evaluated over.
Scoping	The process of identifying the issues to be addressed by an EIA. It is a method of ensuring that an EIA focuses on the important issues and avoids those that are considered to be less significant.
Scoping stage	The stage of the EIA at which the scope is decided upon.
Secondary effects	The potential effects of additional changes that are likely to occur later in time or at a different place as a result of the implementation of a particular action.

Term	Definition
Sensitive receptors	Those who are likely to experience a change in their environment as a result of the construction of Metro due to their own nature.
Short-term effects	Effects that are only short lasting.
Significant impact	An impact which, by its character, magnitude, duration of intensity alters a sensitive aspect of the environment
Sites and Monuments Record (SMR)	Lists with accompanying maps and files of all certain or possible archaeological sites and monuments mainly dating to before 1700AD for all counties.
Soundscape	Any acoustic environment, whether it springs from natural urban or rural sources.
Source Protection Zones (SPZs)	The Environment Protection Agency identifies Source Protection Zones to protect groundwater (especially public water supply) from developments that may damage its quality.
Special Area of Conservation (SAC)	Sites included in Annex I and II of the EC Habitats Directive (92/43/EEC) due to them being considered to be of European interest following criteria given in the directive.
Special Protection Area (SPA)	Sites designated under the European Union directive on the Conservation of Wild Birds (79/409/CEE) to protect important bird species.
Species migration	The movement of species between habitats.
Spoil	The earth excavated during tunnelling and other construction works.
Stakeholders	Those who may be potentially affected by a proposal (e.g. local people, the proponent, Government agencies, NGOs, donors and others).
Statutory bodies	Organisations established at the behest of Government.
Stenotopic species	Species tolerant of only a narrow range of environmental factors.
Stop	Points at which passengers will be able to embark and disembark the proposed scheme.
Stop access points	The points via which the stops can be accessed.
Study Area	This study area encompasses all areas that may potentially be impacted upon by the proposed scheme.
Swords QBC	Bus service linking Swords with Dublin airport and Dublin city.
Temporary effects	Effects that will last for only a certain amount of time.
Temporary impact	Impacts that will last for only a certain amount of time.
Townscape	The urban landscape.
Track gauge	The distance between the two rails.
Traffic assessment	Consists of the collection of data, traffic census and the analysis of this data in order to make traffic flow predictions.
Traffic flow	The number of vehicles travelling along a particular route in a particular direction over a period of time.
Traffic impact model	A model, constructed from data that enables the determination of transportation demands of development proposals and provides for reduction of adverse impacts on the transportation system.
Transport 21	The capital investment framework through which the transport system in Ireland will be developed, over the period 2006 to 2015.
Tunnel Boring Machine (TBM)	The machine used to excavate earth and create the underground tunnels through which the proposed scheme will run.
Tunnel sections	Various lengths of the tunnel.
Twin tunnels	Two tunnels constructed side by side, but not connected other than by occasional cross-over passages.

Term	Definition
Urban Heat Island (UHI)	A microclimatic effect that is experienced in urban areas.
Utilities	Services provided such as water, gas, electricity and telecommunications.
Ventilation shaft	A construction which facilitates the movement of air in and out of the tunnel sections.
Verge	A small parcel of land of incidental use.
Vertical alignment	The positioning of the proposed scheme tracks relative to the ground surface.
Visual amenity	The value of views to a receptor in a particular area
Visual receptors	Those who are likely to experience a change in view.
Wildlife Corridors	A strip of habitat connecting wildlife populations separated by human activities.

